

Souvenir & Abstracts

3rd National Youth Convention

on

Transforming Agriculture For Agripreneurship
& Employment Opportunities:
The Youth Perspective

February 23th-24th, 2018 at
Assam Agricultural University - Jorhat, Assam 785013

Jointly Organized by



All India Agricultural
Students Association
New Delhi



Indian Council of
Agricultural Research
New Delhi



Assam Agricultural
University Jorhat,
Assam

Supported by



Co-sponsored by

MONSANTO



© All India Agricultural Students Association,

Address

All India Agricultural Students Association

A/G-4, NASC Complex

Pusa New Delhi – 110012, India

E-mail: nationalpresident@aiasa.org.in; chiefcoordinator@aiasa.org.in

Website: www.aiasa.org.in

Editorial team

Kuleshwar Prasad Sahu

Milan Kumar Lal

Sonica Priyadarshini

Ashok Kumar

Dr. Sahadeva Singh

Dr. Rana Pratap Bhuyan

Mr. Syed Wasifur Rahman

Sandeep Adavi

Dr. P. Adhiguru

Dr. M. K. Verma

Dr. M. C. Yadav

Piyush Vagadia

Bhargavi H. A.

Dhruv Bhailal Kapadiya

Neelesh Srivastava

Opinions in this publication are of authors and not necessarily of the organizers

Citation: Sahu, K.P., Lal, M. K., Priyadarshini, S., Kumar, A., Singh, S., Bhuyan R. P., Rahman, S. W., Adavi, S., Adhiguru, P., Verma, M. K., Yadav, M. C., Vagadia, P., Bhargavi, H.A., Kapadiya, D. B. and Srivastava, N. (Eds.). 2018: National Youth Convention on Transforming Agriculture for Agripreneurship & Employment Opportunities: The Youth Perspective: Souvenir & Abstract, Published by the All India Agricultural Students Association A/G-4, NASC Complex, Pusa New Delhi – 110012, India

Published by

All India Agricultural Students Association

A/G-4, NASC Complex

Pusa New Delhi – 110012, India

E-mail: nationalpresident@aiasa.org.in; chiefcoordinator@aiasa.org.in

Website: www.aiasa.org.in

*Printed By : G.C. Enterprises, Naveen Shahdara, Delhi-110032 I
Email : kumar.drr1995@gmail.com Mob. : 8587859553*

-: Contents :-

<i>Messages</i>	V
<i>Preface</i>	XVIII
<i>AIASA Cabinet 2017</i>	XX
<i>Committees</i>	XXI
<i>Programme</i>	XXVII

Lead,full length papers and abstracts

Themes

1. Strategies for empowering youth in agriculture for their involvement in establishing agribusiness ventures and services	1
2. Institutional strengthening for high quality innovative research projects and quality education in agriculture	37
3. Attracting Investments in capacity building & Skills for youth in Agriculture	67
4. ICT, Innovations & Startup Platforms	87
5. Transforming Agriculture(quality production, remunerative agriculture, eNAM, cooperative marketing)	124
6. Creation of Green Jobs in Agriculture Sector - Right Person At Right Place	141

Activities of AIASA at different Universities

Advertisement

राधा मोहन सिंह
RADHA MOHAN SINGH

D.O. No. 489/AM



सत्यमेव जयते

कृषि एवं किसान कल्याण मंत्री
भारत सरकार
MINISTER OF AGRICULTURE
& FARMERS WELFARE
GOVERNMENT OF INDIA
07 FEB 2018

Message

I am delighted to know that Assam Agricultural University-Jorhat, Assam; All India Agricultural Students Association (AIASA) and Indian Council of Agricultural Research is jointly organizing 3rd National Youth Convention on **“Transforming Agriculture For Agripreneurship & Employment Opportunities: The Youth Perspective”** on 23rd-24th February 2018 at AAU Campus Jorhat (Assam).

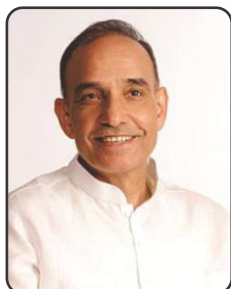
It is gratifying that the thrust of the convention is innovation-driven youth-led agricultural transformation to strengthen the vast but dwindling agrarian welfare and economy - the road to the national prosperity. It is a unique convention as it discusses various issues for making Agriculture economically remunerative and intellectually stimulating profession so that the youth is attracted to it and contributes towards the food, nutritional, and livelihood security of the nation. I am confident that the convention will develop proper road map to transform the agriculture of 21st century for agripreneurship and employment opportunities. The recommendations of the convention are expected to be helpful in devising suitable policies for the employment generation for rural youth which will collectively contribute for the national food security.

I wish the convention a great success.


(Radha Mohan Singh)

Office : Room No. 120, Krishi Bhawan, New Delhi-110 001 Tel.: 23383370, 23782691 Fax : 23384129

डॉ. सत्य पाल सिंह
Dr. Satya Pal Singh



मानव संसाधन विकास, और
जल संसाधन, नदी
विकास एवं गंगा संरक्षण राज्य मंत्री
भारत सरकार
MINISTER OF STATE FOR
HUMAN RESOURCE DEVELOPMENT;
AND WATER RESOURCES,
RIVER DEVELOPMENT AND
GANGA REJUVENATION
GOVERNMENT OF INDIA

Dated: 13.02.2018

Message

India is the land of farming where more than 55% population is directly dependent on it for their employment. Indian agriculture has travelled a long journey from a nation earlier known as begging bowl to a nation with food for all policy. The role of Agricultural research and education on making India a food secured nation cannot be neglected. It was only because of the continuous efforts of our scientists and farmers that each of us are now accessible to food for three times of every day. We have developed a large pool of human resources involved in agricultural research, education and extension. We should try to motivate, protect and encourage these budding agricultural scientists and research scholars, budding with ideas with nation building.

I am very happy to learn that the Assam Agricultural University Jorhat, Assam; All India Agricultural Students Association (AIASA) and Indian Council of Agricultural Research is jointly organizing 3rd National Youth Convention on “**Transforming Agriculture For Agripreneurship & Employment Opportunities: The Youth Perspective**” on 23rd-24th February 2018 at AAU Campus Jorhat (Assam).

I am sure that the members of all three institutions will work hard to maintain the standards. I wish the Organizers, editorial team and the participants a grand success.

(Dr. Satya Pal Singh)

Sarbananda Sonowal



**Chief Minister, Assam
Guwahati**



Dispur

February 15, 2018

MESSAGE

I am delighted to know that Assam Agricultural University, Jorhat is organizing the 3rd National Agricultural Youth Convention on “Transforming Agriculture For Agripreneurship & Employment Opportunities: The Youth Perspective” on 23rd – 24th February, 2018 at AAU Campus, Jorhat in collaboration with All India Agricultural Students Association (AIASA) and Indian Council of Agricultural Research. A souvenir is also being published to mark the occasion.

For an agrarian economy like India, growth of agriculture holds the key to all round progress of the nation. It is imperative that the youth is attracted to this profession so that they could contribute towards the food, nutritional and livelihood security of the country. I am confident that the Convention will be helpful in developing proper roadmap to transform the agriculture sector and drafting suitable policies for employment generation as well.

I convey my best wishes for all success of the Convention.

(SARBANANDA SONOWAL)

ATUL BORA

Minister
Agriculture, Horticulture & Food Processing
Animal Husbandry & Veterinary, UDD and T&CP
Government of Assam



M E S S A G E

I am very happy to know that All India Agricultural Students' Association (AIASA), New Delhi has been focusing on mobilizing the youth to transform agriculture in India since last 3 years and that they are meeting at Jorhat, Assam from 23 – 24th February, 2018 to discuss the issue of "Transforming Agriculture for Agripreneurship & Employment Opportunities : The Youth Perspective".

A constructive leadership is very important for any nation and I feel very proud to see the younger generation taking lead on the matters of advancement of agriculture to facilitate advancement of India. We need a lot of innovations in entrepreneurship development and better institutional linkages with the relevant industry for the betterment of agriculture and farming community.

I appreciate the efforts of ICAR for jointly organizing the convention with AIASA and AAU, Jorhat. I look forward to this convention aimed at deliberating the issues of Agripreneurship and employment generation in the field of agriculture so that more and more youth come forward to adopt agriculture as a profession to make the nation sustainably food secure for its march towards a developed nation.

I wish a great success to the convention and congratulate to the new cabinet of AIASA for the year 2018.

Date : 12th February, 2018


(ATUL BORA)



त्रिलोचन महापात्र, पीएच.डी.

एफ एन ए, एफ एन ए एस सी, एफ एन ए ए एस

सचिव एवं महानिदेशक

TRILOCHAN MOHAPATRA, Ph.D.

FNA, FNAsc, FNAAS

SECRETARY & DIRECTOR GENERAL



भारत सरकार
कृषि अनुसंधान और शिक्षा विभाग एवं
भारतीय कृषि अनुसंधान परिषद
कृषि एवं किसान कल्याण मंत्रालय, कृषि भवन, नई दिल्ली 110 001

GOVERNMENT OF INDIA
DEPARTMENT OF AGRICULTURAL RESEARCH & EDUCATION
AND

INDIAN COUNCIL OF AGRICULTURAL RESEARCH
MINISTRY OF AGRICULTURE AND FARMERS WELFARE
KRISHI BHAVAN, NEW DELHI 110 001

Tel.: 23382629; 23386711 Fax: 91-11-23384773

E-mail: dg.icar@nic.in

MESSAGE

It is a matter of great pleasure that the 3rd National Youth Convention on “**Transforming Agriculture for Agripreneurship & Employment Opportunities: The Youth Perspective**” is being jointly organized by Assam Agricultural University, Jorhat, Assam; All India Agricultural Students Association (AIASA) and Indian Council of Agricultural Research on 23-24 February, 2018 at AAU Campus, Jorhat, Assam.

The agriculture in the 21st century will not only be for subsistence. Due to changed rural dynamics and aspirations of young generations, this sector needs immediate attention to make agriculture a remunerative enterprise. Growing population of India demands increase in both production and productivity. Challenges of market have to be addressed adequately and more employment needs to be generated in this sector to attract and retain the youth in Agriculture.

India is the land of youth having world’s largest youth population, which is the biggest asset of the country. The Government of India has taken several initiative like ARYA, Students READY etc. to reform the agriculture sector for the welfare of rural youths and farmers at large. I look forward to this convention for constructive and in depth deliberations on the issue of employment generation in the field of agriculture, which would provide innovative ideas to enhance opportunities for young generation to acquire Agripreneurship for the development of Indian agriculture.

I congratulate and extend my warm wishes to the organizers for success of this event.


(T. MOHAPATRA)

Dated the 5th February, 2018
New Delhi



कृषि वैज्ञानिक चयन मंडल
(भारतीय कृषि अनुसंधान परिषद)
कृषि अनुसंधान भवन-1, पूसा, नई दिल्ली 110 012

AGRICULTURAL SCIENTISTS RECRUITMENT BOARD
(INDIAN COUNCIL OF AGRICULTURAL RESEARCH)
Krishi Anusandhan Bhavan I, Pusa, New Delhi 110 012



प्रो. (डॉ.) ए.के. श्रीवास्तव
अध्यक्ष

Prof. (Dr.) A.K. Srivastava
Chairman

सन्दर्भ सं/Ref. No. PPS/CHAIRMAN/2018

दिनांक/Dated 30.01.2018

MESSAGE



Agriculture, being the primary sector of Indian economy, is also the source of employment for more than 50% of the population. Agriculture must not be seen only as a profession, but it is more of personal commitment and dedication to serve the human community by eliminating hunger, malnutrition, and poverty. A sustainable food and agricultural system is a collaborative network that integrates several components in order to enhance a community's environmental, economic, and social well-being. It is built on principles of ecological, social, and economic values of a community and region. Further, in India traditionally mixed farming system provides suitable way for managing the farmers income, if one component fail. And the potential of animal husbandry has not been fully tapped in most of the regions of the country.

It is a matter of great pleasure to know that Assam Agricultural University-Jorhat, Assam; All India Agricultural Students Association (AIASA) and Indian Council of Agricultural Research are jointly organizing 3rd National Youth Convention on "Transforming Agriculture for Agripreneurship & Employment Opportunities: the Youth Perspective" on 23rd-24th February 2018 at AAU Campus Jorhat (Assam).

I am sure the deliberation at the conference is expected to contribute towards chalking out a definite road map for Agriculture Reforms in the country to attain nutritional security and livelihood sustainability.

I congratulate and extend my good wishes for organizing the convention successfully.

(A.K. Srivastava)

दूरभाष/Tel: 011-25843295 (O)
011-25842536
011-25841272



Healthy Soils for Healthy Life

फैक्स/Fax : 011-25846540
Email : chairman@asrb.org.in
aksrivastava.asrb@gmail.com



भारतीय कृषि अनुसंधान परिषद
कृषि अनुसंधान भवन-II, पूसा, नई दिल्ली 110 012
INDIAN COUNCIL OF AGRICULTURAL RESEARCH
KRISHI ANUSANDHAN BHAVAN-II, PUSA, NEW DELHI 110 012

डा. नरेन्द्र सिंह राठौड़

उप महानिदेशक (कृषि शिक्षा)

Dr. Narendra Singh Rathore

Deputy Director General (Agril. Edn.)

Phone : 011-25841760 (O)
Fax : 011-25843932
E-mail : ddgedn@gmail.com
nsrdsr@gmail.com
Website: www.icar.org.in



Dated – 30 January 2018

MESSAGE

I am very happy to know that Assam Agricultural University-Jorhat, Assam, All India Agricultural Students Association (AIASA) and Indian Council of Agricultural Research are jointly organizing 3rd National Youth Convention on “**Transforming Agriculture For Agripreneurship & Employment Opportunities: The Youth Perspective**” during 23rd-24th February 2018 at AAU Campus Jorhat (Assam).

I congratulate the AIASA, ICAR and AAU- Jorhat for organizing such Convention which encourages the agricultural professionals to explore the new areas like Agripreneurship for betterment of agricultural fraternity. I am sure the Convention will be an incentive for the participants from various levels and the souvenir brought out on this occasion will be useful and informative for all.

I convey my best wishes for successful conduct of the Conference and publication of Souvenir on this occasion.


(N.S.Rathore)



डॉ. अशोक कुमार सिंह
उप महानिदेशक (कृषि प्रसार)

Dr. A.K. Singh
Deputy Director General
(Agricultural Extension)

भारतीय कृषि अनुसंधान परिषद
कृषि अनुसंधान भवन-1, पूसा, नई दिल्ली 110 012
INDIAN COUNCIL OF AGRICULTURAL RESEARCH
KRISHI ANUSANDHAN BHAVAN-I, PUSA, NEW DELHI - 110 012
Ph. : 91-11-25843277 (O), Fax : 91-11-25842968
E-mail: ddgextension@gmail.com; aksicar@gmail.com



Message

I am glad to mention that the 3rd National Youth Convention on “**Transforming Agriculture For Agripreneurship & Employment Opportunities: The Youth Perspective**” is being jointly organized by Assam Agricultural University-Jorhat, Assam; All India Agricultural Students Association (AIASA) and Indian Council of Agricultural Research on 23rd-24th February 2018 at AAU Campus Jorhat (Assam).

It is timely that the convention will deliberate upon various opportunities for attracting the Indian youth in agriculture. Further, the outcome of deliberation would facilitate capacity building and establishment of agripreneurship in agriculture and allied sectors.

I wish the convention a great success and congratulate to the new cabinet of AIASA for the year 2018.

Dated 31.01.2018

(A.K.Singh)

Prof. R.B. Singh

Chancellor, Central Agricultural University, Imphal
Past President, National Academy of Agricultural Sciences
New Delhi




Message

A sustainable food system is a collaborative network that integrates several components in order to enhance a community's environmental, economic and social well-being. It is built on principles that further the ecological, social and economic values of a community and region. Agriculture, being the primary sector of Indian economy, is also the source of employment for the more than 55% of population. Agriculture is not a profession in real sense; it is personal commitment and dedication to serve the human community by eliminating hunger, malnutrition and poverty from this planet. It is an absolute form of service which touches the stomach and soul of every individual of the society.

I am very happy to learn that the All India Agricultural Students Association (AIASA); Assam Agricultural University, Jorhat, Assam; and Indian Council of Agricultural Research are jointly organizing the 3rd National Youth Convention on “**Transforming Agriculture For Agripreneurship & Employment Opportunities: The Youth Perspective**” on 23rd-24th February 2018 at AAU Campus Jorhat (Assam).

It is a unique Convention in which various issues for making Agricultural profession so remunerative that youth are attracted to it and will contribute towards the food, nutrition, and employment security of the nation. India has the largest youth power in the world, and to harness this demographic dividend, our each agriculture graduate must become a job creator rather than a job seeker. I am sure that the Convention will prepare a road map to achieve food and nutritional security leading to nation's prosperity. The recommendations of the Convention will definitely be helpful in devising suitable policies for the welfare of the farmers and agricultural professionals towards building a New India.

I wish the Convention a great success.


R. B. Singh



IAUA

INDIAN AGRICULTURAL UNIVERSITIES ASSOCIATION

In

GOLDEN JUBILEE YEAR (2017-18)

Executive Committee

- *President*
Dr N.C. Patel
Vice Chancellor
AAU, Anand
- *Vice-President*
Dr A.R. Pathak
Vice Chancellor
JAU, Junagadh
- *Secretary-General*
Dr B.S. Dhillon
Vice Chancellor
PAU, Ludhiana
- *Treasurer*
Dr S.K. Patil
Vice Chancellor
IGKV, Raipur
- *Member*
Dr K. Ramasamy
Vice Chancellor
TNAU, Coimbatore
- *Member*
Dr B. Venkateswarlu
Vice Chancellor
VNMKV, Parbhani
- *Member*
Dr
Vice Chancellor

Dr. R.P. Singh
Executive Secretary

I G-2, C.G.I.A.R
National Agricultural Sciences Complex
(N.A.S.C), Dev Prakash Shastri Marg,
Pusa Campus, New Delhi-110012

MESSAGE

India is the land of Agriculture where more than 65% population is directly/ indirectly dependent on it for their livelihood. Indian agriculture has undergone complete transformation post independence and thereafter dramatically during Green Revolution. We have witnessed tremendous changes the way agriculture being practiced during the past few decades.

Establishment of more than 70 SAU's and more than 100 ICAR research institutes across the country is the testimony of commitment of successive governments to National Agriculture Research and Education Systems. For this purpose it was necessary to develop a large pool of human resource and infrastructure involved in agricultural research, education and extension. At this juncture we have to motivate, protect and encourage these budding agricultural scientists and research scholars, for the nation building, a big challenge at the present day.

I am very happy to know that the Assam Agricultural University Jorhat, Assam; All India Agricultural Students Association (AIASA) and Indian Council of Agricultural Research is jointly organizing 3rd National Youth Convention on "**Transforming Agriculture For Agripreneurship & Employment Opportunities: The Youth Perspective**" on 23rd-24th February 2018 at AAU Campus Jorhat (Assam).

It is a unique convention being organized by AAU- Assam, AIASA and ICAR in which various issues for making Agricultural profession so remunerative that youth are attracted to this profession and will contribute towards the food and nutritional security of the nation. The deliberations at the convention are expected to contribute for policy directions which are expected to help for making proper road map to create assured food and nutritional security, leading to nation's prosperity. Further, such policy dimension will facilitate giving momentum to startups and Agripreneurship in the field of value addition and food processing sector.

I wish the convention a grand success.



(Dr. R.P. Singh)
Executive Secretary

(O) 91-011-25842422 (R) 91-011-25834154 (Mob.) 09811930811 (Fax) 91-011-25842422

E-mail: drsinghrp@rediff.com;
Letter head of Executive Secretary, IAUA



Jorhat, 785013
Assam India

Dr. K.M. Bujarbaruah
Vice Chancellor
Assam Agricultural University

Message

I am indeed very happy for getting an opportunity to host the 3rd National Youth Convention with an associated Seminar on “**Transforming Agriculture for Agripreneurship & Employment Opportunities: The Youth Perspective**”. It is also a pleasure to know that the new AIASA Cabinet 2018 is being formed in this Convention itself.

Relatively less interest of the 10+2 students to pursue agricultural education has become a matter of concern nationally which is why ICAR came up with a focused programme called ARYA to attract and retain the youths in Agriculture. At this point of time when we are all trying to attract students to agricultural streams, formation of AIASA 5 years back was a most welcome step particularly to spread the importance, relevance and the necessity to continually evolve agricultural vulnerability matching technologies through an empowered human resources with needed level of skill, intelligence and knowledge. Since its inception, AIASA has crossed the adolescence period successfully due mainly to advice and guidance it received from the seniors in the profession. And because of its walk towards maturity, the expectations of the Agricultural fraternity from AIASA has also become doubled. The maturity of AIASA could be judged from the topic they have chosen in their 3rd convention and I am sure the output from this deliberation would help us to shape/re-shape our agricultural education, research, extension agenda.

I wish the participants a good stay in our campus, have meaningful interactive dialogue with the partners and carry back rejuvenated ideas and work plan to pursue in the coming years.

(K. M. Bujarbaruah)



ASSAM AGRICULTURAL UNIVERSITY

JORHAT - 785 013

ASSAM (INDIA)

Dr. R.P. Bhuyan

Professor
Faculty of Agriculture

Date 12.02.2018



MESSAGE

It is indeed a great opportunity for Assam Agricultural University to host the 3rd National Youth Convention entitled "Transformation in Agriculture & Agripreneurship Development for Sustainable Employment Generation: the Youth Perspective" in collaboration with All India Agricultural Students Association (AIASA) and the Indian Council of Agricultural Research (ICAR), during February 23-24, 2018.

Stake holders in agriculture- policy makers, scientists, professionals and youth from all over the country are slated to congregate here for the event, which augurs well for the agrarian sector. It is expected that the deliberations and interactions among the participants will open up a new vista, in the sphere of research as well as in meaningful and gainful employment of students pursuing agriculture sciences.

It really is an honor for me to have been given the responsibility of National Organizing Secretary of NYC-2018 and I am thankful to AIASA, ICAR, the National Advisory Committee, the National Steering Committee and the National Organizing Committee for the same. I hope that the participants have a significant, pleasant and memorable time in the Jorhat campus of Assam Agricultural University.

Jai Hind

(Rana Pratap Bhuyan)

Professor & National Organizing Secretary (NYC-2018)

Department of Tea Husbandry & Technology

Assam Agricultural University

Jorhat 785 013

E-mail: ranabhuyan.aau@gmail.com Contact No.: 08135914736/09435051728



Syed Wasifur Rahman
Vice President (NE Zone) &
Local Organizing Secretary
3rd National Youth Convention
All India Agricultural Students Association



All India Agricultural Students Association

MESSAGE

It is my proud privilege as Vice President, North Eastern Zone of AIASA, and the Local Organizing Secretary to host the 3rd National Youth Convention on "Transforming Agriculture for Agripreneurship & Employment Opportunities: The Youth Perspective" jointly organized by AIASA, ICAR, and Assam Agricultural University on 23rd - 24th February 2018. I am looking forward towards a fruitful 3rd National Youth Convention which would promote a strong bridge between students, scientists, professors, policy makers, farmers and stake holders.

The expectations of the Agricultural community from AIASA is very high so our responsibilities are at its peak as our association aims to establish 'Agriculture Council of India' for having proper regulatory mechanism which may also deliberate on restructuring the overall agricultural research in the country to suit the current century technology demand. I appreciate the efforts taken by the AIASA Central and State Cabinet members, ICAR, students of Assam Agricultural University supported by all the Organizing committees to make this convention a successful one.

My sincere and heartfelt thanks to all the invited guests, delegates, sponsors and participants from all over the country for making this youth convention a great success.

I wish each and every participants a very comfortable stay in Assam Agricultural University Jorhat campus, having a meaningful discussion session so that we will have a target oriented effective work plan for the upcoming year.

Syed Wasifur Rahman

(SYED WASIFUR RAHMAN)

Place: AAU, Jorhat

Date: 10 Feb 2018



Sonica Priyadarshini
National President



All India Agricultural Students Association
New Delhi

Preface

This Souvenir is being brought out on the occasion of the " 3rd National Youth Convention on Transforming Agriculture for Agripreneurship & Employment Opportunities: The Youth Perspective- 2018" is jointly organized by the, Indian Council of Agricultural Research (ICAR), Assam Agricultural University (AAU) and All India Agricultural Student's Association (AIASA) on 23rd – 24th February 2018 at Assam Agricultural University, Jorhat. Ministry of Agriculture & Farmers Welfare (GOI), Indian Council of Agricultural Research (ICAR), Assam Agricultural University (AAU) and Centurion University of Technology & Management (CUTM) financially supported this convention. The financial assistance received from Research and Development Fund of National Bank for Agriculture and Rural Development (NABARD) towards printing of the souvenir of the convention is gratefully acknowledged.

The souvenir contains articles full length papers, lead lectures and abstracts of national importance with respect to: Strategies for empowering youth in agriculture for their involvement in establishing agribusiness ventures and services, Institutional strengthening for high quality innovative research projects and quality education in agriculture, Attracting Investments in capacity building & Skills for youth in Agriculture, ICT, Innovations & Startup Platforms, Transforming Agriculture (quality production, remunerative agriculture, eNAM, cooperative marketing) and Creation of Green Jobs in Agriculture Sector with the motto of Right Person at Right Place.

The ICAR is the apex body at national level for development of agriculture in terms of research, education and dissemination of technologies at farm level. The AIASA is a professional society of present and former students in the field of Agriculture, Veterinary, Dairy, Horticulture, Fisheries, Forestry, Home science, Sericulture, ABM and other allied sciences, registered under Societies Registration act 1860. The AIASA advocates for resolving the long pending issues of creation of the All India Cadre of "Indian Agriculture Service" for appointment of right person at the right place. Grant of professional status to agriculture sector at par with other professions is also a prime aim and of time for better job opportunities and career advancement of the personnel serving the primary sector. The main mission is to empower youth in agriculture for development of

agriculture and the nation. It is essential to foster the bond between agricultural students & professionals and to raise the voice for techno-administrative agricultural reforms and advancement in agriculture by involvement of agriculturists in policy formulation and implementation. Assam Agricultural University is the first institution of its kind in the whole of North-Eastern Region of India with the main goal of this institution is to produce globally competitive human resources in farm sector and to carry out research in areas for production optimization.

India, to provide food security, employment and livelihood support in 21st century would require a very significant contribution of Techno-Administrative Agricultural support mechanism. In the present system there are crucial deficiencies with respect to the poor delivery of inputs and services for agricultural production system, e.g. defects in the framework of policy formulation, weaknesses in organization and institutional structures, procedural ineffectiveness, lack of coordination between different agencies and implementation of agricultural development programme by general bureaucrats.

In the backdrop of the addressing the above issues the AIASA has timely organized this convention. The deliberations at the convention are expected to generate crucial policy directions which are expected to help restructuring process for Techno-Administrative Agricultural Service mechanism. The publication has been made possible by the cooperation and support of the participants who readily agreed to prepare the valuable articles and took part in the deliberations. We also take this opportunity to thank all the participants, organizers, and sponsors of the convention for their advices, physical and financial support in organization of the convention.

New Delhi-12
February 13, 2018

Sonica Priyadarshini
(**Sonica Priyadarshini**)
National President, AIASA

3rd National Youth Convention
On
Transforming Agriculture for Agripreneurship and Employment Opportunities: The Youth
Perspective

23-24 February, 2018 at Assam Agricultural University-Jorhat

National Advisory Committee

- Professor(Dr.) R.B.Singh, HE Chancellor, CAU, Imphal- Chairman
- Professor(Dr.) R.P.Singh, Executive Secretary, IAU & Patron, AIASA, New Delhi- Co-Chairman
- Dr. A.K.Srivastava, Chairman, ASRB
- Dr.K.M. Bujarbaruah, Hon'ble VC, AAU-Jorhat
- Dr.A.K.Singh, DDG(Extension)-ICAR
- Dr.V.K.Bahuguna, Former DG, ICFRE
- Professor(Dr.) Balraj Singh, Hon'ble Vice Chancellor, AU-Jodhpur
- Ms. Sonica Priyadarshini, National President, AIASA
- Professor(Dr.) Ram Kumar Yadav, Professor Emeritus, CCSHAU, Hissar(Haryana)
- Dr. Manjit S. Kang, Professor Emeritus, Baton Rouge, LA & Honorary Advisor, AIASA Punjab
- Mr.Prakash Kumar Jha, Michigan State University, USA & Chairman, ICC, AIASA
- Mr. Tanay Joshi, Kenya
- Dr.Rajaram Tripathi, Chairman, CHAMF & National Convener, AIFA
- Dr.J.P.Singh, Secretary General, AIFAA
- Dr. Anil Ram Chauhan, ABLE, New Delhi
- Dr.Sahadeva Singh, Chief Policy Advisor, AIASA
- Shri. Sudhir Kumar, Senior Advisor, AIASA
- Shri.B.Hari Krishna, National President(Elect)
- Dr. Pratik Chavelikar, Chairman, NACC, Anand
- Dr.R.Vinoth, National Secretary(GC), AIASA

National Steering Committee

- Dr. A.K.Singh, DDG(Extension)-Chairman
- Dr.K.M. Bujarbaruah, Hon'ble VC, AAU-Jorhat
- Professor(Dr.) R.P.Singh, Executive Secretary, IAU
- Ms. Sonica Priyadarshini, National President, AIASA
- Dr. Rana Pratap Bhuyan, National Organizing Secretary
- Dr.J.P.Singh, Secretary General, AIFAA
- Mr.M.K.Verma, Principal Scientist(Hort) & Chairman, Editorial Board, AIASA
- Dr.Mahesh Yadav, Principal Scientist, NBPGR, New Dehi
- Dr. Sahadeva Singh, NASC Complex, New Delhi-Convener (General Coordination)
- Dr.P.Adhiguru, Principal Scientist, Div. of Extension, ICAR- Convener (KVKs)
- Mr. Ashok Kumar- Chief Coordinator, AIASA & Convener(Students)
- Mr.B.Hari Krishna, National President(Elect) AIASA
- Mr. Binod Anand, Industry Representative, New Delhi
- Mr. Kuleshwar Prasad Sahu, Chairman(NEB), AIASA

National Organizing Committee

Patron

Dr. Trilochan Mohapatra

Secretary, DARE & DG-ICAR

Chairperson

Dr.K.M. Bujarbaruah

Hon'ble VC, AAU-Jorhat

Co-Chairperson

Ms. Sonica Priyadarshini

National President, AIASA

Mr. Sudhir Kumar

Senior Advisor, AIASA

National Organizing Secretary

Dr. Rana Pratap Bhuyan

Professor Department of Tea Husbandry and Technology
Assam Agricultural University-Jorhat

Local Organizing Secretary

Mr. Syed Wasifur Rahman

Vice President (North East Zone) AIASA & PhD Scholar
Department of Biotechnology, College of Agriculture AAU Jorhat-785013(Assam),
Mob- 09864835330; Email:wasifurrahman246@gmail.com

Conveners

Dr. Sahadeva Singh,

Convenor (GC) and Chief Policy Advisor, AIASA, New Delhi-110012
Mob: 09999641545; Email: sahadeva73@yahoo.co.in

Dr. P. Adhiguru

Convenor (KVKs) and Pr. Scientist, Agricultural Extension Division, KAB-I, New Delhi
Phone: 011-25841038; Email: padhiguru@gmail.com

Ashok Kumar

Convener (Students) and Chief Coordinator, AIASA, New Delhi-110012
Mob: 08505807070; Email: chiefcoordinator@aiasa.org.in

- Dr. Mahesh Yadav, Principal Scientist, NBPGR(ICAR)-Member
- Dr. M.K.Verma, Principal Scientist(IARI), ICAR-Member
- Dr. Venkatesh Hubbali, Director, DCCD-Kochi(Kerala)-Member
- Prof.(Dr.)Vijay K. Yadav-CSAUAT-Kanpur-Member
- Dr. D.N..Singh, Former Addl. Commissioner, MOA, Member
- Professor(Dr.) Om Gupta, Dean, JNKVV-Jabalpur-Member
- Dr. S.K.Singh, Joint MD, Bhumi Sudhar Nigam, Govt of UP- Member
- Dr. Umesh Deshmukh, IGKVV-Raipur-Member
- Mr. Ranvijay Pratap Singh, Advisor, AIASA, JNKVV, MP -Member
- Mr. Rajveer Choudhary, General Secretary(AIASA), Bikaner- Member
- Mr. B. Hari Krishna, National President(Elect), AIASA, IARI- Member
- Mr. Manjunath Deshpandey, Senior Vice President, AIASA-Member
- Ms. Bhargavi, H.A, National Treasurer(Elect), AIASA-Member
- Ms. Nangsol Dolma Bhutia, National Treasurer, AIASA-Member
- Mr. Sourav Kumar Das, National Secretary(Elect) AIASA- Member
- Mr. Milan Kumar Lal, Chief PRO, AIASA-Member
- Mr. Ashirbachan Mahapatra, National General Secretary(Elect),AIASA, -Member
- Dr. R. Vinoth, National Secretary(AIASA), TNAU- Member
- Dr. Ajay Verma, CIAH, Bikaner-Member
- Mr. Kapadiya Dhruv Bhailal, Co-Chairman(NEB)AIASA, Gujarat-member
- Mr. Ankit Kumar Ghorai, Vice President(EZ), AIASA, BCKV, Kalyani, WB-Member
- Mr. Ankit Soni, Vice President(NZ), SHIATS, Allahabad-Member
- Mr. Hemkant Chandravanshi, Vice President(CZ) IGKV-Member
- Mr. Sutanu Karmakar, Vice President(WZ) AIASA, CIFE-Member
- Mr. V.Vediyappan, Vice President(SZ), AIASA, TNAU-Member
- Dr. Jayaraj M., National Secretary(NEB), Annamalai University-Member
- Mr. Neelesh Srivastava, National Secretary(NACC)-Member
- Dr. A.Palanisamy, National Secretary(NDC) & Assistant Professor, TN-Member
- Mr. Mohit Yadav, Co-Chairman(NACC)AIASA, CSAUAT-Kanpur-Member
- Mr. Ashwini Ananda, Joint Secretary(NEZ), AIASA, Nagaland-Member
- Mr. Nikhil Kumar, Joint Secretary(EZ)AIASA, BAU, Sabour-Member
- Mr. Anshuman Jena, State Advisor, AIASA Odisha, OUAT-Bhubaneshwar-Member
- Dr. Prem Prakash, State Chairman(SAEC) AIASA HP, Dr.YSPUHF-Hamirpur-Member
- Mr. Anurag Bhargawa, State President, AIASA Gujarat-Member
- Dr. Wasifur Rahman-AAU(Assam)-Local Organzing Secretary, AAU-Jorhat, Assam
- Mr. N.S.Praveen Kumar, State President, AIASA AP-Member
- Ms. Kiran Thakur, State President, AIASA HP, Dr. YSPUHF-Solan
- Mr. Amir Bashir Wani, State President, AIASA J&K, SKUAST-Kashmir-Member
- Mr. Gautamveer Chauhan, State Advisort, AIASA UP, CSAUAST-Kanpur-Member
- Mr. Shyamal Phukon, State President, AIASA Assam, AAU-Jorhat-Member
- Ms. Ashfeeka Islam, State Secretary, AIASA Assam –Member
- Mr. Boirab Gogoi, State Treasurer, AIASA Assam-Member
- Dr. Pankaj Ojha, Dr.RPCA, Bihar-Member
- Mr. Piyush Vagadia, National Secretary(NAEC) AIASA-Member
- Mr. Asish Kumar Padhy, State PRO, AIASA Punjab, PAU, Ludhiana-Member
- Mr. A. Vijayaprabhakar, State President, AIASA Tamil Nadu, TNAU-Member
- Mr. Kundan Singh, Deputy Chairman(ABM), AIASA -Member
- Dr. Vijay Kumar Kurnalliker, UASR-Member
- Mr. Binod Anand, ABLE, Industry Representative

Local Organizing Committees

SI No	Committee	Chairperson/Co- / Chairperson	Convenor/Members
1	Invitation	Chairman Convener Teacher Members Student Members	Dr. Rabishankar Saikia Dr. Mitul Saikia Dr. Sajib Barua Dr. Bina B. Gogoi Mr. Nitumoni Mahanta Mr. Abhigyan Rajkhowa Mr. Nabanil Talukdar Mr. Parag Jyoti Neog Mr. Trishanku Kashyap Mr. Sanjoy Hazarika Dr. Aditya Borah Mr. Paragmoni Deka
2	Registration	Chairman Convener Teacher Members Student Members	Dr. Mrinal Saikia Dr. Kalyan Pathak Dr. Jayanta Hazarika Dr. Ranjan Das Dr. Prabalee Sarmah Mrs. Barsha Neog Miss Bhaswati Sharma Mr. Milon Jyoti Konwar Mr. Sarat Sekhar Bora Mr. Angshuman Bordoloi Ms Sulakshana Baruah Mr. Ranjan Gogoi Mr. Kuldip Talukdar
3	Technical Sessions	Chairman Convener Teacher Member Student Members	Dr. R. N. Sarma Dr. Pranab K. Dutta Mr. Diganta K. Bora Ms. Ashfeeka Islam Mr. Udit Phukon Mr. Shankar Hemanta Gogoi Mr. Pranjal Kaman Mr. Sanju Borgohain Mr. Dibyarishee Bhattacharya Mr. Anupam Dutta Mr. Gaurav Kashyap Mr. Nipom Patowary Mr. Biswarup Bora Mr. Souvik Chakraborty

4	Transport	Chairman	Mr. Abhijit Choudhary
		Convener	Mr. Imran Hussain
		Teacher Members	Dr. Robin Boro
			Mr. Sundar Barman
			Mr. Sanjib Sharma
			Dr. Debananda Das
			Mr. Sudhangshu Bhagawati
			Mr. Dibosh Bordoloi
			Mr. Amrit Tamuly
			Mr. Rituraj Hazarika
			Mr. Sunny Gogoi
			Mr. Momin Doley
		Student Members	Mr. Partha Pratim Gogoi
			Mr. Prabal Malla Barua
			Mr. Dipankar Barahma
			Mr. Baosring Nunisa
			Mr. Dipankar Handique
			Mr. Anirban Saikia
			Mr. Sourav Barua
			Mr. Abhigyan Rajkhowa
			Mr. Tapon Senchuwa
			Mr. Arindam Deb
5	Accommodation	Chairman	Mr. Minder Teron
		Convener	Dr. Sahidur Rahman
		Teacher Members	Mr. Bhabesh Gogoi
			Dr. Purnima Das
			Dr. Kaberi Mahanta
			Mr. Kritideepan Sarma
			Ms Manisha Sarma
			Mr. Layanmoy Borthakur
			Mr. Rituraj Hazarika
			Mr. Jugabrat Sarma
			Mr. Bibek Sarma
			Mr. Momin Doley
		Student Members	Mr. Shyamal Kishore Bordoloi
			Mr. Anirban Saikia
			Mr. Partha Pratim Gogoi
			Ms. Sweety Kalita
			Mr. Chinmoy Deori
			Ms. Manisha Sharma
			Mr. Nibir Pratim Choudhury
			Mr. Kuldeep Kalita
			Mr. Parag S. Choudhury
			Dr. I. P. Sahewalla
6	Food	Chairman	Dr. Binoy Kumar Medhi
		Convener	

		Teacher Members	Dr. Akhil Ranjan Bora
		Student Members	Mr. Sudhangshu Bhagawati
			Mr. Bhoirab Gogoi
			Mr. Himangshu Mishra
			Mr. Bikash Hazarika
			Mr. Subhankar Saha
			Mr Amrit Tamuli
			Mr. Anjan Sharma
			Mr. Sanidha Sourav Buragohain
			Mr. Momin Doley
			Mr. Gauri Shankar Bordoloi
			Mr.Gourav Kashyap
			Mr. Anupam Dutta
			Mr. Deep jyoti Barman
			Mr. Sourav Baruah
7	Decoration Hall Arrangement	Chairman	Dr. Seuji Bora Neog
		Convener	Mrs. Kankana Deka
		Teacher Member	Ms Bhaswati Sharma
		Student Members	Mr. Kishore Saikia
			Mr. Sanju Borgohain
			Ms Daliva Pathak
			Ms Baishali Handique
			Mr. Parth Protim Sarmah
			Ms Satavisha Bhattacharya
			Mr. Chittradip Nath
			Ms Fahnaz Sultana
			Ms. Rabijita Buragohain
8	Felicitation	Chairman	Dr. Akashi Sarma
		Convener	Dr. Rumjhum Phukan
		Teacher Member	Mr. Manoranjan Gogoi
		Student Member	Ms. Lekhika Borgohain
			Ms. Karishma Bora
			Ms. Bandana Saikia
			Ms. Nilakshi Dutta
			Ms. Priyanka Saikia
			Ms. Murchana Malakar
			Mr. Abinash Das
9	Cultural Programme	Chairman	Dr. K.K. Sharma
		Convener	Dr. D.K. Bora
		Teacher Members	Dr. Bipul Deka
		Student Members	Miss Manisha Sarma
			Mr. Parag Jyoti Neog
			Miss Aneshwa Sharma

			Mr. Abhighyan Rajkhowa Mr. Trishangku Kashyap Ms. Sulakshana Baruah Ms. Sumedha Agarwala Mr. Pura Kozeen Dr. S. K. Chetia Dr. Sailen Gogoi Dr. S. Alam Dr. Inne Gogoi Dr. Purnima Das Dr. Aditi Smith Gogoi Mr. Sourav Barua Mr. Mihir Jit Patowary Mr. Debanga Jyoti Borgohain Mr. Pranjit Boruah Mr. Priyam Pathak
10	Medical	Chairman Convener Teacher Members	
		Student Members	
11	Publicity	Chairman Convener Teacher Member Student Members	Dr. Ranjit Kr. Saud Dr. Sajib Baruah Dr. Basanta Borah Mr. Himangshu Mishra Dr. Muzaharul Islam Mr. Francis Dutta Mr. Raja Phukan Mr. Nitumoni Mahanta Mr. Swarup Anand Dutta Mr. Biraj Kalita Mr. Deepjyoti Paul Mr Darpan Das
12	Editorial	Chairman Convener Teacher Member	Mr. Kuleshwar Prasad Sahu Mr. Milan Kumar Lal Dr. Rana Pratap Bhuyan Dr. P. Adhiguru Dr. M. K. Verma Dr. Sahadeva Singh Ms. Sonica Priyadarshini Mr. Ashok Kumar Mr. Syed Wasifur Rahman Mr. Sandeep Adavi Pankhuri Singhal Mr. Piyush Vagadia Ms. Bhargavi H. A. Mr. Dhruv B. Kapadiya Mr. Neelesh Srivastava
		Student Members	

Programme
3rd National Youth Convention
On
Transforming Agriculture for Agripreneurship and Employment
Opportunities: The Youth Perspective

23-24 February, 2018 at Assam Agricultural University-Jorhat

Jointly Organized By
Assam Agricultural University Jorhat, Assam
Indian Council of Agricultural Research, New Delhi
All India Agricultural Students Association, New Delhi

Day 1: 23.02.2018

08.00-9.45 **Registration**

Technical Session-I :- 10:00 AM to 11:15 AM

Theme : Strategies for empowering youth in agriculture for their involvement in establishing agribusiness ventures and services

Chairman : Professor (Dr.) R.B.Singh, His Excellency Chancellor, CAU

Convener : Ms. Nangsol Dolma Bhutia, National Treasurer, AIASA

 : Mr. Ankit Soni, Vice President, AIASA

Panelists : Dr. Balraj Singh, Hon'ble VC, Agriculture University-Jodhpur

 : Ms. Bhairavi Jani, Chairperson, IEF Entrepreneurship-Key Note Speaker

 : Dr. Raju Kapoor, Leader Corporate Affairs-Dow Agro Sciences Ltd

 : Dr. Anil Ram Chauhan, ABLE, New Delhi

 : Dr. Vishal Singh, KVSS-Innovative Farmer

 : Dr. J.P.Singh, FARMER

 : Presentations by lead speakers

General Discussion & Concluding Remarks by the Chairman
Tea Break & Poster Session-I: 11:15 AM-11:30 AM

Technical Session-II : - 11:30 AM to 12:45 PM

Theme : Institutional strengthening for high quality innovative research projects and quality education in agriculture

Chairman : Dr. A.R. Pathak, Hon'ble VC, JAU

Co-Chair : Dr. M. J. Khan, ICFA

Convener : Dr. Mahesh Yadav, Principal Scientist, NBPGR

 : Ms. Kiran Thakur, State President AIASA HP

Panelists : Dr. A.K.Srivastava, Chairman, ASRB-Lead Speaker

 : Dr. S.K.Patil, Hon'ble VC, IGKV-Raipur-Lead Speaker

 : Professor (Dr.) D.N.Rao, Vice President, Centurion University

 : Dr. P.H. Vatalia, Hon'ble VC, Kamdhenu University-Ahmedabad

 : Presentations by Key Note Speaker & lead speakers

General Discussion & Concluding Remarks by the Chairman
Poster Session-II & Lunch Break: 12:45 PM to -1:45 PM
Stage Set and Sitting Arrangement at : 1:45 PM to 2:00 PM

Inaugural Session, Felicitation and Awards Ceremony : 2:00PM to 3:15 PM

- 02:00-02:05PM : Invocation
02:05-02:10PM : Welcome Address : Hon'ble VC-AAU & Chairman, Organizing Committee
02:10-02:13PM : Welcome by AIASA Assam : Mr. S.Phukon, State President, AIASA Assam
02:13-02:18PM : Welcome by Advisor, AASU : Dr.Samujjal K. Bhattacharya : Advisor,
AASU
02:18-02:23PM : Oath Taking Ceremony for : Dr.R.P.Singh, Executive Secretary, IAUA &
New Cabinet 2018 Patron, AIASA
02:23-02:35PM : Conferment of AIASA Awards & Release of Souvenir and AIASA
Cabinet 2018
02:35-02:40PM : Introductory Remarks : Ms. Sonica Priyadarshini, President (2017-18)
02:40-02:45PM : Address by Patron AIASA : Dr. R.P. Singh, Executive Secretary, IAUA
02:45-02:50PM : Address by Guest of Honour : Prof.(Dr.) R.B.Singh, HE Chancellor,
CAU, Imphal
02:50-03:10PM : Address by Chief Guest : Hon'ble Chief Minister, Govt. of Assam
03:10-03:15PM : Vote of Thanks : National Organizing Secretary

Photo Session & Tea Break: 03:15 to 03:45

Technical Session-III: 03:45 PM to 05:00 PM

Theme Attracting Investments in capacity building & Skills for youth in Agriculture

- Chairperson : Dr. R.K.Singh, Director & Hon'ble VC, IVRI
Co-Chair : Dr. Y.R.Meena, Additional Commissioner, Ministry of Agri., Govt of India
Convener : Ms. Ashfeeka Islam, State Secretary, AIASA Assam
Mr. Ashirbachan Mahapatra, National General Secretary, AIASA
Panellists : Dr. Sohan Premi, DGM, NABARD
Dr. P. Adhiguru, Principal Scientist, Extension Div., ICAR
Dr. R. Vinoth, TNAU
Presentations by four lead speakers

General Discussion & Concluding Remarks by Chair

Poster Session-III: 05:00 PM to 5:30 PM

AGM AIASA : 5:30 to 6:00 PM

Cultural Programme : 6:00 PM to 8:00 PM

Day 2 : 24.02.2018

Technical Session-IV : 10:00 AM to 11:15 AM

Theme ICT, Innovations & Startup Platforms

- Chairman : Dr.C.J.Dangaria, Hon'ble VC, NAU
Co-Chair : Dr. R.P.Singh, Executive Secretary, IAUA
Convener : Dr. P.V.Patel, Director, Students Welfare, JAU-Junagadh
Dr.K.Vijay Kumar, Asstt. Professor & State Coordinator, AIASA Karnataka

Panellist : Shri. Binod Anand, ABLE
Mr. Ramamohan G., Monsanto
Presentations by four lead speakers

**General Discussion & Concluding Remarks by the Chairman
Poster Session-IV, Photo Session & Tea Break: 11:15 to 11:45 AM**

Technical Session-V: 11:45 AM to 01:00 PM

Theme Transforming Agriculture (quality production, remunerative agriculture, eNAM, cooperative marketing)

Chairman : Shri. P.K. Borthakur, IAS, Joint Secretary (Ext), Ministry of Agriculture & FW
Co-Chair : Dr. S.K. Patil, Hon'ble VC, IGKV-Raipur
Convener : Dr. Piyush S. Vagadia, Horticulture Officer, Govt of Gujarat
Mr. Milan Kumar Lal, Chief PRO AIASA
Panellist : Dr. V. Praveen Rao, Hon'ble VC, PJTSAU
Presentations by four lead speakers

**General Discussion & Concluding Remarks by the Chairman
Poster Session-V & VI and Lunch Break: 01:00 PM-02:15 PM**

Technical Session-VI: 02:15 PM to 03:30 PM

Theme Creation of Green Jobs in Agriculture Sector- Right Person At Right Place
Chairman : Dr. K.M. Bujarbaruah, Hon'ble VC, AAU-Jorhat
Convener : Mr. Ashwini Ananda, PhD Scholar & Joint Secretary, AIASA
Ms. N. Vinothini, Deputy Chairperson, AIASA
Panellist : Mr. Sudhir Kumar, Former National President, AIASA-Key Note Speaker
Dr. Dhruv Kapadia, Horticulture Officer, Ahmedabad-Lead Speaker
Presentations by four lead speakers

**General Discussion & Concluding Remarks by the Chairman
Tea Break: 03:30 PM-03:45 PM**

Valedictory Function: 03:45 PM to 4:45 PM

3:45-3:50 PM : Welcome by Mr. Wasifur Rehman, Local Organizing Secretary
3:50-3:55 PM : Remarks by Mr. B. Hari Krishna, Newly elected President, AIASA
3:55-4:00 PM : Remarks by Dr. Sahadeva Singh, Chief Policy Advisor, AIASA
4:00-4:05 PM : Remarks by Shri. Binod Anand, Industry Representative
4:05-4:10 PM : Hon'ble Vice Chancellor, Centurion University
4:10-4:15 PM : Dr. P. Adhiguru, Principal Scientist, Extension Div., ICAR
4:15-4:20 PM : Address by Dr. R.P. Singh, Executive Secretary, IAUA
4:20-4:25 PM : Concluding remarks by Dr. K.M. Bujarbaruah, Hon'ble VC, AAU-Jorhat
4:25-4:35 PM : Certificates Distribution
4:35-4:45 PM : Presidential Speech - Shri. Jagdambika Pal, Hon'ble MP
4:45-4:55 P.M. : Address by Chief Guest- Hon'ble Agriculture Minister, Govt of Assam
4:55-5:00 PM : Vote of Thanks by State Secretary, AIASA Assam

Session 1

Strategies for empowering youth in agriculture for their involvement in establishing agribusiness ventures and services

CREATING AGRIPRENEURSHIP OPPORTUNITIES IN RURAL INDIA TO ATTRACT YOUTHS AND TRANSFORMING AGRICULTURE INTO AGRIBUSINESS BY PRIMARY AND SECONDARY AGRICULTURE DEVELOPMENT

***Jagpal Singh**

Secretary

Foundation for Agricultural Resources Management and Environmental Remediation (FARMER)

Email: jps.farmer@gmail.com

What is the issue?

Though the Indian Agriculture is gifted with rich and good natural conditions like good soil and water quality, rich biodiversity, favorable agro climatic conditions, but the Agriculture Sector in India has not been developed at a pace as it should have been. Unpredictable weather conditions, lack of technology driven precision agriculture, exorbitant price fluctuations of agriculture commodities in harvesting seasons, bureaucratic driven policies and planning have made agriculture, an economically unviable venture. Another factor hindering in attracting youths in agriculture is that due to lack of civic facilities in villages the living conditions are not conducive and at par with cities. This has resulted that youths are migrating to urban areas and even those who are staying in villages have no interest in agriculture profession. Therefore there are two issues to be discussed in this article; how to attract youths to stop migrating to urban areas and how to make agriculture attractive as a profession and entrepreneurship.

Opportunities, Approach and Strategy:

It has been observed that real potential of primary and secondary agriculture has not been exploited and its dynamics have not been appreciated by youths and agriculture professionals due to lack of appropriate policy interventions, financial and technological support for agriprenurship. The cluster based development approach has to be adopted to provide employment opportunities and develop agriprenurship for the youths at local level. The location and agro climatic zone specific agribusiness model, suitable for agriprenurs along with small and marginal farmers, needs to be devised as about 80 to 90% Indian farmers are having average small land holdings of one hectare. Farmers' basic needs; delivery of quality inputs at affordable cost, technological and financial support and assured sale / procurement of its agriculture produce at reasonable price on the pattern of sugarcane are to be taken care of.

To make agriculture as a profitable venture and generate employment for rural youths and Agriculture Professionals, focus has to be given to develop primary and secondary agriculture in a sustainable manner by effective implementation of existing opportunities and find out new opportunities.

Primary Agriculture

Higher productivity contributes to increase farmers' income. To increase productivity, technological driven Good Agriculture Practices (GAP) and demand linked crops specific cluster based production needs to be followed. Primary Agriculture which includes agriculture farm operations and activities related to crop production and allied sector has ample opportunities for employment generation and entrepreneurship development for rural youths at cluster level.

The examples of primary agriculture based agri. business may be Compost Production Units, High Value Vegetables, Fruits and Medicinal Plants Cultivation, Organic Cultivation, Mushrooms Cultivation, Nursery of Horticulture and Ornamental Plants, Milk and Meat Animal Rearing, Dairy Farming for Milk Production, Poultry Farming, Bee Keeping and Customs Services for farm operations.

The new opportunities in primary agriculture for Agriculture Professionals may be; Tissue Culture Plants' Multiplication and Protected Cultivation, Botanicals and Microbial Bio-fertilizers / Bio-pesticides production, Seed Production and Processing, Agri. Inputs Supply Depots, Agri. Clinics/Inputs & Soil Quality Testing Lab. /Farm Clouds Advisory Service and Agri. Tourism development. Cluster based approach for agri. business model may be adopted by involving private players as entrepreneurs in respect of primary agriculture activities.

Secondary Agriculture

Having achieved near self-sufficiency in primary agriculture, the country must now focus attention on secondary agriculture to provide opportunities to agripreneurs. The secondary agriculture provides value addition to agricultural products, creating facilities for primary processing and stress management in agriculture and adds value to the basic agro commodities to allow farmers to get better returns from their harvest. It also creates a new job in the rural sector to grow rural economy which is entirely based on agriculture.

Secondary agriculture can reverse this trend and add two to three-fold value to primary agriculture. Secondary agriculture, in addition to value addition of agriculture produce and increasing farmers' income, has a great potential to create employment for rural youths and Agriculture Professionals.

Secondary agriculture examples are setting up of grading, processing and packaging units for agriculture produce and milk products, WADRA approved storage facilities by private entrepreneurs at cluster level and direct marketing linkages.

The other examples of new opportunities in secondary agriculture which have not yet been fully capitalized in our country may be vitamins from grains, oil from rice bran, starched sugar from corn, milk and protein from soybean, industrial chemicals and bio-fuel from sugarcane and ligno-cellulosic biomass, fiber board from rice straw, high value animal by products, in addition to medicinal plants and herbal products.

The most important constraints for development of secondary agriculture in India are; poor infrastructural civic facilities at village/cluster level; roads, transport, electricity, sanitation and drainage, primary and secondary education, primary health and medical etc. The other major constraints in building agro-industries in India include: lack of coordination between the Science & Technology ministry, Agriculture & Farmers Welfare Ministry especially of R&D institutions - ICAR, CSIR DBT and the agro-industries, restrictions in interstate movement of agricultural produce, poor marketing linkage for processed products, non availability of venture capital, insufficient credit facilities and lack of policy support from government to promote agro industries in rural areas. Indian Council of Agriculture Research has launched a programme “Attracting & Retaining Youth in Agriculture (ARYA)” in order to focus on the rising concern of rural youth moving into urban space due to lack of meaningful livelihood opportunities. Ministry of Skill Development is way off from rural settings and have not given any attractive and impactful programmes to empower rural youth with confidence and knowledge.

There is need to blend/infuse old and new technologies, capital investments and improvements in rural infrastructure, marketing linkages and some critical changes in Government’s policy regulations to stimulate and transform Indian agriculture economy at grass root level. The Technical Advisory Committee on Secondary Agriculture (TACSA) constituted by the Planning Commission has also made similar observations and recommended that:

The initial investment of two billion dollar is made by the Government to develop secondary agriculture in India as under:-

- The Investment, Secondary Agriculture Improvement Fund (SAIF), is to be treated as Venture Capital with expected returns in a defined time;
- An investment of \$200 Million in developing bio-processing infrastructure including building an Integrated Bio-processing Technology Institute (IBTI);
- An investment of \$100 Million coupled with additional private Angel Funds of \$100 Million to develop early stage concept and to generate specific proof of concept promising bio-processing technologies;
- An investment of \$700 Million to be coupled with private venture funds for small company development (minimum of 1:1 matching and up to 1:4 matching of SAIF Private Funds).
- An investment of \$1 Billion for project financing to be coupled with private funds of \$2-3 Billion.

Therefore the agriculture is to be made a profitable venture by higher crop productivity with market intelligence based appropriate cropping system and crop management techniques, value addition by secondary agriculture, marketing linkage, reducing production cost by in-situ on farm inputs production, reducing market dependence for agriculture inputs. The availability of appropriate facilities for safe storage of agricultural commodities will be required for the post harvest management of agriculture produce. Sustainable agriculture can play a pivotal role to empower youths through self employment in agri-business activities in rural India. Employment generation in rural areas will inhibit migration of rural youths to cities.

If successfully implemented, this activity can add hundreds of billions of dollars to the Indian economy and create millions of new jobs within next decade, making a fundamental change in rural life, which has so far not occurred in any significant way over the last 70 years.

In the present scenario, when government is making thrust to double farmers' income and create more and more avenues for employment generation, shaping agriculture into agribusiness is good option with less capital investment. Therefore, following initiatives needs to be taken up by the government to develop primary and secondary agriculture as agribusiness and to create job opportunities for rural youths and agriculture professionals: -

1. Infrastructural and Financial Initiatives to set up of agribusiness / industries at Cluster level;

- I. Cluster identification and formation,
- II. Cluster wise notification of Industrial and Commercial areas.
- III. Creation / strengthening of Infrastructural civic facilities in clusters at par with cities; Roads, Transport, Electricity, Sewage, Health and Education.
- IV. Interest free or on nominal interest micro finance facilities for agribusiness up to Rs. 1Crore without collateral security.
- V. Single window clearance of governments' approvals.
- VI. 15-20 years Tax exemptions / moratorium (GST / income tax).
- VII. Incentives in the form of one time subsidy / grants in aid.
- VIII. Creation of banking, solar electricity network at cluster level.
- IX. Adequate budget provision to set up agribusiness / industries described under primary and secondary agriculture above.

2. Capacity building by Skill Developing and hands-on Training.

3. Opening of marketing outlets; "Kisan Kiosks and Hats" in cities.

In an era when food security in the country as a legal entitlement is linked with nutrition of the deprived population, this proposed model shall be valid and useful in developing products with nutrition for government programmes under the Union and State Ministries of Health, Woman & Child Welfare, Rural Development, Panchayati Raj etc.

The proposed model can be adopted as a pilot plan and shall be enabled in selected districts for each agro-climate. The success of this in major states having more than one agro-climate shall be assessed before launching in all states. The independent body having representation of farmers / farmers' bodies and various agriculture-affiliated NGOs shall be in place for administering this model so as to avoid any bureaucratic hurdles and delays. The impact assessment for socio-economic gains shall be the basis to measure its success along with monetary / financial asset builds up in the target regions.



AGRIBUSINESS INCUBATION PROGRAMME: A WAY TO TRANSFORM AGRICULTURE INTO BUSINESS

Himadri Roy* and O.P. Mishra

*Department of Extension Education
Institute of Agricultural Sciences, Banaras Hindu University, Varanasi.
Email:himadri.roy.cau@gmail.com*

India has the largest youth population in the world. To sustain the food security in our country, it is imperative to encourage the farmers to continue with agriculture, wherein the rural youth have a crucial role to play. Currently, there is a challenge of retaining youngsters in agriculture due to various socio-economic factors, including profitability in agricultural pursuits etc. Attracting youth to the agriculture sector by transforming it into a profitable venture and offering them new avenues and opportunities in agricultural value chain is the prime focus of Agribusiness Incubation Programme. Under this scheme, special efforts are being taken to foster the innovation through creation, development of agri-businesses, facilitate agro-technology commercialization, and to promote the successful agribusiness ventures in order to benefit the farmers through new markets, products and services. Agri-business incubator is an inclusive, market-oriented development plan that seeks to improve farmers' livelihoods through business incubation. The youth can now count on good support from the incubators to strengthen their capabilities and start their businesses and accomplish their dreams.

Key Words: ABI, Rural Youths, Agri-business, Incubators, Entrepreneurship.

1. Introduction:

India is predominantly an agrarian country where 60-70 per cent of its population is dependent on agriculture for employment, source of their livelihood. Youth plays vital role in meaningfully transforming Agriculture in India. The youth population is estimated to be 57 crores by 2016. At present, 35 % of the total population is in the age group of 15-35 years, out of which 75 % live in rural areas. Large numbers of people, mostly young are moving away from rural areas to urban centres because there are fewer employment opportunities back home. The migration of rural youth to cities is around 45 per cent in the country, which has several implications for the future of Indian agriculture. In order to create interest and confidence among rural youth in agriculture, there is a need to make agriculture more profitable. Unless technology is blended with agri entrepreneurship, the productivity would continue to remain low as in the traditional methods of farming and agribusiness. Agribusiness Incubation Programme is a new initiative which promotes agribusiness ventures through technology development and commercialization that benefit the farmers through creation of competitive agri-business enterprises.

2. Definition of Agribusiness Incubation:

Agribusiness incubation is defined as a process which focuses on nurturing innovative early-

stage enterprises that have high growth potential to become competitive agribusinesses by serving, adding value or linking to farm producers. Agribusiness incubators open new entry points, which actors in the agricultural value chains can use to access new markets. They afford leverage via these entry points to accelerate agricultural development and offer the unique potential to develop small and medium-sized enterprises (SME's) which can add value along these chains in ways which other development tools do not offer. Importantly, the process of business incubation is highly selective.

3. Purposes of Agribusiness Incubation:

The key purpose of agribusiness incubation is to help support and develop competitive agribusiness SMEs and while doing so, to develop new models for growth, and contribute to job creation and farm livelihood diversification. Missions that are unique to agribusiness incubators include:

- Identifying and adopting technologies appropriate for specific agribusiness enterprises
- Identifying and motivating entrepreneurs in agribusiness enterprises, frequently in rural areas.
- Building commercial conduits in the form of value chains which integrate new value creating activities in rural and urban spaces.

The prime purpose of the incubator is to show that, new business models also can operate profitably and can create sustainable wealth and new employment. Their additional role is to communicate this information to persons who may be interested in forming new businesses. Through their activities, their communications and their network formation, agribusiness incubators are able to create credible and actionable information about value addition.

4. Basic Types of Agribusiness Incubators:

Recent research on agribusiness incubation indicates that there are three basic alternative types of agribusiness incubators,

1. AGRIBUSINESS VALUE CHAIN/SECTOR DEVELOPMENT INCUBATORS:

- Aim to develop entire agribusiness sectors and provide a range of services
- Incubators that specialize in integrating critical elements of the value chain, providing market access and supporting the creation of new enterprises that fill gaps in the value chain.
- Mobilize multiple resources to respond quickly to new opportunities.

2. AGRICULTURAL RESEARCH AND COMMERCIALIZATION INCUBATORS :

- Facilitate transfer of technology from institutions of higher learning and research centres.
- Stimulate the commercialization of research and the creation of new enterprises.
- Foster diffusion of new technologies.

3. TECHNOLOGY TRANSFER INCUBATORS:

- Incubators that focus on facilitating the transfer of technology at the low tech end or at the high tech end of the spectrum.
- At the low-tech end, with incubators specializing at the grass roots, supporting innovation and entrepreneurship and incubating a diversity of small scale in under-served rural areas.

5. INCUBATOR'S DISTINCTIVE FEATURES:

5.1 ABI's distinguishing features are:

- a) It is embedded in an international agricultural research centre.
- b) It focuses on technology.
- c) It serves a broad spectrum of clients (small farmers, MSME, and advanced biotech firms).
- d) It is closely tied to India's policies and institutions.

5.2 Its primary strengths include:

- a) Its location at a world-famous research center with a large campus, state-of-the-art facilities, laboratories, experimental fields, and a community of national and international scientists.
- b) Its location in a very dynamic and entrepreneurial country with policies favorable to incubators. India has the largest number of agribusiness incubators in the world.
- c) Access to highly educated and experienced professional human resources.
- d) A proven record of success over the first 10 years of operation.

5.3 Its Primary weaknesses include:

- a) Limited flexibility in seizing business opportunities because of the constraints of operating within a large international research center with objectives broader than business.
- b) The need to negotiate among different cultures: researchers versus business development managers, high-tech versus low-tech, medium-scale versus small-scale enterprises; Indian context versus an international mandate.
- c) A brand dependent on its affiliation with ICRISAT. If the link with ICRISAT were ever cut, the incubator's national and international expansion could be compromised.

6. AGRIBUSINESS INCUBATION PROGRAMME IN INDIAN CONTEXT:

In India the Agri-Business Incubation (ABI) program was launched in 2003 as an initiative of ICRISAT in partnership with the Department of Science and Technology (DST), Government of India, to promote public-private partnerships. ABI-ICRISAT is a pioneering initiative for Agri-Business Incubation in India that maximizes the success quotient of start-up enterprises by offering them best opportunities with minimum risk.

Mission: "Improving the well-being of the poor through the creation of competitive agri-business enterprises by technology development and commercialization".

6.1. NETWORKS AND PARTNERSHIPS:

ABI is skilled at forming networks and partnerships with key institutions in India and internationally. The five most important relationships are with:

1. Technology Development Board (TDB) of the Department of Science and Technology (DST), which provided seed funds for ABI start-ups
2. DST's National Science and Technology Entrepreneurship Development Board (NSTEDB),

an institutional mechanism to promote knowledge-driven and technology intensive enterprises. The NSTEDB provided initial financial support to establish ABI.

3. Technopreneur Promotion Program (TePP), an initiative of the Department of Scientific and Industrial Research (DSIR), which lends money to individual innovators or firms for converting their novel ideas into working prototypes. ABI is a TePP outreach centre.
4. The Indian Council of Agricultural Research (ICAR), under the Department of Agricultural Research and Education (DARE). ICAR runs the National Agricultural Innovation Project (NAIP), funded by the World Bank to provide technological support to farmers through development of new strategies, technologies, and innovative solutions. NAIP has given ABI responsibility for mentoring ten Business Planning and Development units or incubators of ICAR and state agricultural universities (SAUs).
5. Micro, Small and Medium Enterprises – Development Organization (MSME-DO), which provides a wide spectrum of services to the sector, nurturing innovative business ideas that could be commercialized within a year, through onsite incubation at Research Institutes and SAUs.

6.2. IMPACT:

TECHNOLOGIES COMMERCIALIZED:

ABI has supported more than 158 ventures in agribusiness since 2003. Among ABI's clients, 62 per cent are seed entrepreneurs, 13 per cent are incubates located on site, 30 per cent are co-business incubates, and 4 per cent are biofuel entrepreneurs.

SUSTAINABILITY:

ABI operates as a business. Since its inception in 2003, ABI's average annual growth rate has been 30 per cent. ABI works on two financial models:

- Under the capital gains model, ABI takes an equity share in companies it incubates. This model is useful for start-up companies with highly proprietary technologies and strong entrepreneurship capabilities. It requires less management support, but the new technology must be very strong.
- The revenue-generation model is a franchisee model in which revenue for ABI is generated through service fees, royalties, rental fees, and one-time fees. It is useful for small-scale entrepreneurs who need significant management support but do not require strong technology inputs; their business is based on incremental technologies or pure services.

6.3. CRITICAL SUCCESS FACTORS:

1. ICRISAT's commitment to bridging the gap between research and farmers.
2. Close partnerships with key institutions of India's government.

3. A solid anchor in the form of ICRISAT scientists and pool of technologies developed by ICRISAT.
4. Clear orientation towards innovative ideas with sound market prospects

7. CONCLUSION:

Agribusiness Incubation Programme can revolutionise the agribusiness sector of India. The challenge for the future is to ensure that the experience is successful and can be replicated so that similar incubation experiences provide a dense network of agribusiness incubators throughout India. The real test is to evaluate the macroimpact of this effort compared to other past efforts pursued to promote agribusiness growth.

8. REFERENCES:

1. Philroy, j., Karuppanchetty, S.M., Selvaraj, R. (2014). "Agribusiness Incubation Transforming Indian Agriculture,"
2. Agribusiness Incubator at ICRISAT: India case study. (2014), Hyderabad.
3. Sharma, K.K., Karuppanchetty, S.M., Aravazhi, S. "Developing Entrepreneurs through an Agribusiness Incubator at ICRISAT".
4. Advanced Incubator Management, Trainer manual.



S1-P3

VALUE-ADDITION THROUGH AGRO-PROCESSING IN AGRIBUSINESS

¹Ashok, ²Jagadish, ³Balakrishnareddy, I. and ⁴Maruthi

¹PhD Scholar, Dept of Seed Science and Technology, ²PhD Scholar, Dept of Agronomy, ³Assistant Professor, Department of Agricultural Microbiology and ⁴M.Sc.(Agri), Dept of Agronomy, College of Agriculture, University of Agricultural Sciences, Raichur-584 104
Email: npbashokreddy@gmail.com

The term agro-processing means establishing processing activities to handle the local produce of the basic farmers with a view to generate additional or higher economic returns to them. It means to reduce post-harvest losses, check outflow of rural population to urban centres, offer remunerative prices to basic producers, help transfer improved/advanced technology to rural areas, industrialise the rural areas, generate employment opportunities, help improve productivity, help develop specific 8 commodities through greater soil treatment and appropriate application of fertiliser, bring recognition to the progressive and innovative initiatives of the farmers etc. Value-addition is achieved through an efficient marketing strategy. This means that the basic products need to be transformed into other products which are in high demand in the market. Simple value-addition can be achieved through a careful and systematic handling of the product, its grading, packaging and transportation. Value-addition is also achieved through attractive, informative, branding and its contents and pricing clearly described on labels. Value-addition is also achieved through a better marketing coordination. Another aspect of value-addition is the creation of goodwill for the product to sustain its presence in the market.

It should, however, be noted that value-addition does not take place through undertaking processing activities alone. Marketing plays an important role as well. Marketing of graded, properly packed semi or fully processed products still adds some more value than the marketing of basic material. The JAs have been able to establish ‘on-line’ contacts with the farmers, farmers’ groups, and financing agencies, wholesale markets, major bulk buyers and consumer groups. For that matter, no agricultural cooperative can survive and bring benefits and services to its members if it is unable to market the produce of its members. Members want not only to sell their produce as fast as possible, but also with higher economic returns and take the money home. It thus becomes the responsibility of the cooperative to assist the farmers in not only selling the members’ produce but also selling it with advantage. Cooperatives have, therefore, to be on an alert look out for markets and means of marketing the products of their members. The development of value-added agro processing industry motivates the farmers for improving productivity and further opens up possibilities of industrial development. The basic requirements are: sound marketing, modern technology, quality control and a better flow of information. Based on the integrated agricultural cooperative marketing network, agriculture can work as the biggest safety net in the process of adjustment by softening the rigors of inflation as well as by raising income and employment for weaker sections of the society in the Region.

Agro-processing leading to value-addition and higher economic returns to farmer members is the key to the success of agricultural cooperatives because through the application of this concept members get more economic returns and they get closer and more involved with their cooperatives. Agricultural cooperatives strive hard to help their members to increase and sustain their income levels through a variety of innovations and services. Economic returns are the key to sustain the relationship between the members and their cooperatives. Application of sophisticated technology for undertaking value-added activities has ensured the following for the integrated cooperatives and their members:

For Cooperatives:

- Broader membership base;
- Ability to generate higher surplus;
- Enhanced surplus to cover costs on extension staff, and to offer extension services and create facilities for technology transfer at the farm level;
- Surplus resources to undertake rural development, including social and cultural activities;
- Optimum utilisation of members’ crops/products and consequently higher returns.

For Membership:

- Higher income levels;
- Higher productivity and production;
- Crops/produce/animal protection through integrated crop/animal-care delivery systems; - Opportunity for participation in the social and cultural development processes;
- Sound all-round development and maintenance of infrastructure – road, banks, transport services, schools etc.
- Exposure to modern technologies and opportunities to participate in, and manage the working of larger complex social organisations, thus leading to development of rural entrepreneurs/leadership.

GUIDELINES FOR IDENTIFYING AND PRIORITIZING HIGH POTENTIAL AGRICULTURE-BASED SUBSECTORS

¹Ashok, ²Jagadish, ³Sudeep Kumar, E. and ⁴Balakrishnareddy, I.

*¹PhD Scholar, Dept of Seed Science and Technology, ²PhD Scholar, Dept of Agronomy, ³PhD Scholar, Dept of Seed Science and Technology and ⁴Assistant professor, Department of Agricultural Microbiology, College of Agriculture, University of Agricultural Sciences, Raichur
Email: npbashokreddy@gmail.com*

Although specific methodological guidance is scarce, some suggested steps for selecting high opportunity subsectors are listed below: -

1) **An overview study should be conducted by consultants having expertise in a variety of subsectors**

As mentioned earlier, a market survey will collect data on currently exploited commodity opportunities, but will not identify any opportunities for marketable commodities that are not locally recognized. Thus, it is critical to form a team of individuals with expertise in a broad range of agricultural commodities such as areas as food ingredients, spices and oils, herbal and health foods, etc. These individuals must also gather other information about commodities and “gathered crops” that might be marketable. This aspect of the review can be accomplished by collecting production information on the plants and herbs available in the country, from private sector sources, from entities that conduct research, and from the local Ministry of Agriculture/Forestry equivalent. It is also important that the experts have the opportunity to view markets in various parts of the country that may display different products used locally, but that traders are unaware may have international potential.

2) **Conduct a review of currently exported crops**

This part of the overview study should include discussions with local Chambers of Commerce, traders/business associations, analysis of customs documents, discussions with shipping/freighting services, discussions with the Ministry of Agriculture and/or Ministry of Commerce, and especially discussions with existing agribusinesses and entrepreneurs, and travel to border towns or utilization of local researchers to collect observational data on commodities actually passing over country frontiers, particularly if customs data are difficult to get or particularly unreliable.

3) **Conduct a review of currently imported food items**

The overview study should include research on imports, both processed and raw. It is likely, in India, that many imported food items will be processed (e.g., Edible Vegetable Oils), and that some import substitution or replacement opportunities exist for agribusiness investment. Raw agricultural products may also be imported, and may be competing with locally produced commodities. The overview study should include an initial analysis (along the lines laid out below) that gives an indication as to the reasons for the imports (e.g., consumer preferences, price, availability and infrastructure limitations).

4) Collect data on kinds, quantities and destinations of commodities exported (or imported)

The data gathered will consist of lists of actual commodities exported and should cover a span of 10 years, or information gathered at five-year intervals, since some marketable commodities may have fallen prey to unstable country conditions, poor world prices, and unfavorable economic conditions that led to the downfall of a previously profitable subsector. Destination is important for evaluating the different kinds of demand for the product: is it a regionally traded product, or is it competing on the international market?

5) Information regarding the consumption/demand for these products should be gathered

While not to be confused with a full-fledged one-product market survey (also referred to as a feasibility study, subsector or commodity assessment), some indicative data must be gathered about the market potential for these crops. For regionally traded commodities, the team could make quick trips to 3-4 major trade hubs or destination markets to collect data regarding volume of consumer demand, consumer preferences, and pricing factors. For internationally traded commodities, the consultants should consult trade data banks, and conduct calls to brokers or processors/end-users to develop an initial profile of demand factors.

6) Commodities should be rated according to a set of pre-established indicators

The indicators are initial ratings that, again, should not be confused with information gathered in a feasibility study or a subsector assessment. The purpose of this rating is to broadly indicate the relative importance or potential of a commodity versus the others identified in the overview study. Indicators such as the following might be used, but will also depend on the sponsor's objectives (i.e. are they able to invest in a program that addresses an entire commodity chain, or are they interested in targeting 2-3 specific small agribusiness activities):

- Current production volume
- Potential production volume
- Constraints to production
- Historical and current volume by market (local, regional, international)
- Use profile (raw vs processed)
- Projected market demand indications (local, regional, international)
- Opportunities for value-added
- Competitors/competitive advantage
- Constraints (policy, tariff, production, other)
- Investment/program input needs to subsector (both private sector and government needs, depending on sponsor objectives)
- Environmental issues/impacts

These comparative ratings are conducted in order to isolate the 2-3 commodities having the most potential for future investment. This analysis should be followed by indepth market surveys (feasibility studies or subsector assessments) conducted for each high-ranking commodity for potential investment programs.



AGRIBUSINESS: SEED INDUSTRY IN INDIA

1Ashok, 2Basave Gowda, 3Sudeep Kumae, E. and 4Manjunath U. B.

*¹PhD Scholar, Dept of Seed Science and Technology, ²Professor (SST) and Special Officer (Seeds), ³PhD Scholar, Dept of Agronomy & ⁴M.Sc. (Agri.) Dept of Seed Science and Technology, College of Agriculture, University of Agricultural Sciences, Raichur
E-mail: npbashokreddy@gmail.com*

Seed is the most important input component for productive agriculture. In the significant advances that India made in agriculture in the last four decades, the role of the seed sector has been substantial. The expansion of seed industry has occurred in parallel with growth in agricultural productivity. Given the fact that sustained growth to cope with increasing demand would depend more and more on the pace of development and adoption of innovative technologies, the seed would continue to be a vital component for decades to come. The organized seed industry of the country is just forty years old. Yet, its growth has been phenomenal. India is one of the few countries where the seed sector is already reasonably advanced¹. The private seed industry is no more confined to just production and marketing of seed. It has as well acquired technological strength to cater to the varietal needs of tomorrow.

Seed is the basic and most critical input for sustainable agriculture. The response of all other inputs depends on quality of seeds to a large extent. It is estimated that the direct contribution of quality seed alone to the total production is about 15 – 20% depending upon the crop and it can be further raised up to 45% with efficient management of other inputs. The developments in the seed industry in India, particularly in the last 30 years, are very significant. A major re-structuring of the seed industry by Government of India through the National Seed Project Phase-I (1977-78), Phase-II (1978-79) and Phase-III (1990-1991), was carried out, which strengthened the seed infrastructure that was most needed and relevant around those times. This could be termed as a first turning point in shaping of an organized seed industry. Introduction of New Seed Development Policy (1988 – 1989) was yet another significant mile stone in the Indian Seed Industry, which transformed the very character of the seed industry. The policy gave access to Indian farmers of the best of seed and planting material available anywhere on the world. The policy stimulated appreciable investments by private individuals, Indian Corporate and MNCs in the Indian seed sector with strong R&D base for product development in each of the seed companies with more emphasis on high value hybrids of cereals and vegetables and hi-tech products such as Bt. Cotton. As a result, farmer has a wide product choice and seed industry today is set to work with a ‘farmer centric’ approach and is market driven. However, there is an urgent need for the State Seed Corporations also to transform themselves in tune with the industry in terms of infrastructure, technologies, approach and the management culture to be able to survive in the competitive market and to enhance their contribution in the national endeavour of increasing food production to attain food & nutritional security. The agricultural sector is highly dependent on the availability and quality of seeds for a productive harvest. Therefore, in order to increase the quantity and quality of produce, efforts are made to

introduce enhanced varieties of seeds with the help of advance technology and modern agricultural methods. In India, agriculture is the dominant occupation, which secures abundant opportunities for seeds market in the region. According to IMARC Group's latest report titled, "Seed Industry in India: Market Trends, Structure, Growth, Key Players and Forecast 2018-2023", the Indian seeds market reached a value of more than US\$ 4 Billion in 2017, exhibiting a CAGR of around 17% during 2010-2017.

The Indian seed market has witnessed a major restructuring as a result of the implementation of some progressive policies by the government. Seed Development, 1988 and National Seed Policy, 2002 have helped in strengthening the Indian seed industry in the areas of R&D, product development, supply chain management and quality assurance. Owing to this, India has emerged as the fifth largest seed market across the globe. Moreover, the active participation of both, public and private sectors has also played a vital role in laying a strong foundation of the industry. This includes launching initiatives to promote the use of hybrid seeds among the farmers who had earlier used outmoded open pollinated varieties. Some other growth-inducing forces, such as growth in income levels, commercialization of agriculture, patent protection systems and intellectual rights over plant varieties, have given a great push to the market. Owing to these factors, the Indian seeds market is further expected to grow at a CAGR of more than 15% during 2018–2023, reaching a value of more than US\$ 7 Billion by 2023.

The report has segmented the market on the basis of type. Currently, grain seeds represent the largest seed type, accounting for more than a half of the total seed production. Other major seed types include oil seeds, vegetable seeds and fruit seeds. An analysis of the market is provided on the basis of regions. The major regions covered in the report are North India, West India, South India and East India. Amongst these, North India represents the largest producer, accounting for around a third of the total market share. The report has also analysed the competitive landscape of the market and provides the profiles of the key players operative in it.

This report provides a deep insight into the Indian seeds market covering all its essential aspects. This ranges from macro overview of the market to micro details of the industry performance, key market drivers and challenges, recent trends, market forecast, SWOT analysis, Porter's five forces analysis, value chain analysis, etc. This report is a must-read for entrepreneurs, researchers, consultants, investors, business strategists, and all those who have any kind of stake or are planning to foray into the Indian seeds industry in any manner.

Key Aspects Analysed:

- Trends and dynamics in the Indian seeds market.
- Major seed types and their current and future market potential.
- Key drivers/restraints and their impact on the current and future market scenario.
- Examination of the competitive landscape.

Types of Seeds Covered in This Report:

- Grain seeds
- Oil seeds
- Vegetable seeds
- Fruit seeds

Major Regions Covered in This Report:

- North India
- West India
- South India
- East India

Focus of the Analysis:

- Overview
- Historical and current market scenario
- Market trends
- Market forecast

Policy Initiatives in Seed Sector: The following policy initiatives have been taken by the Government of India in seed sector:-

- Enactment of the Seeds Act, 1966
- Seed Review Team-SRT (1968)
- National Commission on Agriculture's Seed Group (1972)
- Launching of the World Bank aided National Seeds Programme (1975-85) in three phases leading to the creation of State Seeds Corporations, State Seed Certification Agencies, State Seed Testing Laboratories, Breeder Seed Programmes etc
- Seed Control Order (1983)
- Creation of the Technology Mission on Oilseeds & Pulses (TMOP) in 1986 now called The Integrated Scheme of Oilseeds, Pulses, Oil Palm and Maize (ISOPOM).
- Production and Distribution Subsidy
- Distribution of Seed Mini-kits
- Seed Transport Subsidy Scheme (1987)
- New Policy on Seed Development (1988)
- Seed Bank Scheme (2000)
- National Seeds Policy (2002)
- The Seeds Bill (2004)
- Formulation of National Seed Plan (2005)
- National Food Security Mission (2007)
- RashtriyaKrishiVikasYojna (2007)

National Seeds Policy, 2002: Thrust Areas

- Variety development
- Plant variety protection
- Seed production
- Quality assurance
- Seed distribution and marketing
- Infrastructure facilities
- Transgenic plant varieties
- Import of seeds and planting materials
- Seed exports
- Promotion of domestic private sector seed industry

- Strengthening of the monitoring system

Seeds Bill, 2004: Salient Features

- ***Registration of kinds and varieties of Seeds etc.***
- Evaluation of performance
- Compensation to Framers
- Registration of Seed Producers and Processing Units
- Seed dealers to be Registered
- Regulation of Sale of Seed and Seed Certification
- Seed Analysis and Seed Testing
- Export and Import of Seeds and Planting Material
- Offences and Punishment.

Seed Production System in India:

The Indian seed programme largely adheres to the limited generations' system for seed multiplication in a phased manner. The system recognizes three generations namely breeder, foundation and certified seeds and provides adequate safeguards for quality assurance in the seed multiplication chain to maintain the purity of the variety as it flows from the breeder to the farmer.

Breeder Seed

Breeder seed is the progeny of nucleus seed of a variety and is produced by the originating breeder or by a sponsored breeder. Breeder seed production is the mandate of the Indian Council of Agricultural Research (ICAR) and is being undertaken with the help of;

- I) ICAR Research Institutions, National Research Centres and All India Coordinated Research Project of different crops;
- ii) State Agricultural Universities (SAUs) with 14 centres established in different States;
- iii) Sponsored breeders recognized by selected State Seed Corporations, and
- iv) Non-Governmental Organizations.

ICAR also promotes sponsored breeder seed production programme through the National Seeds Corporation (NSC) / State Farms Corporation of India (SFCI), State Seeds Corporation (SSCs), Krishi Vigyan Kendras (KVKs) etc.

There has been a steady increase in the production of breeder seed over the years.

The indents from various seeds producing agencies are collected by the State Departments of Agriculture and submitted to the Department of Agriculture and Cooperation (DAC), Ministry of Agriculture, Government of India, which in turn compiles the whole information crop wise and sends it to the Project Coordinator/Project Director of the respective crops in ICAR for final allocation of production responsibility to different SAUs/ICAR institutions. The allocation of responsibility for production of breeder seed is discussed in the workshop in respect of the particular crop and is made to various centres as per the facilities and capabilities available at the centres and the availability of nucleus seed of a particular variety. It may be noted that indents are compiled and forwarded to ICAR at least 18 months in advance. To make the programme systematic and for proper evaluation of the breeder seed production programme, monitoring terms have been constituted and

reporting proforma have been devised. The monitoring terms consist of breeder of the variety, the concerned Project Director or his nominee, representative of NSC. The production of breeder seed is reviewed every year by ICAR-DAC in the annual seed review meeting.

The actual production of breeder seed by different centres is intimated to DAC by ICAR. On receipt of information from ICAR, the available breeder seed is allocated to all the indenters in an equitable manner. In the case of varieties which are relevant only to a particular State, the indents for breeder seed are placed by the concerned Director of Agriculture with the SAUs/ICAR institutions located in the State. The breeder seed produced is lifted directly by the Director of Agriculture or foundation seed producing agencies authorized by him.

Foundation Seed

Foundation seed is the progeny of breeder seed and is required to be produced from breeder seed or from foundation seed which can be clearly traced to breeder seed. The responsibility for production of foundation seed has been entrusted to the NSC, SFCI, State Seeds Corporation, State Departments of Agriculture and private seed producers, who have the necessary infrastructure facilities. Foundation seed is required to meet the standards of seed certification prescribed in the Indian Minimum Seeds Certification Standards, both at the field and laboratory testing.

Certified Seed

Certified seed is the progeny of foundation seed and must meet the standards of seed certification prescribed in the Indian Minimum Seeds Certification Standards, 1988. In case of self pollinated crops, certified seeds can also be produced from certified seeds provided it does not go beyond three generations from foundation seed stage-I.

The production and distribution of quality/certified seeds is primarily the responsibility of the State Governments. Certified seed production is organized through State Seed Corporation, Departmental Agricultural Farms and Cooperatives etc. The distribution of seeds is undertaken through a number of channels i.e. departmental outlets at block and village level, cooperatives, outlets of seed corporations, private dealers etc. The efforts of the State Governments are being supplemented by NSC and SFCI which produce varieties of national importance. NSC markets its seeds through its own marketing network and also through its dealer network. SFCI markets its seeds mainly through the State Departments of Agriculture and the State Seed Corporations. The production of certified seed by NSC and State Seed Corporations is mainly organized through contract growing arrangements with progressive farmers. SFCI undertakes seed production on its own farms. The private sector has also started to play an important role in the supply of quality seeds of vegetables and crops like hybrid maize, sorghum, Bajra, cotton, castor, sunflower, paddy etc.

The requirement of certified/quality seeds is assessed by State Governments on the basis of the area sown under different crop varieties, area covered by hybrid and self-pollinated varieties as well as the seed replacement rate achieved. The availability of seed is ascertained by the State Departments of Agriculture on the basis of the production of seed in government farms and production of seeds by State Seeds Corporations and other agencies. The Government of India periodically assesses the requirement and availability of seeds through detailed interaction with State Governments and seed producing agencies in the bi-annual Zonal Seed Review Meetings and

the National Kharif and Rabi Conferences. The Department of Agriculture and Cooperation facilitates tie-up arrangements with seed producing agencies to ensure that the requirement of seeds is met to the maximum extent possible.

Role of Public & Private Seed Sector

The private sector has started to play a significant role in the seed industry over the last few years. At present, the number of companies engaged in seed production or seed trade is of the order of 400 or 500. However, the main focus of private seed companies has been on the high value low volume seeds and market for low value high volume seeds seeds of cereals, pulses and oilseeds is still dominated by the public sector seed corporations. Private sector companies have a significant place mainly in the case of maize and sunflower and cotton. However, in the case of vegetable seeds and planting materials of horticultural crops, the private sector is the dominant player. As the private sector has not been enthusiastic about entering into seed production of high volume low margin crops of wheat, paddy, other cereals, oilseeds and pulses, the public sector seed corporations will continue to remain dominant in cereals, pulses and oilseeds for many more years to come. At present 15 State Seeds Corporation and 2 National level seeds Corporations (National Seeds Corporation of India & State Farms Corporation of India) are functioning in the country. Besides, significant quantities of seeds are also produced by the State Departments of Agriculture, where the State Seeds corporations are not in existence. The contribution of private sector seed companies in total seed production of the country is depicted in the following table:

Year of Production	Total Seed Production (Lakh qtls.)	Share of private sector
2003-04	132.27	47.48%
2004-05	140.51	45.02%
2005-06	148.18	46.80%
2006-07	194.31	41.00%

Seed Export / Import

The export/import of seeds and planting material is governed by the Export and Import (EXIM) Policy 2002-07 and amendment made therein. Restrictions on export of all cultivated varieties of seeds have been removed w.e.f. 01.04.2002, except the following:

- (i) Breeder or foundation or wild varieties
- (ii) Onion, berseem, cashew, nux vomica, rubber, pepper cuttings, sandalwood, saffron, neem, forestry species and wild ornamental plants
- (iii) Export of niger which is canalized through TRIFED, NAFED, etc.
- (iv) Groundnuts, exports of which is subject to compulsory registration of contract with APEDA;

The export of these seeds is restricted and is only allowed on case-to-case basis under licence issued by Director General Foreign Trade on the basis of the recommendations of Department of Agriculture and Cooperation.

The provisions regarding import of seeds and planting material are as under:

- (a) Import of seeds/tubers/bulbs/cuttings/saplings of vegetables, flowers and fruits is allowed without a licence in accordance with import permit granted under Plant Quarantine (Order), 2003 and amendment made therein.
- (b) Import of seeds, planting materials and living plants by ICAR, etc. is allowed without a licence in accordance with conditions specified by the Ministry of Agriculture;
- (c) Import of seeds/tubers of potato, garlic, fennel, coriander, cumin, etc. is allowed in accordance with import permit granted under PQ Order, 2003.
- (d) Import of seeds of wheat, rye, barley, oat, maize, rice, millet, jowar, bajra, ragi, other cereals, soybean, groundnut, linseed, palmtree, cotton, castor, sesamum, mustard, safflower, clover, jojoba, etc. is allowed without licence subject to the New Policy on Seed Development, 1988 and in accordance with import permit granted under PQ Order, 2003.

The EXIM Policy reiterates that all imports of seeds and planting material would be regulated under the Plant Quarantine Order 2003. Import licences would be granted by DGFT only on the recommendations of DAC. A small quantity of seeds sought to be imported would be given to ICAR, or farms accredited by ICAR, for trial and evaluation for one crop season. On receipt of applications for commercial import, DAC would consider the trial/evaluation report on the performance of the seed and their resistance to seed/soil borne diseases. DAC is required to either reject or recommend the application to DGFT for grant of import licence within 30 days of receipt. All importers have to make available a small specified quantity of the imported seeds to the ICAR at cost price for testing/accession to the gene bank of National Bureau of Plant Genetic Resources (NBPGR). The import of seeds has to be cleared/rejected by Plant Protection Adviser (PPA) after quarantine checks within three weeks. The rejected consignment has to be destroyed. During quarantine, the imported consignment is kept in a bonded warehouse at the cost of the importer. While importing seeds and planting material, it has to be ensured that there is absolutely no compromise on plant quarantine procedures. Every effort has to be made to prevent the entry into India of exotic pests, diseases and weeds that are detrimental to the interests of the farmers.

An EXIM Committee was constituted in the Seeds Division to deal with application for exports/imports of seeds and planting materials in accordance with the New Policy on Seed Development and EXIM Regulations. The Committee meets every month, subject to tendency of proposals for import/export of seeds and planting material, and analyzes applications and furnishes recommendations to PPA/DGFT for issuing of otherwise of the licence for import/export of seeds and planting material. Exporters/importers are required to submit 20 copies of applications for export/import in the prescribed formats. The minutes of the EXIM Committee are posted on the Seednet Portal (<http://seednet.gov.in>)

As per World Seed Trade Statistics, India has sixth largest size of domestic seed market in the world, estimated to be at about 1300 million dollars. However, India's share in global trade in seeds (import & export) is of only about 37 million dollars only. To give a boost to seed export, India has decided to participate in OECD Seed Schemes for the following categories of crops:

- Grasses and legumes

- Crucifers and other oil or fibre species
- Cereals
- Maize and sorghum
- Vegetables

OECD Seed Schemes is one of the international frameworks available for certification of agricultural seeds moving in international trade. The objective of the OECD Seed Schemes is to encourage use of seeds of consistently high quality in participating countries. The Scheme authorizes use of labels and certificates for seed produced and processed for international trade according to agreed principles. The Joint Secretary (Seeds) in the Department of Agriculture & Cooperation has been nominated as the National Designated Authority. Further, Heads of Seed Certification Agencies in Karnataka, Andhra Pradesh, Tamil Nadu, Maharashtra, Rajasthan, Uttaranchal, Uttar Pradesh Haryana, Bihar and Assam have been nominated as the Designated Authorities under the Scheme to undertake certification work under OECD Seed Schemes. The department is in the process of completing other formalities under the OECD Seed Scheme guidelines before the certification work gets started.

Conclusion:

The Indian Seed Improvement Programme is backed up by a strong crop improvement programme in both the public and private sectors. At the moment, the industry is highly vibrant and energetic and is well recognized in the international seed arena. Several developing and neighbouring countries have benefited from quality seed imports from India. India's Seed Programme has a strong seed production base in terms of diverse and ideal agro-climates spread through out the country for producing high quality seeds of several tropical, temperate and sub-tropical plant varieties in enough quantities at competitive prices. Over the years, several seed crop zones have evolved with extreme levels of specialization.

Similarly, for post harvest handling, the Indian seed processing/conditioning industry has perfected the techniques of quality up-gradation and maintenance to ensure high standards of physical condition and quality. By virtue of the diverse agro-climates several geographical zones in the country have emerged as ideal seed storage locations under ambient conditions. In terms of seed marketing and distribution, more than about 20000 seed dealers and distributors are in the business.

Over the years, seed quality specifications comparable to international standards have been evolved and are adopted by the Indian Seed Programme in both the public and private sectors. The country has a strong rigorous mechanism for seed quality control through voluntary seed certificate and compulsory labelling monitored by provincial level Seed Law Enforcement Agencies. For seed technology research, India has a national level Directorate under the Indian Council of Agricultural Research as well as Status level research set up in the State Agricultural Universities. In seed education, 4-5 prominent State Agricultural Universities offer post graduation in Seed Technology leading to M.Sc./Ph.D Degree. The seed industry has three well reputed national level associations apart from several provincial level groups to take care of the interests of the industry.

Thus, the Indian Seed Programme is now occupying a pivotal place in Indian agriculture and is well poised for continued growth in the years to come. National Seeds Corporation, which is the

largest single seed organization in the country with such a wide product range, pioneered the growth and development of a sound industry in India. NSC, SFCI, States Seeds Corporations and other seed producing agencies are continuously and gradually expanding all its activities especially in terms of its product range, volume and value of seed handled, level of seed distribution to the un-reached areas, etc. Over the past four decades, these seed producing agencies have built up a hard core of competent and experienced seed producers and seed dealers in various parts of the country and have adequate level of specialization and competence in handling and managing various segments of seed improvement on scientifically sound and commercially viable terms.

S1-P6

WE REAP WHAT WE SOW AND IT IS NEVER LATE TO BEGIN

Pranjit Sutradhar, Ashfeeka Islam & Syed Wasifur Rahman

Assam Agricultural University, Jorhat -13

Email: pranjit3789@gmail.com

The blurred picture of agriculture in the country is the greatest threat in the present day context. In India, to be a farmer still remains the last wish of an individual looking at the kind of opportunities it serves. Youth turn to agriculture only for two reasons- either, that they didn't get any better job, or because they are genuinely interested in making a profitable business. Though, agriculture remains the last resort but it still and will always remain the identity of this nation considering its justifiable contribution in the country's economy.

The mercy of the monsoon and the markets triggers Agriculture. We are well known about the impact of climate change. Moreover, with shrinking land and depleting water resource coupled with rising input costs, farming can be a challenging proposition and to attract youth in this profession is really a Herculean task. The younger generation will be interested in taking to farming as a profession only if farming becomes both economically rewarding and intellectually stimulating. Technology and high revenue could make agriculture attractive to the youngsters. A shadow has value only in the sun. Technology needs to be technically accessible, culturally acceptable and environmentally feasible. Nowadays, youngsters constitute only 13-19% of Farmers. It is imperative to make agriculture a lucrative and profitable occupation in order to increase that number. At the time when even existing farmers are moving away from farming, it is unlikely that educated young minds would take it up unless agriculture is made remunerative, unless productivity or income is increased, farming cannot become an attractive venture for them. Most of our farmers are marginal with small land holdings and if we could introduce implements for such small holdings, we may come out with fruitful results, especially when there is an acute shortage of labour, there is no other option but to bring in equipment which will help farmers replace or at least reduce the need for manual labour which is becoming very expensive and responsible for mass migration of youth from agriculture to non agricultural activities which is much higher than obtained by them in the farming sector. Moreover, agricultural sector as it is highly vulnerable to losses requiring tremendous hard work with inefficient supply of major services such as proper irrigation, farm mechanization and proper marketing with best possible prices results in withdrawing attention from

this noble profession.

Though, in the name of agricultural development, the western pull brought visible changes in the agricultural scenario but at the same time the country presently also witnessing several threats including degradation of inherent soil quality, upsetting the water table through exploitation of ground water, application of chemicals, insecticides, pesticides etc. which is not only ruining our agricultural fields but also bringing a lot of health issues. We are in the middle of the bridge towards sustainability from where neither we could step back nor could we compromise with the future. Therefore, this is the right time to take some concrete decisions which will not only push the countries interests but will also bring hope for this nation to rise again and march with other developed countries.

Our aim must be a hunger free India by eradicating poverty and should reach in a state where no one has to beg for food. In order to achieve food security, India must change from extensive production systems, characterized by minimal inputs and low yields to intensive systems which require greater investments in external inputs and labour saving technologies, but hold the potential to greatly increase yields and provide decent incomes for young farmers now and in future. The agriculture sector has the potential to provide numerous employment opportunities in food production, marketing, processing, retail, catering, and research and, input sales, among others.

Few points has been discussed below which may be helpful to bring out the best possible paths :

- Agricultural produce are perishable in nature and hence setting up of cold storage facilities and food processing units in locations that produce in excess will reduce wastages to a considerable level which surely will put less pressure on the production sector resulting in creating a healthy atmosphere.
- Due to crushing population, agricultural lands are getting converted to non-agricultural activities which are a severe pain in the name of development where government interventions are a must. However, the problem is not only limited to the agricultural land but it is also quite evident that some of the forest land in various states of the country are going through the same stunt.
- Like any other businesses in the world, agricultural business is such that it would soon become one of the prioritised business sectors in the world considering its demand from the huge population of the world. Therefore, to set it what it deserves, the farming community has to be given utmost importance because we can't effort to lose their numbers what we presently have and which is dwindling day by day.
- Farm mechanisation plays a crucial role in the development of any agriculture sector for which efficient equipments and other such has to be advanced as the cost of labour for the farming operation is getting very expensive as well as getting unavailable.
- Value addition will have to be done to primary products in order to increase income.
- Law and regulations for the use of land for agriculture in the country is of minimum standard which has to be enhanced as without maintaining the health of soil we can't think of sustainability as well as prosperity. Policy changes need to be put in place to curb the rampant indiscriminate sale of agricultural land for non-agricultural purposes.
- Nature itself is very unique where we all belong without which we can't think of our survival.

As Dr. A. P. J. Abdul Kalam said, “The duty to protect natural resources begins from oneself, then family, society and to the country”. Therefore, nature’s conservation and maintenance for the greater interest has to be formulated. Only then, we shall be able to remain where we belong or else everything will go in vain.

- Along with the nature, water plays a significant role not only in the agriculture but also in our lives too. Therefore, rational use of it has to be ensured through less wastage and less depletion from underground.
- Rain water harvesting is one of the most sustainable water harvesting schemes; if it is done properly no scarcity for water for agriculture will arise. Each village has a pond, and taking that pond and de-silting it makes that village free from water scarcity.

Demographically, today’s India is at its youngest best and has the power to meet any challenge with the collective consciousness and effort of all people, especially young people. Nations tomorrow relies in the hands of youth and they are our greatest assets. More than 65% of Indian population is between the age group of 15-35 and 50% of the population is below the age of 25. Average Indian age is 29. It makes India, youngest country in the world comparing with other super powered country including China. The statement provides positive node but the average age of farmers is 55 years which indicates lesser youth participation in agriculture. Furthermore, shifting out of agriculture is high among farmers below 30 years of age which is a threat. Therefore, to retain youth and to attract youth in this particular sector is the biggest action to be taken in the recent days.

Moves, which we may make or else it would be too late:-

- Requires training and skill-developing opportunities for youth that can mould them for active participation in decision-making processes.
- Ensuring participation of youth in the nation building processes.
- There is need to learn from other programmes that may have been successful in engaging young people in different sectors.
- Facilitation - Youth Communication, Advocacy and Networking. There is a need to guide youth in terms of how to communicate their challenges, ideas and experiences.
- Privatisation of agricultural lands i.e if some multinational companies adopt our cultivable lands and if these lands are managed properly than we may obtain high benefits with employment generation. Indeed, private farms have the potential to bloom.
- Standard pricing of commodities for better market regulation
- Facilitation of access to credit to promote youth participation in agricultural projects and other sustainable livelihood projects.
- Boosting of online agricultural marketing
In India, we require 86 lakhs quintal seeds ever year. We meet only 30% of this requirement through Central Seed Forum and Seed Production Forum. Producing quality seeds is one skill which the young can be trained in. Therefore, it itself is an opportunity to the youth for becoming high quality seed suppliers in the recent times.
- 68.8% of Indian population dwells in the 6.4 lakh villages and the rest 31.2% lives in cities. job-creation and provision of opportunities in the rural areas need to be kept at par with the metros and cities with equal facilities. Because, we Indian live in villages and even Gandhi Ji followed the same during the struggle for freedom where, farmers played a

- significant role for this nation.
- Appropriate policies need to be developed to make agriculture more attractive, profitable and a credible career to the youth through the application of appropriate and modern technologies.
 - Agriculture transformation will be achieved only through facilitating access of rural youth to agricultural activities.
 - Recognition itself is the carrot on the stick that keeps people hungry for it and a reason for continuous hard work. Therefore, accolades such as upcoming Agri-preneur, Best Young Agriculturalist Award at each district-levels may be instituted.

S1-P7

HOW STARTUPS ARE CHANGING THE FACE OF INDIAN AGRICULTURE

Neelesh Srivastava*

*National Secretary ,National Anti Corruption Cell(NACC),AIASA, New Delhi
CSA University of Agriculture and Technology, Kanpur
Email: neelesh.300@gmail.com

India holds the record for the second-largest agricultural land in the world, with around 60% rural Indian households making their living from agriculture thus creating a huge scope for agriculture startups in the country.

The central and state governments are proactively pursuing policies to improve farmers' lives in India. In fact, PM Modi's government has an aim to double the average farmer's income by 2022. But is enough being done to remove inefficiencies in the agricultural supply chain to make Indian agriculture startup a lucrative investment opportunity?

The State Of Agriculture In India

Agriculture, along with fisheries and forestry, is one of the largest contributors to the Indian Gross Domestic Product (GDP). The GDP of agriculture and allied sectors in India was recorded at \$244.74 Bn in FY '16.

Agriculture In India: Challenges

A drop in landholdings (average 1.4 hectares), small and fragmented land holdings, a decreasing agricultural land versus a growing population, decreasing groundwater levels, poor quality of seeds, lack of mechanization, low yield per unit crop and a dependence on middlemen are some of the challenges for the growth of agriculture in India.

Added to that, an absence of an organised marketing structure for produce, malpractices in the existing unorganised agricultural markets, inadequate facilities for transportation and storage, scarcity of credit, and limited access to superior technology to get timely information is some of the many afflictions which obstruct the Indian agricultural sector.

Opportunities for Agriculture Startups

Opportunities lie in areas like how to increase crop production, improving the nutritional value of the crops, reduction in input prices for farmers, improving the overall process-driven supply chain, reducing wastage in the distribution system, making easy farm mechanization available, and enabling connectivity of farmers with the masses by interlinking the consumer and producer.

Some startups in India

1. Ninjacart

Due to marginal farming, poor logistics and zero market information, a number of middlemen get involved in sourcing the produce from farmers to markets. As a result, the farmer gets only one-fourth of what the consumer pays and also there is much wastage in the supply chain. It is this problem which Ninjacart addresses-cutting out the middlemen from the supply chain. In the last one year, it focused on building a cost-efficient, reliable and scalable supply chain that can handle 300+ tones a day.

2. Waycool

WayCool aims to fix the disorganized perishable supply chain. It is an omnichannel fresh produce distribution company that distributes fruits and vegetables to multiple end-use segments spanning small local shops, modern retail outlets. The company has a retail presence currently in Chennai, through the SunnyBee brand, operating retail stores, mobile stores on trucks. In addition, there are a number of private label products that SunnyBee produces and brands through partnerships with sister companies.

India is the second-largest producer of fruits and vegetables in the world and presents a significant opportunity for private players to profitably organize perishable produce value chains. This is what Waycool is hoping to leverage.

3. Crofarm

Founded in May 2016 by Prashant Jain and VarunKhurana, Crofarm is an F2B (Farm to Business) venture. According to the website, it has over 10,000 farmers in its network and has partnered with Reliance Retail, Grofers, Big Basket, Jubilant Foodworks, Big Bazar and Metro Foods. Crofarm generates revenue through commission, starting from nearly 5% of the price in case of less perishables like potato and onions. It makes a commission of around 15% of the price of green vegetables, and 20-25% in case of fruits and exotics.

AgriTech Funding In India

According to the latest report, for 2016, over \$3.23 Bn was invested in agriculture sector worldwide.. Globally, category-wise, 40% of the total funding (\$1.29 Bn) was invested in food marketplaces or the food ecommerce category, followed by biotechnology startups which garnered 22% of the funding (\$719 Mn). Investment in precision agriculture technologies, which include data-capturing devices and farm management software, came third at \$405 Mn, while investment in Novel Farming Systems, which are startups using new and innovative ways to produce agricultural and biological products, was the fourth category wherein funding flowed (\$247 Mn).

Conclusion

Demand-side drivers such as population growth, rising income levels leading to increasing consumption, and increasing exports favor the growth of agriculture in India. More so, policy support from the government such as increasing MSPs, increasing crop insurance support, the introduction of various schemes to facilitate farmers, initiatives to bolster easy credit to farmers will also increase growth. The need of the hour is for all stakeholders – from governments to agritech startups to investors – to come together in harnessing the opportunity to transform this sector. Mostly, government policies treat agriculture as a poverty alleviation method but the focus should be on enhancing productivity and raising incomes. The impetus should be on the application of technology to lower challenges on the input side right from planting to irrigating to harvesting and finally selling.



S1-P8

TRANSFORMING AGRICULTURE THROUGH INVOLVING YOUTH IN AGRIBUSINESS VENTURES

Suresh Chandra Sharma, Istkharand and S. Singh

*School of Agricultural Sciences, Jaipur National University, Jaipur-302017, Rajasthan
Email: suresh.iabm@gmail.com*

India, a country of 1.36 billion, faces a big challenge in terms of providing basic education, health care and subsequent employment for the people. The basic ills of unemployment and the education for the unemployed youth is a major issue of concern. The rural youths who are 75% of total youths' population in the country and agriculture professionals are not willing to be engaged in agriculture because agriculture is considered as a non-profitable venture. Small scale agriculture is the single biggest source of employment and with necessary support from the Government for improvement in rural infrastructure, input delivery systems, enhancement of support price, quality education, skill development and capacity building of youth and extension functionaries can offer sustainable production. The education curricula that has uniformly been reoriented at graduation level by giving practical shape and professionalism may led to improvement of knowledge horizon of rural youth to initiate work in input delivery systems, production technologies, agriculture trade and marketing. Various organizations such as IIMs, MANAGE, NIAM, IABM & CABM have started providing specialized skills and training to youth to provide them opportunity to conduct agribusiness incubations for employment generation and help them to implement business plan. The central sector scheme of ARYA (Attracting and Retaining Youth in Agriculture) initiated by Central government need to be covered in wider scale in coordination with States for providing the youth the skills for evergreen revolution of agriculture. More efforts are needed for providing credit support to youth in agriculture and interest as support to be provided by government. For employment creation, market oriented agriculture and agribusiness venture must be operated. Youths are not inclined to practice agriculture the way of their forefathers traditional occupation but in a modern way, with an appropriate image that speak to their aspiration as natives of

the digital age – where the media have a great influence on perceptions and aspirations. Youth can play a great role by involving themselves in agriculture to enhance agribusiness. Young generation can see a promising future in Agriculture as well as to influence them to pursue careers in agriculture-based industries. Young graduates can involve in different levels of agricultural value chain viz Research & Innovation/Application, Primary Production, Primary Processing / Aggregation, Secondary Processing /SME Processing, Mechanization, Logistics (Transportation & Ware Housing), Marketing (branding, Advert and Distribution), Wholesale and Retail, VC Service Provider (Admin, Legal, IT etc.)The great challenge of youth unemployment can also be seen as an opportunity for youth to become the engine driving new agriculture and agri-business enterprises as well as rural transformation.

Key words: Venture, Agribusiness, Value chain, Trade and Marketing.

S1-P9

SOCIO-ECONOMIC AND SUSTAINABLE GROWTH OF FARMERS THROUGH ORGANIC FARMING IN ODISHA

Vishal Singh

*Founder of Kaivalya Vichar Seva Samiti (KVSS) and Ex-Dean (ext.),
Centurion University of Technology & Management, Odisha
Email: vishalsinghiitkgp87@gmail.com*

Organic production is a holistic system designed to optimize the productivity and fitness of diverse communities within the agro-ecosystem, including soil organisms, plants, livestock and people. The principal goal of organic production is to make farmers self sufficient and harmonious with the environment.

In Mayurbhanj, Jharsuguda, Bargarh & Sambalpur district of Odisha, thousands of farmers has been adopted complete Organic cultivation and now they are completely avoided chemical fertilizers, insecticide & pesticide and produces only 10 ton of vermicompost in 2013 but up to 2017, the production noticed nearly 300 ton, which is sufficient for 300 acre of Organic farming as manure. Through “Minimum input & maximum out put” method, input cost of cultivation has been minimized and tends to zero. Through “1 Lakh from one acre” concept, nearly 600 familyof Lodha (PVTGs) & Santhal Tribe comunuity has been benifited by intercropping of medicinal crop with orgaic fruits & vegetabls. In, Bargarh and Mayurbhanj distric of Odisha, nearly 5500 youth farmers has been trained to produce Organic compost and insect-pest repellent, 2300 farmers of Jharsuguda and Sambalpur district, has been skilled as “Organic Nursery Raiser”; “Gardener”; “Organic Kitchen Gardener” and “Organic manure producer”. For promotion of indegenious breed of cows, we promoted Desi-Cow based Farming, through basic training and demonstration about various component of organic farming and in present producing different organic farm inputs like organic compost (300 ton/cycle), organic isect and pesti-repellent (1000 litr/ month), and organic nutrients

500 liter/month), panchagavya (2500 kg/month), Anu-khadam (5 kg/cycle), vermi-wash (2000 liter/month), Neemamrutam (1500 liter/month), Amrit-pani (1000 liter/month) and amrit mitti (500 ton/cycle), for better and chemical-free food production, which is adopted by more than 1500 farmers of Mayurbhanj, Gajapati, Sundargarh and Bargarh district of Odisha and practicing in nearly 1200 acre of land. In future, we want to expand our campaign of socio-economic and sustainable growth of farmers through organic farming throughout the India.

S1-P10

AGRIPRENEURSHIP IS A TOOL TO UPLIFTMENT OF UNEMPLOYED RURAL YOUTHS

¹Akkamahadevi Naik, ²VijayalaxmiKhedand³ Ashokkumar. B

*¹Ph.D Scholar, Department of Agricultural Extension, ²Ph.D Scholar, Dept. of Agricultural Economics, ³Ph.D Scholar, Department of Agricultural Extension
UAS, GKVK, Bengaluru-560065, Karnataka, India
Email: ashokbrr8@gmail.com, akkammaagri@gmail.com*

Indian economy is basically agrarian economy. On 2.4 percent of world land India is managing 17.5 percent of world population. At the time of independence, more than half of the national income was contributed by agriculture along with more than 70 percent of total population was dependent on agriculture (Pandey, 2013). But at the present context due to increasing population and lack of resource availability for agriculture operation, the rural youth are disoriented and clueless in the face of lack of income generating and employment opportunities, the rural population facing a major problem i.e unemployment and they are showing moving towards the urban area for searching job to fulfill their basic needs. To come out of that problems it is very much necessity to engage the youths in agriculture activities like floriculture, vermicompost, mushroom production, seed production, apiary, value addition dairy enterprises. The psychological traits including need for achievement, aspiration and risk taking willingness of the potential entrepreneurs has to generate for growth, diversifying income, providing widespread employment and entrepreneurial opportunities in rural areas. A shift from agriculture to agribusiness is an essential pathway to revitalize Indian agriculture and to make more attractive and profitable venture. Agripreneurship have the potential to contribute to a range of social and economic development such as employment generation, income generation, poverty reduction and improvements in nutrition, health and overall food security in the national economy.

Keywords: Agripreneurship, Employment Generation, Poverty Reduction and Agribusiness.

ALUMNI AGRIPRUNERS ARE SHINING IN THE SOCIETY

Dileep Masuthi¹ and Satish D1

¹: *Asst. Professors, KRCCH Arabhavi, UHS, Bagalkot (Karnataka)*
Email: aodileep@gmail.com

Our agriculture alumni are well placed in all the sector of the society. The graduates are willing to work with nature, fighting with nature. The smart technologies in agriculture sector have grown well in recent past. Agriculture is a multiple operations enterprise, where about 10 different operations starting from soil preparation to storage and transport contribute to overall productivity and profit. This makes agriculture a complex system for start-ups to target. The big ticket operations like seed, irrigation, chemicals and machineries are dominated by big players and it requires large investments. But recently most of the agriculture graduate students are having the background of farming and many have emerged as shining stars in the society. These agripruners not only have made their status in the society but also making other dependent farmer/ labors, independent, self relying families of the society. The example in Karnataka state are many. The agripruners alumni are growing day by day. They could establish in such a beautiful manner to stand as a reputed persons of the locality, region or state. This could be only possible because of the confidence that they gain out during their graduation. It is also the recent changes in the course curricula by the education division of ICAR New Delhi as well as the keen interest by the university administrates in the states. The total output students who turn immediately to agriprunership is 4-5 per cent, but alumni who re engage themselves after leaving white color jobs is 18-22 percent. The dropout students who engage themselves as agriculture labor who are helping agripruners who contribute 12% of the labour requirement. And the pre university students who get diploma certificate who are more interested to participate as agripruners is also increasing, because of the more practical exposure in their course curricula in diploma agriculture, which will defiantly increase the life style of the students.



EMPOWERMENT OF RURAL YOUTH THROUGH AGRICULTURE IN CREATION OF JOB OPPORTUNITIES BY ESTABLISHING AGRIBUSINESS VENTURES

Santosh Kumar, RamjeetYadav and Shalinikumara

Department of soil science and Agricultural Chemistry, Bihar Agricultural University, Sabour-813210, Bihar, India
E-mail:santoshpmch05@gmail.com

Rural youth in India have the potential needed for participating effectively in agricultural development. Majority of agricultural policies and programmes formulated in recent past. The major problem encountered by youth in agriculture include lack of interest in farming as a result of

drudgery in farm operations, lack of competitive market for agricultural products, lack of start-up capital, inadequate labour saving technologies for ease of operations and inadequate finance/credit facilities. As a result, serious economic challenges arise which result in undue poverty and vulnerability. This has also made youth to seek employment in other sectors in order to empower themselves economically, resulting in rural-urban migration and leaving the bulk of agricultural production in the hands of inefficient people who often times produce at a subsistence level. However, efforts made in reviving agriculture through rural youth programmes did not given the desired results. Government at various level encourage to promote youth in agriculture through creating awareness on youth employment in agricultural Programme to enable them to know about it and participate actively for enhanced agricultural productivity, increased food security as well as empowering them economically. Most rural youth do not foresee a prosperous future for themselves in the agriculture sector, mostly because of lack of profitability of agricultural activities and lack of physical and social infrastructure in rural areas. These infrastructures are necessary in order to reduce rural-urban migration and keep youth in rural areas as well as promote their interest in agriculture. Rural youth should be involved in the drafting, implementation, monitoring and evaluation of policies and programmes related to agriculture. The use of innovative information and communication technologies should be promoted among rural youth. Education and capacity-building programmes for rural youths should be defined in a more participatory way and focused on agricultural best practices, land laws and knowledge sharing. Informal education programmes should also be implemented in rural areas to change the mind set of people about agriculture. The youth withdrawal from agriculture is higher than that of the older cohorts although a significant proportion of the youth still derive their livelihood from agriculture.

Keywords: Youth, rural area, empowerment, agriculture,



S1-P13

PROSPECT OF THE YOUTH IN AGRICULTURE IN INDIA

Dr. Arnab Kumar Maiti

*M.Com (Co-operative Management), M.Com (Banking & Insurance Management), M.Phil (Commerce), Director, Directorate of Open & Distance Learning, University of Kalyani, P.O: Kalyani, Dist: Nadia, West Bengal
Email: arnab.kmaiti@rediffmail.com*

Agriculture is the biggest occupation undertaken by majority of the people in India. However, entrepreneurship has not been adequately developed in agricultural sector. The main reasons of the Indian farmers are either illiterate or less educated & till recently farming was done in traditional manner as way of life rather than an enterprise. Therefore, the efforts are being made by Government to develop farmers by inculcating in them the qualities of an entrepreneur. Harnessing the youth power is necessary for developing India as self reliant & global economic leader. Educated unemployed youth became a serious concern due to lack of skills & specialization in changing socio-

economic & occupational pattern in rural India. The agrarian situation is worse due to migration as youth are not interested to take farming as an occupation. The internal reasons are social stigma, undignified job, risky & uncertain venture, low return investment and external reasons are the alluring life style & facilities in the urban & metropolitan cities. Both the Central & State Governments have devised programs for entrepreneurs to set up agribusiness in India. These may be classified as programs falling under MSME based on the capital required for investment. The Ministry of MSME, Govt. of India, designs & implements the policies through its field organizations for promotion & growth of MSME including the coir industries. Agri business encompasses agricultural & allied sectors like dairy, poultry, fisheries, forestry etc; portion of industrial sector which produces farm inputs or utilizes from suppliers & the processors of farm products.

It has a major role to play in national development. The specific advantages of agri business & food processing industries include low investment, improved hygienic status of product, extension in shelf life & use of indigenous machinery. The manufactured products can also be nutritionally good & attractive to the consumers. The use of mechanization can help to bring down the cost of production. ICAR started ARYA(Attracting & Retaining Youth in Agriculture) and Students READY(Rural Entrepreneurship Awareness Development Program) for youth empowerment in agriculture with a mission mode. There is a need of developing urban amenities in rural areas & establishing infrastructure for storage,agro-processing,post-harvest management, value chain management, market linkage by mobilizing & net working of youth with an entrepreneurial spirit. Youth have different roles,responsibilities & relations in agricultural production systems which vary from place to place & society to society. Entrepreneurship enhances financial independence & self esteem of youth. Need of agripreneurship development is essential for youth i.e., to train the jobless agriculture graduates & farmers in agri business management & also provide finance to develop their own business in agriculture. Policy makers should establish integrated module for holistic growth & development of youth ensuring access to right information, updated training, ICT led agriculture, youth friendly programs, profitable ventures,market linkage, infrastructure support to Farmers Producer Company's and also Government should provide interest- free crop loans, crop insurance at low premium & support services. So, to promote youth entrepreneurship Govt. should take initiative through providing financial support, impart various training programs, marketing support etc., to make their more involvement in development & improve their socio- economic condition.

S1-P14

STRATEGIES TO ENGAGE YOUTHS IN AGRICULTURE

¹Ashokkumar. B*, ¹Akkamahadevi Naik, ¹Tanweer Ahmed and ²Praveen H.G

*¹Ph.D Scholar, Department of Agricultural Extension, ²Ph.D Scholar, Dept. of Crop Physiology
UAS, GKVK, Bengaluru-560065, Karnataka, India*

**Email:ashokbrr8@gmail.com*

Global population is projected to reach 9 billion by 2050. The number of young people is also expected to increase to 1.3 billion by 2050, 14 percent of the projected global population. Engaging

youth in agriculture has been a prominent topic and has risen up the development agenda, as there is growing concern worldwide that young people have become disenchanted with agriculture. Around 85percent of young people living in developing countries, where agriculture is likely to provide the main source of income it is vital that young people are connected with farming. Increasing youth unemployment, ageing farmers and declining crop yield under traditional farming system, it is very much necessity to engaging youth in agriculture and agriculture should be given a first priority. Strategies and solution for making agriculture more attractive to younger generations viz., Link social media to agriculture, Strengthen higher education in agriculture, Greater use of Information and Communication Technologies (ICT) encourage young people to speak up, Facilitate access to land and credit, Put agriculture on the school curricula, Greater public investment in agriculture and Make agriculture more profitable. Agriculture can play a significant role in removing youth unemployment. The energy that the youth possess and their significant numbers provides us with tremendous opportunities for an increased agricultural productivity. Motivating the youth to view agriculture as a career opportunity requires a multi-level intervention. At first, there should be provide awareness and counselling sessions at the school level. Thereafter, those seeking jobs and looking for a good life need to be lured and sensitized. This can be done by delivering age-appropriate information to farmers. The media, ICT and social media can be used to help better agricultures' image across a broad audience and allow for sharing of information and experiences between young people and young farmers.

Keywords: Youths, Agriculture, ICT, Awareness, Motivation

S1-P15

ENTREPRENEURIAL OPPORTUNITIES FOR YOUTH IN AGRICULTURE

VinodaShankara Naik¹, Mahalakshmi, S. M.1 and Veeresh Wali²

¹**Department of agricultural extension,* ²* *Department of agricultural economics*

¹-*Ph.D Scholars, Department of Agricultural Extension, UAS, GKVK, Bengaluru-560065, Karnataka, India*

²- *Ph.D Scholar, Department of Agricultural Economics, OUAT, Bhubaneswar*
Email:snvinoda@gmail.com@gmail.com

Entrepreneur, one who assumes the responsibility and the risk for a business operation with the expectation of making a profit. Today's knowledge based economy is fertile ground for entrepreneurs, in India. It is rightly believed that India has an extraordinary talent pool with virtually limitless potential to become entrepreneurs. Therefore, it is important to get committed to creating the right environment to develop successful entrepreneurs. To achieve this, India must focus on the following area-Create the Right Environment for Success, Ensure that Entrepreneurs have access to the Right Skill, Ensure that Entrepreneurs have access to "Smart Capital", Enable Networking and Exchange, Government Support- Both the Central and State Governments should take more interest in promoting the growth of entrepreneurship. Implementation constraints of policies promoting entrepreneurship, Simplification of process, Removal of process bottleneck. Networking through

Information and Communication Technologies can help expanding business beyond geographical boundaries. Entrepreneurship is the need of hours to make agriculture a more attractive and profitable venture. It is clear that there is a great scope for entrepreneurship in aIndia and this potentiality can be tapped only by effective management of agri elements such as – soil, seed, water and market needs. An individual with risk bearing capacity and a quest for latest knowledge in agriculture sector can prove to be a right entrepreneurs.

Keywords: Entrepreneur, Smart Capital, Information and Communication Technologies

S1-P16

SMALL TEA GROWING SYSTEM—AN ALTERNATIVE ENTREPRENEURSHIP DEVELOPMENT APPROACH TO ATTRACT RURAL YOUTH

Subhrajyoti Panda^{1*}, Yanglem Lakshimai Devi¹, Avrajyoti Ghosh¹, Sourav Kumar Das²,
P.K Pal³

¹. Research Scholar, ². MSc. Scholar, ³ Professor

¹ & ³ Department of Agricultural Extension, Uttar Banga Krishi Viswavidyalaya, Pundibari,
Coochbehar, West Bengal, pin-736165

². National Research Centre for Plant Biotechnology, IARI, New Delhi

*Email: subhrajyotip1992@gmail.com

Tea, the most ancient beverage mankind has been enjoying, is still the most popular drink in the world; may be regarded as the “national drink” in India is an aromatic beverage commonly prepared by pouring hot or boiling water over cured leaves of *Camellia sinensis*, an ever green shrubs native to Asia. Small tea growers are largely concentrated in North Dinajpur, Kishanganj, Jalpaiguri, Cooch Behar, and at the foothills of the Darjeeling Hills. There are 30,000 such small tea growers in North Bengal and total production is around 91 million kg, which is almost 32.5% of North Bengal's tea production of 280 million kg. The study was conducted in Jalpaiguri and Uttar Dinajpur district of West Bengal. Purposive sampling was done to select the areas and random sampling was followed for selection of individual respondents. The present study mainly considered primary data for analysis. Primary data were collected through group and individual interview schedule. However, small amount of secondary data were also collected from records of CISTA and SHG registers. The results revealed that small tea growing system is economically profitable than the existing crop alternatives. It is observed that B:C ratio is high in case of tea than other crops in the study area. It is also seen that the SHGs are getting higher rate of leaves because the SHGs are bargaining for their product and they are avoiding middlemen for their produce and sometimes they are possessing in their own co-operative processing units. The rate of green leaves in the month of November or December remained lowest but being highest in the month of March to June. Small tea sector supports the family income with 25-100% contribution. It can be concluded from the study that Small tea growing system is a very good alternative to attract rural youth for entrepreneurship development.

Key Words: Ever green shrubs, Economic analysis, B/C ratio, Entrepreneurship, Co-operatives

AGRIPRENEURSHIP DEVELOPMENT IN INDIA

¹Mallesh, K.U. and ²Apurva, V

*Department of Soil Science and Agricultural Chemistry, College of Agriculture, Navile²
University of Agricultural and Horticultural Sciences, Shivamogga
Department of Soil Science and Agricultural Chemistry, College of Agriculture, gkvk¹.
University of Agricultural Sciences, Bengaluru*

**E-mail: appupatil.266@gmail.com, mallesh913@gmail.com*

Agripreneurship development as a tool to upliftment of agriculture as Agripreneurs also known as entrepreneurs. Entrepreneurs may be defined as innovators who drive change in the economy by serving new markets or creating new ways of doing things. Thus, an agripreneurs may be someone who undertakes a variety of activities in agriculture sector in order to be an entrepreneur. A shift from agriculture to agribusiness is an essential path way to revitalize Indian agriculture and to make more attractive and profitable venture. Agripreneurship plays various roles in the growth and development of national economy through entrepreneurship development which increases the income level and employment opportunities in rural as well as urban areas. It helps in inducing productivity gains by smallholder farmers and integrating them into local, national and international markets and also in I reducing food costs, supply uncertainties and improving the diets of the rural and urban poor in the country. Agripreneurship is the need of hours to make agriculture a more attractive and profitable venture. It is clear that there is a great scope for entrepreneurship in agriculture and this potentiality can be tapped only by effective management of agri-elements such as – soil, seed, water and market needs. Thus Agripreneurship is not only an opportunity but also a necessity for improving the production and profitability in agriculture and allied sector.



WOMEN'S EMPOWEMENT IN AGRICULTURE SECTOR

Mallesh, K.U¹, Apurva, V² and Chandrakant

*Department of Soil Science and Agricultural Chemistry, College of Agriculture, Navile²
University of Agricultural and Horticultural Sciences, Shivamogga
Department of Soil Science and Agricultural Chemistry, College of Agriculture, gkvk¹
University of Agricultural Sciences, Bengaluru*

**E-mail: appupatil.266@gmail.com and mallesh913@gmail.com*

Women play a critical and potentially transformative role in agricultural growth in developing countries, but they face persistent obstacles and economic constraints limiting further

inclusion in agriculture. The women are the backbone of workforce and she does the tedious work in agriculture, animal husbandry and homes. Women constitute half power of the country so in order to make this country a fully powerful country, women empowerment is very necessary. It is empowering women to understand their rights to be independent in every area for their proper growth and development. The Women's Empowerment in Agriculture Index (WEAI) is a new survey-based index designed to measure the empowerment, agency, and inclusion of women in the agricultural sector. The Women's Empowerment in Agriculture Index (WEAI) measures the empowerment, agency, and inclusion of women in the agriculture sector in an effort to identify ways to overcome those obstacles and constraints.

The Index is a significant innovation in its field and aims to increase understanding of the connections between women's empowerment, food security, and agricultural growth. It measures the roles and extent of women's engagement in the agriculture sector in five domains:

1. Decisions about agricultural production,
2. Access to and decision making power over productive resources,
3. Control over use of income,
4. Leadership in the community, and
5. Time use.



S1-P19

AGRIPRENEURSHIP IS A WAY TO ERADICATE UNEMPLOYMENT IN RURAL YOUTH

Ashok Kumar.B., Akkamahadevi Naik and Mahalakshmi, S. M.

*Ph.D Scholar, Department of Agricultural Extension, UAS, GKVK, Bengaluru-560065,
Karnataka, India*

**Email:ashokbrr8@gmail.com*

One in every two Indians depends on agriculture for livelihood. Agriculture landscape has changed drastically, since this intervention that a second green revolution was the need an entirely new approach and an entirely new set of technology. A period when the productivity of global agriculture increased drastically as a result of new advance. We believe entrepreneurs are the key drivers of tomorrow innovations and integral to creating a prosperous economy. Some important sources of uncertainty include production risk, price risk and financial risk. Large population of India is dependent on agriculture for their source of revenue. But Indian agricultures low in productivity with large number of disguised unemployment. Entrepreneurial development is a systematic and a controlled development of a person to an entrepreneur. The development of an agripreneur refers to inculcate the entrepreneurial skills into a farmer or young farmer, providing the desirable knowledge, getting higher the technical, financial, marketing and managerial expertise, and building the entrepreneurial approach. Agripreneur has been named as one of the key driver for economic development. During an economic crisis, when development is negative, the importance

of Agripreneurship development has increased. Agripreneurship has been linked to amplified growth, increased creation of wealth and increased quality of life. In developing countries like India for raising the living standard of the enormous majority of the backward regions, planning and implementation for development of Agripreneurial activities are essential because of their over-dependence on agriculture for employment thus Agripreneurship for rural youth appears to be the best potential alternative to find employment avenues.

Keywords: Entrepreneurship, Agriculture, Economic development, Employment, Skill

S1-P20

ORNAMENTAL PLANTS NURSERY: AN AREA TO INVEST SKILLED YOUTH AND TO EARN DOLLARS

Mallikarjun Hebbal¹, Mukund Shiragur², Dilip Masuthi³, Jashwitha, S., VishwasGowda and NamishaArora

*¹: M. Sc (Hort.) FLA student, ²: Asst. Prof of Floriculture and Landscape Architecture, ³: Asst. Prof of Seed Technology, KRCCH Arabhavi, UHS, Bagalkot
Email: hebbalhortico@gmail.com*

With the very strong demand for ornamental plants that most nurserymen enjoy today, it might appear very easy to operate a profitable nursery. In reality, only those nurseries that employ proven cultural and economic management practices can maintain a profitable business. (Perkins, 1973). Different ornamental plants have different botanical forms, individual species and within species variety level genotypes vary significantly in attractive flower colour, foliage type, plant shape, growing habit and are propagated by various means of propagules, thus a wide range of plants collection are essential in an ornamental nursery. Increased competition among nurseries do exist but concentrating on consumer demand and introducing new trend setting varieties can lead in to successful ornamental nursery establishment.

Session 2

Institutional Strengthening for High Quality Innovative Research Projects and Quality Education in Agriculture

NUTRACEUTICAL RICE: AN ENTREPRENEURIAL STARTUP FOR FARMER

Milan Kumar Lal^{*1}, Sourav Kumar Das² and Sandeep Adavi1

¹ *Division of Plant Physiology, Indian Agricultural Research Institute, New Delhi;* ² *National Research Center for Plant Biotechnology, IARI, New Delhi*

**Email: milan2925@gmail.com*

There is booming demand for rice in Asia and other part of the world due to intense rise in world's population. To feed the huge population the production of rice must be increased by 60-70 percent over the next two decades (Chauhan et al., 2017). The consumption of colored rice is increasingly becoming popular in many Asian countries where black rice is often mixed with non-colored rice prior to cooking to enhance the flavor (Juliano, 1993). In addition, red rice is commonly used as a food colorant e.g. in bread, ice cream and liquor in several Asian countries.

Black rice and its importance

Black rice is a range of rice types of the species *Oryza sativa* L., which are high in nutritional value and is a source of iron, vitamin E, and antioxidants. The bran layer of black rice contains one of the highest levels of anthocyanin. In China, black rice is claimed to be good for the kidney, stomach, and liver. Black rice has a deep black color and usually turns deep purple when cooked (Nakamura et al., 2017). Its dark purple color is primarily due to its anthocyanin content, which is higher by weight than that of other colored grains. In addition, pigmented rice composed of high content of phenolic compounds with notable antioxidant activities. Antioxidants prevent cell damage by reactive oxygen species.

Phytochemicals present in black rice:

A) Anthocyanin-

It is the class of flavonoids responsible for the color of rice. The most abundant anthocyanins in colored rice were identified as cyanidin-3-glucoside and to a minor extent, peonidin-3-glucoside. In black rice, contents up to 631 mg/100 g cyanidin-3-glucoside and 363 mg/ 100 g peonidin-3-glucoside have been reported. Compared to black rice, significantly lower total anthocyanin levels have been reported for red rice ranging from 1.5 to 9.4 mg/100 g. Owing to several health-promoting impacts associated with anthocyanins, such as anti-oxidative, anti-inflammatory and anti-cancer effects black rice is considered as a functional food and food ingredient in many Asian countries. The pigment from black rice contains two major anthocyanins: cyanidin-3-glucoside and peonidin-3-glucoside. Anthocyanins are naturally occurring phenolic compounds that provide the color of many fruits (especially berries) and vegetables and they have several valuable effect (de Lima et al., 2017). Anthocyanins can decrease the risk of coronary heart diseases, inflammatory process, and atherosclerosis through their antioxidant, anti-platelet and anti-inflammatory activities (Hu et al., 2003). Foods that are rich in anthocyanins or anthocyanins per se have health benefits. The functional properties of anthocyanins in black rice have been demonstrated in numerous nutritional studies.

B) Antioxidants-

Black rice contains a high level of several phytochemicals, e.g., gamma-oryzanol, tocopherols, tocotrienols and phenolic compounds. It has reported that phenolic compounds exhibit high antioxidant activity against scavengers of singlet oxygen and inhibit high hydrogen peroxide-induced damage to cellular DNA in human lymphocytes. There is evidence that phenolic substances act as antioxidants by preventing the oxidation of LDL-lipoprotein, platelet aggregation and damage of red blood cells. Additionally, phenolics act as: (i) metal chelators, (ii) antimutagens and anticarcinogens, (iii) antimicrobial agents and (iv) clarifying agents. These compounds are a part of the everyday diet and also used as medicines or supplements. Gamma-oryzanol is another phytochemicals that found at high concentration in rice bran, including sterols and ferulic acid, has been reported to exhibit more antioxidant activity than vitamin E as six fold and other health beneficial properties (Nakagawa and Maeda, 2017). Coloured rices are reported as potent sources of antioxidants and encouragements as viable sources of antioxidants for functional foods were made. Of these, red rice gained popularity in Japan as a functional food because of its high polyphenols and anthocyanin content. Before the health beneficial effects of pigmented rice emerged, Chaudhary (2003) saw an upcoming demand of black rice as an organic food colouring agent which has been at least partly possible due to the increased production of black rice. Black rice has a number of nutritional advantages over common rice, such as a higher content of protein, vitamins and minerals, although the latter varies with cultivar and production location. Anthocyanin pigments have been reported to be highly effective in reducing cholesterol levels in the human body. Effects of peonidin, peonidin 3-glucoside and cyanidin 3-glucoside, major anthocyanins extracted from black rice, also exerted an inhibitory effect of cell invasion on various cancer cells The QTL for amylose, protein, and moisture content in rice has been identified that will help in implication of the more further research (Bruno et al. 2017). Their important bioactivities include anti-inflammatory enhancement of the immune system, heart disease, cardiovascular disease, glycemic control, diabetes and inhibit tumor promotion.

Reference

1. Bruno, E., Choi, Y.S., Chung, I.K. and Kim, K.M., 2017. QTLs and analysis of the candidate gene for amylose, protein, and moisture content in rice (*Oryza sativa* L.). 3 Biotech. 7(1): 40.
2. Chaudhary, R. C. 2003. Speciality rices of the world: Effect of WTO and IPR on its production trend and marketing. Journal of Food, Agriculture and Environment. 1 (2): 34–41.
3. Chauhan, B.S., Jabran, K. and Mahajan, G., 2017. Rice production worldwide. Cham, Switzerland: Sprinkler International Publishing.
4. de Lima, Â.G., Barum, M.T., Ramirez, R.P., Fonseca, S.F., Pieniz, S. and Rodrigues, K.L., 2017. Acceptability, Nutritional Composition, and Protein Digestibility of Food Produced with Black Rice. Journal of Culinary Science & Technology. 1:1-10.
5. Hu, C., Zawistowski, J., Ling, W., & Kitts, D. D. 2003. Black rice (*Oryza sativa* L. indica) pigmented fraction suppresses both reactive oxygen species and nitric oxide in chemical and biological model system. Journal of Agricultural and Food Chemistry, 51: 5271–5277.
6. Juliano, B.O., 1993. Rice in human nutrition (No. 26). Int. Rice Res. Inst.

7. Nakagawa, K. and Maeda, H., 2017. Investigating Pigment Radicals in Black Rice Using HPLC and Multi-EPR. *Journal of Oleo Science*. 66(5): 543-547.
8. Nakamura, S., Hara, T., Joh, T., Kobayashi, A., Yamazaki, A., Kasuga, K., Ikeuchi, T. and Ohtsubo, K.I., 2017. Effects of super-hard rice bread blended with black rice bran on amyloid β peptide production and abrupt increase in postprandial blood glucose levels in mice. *Bioscience, biotechnology, and biochemistry*. 81(2): 323-334.

S2-P2

NABARD: GROWTH OF MICROFINANCE SECTOR IN INDIA THROUGH DIFFERENT APPROACHES

¹Ashok, ²Jagadish, ³Sudeep Kumar, E. and ⁴Maruthi

*¹Dept of Seed Science and Technology, ²Dept of Agronomy, ³Dept of Agronomy and ⁴Dept of
Agronomy, College of Agriculture, University of Agricultural Sciences, Raichur-584 104
Email: npbashokreddy@gmail.com*

The importance of institutional credit in boosting rural economy has been clear to the Government of India right from its early stages of planning. Therefore, the Reserve Bank of India (RBI) at the insistence of the Government of India, constituted a Committee to Review the Arrangements For Institutional Credit for Agriculture and Rural Development (CRAFICARD) to look into these very critical aspects. The Committee was formed on 30 March 1979, under the Chairmanship of Shri B. Sivaraman, former member of Planning Commission, Government of India.

The Committee's interim report, submitted on 28 November 1979, outlined the need for a new organisational device for providing undivided attention, forceful direction and pointed focus to credit related issues linked with rural development. Its recommendation was formation of a unique development financial institution which would address these aspirations and formation of National Bank for Agriculture and Rural Development (NABARD) was approved by the Parliament through Act 61 of 1981.

NABARD came into existence on 12 July 1982 by transferring the agricultural credit functions of RBI and refinance functions of the then Agricultural Refinance and Development Corporation (ARDC). It was dedicated to the service of the nation by the late Prime Minister Smt. Indira Gandhi on 05 November 1982.

Set up with an initial capital of Rs.100 crore, its' paid up capital stood at Rs. 5,000 crore as on 31 March 2016. Consequent to the revision in the composition of share capital between Government of India and RBI, the Government of India today holds Rs. 4,980 crore (99.60%) while Reserve Bank of India holds Rs. 20.00 crore (0.40%).

Micro Credit Innovation:

NABARD, through its' Micro Credit Innovations Department has continued its role as the

facilitator and mentor of microfinance initiatives in the country. The overall vision of the department is to facilitate sustained access to financial services for the unreached poor in rural areas through various microfinance innovations in a cost effective and sustainable manner.

NABARD has been continuously focusing on bringing in various stakeholders on a common platform and building their capacities to take the initiatives forward. This has resulted in tremendous growth of microfinance sector in India through different approaches like:

Self Help Group – Bank Linkage Programme (SHG-BLP)

Based on the observations of various research studies and an action research project carried out by NABARD, the model of ‘SHG-BLP’ has evolved as a cost-effective mechanism for providing financial services to the unreached and underserved poor households. What started as a pilot to link around 500 SHGs of poor to the formal financial institutions during the year 1992-93 has now become the largest microfinance programme in the world, in terms of the client base and outreach. The SHGs which follow ‘Panchsutras’ viz. conduct of regular group meetings, regular savings within the group, internal lending based on the demand of members, timely repayment of loan and maintenance of proper books of accounts are considered to be of good quality and over years have proved themselves to be good customers of Banks.

The NGO sector has played a prominent role of working as a Self Help Group Promoting Institution (SHPI) by organizing, nurturing and enabling credit linkage of SHGs with banks. NABARD later coopted many others as SHPIs including the rural financial institutions (RRBs, DCCBs and PACS), Farmers’ Clubs (FCs), SHG Federations, Individual Rural Volunteers (IRVs) etc. These stakeholders were encouraged to take up promotion of SHGs by way of promotional grant assistance from NABARD. This savings led microfinance model has now become the largest coordinated financial inclusion programme in the world covering almost 100 million households in the country. With more than 86% of the groups being exclusively women groups, the programme has provided the much needed push to empowerment of women in the country.

Other than championing the movement and providing promotional support, NABARD has enabled an entire ecosystem of support through policy advocacy at Bank and Government level, organising and sponsoring a large number of training & capacity building programmes, seminars & workshops for the benefit of all the stakeholders viz. the bankers, the Government agencies, the NGO partners and more importantly the SHG members themselves. Banks are also provided 100% refinance support by NABARD for financing of SHGs.

Product level changes like allowing voluntary savings in the group, sanction of cash credit/ overdraft system of lending to SHGs, allowing formation of JLGs within SHGs, improving risk mitigation systems, building second tier institutions of SHGs, etc. were brought subsequently to address operational issues emerging from time to time. Further, to enable SHG Members to take up livelihood activities, NABARD has been supporting Micro Enterprise Development Programmes (MEDPs) and Livelihood and Enterprise Development Programmes (LEDPs) for SHGs. NABARD is implementing and supporting implementation of various Schemes announced by Govt. of India

viz. Promotion of Women SHGs (WSHGs) in backward and Left Wing Extremism affected districts of Ministry of Finance, National Rural Livelihoods Mission (NRLM) of Ministry of Rural Development.

Financing of Joint Liability Groups (JLGs)

Financing of JLGs was introduced as a pilot project in 2004-05 by NABARD in 8 States with the support of 13 RRBs. The scheme was later mainstreamed for the banking system in the year 2006. JLGs are informal groups of 4-10 members who are engaged in similar economic activities and who are willing to jointly undertake to repay the loans taken by the Group from the Banks. JLGs basically are Credit groups of small/marginal/tenant farmers/ asset less poor who do not have proper title of their farmland. Regular savings by the JLG members is purely voluntary and their credit needs are met through loans from financial institutions and such loans could be individual loans or group loans against mutual guarantee.

Apart from extending refinance support of 100% to the financing Banks, NABARD also extends financial support for awareness creation and capacity building of all stakeholders under the Scheme. NABARD also extends grant support for formation and nurturing of JLGs to Banks and other JLG Promoting Institutions (JLGPIs).

NABARD Financial Services Ltd. (NABFINS)

NABARD, while promoting NABFINS has envisaged that NABFINS shall evolve into a Model Microfinance Institution to set standards of governance among the MFIs, operate with exemplary levels of transparency and operate at reasonable/moderate rates of interest. It is a NBFC – MFI which commenced its operations in November 2009.

NABARD is the major shareholder of this MFI others being Government of Karnataka, Canara Bank, Union Bank of India, Bank of Baroda, Federal Bank and Dhanalakshmi Bank. NABFINS extends loans to SHGs through its own trained Business & Development Correspondents (BDCs). NABFINS also extends loans to other second level organizations like Federations as well. NABARD is continuing its refinance assistance to NABFINS. Further details regarding NABFINS can be seen from www.nabfins.org.

Support for training and capacity building of clients

Giving due recognition to training and capacity building of various stakeholders such as bankers, NGOs, Government officials, SHG members and trainers, NABARD has trained around 37.69 lakh participants as on 31 March 2017, in the process giving shape to a strong back up team for implementation of the programme. Further it revised existing training modules and the 'Revised Handbook on Training Programmes under SHG-BLP in association with GIZ.

Micro Enterprise Development Programme (MEDPs)

NABARD since 2006 has been supporting need-based skill development programmes (MEDPs) for matured SHGs which already have access to finance from Banks. MEDPs are on-location skill development training programmes which attempt to bridge the skill deficits or facilitates optimization of production activities already pursued by the SHG members. Grant is

provided to eligible training institutions and SHPIs to provide skill development training in farm/off-farm/service sector activities leading to establishment of micro enterprises either on individual basis or on group basis. Over the years around 3.47 Lakh SHG members have been covered through 12,531 MEDPs.

Livelihood and Enterprise Development Programmes (LEDPs)

As skill upgradation trainings alone have limited impact on livelihood creation among the SHG members, it was thought prudent to create sustainable livelihoods among SHG members and to attain optimum benefit out of skill upgradation and a new scheme titled Livelihood and Enterprise Development Programme (LEDP) was launched in December 2015. It envisages conduct of livelihood promotion programmes in clusters. There is provision for intensive training for skill building, refresher training, backward-forward linkages and handholding & escort supports. It also encompasses the complete value chain and offers end-to-end solution to the SHG members. It is to be implemented on a project basis covering 15 to 30 SHGs in a cluster of contiguous villages where from SHG members may be selected.

The skill upgradation training is provided in batches of 25-30 members and covers agri & allied activities as well as rural off-farm sector activities. LEDP will not only facilitate promotion of sustainable livelihoods but also derive full advantage from promotional assistance. NABARD will provide grant support for skill upgradation programmes, establishment of demonstration unit and need based critical infrastructure. LEDP has been mainstreamed in May 2017.

Scheme for promotion of Women SHGs (WSHGs) in backward & LWE districts of India Subsequent to announcement made by Hon. Finance Minister in the Union Budget 2011-12, a scheme for promotion and financing of Women Self Help Groups (WSHGs) in association with Govt. of India is being implemented across 150 backward and Left Wing Extremism (LWE) affected districts of the country since March-April 2012. The scheme aims at saturating the districts with viable and self-sustainable WSHGs by involving anchor agencies who shall promote & facilitate credit linkage of these groups with Banks, provide continuous handholding support, enable their journey to livelihoods and also take the responsibility for loan repayments. Under the Scheme, in addition to working as an SHPI, the anchor agencies are also expected to serve as a banking / business facilitator for the nodal implementing banks.

To facilitate implementation of the Scheme, an exclusive fund viz. 'Women SHG Development Fund' was set up by Dept. of Financial Services, Ministry of Finance, Govt. of India in NABARD with a stated corpus of Rs. 500 Crore Grant support @ 10,000/- per SHG to the Anchor agencies and also the cost of publicity, training & other capacity building initiatives is met out of this fund.

Collaboration with NRLM

NABARD continues close coordination with all stakeholders in SHG BLP sector. Collaboration with NRLM is being regularly maintained and enhanced for the support of SHG BLP. Coordinated efforts like conduct of National level seminars and workshops, mutual dialogues and capacity building of stakeholders on SHG BLP have now become very regular. Coordinated efforts

in following areas have particularly proved immensely fruitful.

- **Training of Trainers (TOT) programme**

NABARD and NRLM are collaborating on capacity building needs of bankers and grass root level functionaries to strengthen the Self Help Group bank Linkage Programme through a number of initiatives. With the goal of training all rural bank managers, a series of Training of Trainers (TOT) programmes for Bankers, SRLM staff, DDMs & Officers drawn from 17 states have been held at BIRD, Lucknow. These trainers have further conducted training programmes of bankers in their respective states during the year. Moreover, as a part of the collaboration, state specific trainings of trainers of SHGs on financial inclusion were conducted by BIRD for 9 priority states. These trainers are providing financial literacy training to SHG members and leaders in these states. The financial literacy material developed under NABARD RFIP were used for these trainings. BIRD also conducted two training programmes on Bank Sakhi model for NRLM and SRLM participants during the year.

- **Conduct of Village Level Programmes (VLPs)**

With a view to foster better understanding of mutual requirements between banks, SHGs & SHPIs and to sort out issues like credit linkage & repayment etc. at ground level, Village Level Programmes (VLPs) are being conducted with the support of banks and NRLM in 13 priority States. These VLPs sponsored by NABARD are also helping in opening of SHG accounts, their credit linkage and regular loan repayments.

- **Smooth transition of WSHGs promoted in NRLM intensive blocks to SRLMs**

In order to ensure that all Women SHGs promoted in the NRLM intensive blocks, irrespective of promoting agencies receive eligible benefits like subvention, RFA, CIF etc. under NRLM, meetings have been organized between Anchor NGOs, SRLMs and nodal Banks and a list of SHGs formed in the intensive blocks under WSHG programme have been handed over to SRLMs for ensuring handholding over a long period.

Some of the salient features of the scheme are as below:

1. An anchor NGO / support agency will be selected by LDM in consultation with the DDM, NABARD and DLCC in each of the identified districts for implementation of the project.
2. The scheme would be implemented through bank branches with CBS facility.
3. The identified Bank branch will enter into an MoU with the identified NGO / support agency.
4. The identified NGOs will be eligible for grant assistance upto a maximum of Rs. 10,000 per WSHG.
5. All loans to new WSHGs promoted shall preferably be under the cash credit mode.
6. NABARD will provide need-based awareness and capacity development programmes for key stakeholders under the project.
7. As on 31 March 2017, the total number of WSHGs promoted and credit linked are 2.01 Lakh and 1.14 Lakh respectively:

SHG Films

MCID has been bringing out films on a regular basis to disseminate the progress achieved by rural women entrepreneurs, who got assistance from NABARD. Some important films that highlight the concepts and successes of SHGs are listed below:

- Luminous link
- Uniqueness about SHG-BLP – the largest Mf programme in the world
- Design features
- EShakti: Pilot Project on Digitisation of SHGs
- Scheme for promotion of Women SHGs (WSHGs) in backward & LWE districts of India
- Progress in implementation of WSHG Scheme as on 30 September 2017
- Status of Microfinance in India
- NGOs / MFIs debarred for future support from NABARD
- Highlights of the SHG-Bank Linkage Programme
- WSHG Status Archives



S2-P3

ORGANIC FOUR LAYER FARMING IN INDIA

AkashChourasiya

(Unnat Krishi Abhiyan Parisad Madhaya Pradesh)

Behind old R.T.O office near water tank Rajeev nagar tilisagar M.P 470002

Email-akashchourasiya05@gmail.com

Introduction

Today's basic problems of farmers in Indian agriculture such as –continuous water level decreasing which is a very big challenge for us, weed problem in the increasingly growing fields, outbreak of pests on crop, constant growth costs, climate change that have direct effect on agriculture, migration of youth from Indian agriculture, continuous land revenues are reduced because the land of agriculture is constantly changing in building road housing and family divination and continually increasing population. So, let us take such techniques that with the solution of these problems reduce the water and increase production in small space and reduce the cost of cultivation. Four layer farming is an alternative to these problems. This technology can earn up to Rs 10.50 lakhs in one acre. Young people can start entrepreneurship.

Innovation

Organic four layer farming in which the cost of farmer is reduced 3 to 4 times and production increases four times with four crops, then the total profit of the farmer goes up to 8 times. This method can revolutionize urban area & organic vegetable production in the country and the financial condition of the farmer will also be strengthened.

This method the consumption of fertilizers, water, labor, time and capital investment is reduced and four crops are produced. Along with the bed effects of climate change the crop is safe. In

this four layer organic farming 4 crops grown simultaneously on the same field at different level of field by using depth of land. This method maximizes use of manure and water available at different level in the land.

Description

Four layer organic farming is different from traditional farming. In this method we grow four crops for example ginger, leafy vegetable, kunduru and papaya, simultaneously on the same field. In this method ginger is planted under two inch of field in the month of February. Ginger comes over land in about 2 to 2.5 month in the mean time we sow leafy vegetable on the surface layer of the field. We create a semi-shady shade of bamboo or grass on the same place over ginger and leafy vegetable. This semishady shade protects ginger and leafy vegetable.

Utilizing the optimum of this shade we spread liana crop of kunduru on it. Kunduru is planted on field with the distance of 5 to 6 feet and at the same time papaya is also planted on the same field with the distance of 18 to 12 feet. Thus these crops grow over semi-shady shade. In this method the level of roots of all four crops are 3 inch for leafy vegetable , 3-9 inch for ginger, 1 feet for kunduru and 2 feet for papaya is also different which ensures the maximum utilization of available manure and water in the land of each level. Along with this planting the land on the ground covers it completely for some time, so that no weed can grow. Leafy vegetable also working like mulching which does not have to be put to the weed and the cost is also saved. And by leafy vegetable covering the ground, up to 70% water avoids evaporation. So this method save also 70% water.

In the field there is no water and weeds are not look insect. So the cost of insecticides and pesticide is saved. Being shed for a liana crop and with the natural semi-shade shed of grass and bamboo protects all crops from the effects of the climate change. So the effect of climate change is also avoided, which does not have to spend extra money. Using this method four crops can be grown with the manure, water, labor, time and capital of one crop. This method reduces investment up to 4 to 5 times and increases production up to 4 times. Thus the real gain increases up to 8 to 10 times.

Conclusion

India being an agriculture country, 60% of the population is dependent of agriculture. To ensure the availability of organic food of heavy population 'multi layer organic farming' (four layer farming) is undoubtedly going to be useful in every respect. This technique is in the reach of farmers and effective in limited resources. It makes entire agriculture cycle self-supporting. It generates harmony with nature because of no need of using chemical pesticides to destroy insects. Weed cannot develop because there is no spece on field, lefy vegetable has been sown which covers the whole surface. This method can bring economic prosperity of the farmers and a great change in the Agricultural Production in the country.



ENTOMO-PATHOGENIC NEMATODES: A BOON TO AGRICULTURE AND AN ALTERNATIVE TOOL FOR BIOMANAGEMENT OF INSECT PESTS

Istkhar*, Suresh Chandra Sharma, Amar Prakash Garg and S. Singh

School of Agricultural Sciences, Jaipur National University, Jaipur-302017, Rajasthan, India,

**Email: istkharrao@gmail.com*

Entomopathogenic nematodes are the lethal insect pathogens which kill their host very quickly. They are one of the key factors for regulation of insect population. But the topic of interest is that they may be utilized to control insect pest population. The pathogenicity of these nematodes is depending on the mutualistic bacteria that reside in their alimentary canal. The toxins produced by these bacteria cause the death of insect host within 24 to 48 hours. Easily availability in moist soils, high reproductive rate, vast variety of insect hosts and presence of infective juvenile (IJs) stage that can live for long duration in absence of food are the other factors which create the interest of scientists in these microscopic worms to use them as bio-control agents.

Key words: Insect pathogens, entomopathogenic nematodes, pathogenicity, biocontrol agents.

Introduction

Nematode or roundworms (or sutrakrami in hindi) with translucent body is found in almost everywhere where if any sign of life is present. The nemic community represent a morphologically simple looking but ecologically and physiologically diverse and most adaptable group of pseudocoelomates. A great diversity is found in this phylum as they found in almost every kind of habitat. They are found as parasites of animals and plant and also as free living. Plant parasitic nematodes (PPNs) perform key function in ecosystem as being harmful to crop protection. The variation is size from 0.2mm to 11 mm in roots of plants upto the size of alimentary canal of whale is also making them as an interesting animal in the animal kingdom. They occur in unimaginable numbers and in a wide variety of shapes, sizes and structure. Every inch of this globe, including the oceans, the rivers, the pools, the ponds and the puddle are all teeming with these tiny creatures. It has been estimated that nearly 90% of all the metazoa are nematodes. Some of these tiny creatures are free-living in the marine and freshwaters, others are soil inhabiting, still others are parasitic on different kinds of flora and fauna which are of considerable agricultural, clinical and veterinary importance as pests of plants and parasite of man and livestock. Nematodes are amazing animals, both ancient and diverse.

Nematodes are found to occupy almost all the conceivable habitats, but are often overlooked because most of them are microscopic in size. For instance, a square yard of woodland or agricultural habitat may contain several million nematodes. Many species are highly specialized parasites of vertebrates, including humans, or of insects and other invertebrates. Among the vast variety of parasitic nematodes, some have evolved an association with insect pathogenic bacteria. Together the bacteria and nematode are a lethal duo. These nematodes are called 'entomopathogenic nematodes' (EPN).

The earliest records of nematodes associated with insects can be traced back to Ulisse Aldrovandi, nearly 400 years ago, when he reported the presence of long thread-like or eel-like worms on the bodies of dead grasshoppers. The next report of these nematodes after Aldrovandi was by Lister (1672). Rene Anthoine Ferchault de Reaumur also studied the nematodes associated with insects and in 1742, described an unusual worm from bees which later in 1837 was named as *Sphaerularia bombi*, a common parasite of bumble bees. Later in the same decade, William Gould (1747) who was renowned as father of British Myrmecology described the emergence of worms, the mermithids from ants and wrote a famous book "An Account of English Ants". The early information of insect parasitic nematodes referred to rather large and impressive animals measured in centimetres rather than millimetres and it was not until 20th century that the nematodes we now refer as entomopathogenic.

Why entomopathogenic nematodes?

The term Entomopathogenic comprises from two Greek words entomon means 'insect', and pathogenic means to 'cause disease', hence the term 'entomopathogenic' translates as disease-causing to insect. Now days these nematodes are of considerable interest because of their potential as biological control agents of insects' pest. As pests, insects cause heavy loss to the crop, in spite of annual use of million tons of pesticides plus various biological and other non-chemical control methods. In recent years, the outbreaks of pests have become more common mainly due to development of insecticide resistance and subsequent control failures. Indiscriminate use of highly toxic, persistent chemical pesticides for the control of insect pest has also resulted in various other problems including environmental pollution, loss of predators, parasites and health hazards. Entomopathogenic nematodes or simply EPN are the new hope in the field of integrated pest management where they can be applied easily without damaging the environment.

Presently there are two genera of EPN namely *Steinernema* and *Heterorhabditis* and several species of these nematodes have been commercialized globally. Researches in India were started since the mid-1960's (Kaya et al., 2006), and many sampling programmes have been conducted for the isolation of indigenous populations (Divya and Sankar, 2009). Till date only seven *Steinernema* and one *Heterorhabditis* species has been reported and a number of unidentified isolated are under process (Bhat et al., 2017). The pathogenicity of these nematodes was also established on several insect pest populations (Gupta et al., 2011; Istkhar et al., 2016; Istkhar and Chaubey, 2016a, 2016b, 2018). Native species of EPN that are adjusted to local environmental and climatic situations are especially good candidates for use as biological control agents. Several species of EPN has been commercialized and available in the US and UK and some of them are listed in the table 1, but in India, there is still a need to establish them in the market.

Life cycle of entomopathogenic nematodes

The life cycle of EPN is similar to other nematodes and also comprises Egg-L1-L2-L3-L4-Adults stages with the aid of some special circumstances. The infective juvenile nematode (3rd stage juvenile or IJs), which is the only free-living stage, has the ability to actively locate insect-hosts, enters the host via natural openings, i.e., mouth, anus, spiracles or occasionally through the insect cuticle. The IJs of nematodes than kill their hosts with the aid of symbiotic bacteria *Xenorhabdus* (*Steinernema*) and *Photorhabdus* (*Heterorhabditis*) carried in the nematode's alimentary canal

(Poinar, 1990). These nematodes then release their symbionts into the hemolymph of insects, which are the primary agents responsible for killing the host within 24 to 72 hrs. Bacteria multiply rapidly in the hemolymph and produce toxins and other secondary metabolites, which contribute to the weakening of the host's defence mechanism. Two developmental cycles thus occur in the host – that of nematodes and that of bacteria. After the nematodes complete one to three generations within the insect cadaver, infective juveniles (IJs) exit to find new hosts (Poinar, 1990). The two nematode genera differ in their life cycles in that the Steinernematids contain only amphimictic forms (first and second generation males and females), whereas the first generation of Heterorhabditids (arising from infective juveniles) contain only hermaphrodites, and subsequent generations may contain amphimictic and hermaphroditic forms. The nematodes and bacteria have a mutualistic relationship, the later provide nutrients to the former, produce antibiotics that inhibit competing microbes, and kill the host through septicaemia. Although the nematodes may also contribute to host death through suppression of the immune system and toxin production (Akhurst and Boemare 1990), the most important role they play in the mutualism is serving as vectors for the bacteria. Without the nematode, the bacteria cannot survive well in the natural environment and are generally not pathogenic when ingested by a host (Akhurst and Boemare, 1990; Morgan et al., 1997).

Indian economy and pest problem

India is the second largest populated country in the world after china and as per the agriculture resources; it is the world's second largest country too. India has made a great improvement in agriculture but agriculture throughout history has been beset by several pest outbreaks. Serious yield losses have been reported in legumes due to only one insect *Helicoverpa armigera* which range from 20 to 30% and sometime rise to 75% in chickpea alone with an estimate of US \$ 927 million in chickpea and pigeon pea, and possibly \$ 5 billion on different crops worldwide (Srivastava et al., 2005; Wubneh, 2016). *H. armigera* alone have been reported in crops like cotton, tomato, groundnut, sorghum, pearl, millet and other crops of economic importance. It has been estimated that about Rs. 1200 crore worth of pesticides were used in India to control the bollworm complex of cotton. However pest has become serious with regular outbreaks and has developed resistance to almost all conventional insecticides including synthetic pyrenoids (Kranthiet al., 2002). As a result chemical control through the use of synthetic insecticides could not become panacea in the protection of agriculturally important crops. Therefore it is a need to emphasis on the integrated pest management strategies with more reliance of biological control.

Advantages of using epn as pest control measures

Although many other parasitic nematodes cause diseases in plants, livestock, and humans, EPN, as their name implies, only infect insects and kill them within short period. EPN infect insect including the larval form of butterflies, moth, beetles and flies as well as adult cricket and grasshopper. They are capable of infecting and killing insect with the aid of symbiotic bacteria and do not harm plants and other various test organism including mammals (mice, rabbits and monkey) and have shown that the EPN tests were harmless when fed, injected or inhaled (Boemareet al., 1996). They are also harmless to earthworm too (Capineraet al., 1982). EPN used against many insect pest i.e. rice leaf folder, tobacco cutworm, brinjal fruit borer, diamond back moth and sugar beet beetle.

Conclusion

Men have used different pesticides extensively to protect crop from pest. Chemical pesticides are the primary solution for controlling insect, but it causes the health hazards and environment problems especially if the pesticide get into soil and water. The use of chemicals in pest management programmes has created many serious health diseases like chest pain, dry throat, muscles stiffness, stinging eyes, and difficult breathing. Thus chemical pesticides will not give adequate solution to pest management. Among the other bio-pesticides EPN are promising agents for control of various insect pests, but they have certain limitations like soil is the natural habitat of EPN, they cannot tolerate direct sunlight, low humidity (< 80% relative humidity). However EPN have several advantages that qualify them as commercially valuable bio control agents. Nematodes use may be expanded by increasing host stability through genetic improvement or better formulations.

Table 1: List of some commercially used species of *Steinernema* and *Heterorhabditis* as bio-pesticides.

EPN species	Major pest(s) targeted- as recommended by various commercial companies
<i>S. glaseri</i>	White grubs (scarabs, especially Japanese beetle, <i>Popilliaspp.</i>)
<i>S. kraussei</i>	Black vine weevil, <i>Otiorynchussulcatus</i>
<i>S. carpocapsae</i>	Turfgrass pests- billbugs, cutworms, armyworms, sod webworms, chinch bugs. Orchard, ornamental and vegetable pests- codling moth, cranberry girdler, dogwood borer and other clearwing borer species, black vine weevil, peachtree borer, shore flies (<i>Scatella spp.</i>)
<i>S. feltiae</i>	Fungus gnats (<i>Bradysia spp.</i>), shore flies, western flower thrips
<i>S. scapterisci</i>	Mole crickets (<i>Scapteriscus spp.</i>)
<i>S. riobrave</i>	Citrus root weevils (<i>Diaprepes spp.</i>)
<i>H. bacteriophora</i>	White grubs (scarabs), cutworms, black vine weevil, flea beetles, corn root worm
<i>H. megidis</i>	Weevils
<i>H. indica</i>	Fungus gnats, root mealybug, grubs
<i>H. marelatus</i>	White grubs (scarabs), cutworms, black vine weevil

MICROBIAL BIOPESTICIDES: AN INNOVATIVE CONCEPT OF AGRIPRENEURSHIP FOR FARMERS

Sourav Kumar Das*¹, Milan Kumar Lal², Chandra Prakash¹

¹ National Research center for Plant Biotechnology, IARI, New Delhi;

² Division of Plant Physiology, IARI, New Delhi

*Email: souravkumardas001@gmail.com.

Introduction

Chemical pesticides are generally well known for their effective role in disease management because not only they act on a broad host range but production technology is also less expensive. However, the devastating part is their huge negative impact on the environment and ecosystem including the living beings of the planet. In the absence of suitable alternative, the use of synthetic chemical pesticides has dominated around the world (Mishra et.al 2015). By the advent of eco-friendly approach of developing and using biopesticides, the situation is gradually changing but in fact can move far more swiftly in this direction which will be sustainable and safe to living organisms.

Although biopesticides are replacing the chemical pesticides very slowly, a complete global look at the biopesticide scenario indicates that, the industries based on them are still in an insecure position in comparison to the chemical pesticide industries which rule the agriculture. Shifting of Wheel from chemical Pesticides to Biopesticides is needed (Mishra et.al 2015). Different biotechnological approach may be adopted regarding the designing of suitable micro organism for the production of microbial biopesticide, which would play a vital role in eco-friendly agriculture.

Biopesticides

Biopesticides are defined as naturally occurring organisms, their by-products, products derived from insects and micro organisms and products derived from plants. Biopesticides are pest management tools that are based on beneficial microorganisms such as bacteria, viruses, fungi etc. The most commonly used microbial biopesticides are living organisms, which are pathogenic for the pest of interest, includes biofungicides (Trichoderma, Pseudomonas, Bacillus), bioherbicides (Phytophthora), and bioinsecticides (Bt) (Gupta and Dikshit 2010).

Types of Biopesticides

Bacteria	<i>Bacillus thuringiensis</i>	Lepidoptera	Cotton, corn, vegetables
	<i>Bacillus sphaericus</i>	Mosquitoes, flies	Soybean, peanuts, wheat,
	<i>Bacillus subtilis</i>	Fungal pathogens	
	<i>Pseudomonas fluorescens</i>		

<i>Fungi</i>	<i>Trichoderma viride</i> <i>Trichoderma harzianum</i> <i>Trichoderma hamatum</i> <i>Beauveria bassiana</i> <i>Verticillium lecanii</i>	Fungal pathogens	Wheat, rice, pulses, vegetables, spices and sugarcane
	<i>Metarhiziumanisopliae</i> <i>Paecilomyces lilacinus</i> <i>Nomuraea rileyi</i>	Insect pests	Cotton, pulses, oilseeds, spices and vegetables
Viruses	<i>Nuclear Polyhedrosis Virus (NPV) of Helicoverpa armigera, Spodoptera and Chilo infestans</i>	American bollworm, tobacco caterpillar and shoot borer	Cotton, sunflower, tobacco and sugarcane

Advantages of Biopesticides

Biopesticides have the following advantages over chemical pesticides:

1. Biopesticides are eco-friendly in nature and degrade quickly, do not leave harmful residues.
2. They are more target specific affecting only the target pests and their close relatives and are non hazardous to other insects, fish, birds, mammals.
3. Development of resistance to biopesticides are very less compared to chemical one.
4. They are effective in small quantity.
5. Biopesticides and biocontrols are relatively cheaper than chemical pesticides.
6. They are easy to apply and are helpful for rural Entrepreneurship development.
7. They are compatible with microbial biofertilizers, like nitrogen fixers and phosphate solubilizer.

Regulations for commercial production

The manufacture, production, registration, use, exports and import of biopesticides in the country is governed by The Insecticide Act, 1968. The following bodies regulates the pesticides as well as the biopesticides production in the country and functions under the Ministry of Agriculture:

(According to “Entrepreneurship Development Programme” In Biotechnology report)

- a) Central Insecticides Board (CIB): Responsible for formulating policies.
- b) Registration Committee (RC): Responsible for registration/ biopesticides for manufacture, import and export in the country.
- c) Central Insecticides Laboratory (CIL): Responsible for checking the quality of pesticides/ biopesticides being supplied to the market.
- d) State Department for Agriculture (SDA): Responsible for issuing manufacturing license and quality check.

IMPROVING PRODUCTIVITY/MANAGEMENT OF SMES IN THE AGRIBUSINESS SECTOR

¹Ashok, ²Jagadish, ³Sudeep Kumar, E. and ⁴Vinay B. Patil

^{1,3}Dept. of Seed Science and Technology, and ^{2,4}Dept. of Agronomy
College of Agriculture, University of Agricultural Sciences, Raichur-584 104
Email: npbashokreddy@gmail.com

Knowledge is power and a great equalizer. In this information age, “getting wired” or connected is necessary for long-term survival and growth. For Small- and Medium-scale Enterprises (SMEs) or, in fact, any business, this means establishing reliable (accurate, updated and timely) sources and maintaining an information base that is put to good use throughout an organization to enable - 65 - people to make good decisions and take the correct and timely action. In all activities and steps of the business process, information is used and needed. The quality of information that is used could easily spell the difference between good and bad decisions, timely and delayed actions, and, ultimately, survival or failure.

The following recommendations are, in one way or another, linked to the role and value of information that leads to business success:

Pursue benchmarking, competitive comparisons and best practices sharing at various levels, including departmental, company, inter-company, industry, national and international.

Sustain an information dissemination program, e.g., television documentaries, radio broadcasts, publications and extension workers.

Continue strengthening IT and telecom infrastructures, e.g., the Internet.

Encourage networking and linkage promotion, e.g., tripartite partnerships between the government, farmers/SMEs and large companies.

Broaden training curricula beyond the usual format of technical-basic management to include human resources development, networking, market research and intelligence gathering.

Exploit the use of National Quality Awards criteria (e.g., Rajiv Gandhi National Quality Award as a framework.



CHARACTERIZATION OF GREY WATER TO ASSESS ITS FEASIBILITY TO REUSE

Prarthana P. Hazarika¹, K.Deka², B.K.Medhi³, J.Thaosen⁴

¹*M.Sc student, Department of Soil Science, Assam Agricultural University, Jorhat*

²*Senior Research Fellow, NICRA, KVK Cachar*

³*Principal Scientist, AICRP on Irrigation Water Management, AAU, Jorhat*

⁴*M.Sc student, Department of Agronomy, Assam Agricultural University, Jorhat*
Email:prarthana96780@gmail.com

Grey water reuse, reclamation and recycling are essential in coming years for the development of sound water management policy. About 60% of world population is expected to suffer water scarcity by the year 2025. Greywater is an important component of water conservation and comprises 50-80% of residential wastewater and offers a great potential as an economic and resource conservation component of the integrated water resources management especially in dry areas. In Assam, about 24340 lakh litre of greywater is wasted every day. Effort therefore should be to evaluate viable strategy for further reutilization of this potential resource, especially in the field of agriculture. Characterization of grey water with special reference to key water quality parameters signifies immense importance for further reutilization so far the water productivity is concerned. A study conducted at Assam Agricultural University on characterization of grey water collected periodically envisaged that irrespective of dilution of grey water due to onset of monsoon from the month of March onward there was not much variations in respect of pH, while, concentration of PO₄ although was recorded higher initially during the months from November to February, it was found to decrease from March and evidently negligible during June to August. In regards to Biochemical Oxygen Demand (BOD) and Dissolved Oxygen (DO), it revealed that DO concentration was found minimum in the months from November to March and their value was found increasingly high onwards and attained its maximum in the month of June. This trend was reversed in the case of observed values of BOD. Total N, Total Soluble Solid (TSS), Chloride and EC although showed higher value initially during the months of November to January but decreased gradually thereafter and maintained minimum values in the month of August, which might possibly due to dilution effect owing to downpour. In soil column study, irrespective of soil types, percent removal efficiency found to decrease for BOD and phosphate with increase in soil depths while, reverse trend was noticed for NH₄, TSS, Cl, EC and alkalinity. The greywater can be used for irrigation efficiently, with or without treatment, thus contributing to the global reduction of water use. Benefits of Water Recycling according to the Environmental Protection Agency (EPA) consist of finding ways to decrease the diversion of water from sensitive ecosystems, decreasing wastewater discharges, reducing and preventing pollution, and saving energy.

Key words: (Grey water, characteristics, quality, soil column, EPA)

EFFECT OF CONSORTIUM BIOFERTILISER ON FODDER MAIZE YIELD

P. Suryavanshi*, M. Sharma and Y. Singh

*Krishi Vigyan Kendra, S.A.S. Nagar (Mohali)
Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana, Punjab
Email: priyankaagrios@gmail.com

Biofertilizers are carrier based preparations containing beneficial microorganisms in a viable state intended for seed or soil application and designed to improve soil fertility. The living micro organisms involved in consortium biofertilizer are nitrogen fixing, phosphorus solubilizing and plant growth promoting rhizobacteria, which fixes atmospheric nitrogen, solubilizes phosphorus and secretes plant growth promoting substances (IAA, Siderophore, growth hormones). These properties of the consortium biofertilizer are instrumental in improving soil fertility and enhancing the growth and development of plants. Maize is considered to be one of the best cereal fodder crops grown during kharif season in Punjab. To investigate the effect on consortium biofertiliser on yield of fodder maize variety J 1006, front line demonstrations has been conducted on ten farmer's field by Krishi Vigyan Kendra (Mohali) during kharif season 2017. The seed of one acre (30 kg) was treated with 500gm of consortium biofertilizer made by PAU, Ludhiana. Mode of application was seed treatment in which slurry of the biofertilizer (500gm) is prepared in 500 ml water followed by mixing with the seeds on clean, cemented floor and drying for 2-3 hours in air prior to sowing. Crop was harvested at pre flowering stage (55-60 DAS). Crop was grown with recommended package of practice. From the present study it can be concluded that higher growth traits like green fodder yield (190 q/acre) and dry matter yield (46 q/ha) was obtained when maize variety J-1006 was inoculated with consortium biofertilier as compared to control (no consortium treatment). It is therefore concluded that biofertiliser is an effective means to improve the yield of fodder crop like maize, which helps in increase in higher net returns for the farmers.

Key words: Biofertiliser, Consortium, J 1006, Growth and Yield.

S2-P9

FORTIFICATION OF HUMIC ACID AND ITS INFLUENCE ON SOIL PROPERTIES AND CROP PRODUCTIVITY

Chandrakant¹, Mallesh, K.U¹, Apurva, V² and AdivappaMallappa Asangi¹

*Ph.D. Scholars, Department of soil science and agricultural chemistry¹
University of agricultural sciences, GKVK, Bengaluru-560065
Department of Soil Science and Agricultural Chemistry²,
College of Agriculture, Navile
University of Agricultural and Horticultural Sciences, Shivamogga
Email: chandru1085@gmail.com and mallesh913@gmail.com*

Humic substances are naturally occurring, biogenic heterogeneous organic substances that are found in extracts of organic sources like compost, peat, lignite etc., characterized by high molecular weight substances with yellow to black colour. These play an important role in soil fertility through chelation, buffering, clay-mineral organic interaction and CEC which are essential for improving soil quality and crop productivity. Increased removal of nutrients as a consequence of adoption of HYV's, intensive cropping system and imbalance use of high analysis fertilizers which causes declined in the level of nutrients in the soil to below normal, at which productivity of crops cannot be sustained. The poor recovery of nutrients necessitates the adoption of improved techniques like use of synthetic chelates. Since it is a costly technology, resorting to fortification of humic acid with essential nutrients which acts as natural chelates seems to be economically viable and improves soil health and uptake of nutrients helps in enhancing the productivity of crop. Fortification is the adding minerals or micronutrients to humic acid to prevent nutritional deficiencies, mainly to improve crop productivity and physiological activities. It makes the substances more nutritious and helps in uptake of nutrients from soil in enhancing movement and biological activities.

These fortification of humic acid not only increase crop productivity but also reduces the load on the inorganic chemicals, saves cost on the fertilizer by enhanced use of applied nutrients. Fortification of humic acid recognised as a key component which improves the availability of nutrients through complexation and chelation reactions in soil, by preventing their fixation and precipitation helps in getting higher yield through higher nutrient uptake. To prevent continuous decline in soil nutrient status and soil fertility, it is important to use humic acid fortified with mineral nutrients to meet nutritional requirement of crops.

S2-P10

INTEGRATING COMPOSTING AND VERMICOMPOSTING - A POTENTIAL EMPLOYMENT GENERATION FOR THE RURAL YOUTH

Megha Raghavan *, B. N Hazarika

*College of Horticulture and Forestry, Central Agricultural University, Pasighat,
Arunachal Pradesh*

Email: megharaghav28h@gmail.com

The major problems associated with traditional thermophilic composting are the long duration of the process, the frequency of turning of the material, loss of nutrients during the prolonged composting process, and the heterogeneous nature of the product. The major drawback in the vermicomposting process is that it must be maintained at temperatures below 35 °C which does not remove all the pathogens. Thus, an integrated system approach that harvests advantages from both processes would be necessary to provide a product free of pathogens, and a product with desirable characteristics at a faster rate than either of the individual processes.

If vermicomposting is used in combination with the traditional composting, the required temperature for ensuring adequate pathogen kill would be achieved. Combining the two systems

will result in a superior product with more stability and homogeneity.. The quality parameters like pH and EC will increase after composting and decreases after vermicomposting and the combined treatment .The lowered C:N ratio is a good indicator of quality organic fertilizer and it was significantly lower in the treatments involving vermicomposting suggesting that it was more intensely decomposed. The concentration of mineral N (mainly NO₃) was higher indicating an important degree of mineralization. Hence, earthworms change the degrading property of the manure. This was reflected by the lower EC, C to N ratio and pH in the substrates produced after vermicomposting. High-moisture organic waste can be composted using low-moisture bulking agents such as straw, sawdust, peat, peanut shells, rice hull, etc.

Vermicomposting is not only a powerful method of recycling the organic waste but it has potentiality for employment generation especially in rural areas. However, the better substrate in shorter period can be obtained from combined process of composting and vermicomposting.

Key words: composting, vermicomposting, employment, organic, fertilizers, etc.

S2-P11

JACKFRUIT: A PIONEER MINOR FRUIT WITH MAJOR AGRIBUSINESS POTENTIAL

Ashok Chhetri¹* and B.N. Hazarika²

¹*College of Horticulture & Forestry, Central Agricultural University, Pasighat, Arunachal Pradesh*

²*College of Agriculture, Central Agricultural University, Pasighat, Arunachal Pradesh*

**Corresponding email: chhetriash@gmail.com*

Jackfruit (*Artocarpus heterophyllus* Lam.) is a well adapted tropical fruit crop originated in Western Ghats in India. In India, it is primarily distributed in Southern and Eastern India. In general, Jackfruit is not commonly commercially cultivated as monocrop in major areas like other major fruit crops and confined either in homestead gardens as one or two plants or growing naturally in roadside or in forests. Owing to its tree size and long gestation period, people generally used to neglect this wonder crop which produces highly nutritious fruits, high quality timber, and feed for livestock particularly leaves for goat. Besides, nowadays dozens of value added products from jackfruit are available which are having immense potential in domestic as well as in international market. Jackfruit bulb or flake can be used for the preparation of chips, RTS (ready to serve beverages), preserve, pickles, squash, nectar, wine and vinegar. Products such as dehydrated unripe jackfruit and dehydrated fruit can also be manufactured for long storage. Jackfruit pulp can be made from soft-fleshed jackfruit, a type that is highly wasted. Soft-fleshed jackfruit is not relished by many as a table delicacy because its flesh is very soft. An array of accessory value added products can be made from jackfruit pulp such as ice cream, milk shake, toffee, chocolate and a host of other products. The seed of the jackfruit is an important food source that is largely wasted in most of the jackfruit growing countries. A miniscule quantity is used in cooking. Tender young fruits are having high demand as

vegetables in lean period of vegetables. Jack seed flour which is prepared from grounded seeds of jackfruit can be used as an alternative of “maida”. The young leaves and fruit waste provide valuable fodder for cattle, pigs and goats and are said to be fattening. In India, the leaves are used as food wrappers in cooking, and they are also fastened together for use as plates. Apart from these values, jackfruit has many medicinal benefits. There is a good market of jackfruit product in Thailand . With the advent of India’s Look East Policy and construction of India-Myanmar-Thailand trilateral highway to boost trade and commerce with ASEAN and other Southeast Asian countries, now it is possible to export processed products to these potential markets especially from North East India.
Keywords: Agribusiness, Artocarpus, flake, jackfruit, seed

S2-P12

PROBLEMS AND PROSPECTS OF AGRO-FORESTRY SYSTEMS IN NORTH EASTERN INDIA FOR THE YOUTH EMPOWERMENT

**Sarat Sekhar Bora¹, Palash Thengal², Milon Jyoti Konwar³, Syed Wasifur Rahman⁴ and
Shyamal Phukon⁵**

^{1,3}Department of Agronomy, ²Department of Nematology, ³Department of Agronomy,
⁴Department of Agril. Biotechnology, ⁵Department of Tea Husbandry and Technology
Assam Agriculture University Jorhat, Assam 785013
Email Id*: saratsekharbora@gmail.com

Acceleration in human and livestock population growth necessitated acquisition of more and more land under cultivation. The area under agriculture and forest has been reduced drastically due to population pressure and this has resulted in a wide gap between demand and production of agricultural and forest products viz. food, fodder, vegetables, fuel wood, timber medicines etc. Hence, an interest in agroforestry has therefore become necessary in order to encourage sedentary. Agroforestry is of great importance in recent times primarily because of meeting the diversified needs of people and for sustaining the frazzle ecosystem for generations to come. Agroforestry is a land use management system in which trees or shrubs are grown around or among crops or pastureland. About 80% of the people of north-east (NE) India are directly or indirectly concerned with agriculture. Farmers, in this region, are generally small holders and thus, an attempt with agroforestry practices can result an increase in their earnings without endangering the fragile ecosystem (Gogoi, 2015). In the NE region, trees are deliberately integrated with the crop and livestock production system. A number of crops like maize, ginger, pineapple, coffee, and vegetables are grown with tree species such as Pinus kesiya, Alnus nepalensis, Schima wallichii, Pyrus communis, Prunus domestica, Areca catechu etc. Though different problems such as lack of knowledge, credit facilities, saplings availability etc., were present in this region, prospects are available. Different agroforestry models are available in respect to the different locations are need to be studied through different researches. So, an effective strategy based on agroforestry with scientific introduction of suitable tree species with crops on farm lands require not only for feeding the increasing population but also for conservation of land resources for the future generations to come as well as creation of different opportunities for the youths of N.E India.

**PROTECTED CULTIVATION: AN INNOVATIVE APPROACH FOR
TRANSFORMATION AND ADVANCEMENT OF AGRICULTURE IN PERI-URBAN
AREAS**

Lekhika Borgohain¹, Tejaswini Shiriyappagoudar²& Vedashree M.S.³

¹Department of Soil Science, ²Department of Horticulture
& ³Department of Plant Breeding and Genetics
Assam Agricultural University, Jorhat-1³

Protected cultivation is an advanced technology of 21st century and is more appropriate for high value low volume crops like flowers, vegetables and some fruits like strawberry. It has been developed first in China. It is most suitable business for marginal farmers and unemployed youths. Protected cultivation of horticultural crops provides better quality, higher productivity, off season production, virus free cultivation and good market price to the growers ultimately increasing the economic status of the farmers and also raises the national economy by sale of high quality produce in domestic and international markets. Protected cultivation at least is needed to convert some portion of present 9.54 million ha area under vegetable cultivation for increasing the national productivity and quality of the produce. Presently area under protected cultivation of horticultural crops is only around 40,000 ha and out of which large portion mostly in northern parts of India is not successfully being utilized for protected cultivation. Production of vegetable and cut flower crops under protected conditions not only provides high water and nutrient use efficiency but it can easily increase the productivity by 3-5 folds over open field cultivation of these crops under varied agro climatic conditions of the country. This technology has very good potential especially in urban and peri-urban areas adjoining to the major cities which is a fast growing market for fresh produce of the country. Vegetable and cut flower farming in agri-entrepreneurial models targeting various niche markets of the big cities of the country is regularly inviting attention of the vegetable and flower growers for diversification from traditional ways of crop cultivation to such modern methods. But protected cultivation technology requires very careful planning, maintenance and management about timing of production.

Keywords: Protected cultivation, high quality produce, vegetables and cut flowers, unemployed youth, peri-urban areas.



RESOURCE CONSERVATION TECHNOLOGIES AND ITS INFLUENCE ON SOIL PROPERTIES

Chandrakant¹, Mallesh, K.U¹, Apurva, V² and Adivappa Mallappa Asangi¹

Ph.D. Scholars, Department of soil science and agricultural chemistry¹

University of agricultural sciences, GKVK, Bengaluru-560065

Department of Soil Science and Agricultural Chemistry²,

College of Agriculture, Navile

University of Agricultural and Horticultural Sciences, Shivamogga

Email: chandru1085@gmail.com and mallesh913@gmail.com

Green revolution has increased food grain production by four fold since 1950-51 with adoption of HYVs, intensive input use, extensive tillage, burning of residues and irrigation. The intensive cultivation has lead to degradation of natural resources such as soil, water, vegetation etc. In this context, globally conservation agriculture (CA) has opened a new paradigm as it has potential for higher resource use efficiency, water productivity and climate change mitigation through its key principles. “Conservation agriculture is a concept for resource-saving crop production that strives to achieve acceptable profits together with high and sustained production levels, while concurrently conserving the environment” (FAO, 2009).

The key principles of conservation agriculture technologies are minimizing soil disturbance, maintaining permanent soil cover, and diversifying crop rotations. Conservation Technologies improves physical, chemical and biological properties of soil. It is specific to site, crop and environment conditions. Increased yields, resource improvement, reduction in cost of production, nutrient, water, energy, labour and time saving was observed with high efficiency by attaining Ecological balance with sustained yield and returns. Conservation tillage systems resulted in higher water content and bulk density and decreased penetration resistance as compared with conventional tillage. It prevents the problems associated with conventional agriculture viz., Reduction of soil fertility and physical structure, increased erosion, High labour/ energy requirement and delayed planting through various conservation technologies like direct sowing, no-tillage, reduced tillage / minimum tillage, surface incorporation of crop residues or mulching, intercropping with legumes, crop rotation and rainwater harvesting approaches which helps in the effective soil and water conservation for higher crop productivity and improved soil properties.



ORGANIC AQUAFARMING: AN OPPORTUNISTIC EMPLOYMENT GENERATING APPROACH TOWARDS AQUAPRENEURSHIP

Suvendu Saha*¹, Sourav Maiti¹, Soumyadip Purkait², Suman Das³, Biswadeep Dey⁴

¹*Dept. of Aquaculture, Faculty of Fishery Sciences,*

²*Dept. of Fishery Economics and Statistics, Faculty of Fishery Sciences,*

³*Dept. of Fishery Engineering, Faculty of Fishery Sciences,*

⁴*Dept. of Aquatic Animal Health, Faculty of Fishery Sciences,*

West Bengal University of Animal and Fishery Sciences, Kol-700094

**E-mail: suvendusaha3@gmail.com*

Two different studies were conducted in the Sandeshkhali block of Sunderbans in North 24 Parganas and Mudiali Nature Park in Kolkata in West Bengal during 17th July 2016 to 24th July 2016 to evaluate the scenario of Organic farming practices and how it is creating employment opportunity in rural locales. A BPL (Below Poverty Level) family consisting of 4 members owned 1 acre land and started organic farming in Sandeshkhali block of Sunderbans in North 24 Parganas under the Anandadhara project of West Bengal government. Currently they have two fishing ponds, twenty five ducks, two cows, ten goats and grow vegetables and paddy on 0.40 acre of the total land. This practice gives employment to 05 farmers as they work on there as labourer and earns a monthly income around 4-5 thousands each. Another story of a group of Fishermen of Mudiali Fishermen Co-operative Society (MFCS) at Kolkata is an amazing example of passion, perseverance and teamwork in organic farming. In 1961 they formed a co-operative society of fishermen and raised funds by contributing as minimum as 25 paisa per person per day, mortgaging family jewelry and taking loans from the local rich people to lease 250 hectares of waterlogged lowland at the south-western edge from Calcutta Port Trust. In the next fifty years MFCS did the impossible by turning the leased land, currently measuring around 60 hectares, into a fishing haven. It has 31 varieties of fish as well as a bio-diversity Nature Park. Now 300 families depend on this fishery. Besides fishery they have also diversified in to commercial goat and duck rearing, fish breeding, horticulture, manufacturing paddle boats, managing eco-tourism and social forestry and earn additional 50 lakh per year. The above studies highlight the potential of organic farming to ensure food security, better income and social status.

S2-P16

USE OF SQUARE MESH PANELS IN ESTUARINE WINTER MIGRATORY SET BAG NET (EWMSBN) AND IT'S IMPACT ON JUVENILES CATCH

N.A. Talwar*, Suman Das, Subhasis Dolui and Kouser Shaik

Department of Fishery Engineering, Faculty of Fishery Sciences West Bengal University of Animal and Fishery Sciences, Chakgaria Kolkata – 700094

Email: natalwar@gmail.com

Winter migratory set bag net (WMSBN) is one of the most important artisanal fishing gears used for exploitation of estuarine resources in West Bengal (India). The operation of this net during high tide is harmful as it captures large quantities of juveniles of fish and prawns entering into estuarine system. Comparative studies were carried on the juveniles catches of fish and prawns obtained in two identically designed 12.5 meters of head rope and foot roped winter migratory set bag net, based on the design approach suggested by Bay of Bengal Programme (BOBP). One of them was fabricated with the incorporation of square mesh panels in the forward part of the upper belly and codend (experimental winter migratory set bag net- EWMSBN) and another one was constructed with diamond mesh webbings throughout the net (conventional winter migratory set bag net-CWMSBN). The fishing ground was selected within the depth range of 18 m to 20 m based on the operation of other commercial bag-netters in the vicinity. Alternative hauling techniques were followed for maintaining similarity in wind direction, wind speed, duration and depth of operation to minimize the possible errors between the nets. The results showed that the average juveniles catch rate was about 8.87 kg per haul in experimental net (EWMSBN), which is almost 3.12 times lesser than the conventional net (CWMSBN) (27.68 kg per haul). However, the difference in reduction of juveniles catch in both conventional as well as the experimental net was not found to be statistically significant.

Key words: Winter migratory set bag net, Square mesh panels. Diamond mesh, Juveniles catch

S2-P17

TRANSFER OF TECHNOLOGY BY DEMONSTRATION OF NEW HERBICIDE AND ITS MIXTURES ON WEED CONTROL EFFICIENCY AND YIELD OF DIRECT-SOWN RICE (ORYZA SATIVA L.)

Ashirbachan Mahapatra*, Hemant Kumar Jangde, Vishal Kumar Gupta

Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh – 492012

**E-mail: ashirbachan@gmail.com*

The present demonstration was conducted at Institute Research Farm of ICAR-NRRI, Cuttack (Odisha) during wet season of 2016 to show the weed control efficiency and the yield of direct-sown rice. The experiment was conducted taking a new herbicide molecule XR-848 Benzyl Ester along with its mixture with Cyhalofop Butyl in different doses to study their effect on weed infestation and yield of direct-sown rice. The experiment was laid out in Randomized Block Design (RBD) with three replications and nine treatments viz. four herbicide mixtures (T1-XR-848 Benzyl Ester+Cyhalofop Butyl 12% EC (w/v) @ 120(20+100)g ha⁻¹, T2-XR-848 Benzyl Ester+Cyhalofop Butyl 12% EC (w/v) @ 150(25+125)g ha⁻¹, T3-XR-848 Benzyl Ester+Cyhalofop Butyl 12% EC (w/v) @ 180(30+150)g ha⁻¹ and T4-XR-848 Benzyl Ester+Cyhalofop Butyl 12% EC (w/v) @ 360(60+300)g ha⁻¹), three alone herbicides (T5-XR-848 Benzyl Ester 2.5% EC (w/v) @ 25g ha⁻¹, T6-XR-848 Benzyl Ester 2.5% EC (w/v) @ 30g ha⁻¹ and T7-Bispyribac-Na 10% SC @ 30g ha⁻¹), one weed free (T8) and an untreated weedy check (T9). Among the herbicides, XR-848 Benzyl Ester

+ Cyhalofop Butyl 12% EC (w/v) @ 150 (25+125) g ha⁻¹ (T2) showed the maximum weed control efficiency at harvest stage i.e. 82.35 % and was proved to be the best herbicide mixture yielding at par with the weed free (T8) which could be one of the best options for chemical weed control in direct-sown rice for farmers.

Keywords: Herbicide, herbicide mixture, weed control efficiency, yield, direct-sown rice

S2-P18

TRACTOR OPERATED PLASTIC MULCH LAYING EQUIPMENT: AN OPPORTUNITY TO BE AN ENTREPRENEUR

Siddesh M. H.,* M. Veerangouda, Sunil Shirwal, Prakash K V and B. MaheshwaraBabu

*Department of Farm Machinery and Power Engineering, College of Agricultural Engineering,
P. B. No. 329, UAS, Raichur - 584 104, Karnataka*

**Email:siddeshgouda@gmail.com*

The technology and practice of using plastics to improve horticultural crop yield is a relatively new science commonly referred to as plasticulture. Plastic mulches covering raised beds in which crops are planted are one form of plasticulture. The plastics we use today are made from inorganic and organic raw materials, such as carbon, silicon, hydrogen, nitrogen, oxygen and chloride. The basic materials used for making plastics are extracted from oil, coal and natural gas. When compared to other mulches, plastic mulches are completely impermeable to water; it therefore prevents direct evaporation of moisture from the soil and thus limits the water losses and soil erosion over the surface. The suppression of evaporation also has a supplementary effect; it prevents the rise of water containing salt, which is important in countries with high salt content water resources. These new materials combined features exhibiting strength, flexibility, light-weight, easy and low-cost production. Plastic mulch can be used effectively to modify soil temperature. Plastic films are laid before crop planting or transplanting. This includes preparation of seed bed, spread mulch film and anchoring of edges of film. Raised seed bed has to be prepared for plastic mulch laying. Two persons are required for laying the plastic roll over the soil, while one more person behind them to shovel the soil onto the edges of the mulch. These operations are done manually became very time consuming, labour intensive, tedious and costly. A primary challenge in establishing crops in plastic mulch is the need to perforate the plastic to enable either seed or transplants to be placed in the soil. Manual method is economical for the small fields but not for the large fields. In modern agriculture, tractor has become one of the major sources of power which is generally used for majority of the agricultural operations like irrigation, land development, tillage, sowing, harvesting, threshing and transportation. Tractors help in reducing the time required for these operations. It is also used as power source in farms for harvesting, threshing, pumping of water, etc. Hence, it has become the integral part of mechanized agriculture. Plastic mulching by conventional method requires more human labour, time and cost of operation. Keeping the above facts in view tractor operated plastic mulch laying equipment was developed. It is observed that cost of operation of tractor operated plastic mulch laying equipment was Rs.1765.0 ha⁻¹ as compared to Rs. 2852 ha⁻¹ for conventional method using human labour. The saving in cost of 61.58 per cent is obtained for tractor operated

plastic mulch laying equipment as compared to conventional method. The breakeven point for tractor operated plastic mulch laying equipment was estimated to be 105 h yr⁻¹ with a payback period of 0.70 years. Hence there is a wide scope to be an entrepreneur by adapting this type of technologies for conservation agriculture.

S2-P19

IMPORTANCE AND APPLICATIONS OF REMOTE SENSING IN AGRICULTURE

Apurva, V¹. and Mallesh, K.U²

*¹Department of Soil Science and Agricultural Chemistry, College Agriculture, Navile
University of Agricultural and Horticultural Sciences, Shivamogga*

*²Department of Soil Science and Agricultural Chemistry, College of Agriculture, GKVK.
University of Agricultural Sciences, Bengaluru*

**E-mail: appupatil.266@gmail.com and, mallesh913@gmail.com*

With advances in satellite, airborne and ground based remote sensing, reflectance data are increasingly being used in agriculture. Remote sensing is the process of obtaining information about objects without coming into direct contact with the object. It has been found to be a valuable tool in evaluation, monitoring and management of land water and crop resources. The launching of Indian remote sensing satellite (IRS) enhanced the capabilities for better utilization of this technology and significant progress has been made in soil and land cover mapping, land degradation studies, crop identification, crop condition assessment and stress detection, crop yield modelling and estimation, soil moisture estimation, identification of pest and disease infestation, monitoring of waste lands, soil mapping and production estimates. Remote sensing has also been used to assess the water needs of plants and determine the date of commencement of irrigation, making it easier to manage crop production under conditions of water stress.

S2-P20

ENTREPRENEURIAL OPPORTUNITIES IN FRUITS AND ITS PRODUCTS OF ASSAM

SukanyaGogoi* and UtpalKotoky

*Department of Horticulture
Assam Agricultural University, Jorhat, Assam*

**Email: sukanyagogoi21@gmail.com*

Assam with diverse soil and climatic conditions provide ample opportunities to grow varied horticultural crops. It is situated in sub-tropical zone and the climate is characterized by hot-wet summer and cool winter. Horticultural crops spread across an area of 5.51 lakh hectares with annual production of 74.72 lakhs tonnes. The productivity of the fruit crops of Assam is 14.24t/ha which is

below the national average of 14.51t/ha. The region has a rich diversity in fruit crops. In citrus, there are as many as 17 species, 53 varieties and 7 probable hybrids. In banana, in addition to numerous cultivated triploids, *Musa accuminata* and *M. balbisianadi* ploids are found in semi-wild state in the region. 'Bhimkal' and 'Athiakal' are two unique *M. balbisianacultivars* of the region. Quite a good number of indigenous minor fruits having high nutritional and medicinal properties are also found in the state. In spite of immense potentiality for the development of fruit crops, the 'Commercial Fruit growing in true sense in the state is yet to have a breakthrough. With the exception to a certain extent of Mandarin, banana, pineapple plantations, most of the fruit crops in the state are largely grown in mixed homestead gardens. Area expansion, formation of growers association, buyers association, establishment of processing unit, pack-house facilities in production sites, generation of quality planting materials, transfer of improved production technologies, reduction of post-harvest losses with appropriate technologies, improvement of marketing infrastructure, technological intervention for value addition are some of the strategies to be considered for entrepreneurship development in fruit crops in Assam. Pulp/puree, juice concentrates, juice powders, various dry and oil-based pickles can be prepared from fruits of the region. Chips from plantain cultivars of banana and jackfruit products like chips, papad, floors, squash and wine are the important commercial products can be prepared commercially. Therefore, the region has immense potentialities for entrepreneurship development based on fruits and its products for economic upliftment of the state.

Key words: Assam, fruits, strategies, banana, diversity

S2-P21

PRESENT STATUS AND FUTURE PROSPECTS OF DIGITAL TECHNOLOGY IN PESTS MANAGEMENT: A REVIEW

Joli Dutta¹, Pradip Kumar Borah¹, Amrit Tamuly², Roji Chutia³ and Moromi Buragohain⁴

*¹Department of Plant Pathology, ²Department of Plant Breeding and Genetics, ³Department of Agronomy, ⁴Department of Extension Education
Assam Agricultural University, Jorhat-785013
Email: duttajoli@gmail.com*

Digital farming provides tremendous opportunities for farmers which leads to sustainable agriculture. It opens the way for new agricultural revolution that makes farming smarter and more efficient. Digital Agriculture Service aggregates granular, real-time data from a variety of sources, including environmental sensors in the field. It allows farmers to review historical information on similar issues that may have been encountered, so that, they can learn from the actions taken at that time and make better operational decisions today. Insects, diseases and weeds are major problems of crop production which can cause severe crop damage and jeopardize harvests. Now-a-days, innovative digital farming technology can help to overcome these problems. For example, satellite imagery and drones can deliver detailed field observations, and remote sensors can also take regular pictures and measure the emitted radiation in a range of wavelengths. By integrating historical data, a farmer can foresee the spread of pests and diseases at an early stage. This data is used to generate detailed real-time field maps that allow for the precise application of crop protection and other

valuable inputs. Another example is a mobile app (Plantix) which allows farmers to identify pests or diseases and provides remedial measures. It is the latest addition of using modern digital tools to benefit the smallholder farmers.

Keywords: Digital farming, Crop protection , Satellite imagery, Remote sensors



Session 3

Attracting Investments in Capacity Building & Skills for Youth in Agriculture

**A REVIEW PAPER ON AGRO-TOURISM:
AN ALTERNATIVE LIVELIHOOD OPTION FOR EMPOWERING RURAL YOUTH**

Buragohain M¹, Bordoloi N¹, Saikia D¹, Sharma H¹, Chutia R² and Dutta J³

*Department of Extension Education¹, Department of Agronomy² and
Department of Plant Pathology³*

Assam Agricultural University, Jorhat-785013

Email: moromiburagohain1³@gmail.com

The term agro-tourism emerged in the late twentieth century. It includes agricultural farms that are related to tourism. This notion represents all activities related not only to tourists but also to the organizers of the holidays in general. Agro tourism is very important for rural communities as well as urban areas. It can provide several advantages: income, employment, use accommodation, activities, natural resource conservation, recreation and education. Agro tourism intends to obtain higher standards of living for rural communities especially through increased income for people who work in agriculture. Agro-tourism is defined as a commercial enterprise on a working farm conducted for the enjoyment, education, and/or active involvement of the visitor, generating supplemental income for the farm (Chase, 2008). Agro-tourism is important to quality of life for economic and cultural reasons, promoting experiential education, preserving traditional land use, and contributing to a rural sense of place. In many cases, agro-tourism allows farmers/youths to diversify their core operations and keep farmland in production while preserving scenic vistas and maintaining farming traditions. This paper investigates the opportunities and scope of agro-tourism in empowering rural youth in India with special reference to Assam.

Keywords: Agro-tourism, Rural youth, Agriculture

Introduction:

Agriculture is the backbone of Indian Economy. Around 85 percent of the population is directly or indirectly dependent on Agriculture and almost 26 percent of India's GDP comes from Agriculture. 90 million farmers are dwelling in 6.25 lac villages producing more than 200 MT of food grains feeding the country. More than a profession or a business, agriculture is India's culture. Hence, adding additional income generating activities to existing agriculture would certainly increase contribution of agriculture in the national GDP

Tourism is one of the fastest growing industries of the world. According to a recent study, world tourism generated 15% of world's G.N.P. It is forecasted that by 2020, tourism industry would be single biggest industry in the world. At present, tourism is a potent tool for Socio economic development of modern world. The word "tourism" relates to the interest of visitors and places and regions for recreational purposes. It is a phenomenon of modern civilization. The basic forces of tourism industry are the gifts of the nature, the people, cultural heritages and unique traditional values upheld by the community. Well develop transport and communication, along with banking and suitable accommodation facilities have further been strengthened the tourism. Tourism as

grown into on global industry and has become a major sources of revenue for many nations. Today tourism viewed as a economic and Social force of the major proportion in the world. Among the different farms of tourism, agro- tourism has long been recognized as an important sector of tourism industry. It is important in the sense basically reflects rural life art, and culture, heritage at rural location, there by benefiting the local community both economically and socially as well as enabling interaction between the tourist and the localities for a more enriching tourism experience. Since India's heart lies in its villages, every rural community is familiar in its folklore and indigenous crafts. The traditional way of life can greatly enrich the visitor's experience. A visitor experience based on agro-tourism is especially relevant for India, where almost 74% of the population resides in its 7 million villages. Agro-tourism is considered one of the activities to be supported to ensure rural development. It is basically experience oriented and location specific and solely dependent upon natural environment. Serious efforts need to be made in this direction and agro-tourism is one such activity. Promotion of tourism would bring many direct and indirect benefits to the people

SCOPE OF THE STUDY:

Agriculture is a most important occupation in the India including in the Maharashtra. But, today it has becomes unprofitable due to prices fluctuations of Agro-products and some internal weakness of the agriculture sector. Hence, there is need to do some innovative activities in the agriculture, which will help to rural youths, farmers and rural peoples. Urban population is increasing day by day today the urban people's world is restricted in the closed door flats, offices, clubs, television, video games, spicy fast food, computer, internet, and so on. They can see nature only on television or screen of the computers. More over some people living in the cities do not have relatives in villages and they never visited or stayed in village. These peoples want enjoy rural life but there is problem of such type of facilities. Hence, it is opportunity to the farmers and rural youth for development of the agro-tourism centre's and serves him and create additional income.

OBJECTIVES OF THE STUDY:

1. To know the opportunities and scope of agro-tourism in India with special reference to Assam
- 2.

SCOPE OF AGRO-TOURISM:

Agri-Tourism has great scope in the present context for the following reasons:

1. An inexpensive gateway - The cost of food, accommodation, recreation and travel is least in Agri-Tourism. This widens the tourist base. Present concept of travel and tourism is limited to urban and rich class which constitutes only a small portion of the population. However, the concept of Agro-Tourism takes travel and tourism to the larger population, widening the scope of tourism due to its cost effectiveness.
2. Curiosity about the farming industry and life style - The urban population having roots in villages always have had the curiosity to learn about sources of food, plants, animals, raw materials like wood, handicrafts, languages, culture, tradition, dresses and rural lifestyle. Agro-Tourism which revolves around farmers, villages and agriculture has the capacity to satisfy the curiosity of this segment of population.

3. Strong demand for wholesome family oriented recreational activities: Strong demand for wholesome family oriented recreational activities .Villages provide recreational opportunities to all age groups i.e. children young, middle and old age, male, female, in total to the whole family at a cheaper cost. Rural games, festivals, food, dress and the nature \ provides variety of entertainment to the entire family.
4. Health consciousness of urban population and finding solace with nature friendly means Modern lifestyle has made life stressful and average life span has come down. Hence, people are in constant search of pro-nature means to make life more peaceful. Ayurveda which is a pro-nature medical approach has roots in villages. Indigenous medical knowledge of villagers is respected. Organic foods are in greater demand in urban areas and foreign countries. In total, health conscious urban population is looking towards pronature villages for solutions.
5. Desire for peace and tranquility - Modern life is a Desire for peace and tranquility product of diversified thinking and diversified activities. Every individual attempts to work more, in different directions to earn more money to enjoy modern comforts. Hence, peace is always out of his system. Tourism is a means for searching peaceful location. Peace and tranquility are inbuilt in Agro-Tourism as it is away from urban areas and close to nature.
6. Interest in natural environment - Busy urban population is leaning towards nature. Because, natural environment is always away from busy life. Birds, animals, crops, mountains, water bodies, villages provide totally different atmosphere to urban population in which they can forget their busy urban life.
7. Nostalgia for their roots on the farm - Cities are Nostalgia for their roots on the farm growing at the cost of villages. Villagers are migrating to cities in search of jobs and to seek the comforts of modern life. Hence, yesterday's villagers are today's urbanites. Deep in the heart of urbanites lies the love and respect for their ancestors and villages. Hence, visit to villages satisfies their desire. This is also expressed through the hatred of urbanites to flat culture and love for farmhouses located in the outskirts of cities. Any opportunity to visit villages and spend time with family is dream of any urbanite. But, minimum decent facilities are always problem. Agro-Tourism attempts to overcome this problem.
8. Rural recreation - Villages provide variety recreation to urbanites through festivals and handicrafts. Villagers (farmers) lifestyle, dress, languages, culture / traditions which always add value to the entertainment. Agricultural environment around farmers and the entire production process could create curiosity among urban taught. Places of agricultural importance like highest crop yielding farm, highest animal yielding farm, processing units, farms where innovations tried add attraction to the tourists. Agricultural products like farm gate fresh market, processed foods, organic food could lure the urban tourists. As result of this agro – atmosphere in the villages, there is scope to develop Agro – Tourism products like agri-shopping, culinary tourism, pick and own your tree / plot, bed and breakfast, pick and

pay, bullock cart riding, camel riding, boating, fishing, herbal walk, rural games and health (ayurvedic) tourism.

9. Educational value of Agro-Tourism – Agro-Tourism could create awareness about rural life and knowledge about agriculture science among urban school children. It provides a best alternative for school picnics which are urban based. It provides opportunity for hands on experience for urban college students in agriculture. It is a means for providing training to future farmers. It would be effectively used as educational and training tool to train agriculture and line department officers. This provides unique opportunity for education through recreation where learning is fun effective and easy. Seeing is believing, doing is learning.

WHY TO PROMOTE AND SUPPORT AGRO-TOURISM IN INDIA:

We all know majority of our country lives in the rural areas. And in these rural areas the activities such as agriculture, forestry, and fishery are the means of livelihood. According to Dr. M.S. Swaminathan agrarian activities will be the only sector for this country which will provide major job opportunities for youth. We all have noticed that the outlook of the present policy on Agriculture by the central government is focused on these areas. At the same time we all have observed excesses of modern agriculture technologies causing damages to the local ecology. The returns from farming are slow and low of which the price is determined not by the farmer but somebody else. Hence, the existing generation guides their next generation to undertake any other profession but agriculture; which has potential of quick and assured income along with dignity. The outcome of this is that the rural areas are still fumbling for survival

So, Agro-tourism can bring about many more added benefits in rural areas by way of assisting farming and other rural families to use existing resources better in order to improve income and the viability of the farm business, providing interactive opportunities to the villagers with national and international tourists right in their own places thereby enhancing understanding of the outside world, improving the infrastructure facilities and standards for tourists and local people, enriching the heritage and culture of the region, and bringing about overall transformation of rural sectors into active functional centres.

Role of agriculture institutes in promotion of Agro--tourism

Around 1000 agriculture teaching, training, research and marketing organizations are there in the country. Each institute is equipped with technically trained manpower, infrastructure for lodging, boarding, fields and other necessary facilities which could be used for promotion of Agro-tourism concept. Urban, foreign tourist could be attracted, accommodated and exposed to agricultural situations on payment basis. This helps in efficient use of existing manpower, infrastructure on one side and generating the income to the institute. This approach is possible by just utilizing the facilities of the existing institutes in Agro-tourism. The same facility could be used for further promotion of the concept by building the capacity of the farmers, agripreneurs in Agro-tourism. Thus, these centres could serve as nodal centres for promotion of Agro-tourism concept. All the state agricultural universities, animal husbandry universities, fisheries universities, ICAR organizations, KrishiVignan Kendra, state, district level farmers training centres, demonstration

farms and seed production farms could be brought under this concept. This would bring down economic burden of the government, efficient utilization of resources and promotion of Agro-tourism concepts.

SCOPE OF AGRO-TOURISM IN ASSAM:

Assam a get way to the North East India. It is a state of India which is the pioneer in respect of tourism among North Eastern State. The state is rich in natural resources and biodiversity. The state has enormous potentiality with naturally gifted wild-life, important religious and historical sites and also folk cultural setting. The state is also endowed with many basic resources, unique natural beauty, and different species of wild life, religious places, historical sites, diverse attractive rural cultural heritage and friendly hospitable rural people for which the state can rightly be designated as paradise state. Assam is a agro-based rural economic state where tourism is the premature economic activity of the people. Nature has blessed Assam with a good number of large forests full of rarest flora and fauna, rarest wild life, beautiful green plants, a network of rivers and blue hills. The state is very rich in traditional values with large diversified rural tribes and culture. The major problem in rural area of the state is it less diversified working opportunities. Most of the rural people are farmers: a few of them are either fishermen or artisans. All these activities are subsistence in nature and as such none is remunerative. Consequently villagers are struggling with one or two earning members in the family with less saving due to high consumption expenditure. Large family size, low income and poverty are the major problems of rural masses in Assam. In this background, agro-tourism can be a viable alternative for additional earning for the people of Assam. Realizing its economic significance, the government of Assam has taken a fresh initiative to explore rural tourism which has largely remained untapped as there are many places in the state's vast rural Satra that speak of culture history and religion. The basic objective of the agro- tourism is to project the multi-faceted village life in which art; culture and religion have formed a tapestry.

Till now, the government has proposed to develop a few areas as viable tourist spots. Mention may be made about the Shyamgaon area at Titabor in Jorhat district which is dominated by Buddhists. Tourists can be taken around the place to get them acquainted with Buddhist practices of the residents. This village lies close to Jorhat where Majuli, the seat of Vaishnavite culture is situated and also not very distant from the Kaziranga National Park. Along with this, the government has also made plan for the development of rural tourism in the Dehing-PatkaiKshetra in Tinsukia district, Sualkuchi, the silk township in Kamrup district, Durgapur near Kaziranga and the Asharikandi area in Dhubri district. These are just a few of the vast sea of rural tourism. There are about 26147 villages in Assam and each very village has been characterized by the colourful lifestyle of different castes/tribes which has a long history of diverse and unique cultural heritage. Their traditional art, culture and crafts are very attractive and these are sources of great attraction for tourist. Assam's handicrafts and handlooms need no introduction and have become popular in both domestic and international markets. All these make Assam a treasure house for the growth of agro tourism. An integrated approach of development is unavoidable because Assam has vast potentials in other segments of tourism including Wild life Tourism and Eco-tourism, River tourism, Tea and Golf tourism, Pilgrimage & Cultural tourism, Heritage tourism etc. The hills and plains of Assam is famous for bio-diversity and huge numbers of medicinal, ornamental and valuable timbers, bamboos, canes etc. are available in the hills and forests of Assam.

WHY TO PROMOTE AGRO-TOURISM IN ASSAM:

As we know Assam state is very rich in traditional values with large diversified rural tribes and culture but the major problem in rural areas is its less diversified working opportunities. Most of the rural people are farmers. Consequently, villagers are struggling with one or two earning members in the family with less saving due to high consumption expenditure. Large family size, low income and poverty are the major problems.

In this background agro-tourism can be a viable alternative for additional earning for the people of Assam. Realizing its economic significance the government of Assam has taken a fresh initiative to explore agro-tourism. If we promote agro-tourism in Assam there is a possibility of getting benefits like:

- Income is much higher
- Market for agriculture product and handicraft
- Create job opportunities in rural areas
- Enhance in standard of living of rural masses forth
- Help rural population to come closer to the mainstream of population, and finally
- Cease movement of rural people to the Metros or other urban centers for jobs

It is generally said that- “If you want to see the real India then visit Indian villages and if you want to see real Assam then visit colorful Assamese villages”

Agro-tourism can be a concept if adopted in Assam with seriousness can reap good results and help to increase Assam’s share in national tourist market. This can be done if state on its own start working on a plan to identify places for agro-tourism. Also income from agro-tourism is much higher than what rural people can earn from agriculture. Through rural tourism market for agriculture products and handicrafts will develop in rural areas farmers and will develop a direct contact with the customers.

FUTURE PROSPECTS OF AGRO TOURISM:

Both long term and short term strategies are required to redefine agri-activities as an additional tourist attraction.

- Necessary planning and its implementation by concerned government departments like agriculture, horticulture and tourism in collaborative manner.
- Creation of service providers in the project areas. Provision of necessary training for such providers is also important.
- Along with the cultivation of a particular crop species for tourism purposes, approaches to achieve maximum aesthetic values need to be considered.
- For greater effectiveness of agro-tourism, approaches to integrate the local traditional and cultures are important.
- Provision of better publicity campaign.
- Proper selection of area for agro-tourism purpose. Preparation of a directory for such area with contract details of service provider or any key persons will help in fixing up the program by tourist.

CASE STUDY

A Case Study on Agri Tourism Destination – Malegoan Village, Taluka Baramati, District Pune, Maharashtra Dr. R. Gopal*, Ms. Shilpa Varma** and Ms. Rashmi Gopinathan***

Objectives of the study

- 1) examines the key issues involved in the development of Agro-tourism in India
- 2) the challenges faced by Agro- tourism industry
- 3) suggest recommendations for the success of this industry

Research Methodology

The research methodology involved field research which was widely used to understand the concept of Agro tourism and the various aspects that are involved in the successful development of Agro tourism. For the field research, a questionnaire was used comprising of both open-ended questions as well as close ended questions. The sample size used for the study was 100. The sample was selected in a random manner and the respondents were personally interviewed by the authors.

DISSCUSIONS

Based upon a detailed analysis of the case, the following positive outcomes at the Malegaon Village Khurd, Baramati Taluka can be highlighted:

1. Lives of the farmers changed considerably with the agri-tourism destination venture.
2. The farmers today have developed themselves into entrepreneurs.
3. They have learned soft skills to handle customer service and to market their product.
4. The entire agro-tourism venture has raised the self-esteem of the farmers.
5. The agro-tourism venture has a positive effect among the community from a drought prone area where the suicide cases were increasing.
6. Today the Agro-Tourism destination has more than 4,300 tourists from urban cities every year from 2005. Besides the year end of 2006 also saw Korean companies coming to enjoy the destination.
7. Efficient utilization of the existing natural resources.

SUCCESS STORY

KAZIRANGA ORCHID AND BIODIVERSITY PARK:

The park is located at Durgapur village in Kohora range of Kaziranga National Park in Assam. The park is spread across 16 bigha of land. The park has green house, lake for boating, angling, small tree house etc. This park will house 500 orchid species found in North East region, 200 varieties of paddy, medicinal plants which are fast to become extinct. It also has local flowers, fruits and indigenous rice varieties.

Main aim of the park:

- Conserve the local varieties of orchids, flowers, fruits, fish and colourful ethnic culture
 - Spread knowledge
 - Taste local jouse, local fruits, pithas and enjoy Borgeet, xathriya dance performances
- Employment generation:
- Offer jobs to the local villagers
 - Provide employment to 60 local villages

- Engaged some English-speaking Assamese youth who will guide and share information about orchid and rich biodiversity with tourists visiting the park. A nominal fee is charged from tourist and visitors for maintenance of the park and pay back of the employees.

CONCLUSION:

Agro-Eco Tourism could supplement considerably to agro-entrepreneurship creating self-employment generation opportunities for rural youth may develop awareness for nature conservation among people making them to enjoy the beauty and solemn calmness of nature to escape from the fever and fret of modern life. There is need to make strenuous efforts to bring The state on agro-eco tourism map of the country and rural youth can be motivated by providing loan on lower interest rates.

Hence, the agriculture departments of the districts', Agriculture Universities should try to give orientation about it and provide some innovative ideas regarding to the Agro-Tourism. The government should try to provide optimum financial aids to the agro-tourism activities. Bank should provide optimum financial help for the agro-tourism activities in any state. Union of the agro-tourism service providers is also another need of these farmers which helps to the agricultural tourism network in the India.

REFERENCE:

1. Chase, L. C. (2008). Agritourism. In Encyclopedia of rural America: The land and people (2nd ed., pp. 70-74). Millerton, NY: Grey House Publishing
2. Dennis M. Brown and Richard J. Reeder, 'Agri-tourism Offers Opportunities for Farm Operators' 2004, U.S.A
3. Kuehn, D., & Hilchey, D. (2001). Agritourism in New York: Management and Operations. Oswego, NY: New York Sea Grant. Retrieved from: [http://www.seagrant.sunysb.edu / Images/Uploads/PDFs/themeareas/CoastalEco/AgritourismInNY.pdf](http://www.seagrant.sunysb.edu/Images/Uploads/PDFs/themeareas/CoastalEco/AgritourismInNY.pdf)
4. Lopez, E. P., and F. J. C. Garcia. 2006. "Agroturism sustainable tourism and ultra peripheral areas." *Revista di Turismo e Patrimoniales Cultural* 4(1): 85-97.
5. R. Gopal, S. Varma, R. Gopinathan .Rural Tourism Development, constraints and possibilities with a special reference to Agri Tourism – A case study of Agro tourism Destination Maligaon Village, Taluka Baramat, Dist: Pune, Maharashtra
6. Rural Tourism - Challenges and opportunities- Piali Haldar Kalinga Institute of Industrial technology University Greater Noida
7. Sharpley, R. 2002. "Rural tourism and the challenge of tourism diversification: the case of Cyprus." *Tourism Manager* 23(3): 233-244.
8. Tourism in Assam, Trend and potentialities P. Bhattachary- Bani Mandir, Guwahati.



BIOTECH PARKS: AN EXCELLENT CONCEPT FOR AGRIPRENEURSHIP

Sourav Kumar Das*¹, Milan Kumar Lal²

¹*National Research center for Plant Biotechnology, IARI, New Delhi;*

²*Division of Plant Physiology, IARI, New Delhi*

**Email: souravkumardas001@gmail.com.*

Introduction

Biotechnology has the immense potential to provide environment friendly products and processes in almost all areas of economy. In countries like India, biotechnology has created lot of employment especially in agriculture and allied sectors. India has initiated steps, to promote biotechnology industry by taking initiatives aimed towards providing facilities for accelerated commercial development of Biotechnology (dbtindia.nic.in). One of the innovative way of development in biotechnology and agriculture is through setting up the biotechnology parks, where facilities for technology incubation, technology demonstration and pilot plant studies are provided for encouraging research and development activities. Biotechnology parks are established for facilitating product advancement and innovation through the development of biotechnology industrial cluster, which can produce biotechnologists and entrepreneurs who have strong interest and foundation in research and innovation in the field of agriculture and science. To promote biotechnology research and commercialization activities in the country, both Central and State Governments are making their efforts by setting up biotechnology parks, incubators as well as pilot projects through public private partnership.

Biotech parks

Biotechnology parks are generally science and technology parks with a special emphasis on biotechnological development (EDP 2007). Biotech parks are promoted in our country to help the small and medium scale entrepreneurs and technopreneurs and agripreneurs for starting their own ventures in the field of biotechnology. Biotech park has an increased activity towards applied research and technology development by both the academy and the industry leading to improvement in the field of agriculture, biotechnology, science and technology.

Functions

Encouraging and supporting incubation and development of biotech innovations.

Provides career of market driven self-employment in the broad field of biotechnology.

Providing opportunities to the entrepreneurs to develop efficient processes for cost-effective product development.

The Park provides facilities to carry out applied biotech projects in areas such as food and nutrition, natural products, recombinant DNA and monoclonal antibodies technologies for diagnostics, prophylactics and therapeutics, agricultural biotechnology products and processes, analytical and quality control services etc.

Facilities/services & incentives at biotech parks Biotech parks are equipped with state-of-the-art facilities, along with which it comprise the following:

1. Technology incubation center (TIC)
2. Specialized facilities
3. Common facilities
4. Business support facilities (BSF)
5. Business enterprise zone (BEZ)

Organisations providing initiatives

1. Department Of Biotechnology (DBT)
2. Biotech Consortium India Limited (BCIL)
3. Council of Scientific and Industrial Research (CSIR)
4. Department of Science and Technology (DST)
5. National Science and Technology Entrepreneurship Development Board (NSTEDB)

List operational biotech parks in india

Name of Park	Place of Establishment	Year of Establishment	Name of Park	Place of Establishment	Year of Establishment
Agri-Biotech Park	Dharwad, Karnataka	2009	Guwahati Biotech Park (GBP)	Guwahati, Assam	2008
Alexandria Knowledge Park	Hyderabad, A.P	2001	International Biotech Park	Pune, Maharashtra	2003
Ansal API Biotech Park	Lucknow, Uttar Pradesh	2010	Kolkata Biotech Park	Kolkata, West Bengal	2011
Bangalore Helix	Bangalore, Karnataka	2009	Marine Biotech Park	Visakhapatnam, A.P	2003
Biotechnology park	Kharagpur, West Bengal	2008	Peninsula Biotech Park	Goa	2006

Commercial potential

1. Technical Development
2. Regulatory Clearance
3. Manufacturing Requirements
4. Market Development
5. Financial Feasibility

References

1. "Entrepreneurship Development Programme" In Biotechnology (2007). Biotech Consortium India Limited, New Delhi & Small Industries Service Institute, Mumbai.
2. Patra, S. K. (2014). Knowledge Production by Indian Biotechnology Parks. Asian



AGRICULTURAL COOPERATIVES EMPOWERING YOUTH, HOW?

Jagadish*, Prathima, A.S., Rohini, N Meti, and K. S. Tapashwini

**Ph. D Scholar, Dept. of Agronomy, UAS, Raichur, Karnataka*

**Email: jmgayakwad@gmail.com*

A series of recommendations for increasing agricultural cooperatives' empowerment of youth were drawn up by rural youth and young producers' representatives at joint regional workshops held by FAO, the International Fund for Agricultural Development (IFAD) and the International Movement of Catholic Agricultural and Rural Youth (MIJARC) in Senegal, Sri Lanka and Peru in 2015. These recommendations were refined during the fourth global meeting of the Farmers' Forum hosted by IFAD in 2016, and are addressed to cooperatives, governments and donors.

1. Cooperatives should become youth-sensitive, particularly in their representation and governance. Youth sections should be created within mixed cooperatives, and gender inequalities should be addressed to ensure the active participation of young women. The creation of youth-only cooperatives should also be facilitated.
2. Cooperatives should provide mentoring, guidance and advisory services to their young members, so that they can become leaders and farmer entrepreneurs, and can overcome constraints (e.g: through access to training, land and credit).
3. Cooperatives should value indigenous/traditional agricultural knowledge and practices, while also promoting innovations to stimulate youth's interest in agriculture.
4. Cooperatives, donors and governments should formulate and implement youth focused agricultural development projects and programmes.
5. Cooperatives, governments and the international community should play a proactive role in raising the image/profile of agriculture. Cooperatives can be a platform for sharing/demonstrating farmers' success stories, or linking young women and men to educational institutions and agricultural schools.
6. Donors and governments should provide specific financial support for the development of cooperatives that involve and/or engage with young people.

SKILLED LABOUR: THE BACKBONE OF ALL NURSERIES

Mallikarjun Hebbal¹, Dilip Masuthi², Mukund Shiragur³, Jashwitha, S., VishwasGowda and NamishaArora

*¹M. Sc (Hort.) FLA student, ²Asst. Prof of Seed Technology, ³Asst. Prof of Floriculture and Landscape Architecture, KRCCH Arabhavi, UHS, Bagalkot
Email: hebbalhortico@gmail.com*

A nursery is a managed site, designed to produce seedlings grown under favorable conditions until they are ready for planting. There is a wide scope for fruit orchards, ornamental and vegetable nurseries at highways and co-operative housing societies. It assures the production of genetically improved quality planting material(Ratha Krishnan et al., 2014).

The special plantation drives and environmental clearance compulsion by greening activity also increased the demand of seedlings. Inadequate availability of quality planting material is one of the important determining factors in development of a sound horticulture, pulp and paper industry. Seed propagation, cuttings, suckers, runners, grafting, budding, layering are different methods of propagation in which the nurseryman has to be expert and his skills decides the quality of nursery products. Hence, skilled labour is backbone of any nursery.



INDIAN AGRICULTURE: HOW TO ATTRACTING YOUTH TOWARD THE AGRICULTURE

RandhirYadav¹, Mohit Yadav² and Mulayam Singh³

*¹Department of Agricultural Economics & Statistics, ² Department of Agronomy
³Department of Soil Conservation & Water Management
C. S. A. University of Agriculture & Technology Kanpur
Email: randhiryadav94726@gmail.com*

The world's highest number of youth population live in India. In India, they are living in the rural areas of the continent, with more than half of them directly engaged in agriculture. However, many rural youth prefer to migrate to cities or work abroad. Many of those who stayed did not have better options. They see that farming does not earn, that it is a lowly and high risk job, and is poorly supported by government and other institutions. However, the youth can be attracted to agriculture if agriculture will earn enough for them to raise a family, they are provided basic resources such as land ,capital, training, farm equipment and market, and they can see meaning and significance in their

work. To harness the potentials and energy of the youth for agriculture, a comprehensive and integrated policy and program on agrarian reform, rural development, sustainable, agro-ecological production and farmer-managed agro-based enterprises as well as on markets and trade should be put in place, with special incentives and provisions for young farmers, especially women. The youth is the future of the nation, and the rural youth is the future of agriculture and rural industry. The time to act is now, if we would like to have farmers, and food, in the future.

S3-P6

YOUTH ARE THE FUTURE OF FARMER'S IN INDIA

Vinay, B Patil*, Jagadish, ¹. Balakrishna Reddy and Mallikarjun, ^s

**Ph. D Scholar, Dept. of Agronomy, UAS, Raichur, Karnataka*

**Email: vin231989@gmail.com*

According to the UN youth is defined as a person in 15-24 years of age group whereas the census of India treats people in the age group of 15-29 years as youths. The participation of the rural youths for development in J&K can be more impressive if more attention is paid on them. According to 2011 census, population of Jammu and Kashmir is 1.25 crores, of which 6,640,662 are males and 5,900,640 are females. Sex ratio in Jammu and Kashmir is 889 i.e. there are only 889 females per 1000 males much below the national average of 940 females per 1000 males. The economy of Jammu and Kashmir has been facing an armed conflict from the last 30 years. Disturbance due to militancy in the state has deeply affected people's employment, their attitude, behaviour, habits, health etc. The rural youths of Jammu and Kashmir have suffered a lot especially after 80s and this process is continued. Rural youths of the state can contribute significantly to the economy of the state. Rural youths are the key agents for the development of the state. Government have launched a number of state and centrally sponsored schemes in the state from time to time for the upliftment of rural youths. It has been observed that rural youths of the state have innate capabilities to change the destiny of the state. Rural youths are the future of the agricultural sector in the state. A large number of rural youths of the state are migrating towards the urban areas in search of employment and to live a better life. They are migrating towards urban areas because there are limited resources, poor infrastructure and unemployment in the rural areas. In this way we are losing the present and future agriculturists in the state. Agriculture is an important tool which can stop the migration from rural areas towards the urban areas and can create the income and employment opportunities for the rural youths.

Youth is often the time when one starts to dream of the future, thinks of the path to take and boldly and aggressively set the life in motion. In many villages, to be a farmer is not a part of this dreamt future. What will then be the future of agriculture without the involvement of young farmers? If there is no farmer then there will not be food and life. It has been observed that the majority of rural youths are not attracted towards agriculture. We need to find out the initiatives being taken to encourage the youth to be in agriculture and need to give the recommendations for the youth to stay in this profession. India is said to be the youngest country in the world as it is having the highest

number of youths in the world. The rural youths are often unemployed or work informally in unpaid or underpaid, low skilled and insecure. The lack of opportunities and decent jobs in the rural areas compel the youths to migrate to cities. For many decades, the rural youths in the state have been under-tapped and neglected by their communities, governments and international organizations and thus are unable to make full use of their energy and potentials in the agricultural sector. Sons and daughters of the farmers in the state are often reluctant to go into farming due to various reasons. Many of those who continue to stay in the farming were often forced or did not have better options. This has resulted to ageing of the farming population. The youth is the future of the state and the rural youth is the future of agriculture and rural industry. How can we then attract the youth to stay or work in the rural areas? Different kinds of policies and programmes are needed to be made by the government for their secure future and stay in agriculture and rural industry by their choice.

S3-P7

EMPOWERING YOUTH THROUGH AGRICULTURAL SKILL DEVELOPMENT

A.K. Verma¹, R. Choudhary² and R.P. Singh³

*¹Senior Coordinator (H), AIASA & Scientist, ICAR-CIAH, Bikaner, ²Former National General Secretary, AIASA, ³Scientist (SMS), KVK, JNKVV, Jabalpur
Email: ajayhorti19@gmail.com*

Agriculture contributes about 15.7 % of country's GDP and is estimated to employ millions of people. Besides this, Agriculture Industry employs a large number of people in the organized and the unorganized sector. As a large sector is predominantly unorganized there is a need for training interventions in agriculture for creating awareness about the need for skilling and upskilling among rural youth. Population is increasing and agricultural land holding is decreasing day by day, which causes low agricultural productivity and farmer income. Getting skilled labour for hi-tech agriculture and allied activities is one of the major constraints in better economic returns to the farmers. Lack in transfer of knowledge through traditional modes and educating the rural youth in farming practices is also a global challenge. Earlier there were joint families system, so children were trained by their grandparents and parents about farming system but now adays due to increasing nuclear families, the farming skills are not disseminated to the younger generation at one hand and secondary due to continuous loss in farming business many farmers are leaving agriculture and entering into other professions. One of the biggest problems of our country is unemployment, which is increasing in both rural and urban areas is not only economic problem but also a social issue. There are several opportunities in field of agriculture which can be harnessed to create employment opportunities. For instance, skill development in the field of seed industry, nursery raising, protected cultivation and value addition has great potential for employment generation and converting rural youth from job seeker to job provider. Thus, skill development in agriculture will not only help in achieving rapid growth in the Agricultural sector but will also enhance the economic value of time and labour of landless workforce. Besides this it will help in achieving government's vision to double the farmer's income along with providing employment opportunity to rural youths for self-sustainability and in bringing new entrepreneurial ideas.

SMALL TEA GROWING SYSTEM—AN ALTERNATIVE ENTREPRENEURSHIP DEVELOPMENT APPROACH TO ATTRACT RURAL YOUTH

Subhrajyoti Panda^{1*}, Yanglemlakshimai Devi¹, Avrajyoti Ghosh¹, Sourav Kumar Das², P.K Pal³. Research Scholar, ². MSc. Scholar, ³ Professor

¹ & ³ *Department of Agricultural Extension, Uttar Banga Krishi Viswavidyalaya, Pundibari, Coochbehar, West Bengal, Pin-736165*

². *National Research Centre for Plant Biotechnology, IARI, New Delhi*

**Email: subhrajyotip1992@gmail.com*

Tea, the most ancient beverage mankind has been enjoying, is still the most popular drink in the world; may be regarded as the “national drink” in India is an aromatic beverage commonly prepared by pouring hot or boiling water over cured leaves of *Camellia sinensis*, an ever green shrubs native to Asia. Small tea growers are largely concentrated in North Dinajpur, Kishanganj, Jalpaiguri, Cooch Behar, and at the foothills of the Darjeeling Hills. There are 30,000 such small tea growers in North Bengal and total production is around 91 million kg, which is almost 32.5% of North Bengal's tea production of 280 million kg. The study was conducted in Jalpaiguri and Uttar Dinajpur district of West Bengal. Purposive sampling was done to select the areas and random sampling was followed for selection of individual respondents. The present study mainly considered primary data for analysis. Primary data were collected through group and individual interview schedule. However, small amount of secondary data were also collected from records of CISTA and SHG registers. The results revealed that small tea growing system is economically profitable than the existing crop alternatives. It is observed that B:C ratio is high in case of tea than other crops in the study area. It is also seen that the SHGs are getting higher rate of leaves because the SHGs are bargaining for their product and they are avoiding middlemen for their produce and sometimes they are possessing in their own co-operative processing units. The rate of green leaves in the month of November or December remained lowest but being highest in the month of March to June. Small tea sector supports the family income with 25-100% contribution. It can be concluded from the study that Small tea growing system is a very good alternative to attract rural youth for entrepreneurship development.

Key Words: Ever green shrubs, Economic analysis, B/C ratio, Entrepreneurship, Co-operatives

IMPACT OF ICT INTERVENTIONS IN ENHANCING SKILLS OF RURAL YOUTH IN AGRICULTURAL DEVELOPMENT

¹Praveen. H. G., ²Madhushree.A. and ³Venkatesh, C. S.

¹ & ² *Ph.D Scholars, UAS, GKVK, Bangalore and ³ SRF, AICRP on IFSD, UAS, Hebbal, Bangalore- 560065*

Email: praveenhg.agri1@gmail.com

Information and communication have always mattered in agriculture. Farmers in a village may have planted the “same” crop for centuries, but over time, weather patterns and soil conditions change and epidemics of pests and diseases come and go. Updated information allows the farmers to cope with and even benefit from these changes. Providing such knowledge can be challenging. Agriculture is facing new and severe challenges in its own right, With rising food prices that have pushed over 40 million people into poverty since 2010, more effective interventions are essential in agriculture (World Bank 2011). ICT services is one among which is helping the young farmers to understand the modern cultivation methods, availability of agriculture inputs, irrigational sources, availability of pesticide and fertilizers for increasing the production and productivity of crops. The main focus of ICT in agriculture is meeting the farmers’ needs for information. The service role of ICTs can enhance rural communities’ opportunities by improving their access to market information and lower transaction costs for poor farmers and traders such as Broad basing agricultural extension activities, developing farming system research and extension; having location-specific modules of research and extension; and promoting market extension, sustainable agricultural development, participatory research, etc. ICT helps the extension system in re-orienting itself towards the overall agricultural development of small production systems. With the appropriate knowledge, small-scale producers can even have a competitive edge over larger operations. Developing countries can create Traditional Knowledge Digital Libraries (TKDL) to collect and classify various types of local knowledge so that it can be shared more widely. These libraries could also integrate widely scattered references to Indigenous Technical Knowledge (ITK) systems in a retrievable form. Thus IT could act as a bridge between traditional and modern knowledge systems. Hence, ICT are going to play greater role in private sector agribusiness, market information and market intelligence. Which inturn brings improved skills in different activities in their farming activities and also concerned institutions can create employed opportunities for rural youth with a view of sustainable agricultural development.



S3-P10

YOUTH’S PARTICIPATION IN COOPERATIVES:CHALLENGES AND SUCCESSES

Jagadish*, Ashok, Rajesh V. A and Sharath Kumar B.

Dept. of Agronomy, UAS, Raichur, Karnataka

Email: jmgayakwad@gmail.com

Youth face specific constraints in joining a cooperative. Some cooperative by-laws stipulate membership conditions, such as landownership and the payment of membership fees, to which youth often cannot adhere. Youth, particularly young women, typically do not own (enough) land and cannot pay membership fees. To address this issue, some Latin American organizations have introduced the concept of household membership, ensuring that family members other than the head of household who owns the land can be involved in the organization (MIJARC/IFAD/FAO, 2012). Cooperatives can also play an important role in facilitating land access for youth. For example, cooperatives in Burkina Faso have negotiated with village chiefs to convince them to give land to young women in their communities. When youth form their own

cooperatives, they often struggle with cumbersome and complex procedures to register these cooperatives. Youth only and mixed organizations (those with both young and older members) face different constraints in representing youth. Youth only organizations are generally informal and lack human and financial resources. On the other hand, although youth often form a large percentage of the membership of mixed organizations, they are frequently not well represented in and excluded from decision making processes. Young people's limited participation within organizations also undermines their ability to participate in policy processes outside the organization. Culture and traditions characterized by hierarchical relationships in which young people are expected to obey older community members also complicate youth's participation in cooperatives. Again, young women face additional challenges in having their voices heard. However, there is growing recognition of the importance of ensuring adequate representation of young people in cooperatives and their active participation in decision making. As a result, many cooperatives have been expanding their membership bases to include young people, establishing youth structures within the organization, and promoting youth leadership.

S3-P11

PRECISION FARMING IN RELATION TO NUTRIENT MANAGEMENT

ChutiaRoji¹, Bhagawati P.C¹, DuttaJoli² and BuragohainMoromi³

Department of Agronomy¹, Department of Plant Pathology² and Department of Extension Education³

Assam Agricultural University, Jorhat-785013

Email: rojichutia10@gmail.com

Precision farming is comprehensive information based on farm management system to identify, analyse and manage variability within fields for optimum profitability, sustainability and protection of land resources (Swain, 2014). It basically means adding the right amount of treatment at the right time and the right location within a field. Precision farming integrates environmental health, economic profitability, social and economic equity by giving emphasis on crop management using technologies like GIS, GPS, remote sensing along with ground equipment like variable rate applicators, yield monitors and computers along with appropriate software. Site-specific nutrient management (SSNM) is a component of precision farming and can be used for any field or crop. SSNM aims at balanced nutrient application to crops based on the nutrient requirement to produce a unit quantity of yield, the native nutrient supplying capacity of soil and specific targeted yield. Major nutrients to be applied under SSNM is decided considering the soil test results, soil test rating for N, P₂O₅ and K₂O, nutrient removal and set yield target for each crop. Research carried out using SSNM on grain yield of rice demonstrated the yield advantage of rice (10.48 t/ha) over STLR (6.94t/ha) and Farmers practice (6.7t/ha). Effect of Targeted Yield Approach on Growth, Yield and Nutrient Uptake of Maize using SSNM yield advantage of Maize (9.77t/ha) over STCR (8.56t/ha). Enhancing the Productivity and economic returns of field crops with balanced nutrient application through SSNM. Balanced nutrient application through SSNM could enhance the crop productivity and economic returns over RDF and the farmers practice (FFP). Under Site specific

Nutrient management Performance in Rice-Wheat cropping system is found better than farmers practice.

Key words: Precision farming, Site specific nutrient management, GIS, GPS, Remote sensing

S3-P12

ATTRACTING INVESTMENTS FOR CAPACITY BUILDING AND SKILL DEVELOPMENT IN YOUTH IN AGRICULTURE

SaurbhSoni*, Shiksha and Munish Sharma

CSK Himachal Pradesh KrishiVishnavidyalya, Palampur – 176062

**Email:saurbhsoni@gmail.com*

The landscape surrounding agriculture has undergone significant changes in recent years. Higher food prices, the consequent world food price crisis in the late 2000s, along with a projected 60 per cent expansion in demand for agricultural products by 2050, has driven a resurgent interest in the sector – among policy-makers, development practitioners, and private actors. As rural and agricultural markets are transforming, with higher demand and prices, more integrated supply chains, greater rural-urban connectivity in many areas and exponential growth in urban markets, new opportunities are emerging for young people to start up and run profitable agribusinesses. To do this, however, they need a range of skills and knowledge – agricultural, financial, and entrepreneurial – as well as a broader environment of youth targeted policies and investments. Investing in the education and training of young rural people is becoming ever more important as the challenges associated with adopting sustainable, climate-smart production methods and linking up with marketing opportunities in modern value chains are growing. The increasing engagement of multinational and national companies in food value chains – along with increased consumer sensitivity to global issues of sustainability and poverty reduction – means that opportunities for young people to engage in agriculture today and in the future are arguably greater than was the case for their parents. At the same time, however, greater competition and more demanding quality standards at the market side – and more competition over scarce natural resources, including land, from the production side – imply the need for these young people to develop a range of skills and knowledge that have not always been readily accessible in rural areas. It is unfortunate that the training needs of young rural people – in particular those needed to develop capacities to engage in productive, profitable and sustainable agriculture – have rarely been systematically addressed in education and training agendas. Even today, many national training plans contain no specific acknowledgement of the particular requirements of youth. Nonetheless, what is encouraging is that in recent years many examples have emerged of initiatives targeted at young rural people who have highlighted new approaches and methodologies to developing the capacity of youth to engage in agriculture. Many of these initiatives have considerable potential to be adapted to different contexts. It is important to ensure that lessons learned from these initiatives are documented and integrated into planning and policy agendas.

ROLE OF CAPACITY BUILDING FOR YOUTH DEVELOPMENT IN RURAL AREAS

M. Mudoj and D. Saikia

Assam Agricultural University, Jorhat

**Email: mridupaban072@gmail.com*

This paper tries to review the role of capacity building for youth development. Capacity building (or capacity development) is the process by which individual and organizations obtain, improve, and retain the skills and knowledge needed to do their jobs competently. Capacity building and capacity development are often used interchangeably; however, some people interpret capacity building as not recognizing people's existing capacity whereas capacity development recognizes existing capacities which require improvement. Youth in rural areas have fewer opportunities for development. For example, rural students are reportedly less satisfied with their communities than urban students (Howley, Harmon, & Leopold, 1996). Rural youth face more stereotypes than urban youth and may have lower aspirations for education and careers. Unfortunately, many rural youth leave their home areas and do not return, a factor that is troubling for long-term community development. Rural areas often lack financing that urban areas can afford and lack professional leadership and coordination of existing recreation resources (Brademas & Weber, 1999). Youth in rural areas often have less access to technological assets than urban youth (Elbert & Alston, 2005). This lack can affect occupational opportunities, educational growth, and skill development of rural young people (Elbert & Alston, 2005). These challenges can be conquered by effectively mobilizing and accessing the limited resources of their communities through providing capacity building and training opportunities to rural youth with assurance that they would be able to build up their skills, capabilities and approaches for development. Capacity building in rural areas can enhance positive youth development and improve the quality of life the community.

Key words: Capacity building, rural youth

Session 4
ICT, Innovations & Startup Platforms

Innovative ICT-mediated Agricultural Knowledge Sharing: Challenges and Opportunities

P. Adhiguru¹, Letha Devi G² and AK Singh³

¹Principal Scientist(AgrilExtn), Agricultural Extension Division, ICAR, New Delhi, ²Senior Scientist, National Institute of Animal Nutrition and Physiology Bengaluru, and ³Deputy Director General(AgrilExtn), ICAR

Information and Communication Technologies are emerging as an important tool for the development of societies and have driving forces in the economies worldwide. The Agriculture sector is gearing itself to make optimal use of the new information and communication technologies. At the Government of India level, a number of important initiatives have been taken to provide IT Hardware and connectivity to all organization involved in Agricultural Education, research, development and dissemination. Simultaneously Agricultural content development initiatives have been taken by Ministry of Agriculture, in collaboration of National Informatics Centre (NIC), to provide marketing information of various agricultural commodities to the farming community. Another content-creation and aggregation initiative is being supported by Indian Council of Agricultural Research (ICAR), under its World Bank aided project – National Agricultural Innovations Project (NAIP), wherein the Leading ICT institutions like IIT Kanpur, IIT Mumbai, IITKM, Kozikode and International Crop Research Institute for Semi-Arid Tropics (ICRISAT) have been roped in to guide National Agricultural Research System to design, development and implement Knowledge Management Systems (KMS) in Agriculture. NAIP has supported all the State Agricultural Universities (SAUs) to improve their ICT infrastructure and enhance the ICT capacity of their teaching staff. Similarly National e-Governance Plan - Agriculture (NeGP-A), of Government of India has supported establishment of ICT Nodal Cells in all state departments of Agriculture. ICTs are thus emerging as very important tools for Agricultural Extension, and it is now a must for every Agriculture graduate to have working knowledge of Computers, Communications, Mobile-Apps, Internet and World-Wide-Web.

Use of ICTs in Agricultural Extension: Options and Opportunities

ICTs have opened whole new set of options for the Agricultural Extension scientists, Extension officers in the research and extension system to improve the speed, accuracy of the communications at relatively lower costs. The ICT tools like Internet, e-mail, on-line Expert Systems, Call Centres, Short Message Service (SMS) and information portals on Agricultural marketing information, packages of practices and subject specific discussion groups on Internet have enhanced access of Extension personnel to the latest information within and outside the country. Communication is the central mechanism of Extension process.

Usefulness of ICT application to farmers

Type of information/services received through mobile is diverse and helps in cost-effective acquisition of information. In general, the advantages of this technology are:

1. The inevitable and growing importance of mobility in agriculture offers various advantages. All types of information on crop, soil, climate, rainfall, seeds and machinery at any point in time, and any number of times is available on finger tips of farmers (World Bank 2011).
2. It gives a variety of information in single stroke. Mobile phones reduces the costs of farmers by reducing transaction cost, communication cost by providing them information at their field and as per demand.
3. The market connectivity is also improved with the visibility and knowledge of the potential buyers and sellers in the locality with an opportunity to develop direct contacts. The commodity prices can be delivered in a real time mode. (Kuek et al. 2011).
4. In addition to voice communication, mobile phones allow for the transfer of data, which can be used in the context of applications for the purposes of health, education, commerce or governance. (Rashid and Elder, 2009).
5. Timely information available in appropriate formats.

Information and Communication Technologies (ICT) can play an important role in transforming the farm information delivery. In a 2006 survey, IICD analyzed the use of ICT in agriculture in over fifty supported projects. End users clearly indicated that awareness-raising and training are highly valued and lead to empowerment.

Innovative ICT Enabled Agricultural Advisory Services in India- an Inventory

India is the home to the largest number of ICT-enabled Agricultural Advisory Services Projects (both in terms of number of Projects and number of farmers reached through SMS, Farmers' Call Centre and Web-based Services).

The following are some of the ICT applications developed by different institutions to provide agricultural information/services to the farmers.

Name of the app	Name of the organization	Information/Service provided
1.mKisan SMS portal	DAC&FW	With the assistance of KrishiVigyanKendras (KVKs-Farm Science Centers) provides location specific web based SMS agro advisories to two crore farmers,
2.KVK Portal	Agricultural Extension Division, ICAR &ICAR-IASRI	Provides information and advisory to the farmers and facilitate online monitoring of the activities of 681 KVKs established at district level,
3.Kisan Call Centers (KCCs)	DAC&FW	Toll free helpline service in 22 languages through Agricultural experts to farming community

4. AGMARKNET portal	DAC&FW	Provides details about market functionaries, sold and unsold stocks, as well as the sources of supply and destination
5. eNAM portal		A single window service for all Agricultural Produce Marketing Committee (APMC) related information and services such as commodity arrivals & prices, buy & sell trade offers, provision to respond to trade offers, among other services.
6. ITC e-chaupal	ITC	4000 Internet chaupals (kiosks) in villages for foodgrain procurement, support agriculture trading
7. Kisansuvidha app	ICAR-New Delhi	Weather, market prices, seeds, fertilizers, machinery etc.
8. Mobile app riceXpert	ICAR-National Rice Research Institute, Cuttack	Insect pests, nutrients, weeds, nematodes and disease-related problems, rice varieties for different ecologies, farm implements for different field and post harvest operations.
9. Pusa krishi app	IARI-New Delhi	New varieties of crops developed by Indian Council of Agriculture Research (ICAR), resource conserving cultivation practices as well as farm machinery and its implementation
10. Oilseeds at a glance	ICAR-Indian Institute of oilseeds research	Comprehensive information about 9 oilseed crops viz., Groundnut, Rapeseed and Mustard, Soybean, Sunflower, Safflower, Sesame, Niger, Castor and Linseed. Crop information, Released varieties and hybrids, State-wise preferred varieties and hybrids, AICRP centres contact information, ICAR seed Project centres dealing with oilseed crops, Mandis/selling markets for each state.
11. Cotton mobile app	CICR Nagpur	Cotton cultivation, planning for cultivation, selection of BT varieties, cotton sowing, seed treatment, nutrient management, weed and water management, cotton growth management, pest management, picking and storage

12.IFFCOkisaan app	IFFCO	Information related to mandi prices, weather forecast, agricultural advisory, best practices tips related to a griculture, Animal Husbandry, horticulture; a buyer and seller platform, and all agriculture related news and govt. schemes.
13. mkrishi	TCS	Information on microclimate, local market price, enables farmers to send queries specific to their land and crop to receive personalized replies from agricultural experts, on their phones.
14.Digital Mandi	BSNL	Allow farmers to call up a (BSNL) number and get the rate of commodities, like vegetables, grains, pulses or fruits in any mandi (market) across the state
15.Agri market	Brinvik	This app is for agriculture traders and farmers in india. Farmers can see the commodity prices on their mobile anytime. App is covering most of the farm product from all over the indian agriculture markets, market yard.

Constraints of ICT applications

The rural community, especially farmers, is facing many problems in the use of ICT tools such as mobile phones. Constraints in any system adversely affect the process, thus know how of various constraints associated with mobile application is equally important to technology developer. There are many constraints indicated such as knowledge, content and accessibility.

- Knowledge related constraints: Farmers are often unaware to access tools and associated information, which could potentially be due to lack of awareness of mobile app as personal constraints. Sometimes in rural areas, people keep mobile phones but they do not know availability of apps, the manner in which app is to be utilized.
- Content related constraints: Main challenges that rural communities have faced is impeded mobile application due to language barrier and non-availability of content in vernacular languages as well as lack of pictorial interface in retrieving the content is biggest challenge for them.
- Accessibility: Technical inefficiency in operating mobile phones is a barrier between the

user and flow of information. Most of the farmers do not use Smartphone, so they cannot get information that is developed based on smartphone software.

- Connectivity: Farmers face low network coverage. In rural India due to poor connectivity and poor network coverage mobile phone application is slightly decreasing in recent years. Strategies for effective use of ICT
- The development departments need to be sensitized about various ICT tools available and their potentiality for networking and sharing database. Within village, each development and agency should have its own portal for sharing the information with regard to development programs with adequate support of data base.
- The ICT-based infrastructure should be established such that its quality of functioning is sustainable in public-private partnership mode. The information needs of villagers are to be constantly assessed for building database incorporating both indigenous and exogenous information. The information shared should be appropriately supported by services by the concerned development departments.

References

- Ray, GL (2003). Extension, communication and management, Kalyani Publications, Kolkata
- Das, P. and Parshad, R. (Eds.) (2006). Proceedings of first National Conference of KVKs, Division of Agricultural Extension, ICAR, New Delhi.
- Das, P. and Parshad, R. (Eds.) (2007). Proceedings of second National Conference of KVKs, Division of Agricultural Extension, ICAR, New Delhi.
- Das, P. and Prabhukumar, S. (Eds.) (2008). Models of technology delivery mechanism – experience of KVKs, Division of Agricultural Extension, ICAR, New Delhi.
- Sadamate, V.V., Ventatasubramanian, V. and Rasheed Sulaiman, (2008). Technology Transfer and Extension- Issues and Recommendation, Proceedings of Second Green Revolution Summit by CII, Kolkata



S4-P2

ROLE OF YOUTH IN AGRICULTURE AND INFORMATION COMMUNICATION TECHNOLOGY

***Vediyappan, V¹., A. Palanisamy² and R. Vinoth³**

¹Dept of Agricultural Entomology, TNAU, Coimbatore. ²SethuBhaskara Agricultural College and Research Foundation, Karaikudi, ³Institute of Agriculture, AEC& RI, Kumulur, Trichy.

*Email: vvedi1996@gmail.com

Agriculture plays a major role in the economic growth and development of most countries. Agriculture has played a key role in the development of human civilization. Until the Industrial Revolution, the vast majority of the human population labored in agriculture. Development of agricultural techniques has steadily increased agricultural productivity, and the widespread diffusion of these techniques during a time period is often called an agricultural revolution. A remarkable shift in agricultural practices has occurred over the past century in response to new technologies. Agriculture encompasses a wide variety of specialties and techniques, including ways to expand the lands suitable for plant rising, by digging water-channels and other forms of irrigation. Consequently, the need for effective and progressive agricultural development is fundamental. To achieve this, the active group of individuals, constituting the youth needs to be involved extensively. Even though literature indicates that youth face constraints that hinder their active involvement in agricultural activities.

Key words: Agriculture, challenge, participation, rural youth, significance

Introduction

Youths are the primary productive human resource of socio-economic development. It is, therefore, essential to identify the roles of youth in mainstream development. Nigerian youth are diverse in ethnicity, religion, and socioeconomic backgrounds. Such diversity necessitates customized initiatives to meet needs and activate their untapped potentials. If about 21.5% unemployed youths are gainfully involved in agriculture, there would be a rapid growth in the nation's economy. Every youth has a role to play in any segment of agricultural/ food value chain.

9 ways to engage youth in agriculture

1) Link social media to agriculture

The rise of social media and its attraction among young people with access to the appropriate technologies could be a route into agriculture. Mobile phone use in Africa is growing rapidly and people are now much more connected to sources of information and each other. Utilising these channels to promote agriculture and educate young people could go a long way in engaging new groups of people into the sector.

2) Improve agriculture's image

Farming is rarely portrayed in the media as a young person's game and can be seen as outdated, unprofitable and hard work. Greater awareness of the benefits of agriculture as a career needs to be built amongst young people, in particular opportunities for greater market engagement, innovation and farming as a business. The media, ICT and social media can all be used to help better agriculture's image across a broad audience and allow for sharing of information and experiences between young people and young farmers.

3) Strengthen higher education in agriculture

Relatively few students choose to study agriculture, perhaps in part because the quality of agricultural training is mixed. Taught materials need to be linked to advances in technology, facilitate innovation and have greater relevance to a diverse and evolving agricultural sector with a focus on agribusiness and entrepreneurship. Beyond technical skills, building capacity for management, decision-making, communication and leadership should also be central to higher education. Reforms to agricultural tertiary education should be designed for

young people and as such the process requires their direct engagement.

4) Greater use of Information and Communication Technologies (ICT)

Not only can ICT be used to educate and train those unable to attend higher education institutions but it can be used as a tool to help young people spread knowledge, build networks, and find employment. Catering to a technologically savvy generation will require technological solutions. Such technologies can also reduce the costs of business transactions, increasing agriculture's profitability.

5) Empower young people to speak up

If we are to enable youth to transform agriculture then the barriers to their engagement, such as access to land and finance, need to be addressed. National policies on farming and food security need to identify and address issues facing young people. As such youth need to become part of policy discussions at the local and national levels, whether as part of local development meetings, advisory groups or on boards or committees. The Young Professionals' Platform for Agricultural Research for Development (YPARD) aims to provide a platform for young people to discuss opportunities in agricultural development, share experiences and advocate for greater youth engagement and representation.

6) Facilitate access to land and credit

Land is often scarce and difficult to access for young people, and without collateral getting credit to buy land is nigh on impossible. Innovative financing for agriculture and small businesses is needed. For example soft loans provided to youth who come up with innovative proposals in agriculture or micro franchising.

7) Put agriculture on the school curricula

Primary and high school education could include modules on farming, from growing to marketing crops. This could help young people see agriculture as a potential career. Farm Africa run a project aiming to help school children discover more about agriculture as a profession.

8) Greater public investment in agriculture

Young people may see agriculture as a sector much neglected by the government, giving farming the image of being old fashioned. Investment in agriculture is more effective at reducing poverty than investment in any other sector but public expenditure on agriculture remains low. Regional and continent-wide programmes such as the Comprehensive Africa Agriculture Development Programme (CAADP) may go some way in transforming the prominence and reputation of agriculture in Africa but national efforts and public investments are also needed.

9) Make agriculture more profitable

This is an easy statement to make but a difficult one to realize. Low yields and market failures in Africa reduce the potential of agriculture to be profitable and to provide people with a chance of escaping poverty and improving their quality of life. Making agriculture profitable

requires that the costs of farming and doing business are reduced while at the same time productivity increases. Although large-scale commercial farming springs to mind, this is not necessarily the case, and small farms can be highly productive with low labour costs. Of course all of these solutions come with their own hurdles: access to education and technologies, rural development, land rights etc. “Africa has the highest number of youth in the whole world, and some of the most fertile soils – the two combined could be a force to promote agricultural development!” Foregoing engaging youth in agriculture and the potential for transformation this could bring because of the complexities of modernising agriculture would be a huge opportunity lost.

Information and communication technology in agriculture

ICT in agriculture also known as e-agriculture, is developing and applying innovative ways to use ICTs in the rural domain, with a primary focus on agriculture. ICT in agriculture offers a wide range of solutions to some agricultural challenges. It is seen as an emerging field focusing on the enhancement of agricultural and rural development through improved information and communication processes. In this context, ICT is used as an umbrella term encompassing all information and communication technologies including devices, networks, mobiles, services and applications; these range from innovative Internet-era technologies and sensors to other pre-existing aids such as fixed telephones, televisions, radios and satellites. E-agriculture continues to evolve in scope as new ICT applications continue to be harnessed in the agriculture sector. More specifically, e-agriculture involves the conceptualization, design, development, evaluation and application of innovative ways to use ICTs in the rural domain, with a primary focus on agriculture. Provisions of standards, norms, methodologies, and tools as well as development of individual and institutional capacities, and policy support are all key components of e-agriculture.

ICT for market access

In this document, market access ICT services entail any service that gives beneficiaries, especially farmers, access to information on the pricing of agricultural products (inputs and outputs), and connections to and knowledge of suppliers, buyers and logistics providers, such as storage facilities and transport companies. These services also cover ICT solutions that help the typically larger upstream and downstream firms, such as processors or exporters, manage their operations and the quality of the produce better. Most examples, if not all, have a pricing information component and provide information on or links to at least one of the players mentioned: suppliers, buyers or logistics providers (the most common from the farmers’ perspective being buyers).

Types of market access ICT service

Market access ICT services are somewhat simpler, less varied and newer than the production systems management ICT services described in Chapter 2. The following are some of the market access service types provided. The most common services provide current market pricing for relevant agricultural products. As many of these services are new (and in pilot stages), there will likely be much evolution in final service provision and probably new services and ways of delivery:

Pricing services;
Virtual trading floors (VTFs)

Holistic trading services;
Downstream administration/management

Revolutionizing Agriculture through ICT

Over the last few decades massive technological development and opportunities have transformed people's lives. However, these opportunities have not benefited the agriculture sector in a significant way. Farmers and various other actors along the agriculture value chain need significant amounts of information. Information and Communication Technologies (ICTs) will play a key role in knowledge exchange, targeted recommendations, market integration and access to finance to make agriculture a profitable enterprise and attractive for youth. Digital Agriculture is "ICT and data ecosystems to support the development and delivery of timely, targeted information and services to make farming profitable and sustainable while delivering safe nutritious and affordable food for ALL."

References

1. Adefalu, F.O., Adekunle, O.A., Oladipo, L.L., Adisa, R.S. and Fatoye, A.D. 2009. Constraints to youth involvement in agricultural production in Kwara state, Nigeria. *Agricultural Extension*, 13 (1):102-108.
2. Adeogun, S.O. 2015. Participatory diagnostic survey of constraints to youth involvement in cocoa production in cross river state of Nigeria. *Agricultural Sciences*, 60 (2):211-225.
3. Atwal, G.S. 1972. Evaluation of Farm Radio Programmes Broadcast from All India Radio, Jalandhar, M.Sc. Thesis, Punjab Agricultural University, Ludhiana, India.
4. Bhatnagar, S. 2000. Information technology and development: Foundation and issues. Sage publication, New Delhi



S4-P3

A CASE ANALYSIS OF DIGITAL/ICT BASED UNIFIED MARKET PLATFORM BENEFICIARY IN CHIKABALPUR DISTRICT OF KARNATAKA

Harisha N¹ and Chinmayi V²

*¹Ph.D Scholar, Dept. of Agriculture Extension, Acharya N.G. Ranga Agricultural University,
College of Agriculture, Bapatla, Andhra Pradesh.*

*²Ph.D Scholar, Department of Agriculture Extension Education, UAS Raichur, Karnataka
Email: harishnmuni@gmail.com , Chinmayi.kashyap9@gmail.com*

India is basically an agrarian society where sole dependence has been on agriculture since time immemorial. In the olden days, the agricultural produce was fundamentally bartered by nature where farmers exchanged goods for goods and also against services. Gradually the scenario changed with the changing times and agriculture produce began being sold with an element of commercial value. Karnataka had a long history of regulated markets, even before many other states conceived the idea. Unified marketing platform (UMP) launched for the first time in the country in Karnataka in February 22, 2014 with purpose to implement market reforms bringing in efficiency and transparency in the agricultural marketing system. With this, study was conducted on to know the

opinion of farmers on unified marketing platform. The results reveals, Online cocoon trading system which enhances income, confidence and attracts many non-sericulture farmers for silk production, it reduces burden of silk imports.

Keywords: Unified marketing platform, Opinion

Introduction

India is basically an agrarian society where sole dependence has been on agriculture since time immemorial. In the olden days, the agricultural produce was fundamentally bartered by nature where farmers exchanged goods for goods and also against services. Gradually the scenario changed with the changing times and agriculture produce began being sold with an element of commercial value. In India, there are networks of cooperatives at the local, regional, state and national levels that assist in agricultural marketing.

Agricultural marketing scenario in the country and the state has undergone a change since independence, owing to the increase in the quantity and the variety of commodities produced, the marketable surpluses, changing consumption pattern in the society, linkages with the international market, etc.

Karnataka had a long history of regulated markets, even before many other states conceived the idea. After reorganization of states, recognizing the importance of agricultural marketing, the Karnataka legislature enacted the Karnataka Agricultural Produce Marketing (Regulation and Development) Act, 1966 which came into effect on May 1, 1968 and provided for improved regulation in the marketing of agricultural produce, development of an efficient marketing system, promotion of agricultural-processing, agricultural export and the establishment and proper administration of markets for agricultural produce. It put in place an effective infrastructure for marketing of agricultural produce and laid down procedures and systems in the state.

There are many programmes were implemented in recent past. The impact or results were not up to the mark. The situations of rainfed farmers become worsen year by year. So, we need to formulate policies for improvement of marketing system to develop farmers with socially and economically.

In the year 2013, the GOK formulated a committee called "State Agricultural Marketing Reforms Committee" headed by ManojRajan, to identify the major problems and suggest needed interventions. For this they come out with new programme unified marketing platform(UMP) and launched for the first time in the country in Karnataka in February 22, 2014. In the district of Tipatur, Arasikere and Chamarajnagar markets for trading of copra, coconut and turmeric, respectively in the year 2014. The Platform is developed and operated by Rashtriya e- Market Services Private Limited(ReMS) a joint venture company of Government of Karnataka and NCDEX e-Markets Limited, Mumbai with purpoto implement market reforms bringing in efficiency and transparency in the agricultural marketing system for efficient price discovery to benefit farmers and other market participants and also to promote and encourage participatory and equitable socio-economic development of farmers in particular and stakeholders of the market in general of Karnataka through vibrant, self-reliant and competitive agricultural marketing system.

Objectives

1. To know the opinion about unified marketing of registered farmers.

Methodology

With the objective the study was conducted in cocoon market, Shidlagatta, Chikbalapur district. Respondents were selected by using random method with personal interview.

Example Online Cocoon Market, Shidlagatta, Chikbalapur district

It is an innovative transparent online trading system for scientific price determination to cocoons. It was implemented at Shidlagatta in September 2016. The system was developed by the Mr. Satya Prakash the Principal Scientist at Department of sericulture, GOK. Arrivals about 30-35 tons/day. Daily transaction is about Rs. 1-2 crores. Nearly thousands of farmers were registered under online cocoon trading platform. From one of the farmer Narayana Swamy he shares opinion about UMP belong to Iragasandra village, who has 25 years experience in sericulture. In earlier days cocoons were sold through open auction facing many problems i.e., unable to determine good remunerative prices, Tray/Jallery problem, delayed and cut down payments, lack of marketing information, but since from one and half years he selling cocoons consistently in online trading platform and also happy with this platform.

Table 1: Economic analysis of sericulture of Narayana Swamy

Table No.1.1: Total cost of sericulture during pre implementation of online trading

Sl. No.	Particulars	Quantity	Price	Cost (Rs.)
	Production cost			
1	Mulberry	40 Bundles	470	18800
2	Two instars Silk worms	100 Eggs	3400	3400
3	News Paper	20 Kg	11	220
4.	Labour			
	a. Men labour	3 man days	200	600
	b. women labour	5 man days	120	600
5.	Mulberry transportation cost	4 days	250	1000
6.	Chaki paper	2 bundles	80	160
	Transportation cost to Shidlaghata	34 KM	500	500
7.	Rent for Chandrike	80	10	800
	Total			25480

Table No.1.2: Total cost of sericulture during post implementation of online trading

Sl. No.	Particulars	Quantity	Price	Cost (Rs.)
	Production cost			
1	Mulberry	40 Bundles	500	20000
2	Two instars Silk worms	100 Eggs	4000	4000
3	News Paper	20 Kg	12	240
4.	Labour			
	a. Men labour	3 man days	250	750
	b. women labour	5 man days	150	750
5.	Mulberry transportation cost	4 days	300	1200

6.	Chaki paper	2 bundles	100	200
	Transportation cost to Shidlaghata	34 KM	600	600
7.	Rent for Chandrike	80	11	880
	Total			28620

Table 3: Price Analysis of cocoons during Pre and Post implementation of online trading

Sl. No.	Particulars	Open auction /pre implementation(<2016)	Online trading(2016-2017)	Per cent change
1.	Average yield in Kgs	95	95	0.00
2.	Market Price/ Kg	320	360	11.11
3.	Gross Income	30400	34200	14.85
4.	Total cost	25480	28620	10.97
5.	Net income	4920	5580	11.82

Table 3 depict that 11.82 per cent of farmers income is raising caused by 11.11 per cent (Rs.320-360 between 2016-2018) of cocoon prices increased and also shown that gross income and total cost are increasing 14.85 %, 10.97 % respectively. Online cocoon trading system which enhances income, confidence and attracts many non-sericulture farmers for silk production, it reduces burden of silk imports.

Conclusion

Though the Unified Market Platform is at an infant stage in the state, however, the results obtained on pilot basis study are encouraging and farmers got a remunerative price and increased the farmers income steadily. The UMP process which starts from arrival of commodity to e-permitting from the particular farmer has built confidence among the farmers about transparency of UMP and it's benefits. NITI AYOJ, GOI indicated that the prices of certain commodities in Karnataka mandies have been increased to the extent of 38% between 2013-14 to 2015-16 due to UMP. It is the key milestone for farm income growth and doubling the farmer's income 2022-23. The Govt. suppose to formulate and implement market oriented policies, agricultural universities, KVKs, Research institutes etc. should be work towards market –led extension to transforming unprofitable agriculture sector into profitable agriculture sector and for sustainable development of agrarian community in the country.



S4-P4

DIGITAL FARMING MAKING AGRICULTURE ATTRACTIVE

***¹Palanisamy, A., V².Vediyappan, and R. Vinoth³**

¹Sethu Bhaskara Agricultural College and Research Foundation, Karaikudi. ²Dept. of Agricultural Entomology, Coimbatore. ³Institute of Agriculture, AEC & RI, Kumulur, Trichy.

*Email: anbu645@gmail.com

Farming has and will always be a field where decisions are made from a mixture of knowledge, experience, and gut-feeling. Digitalization provides the farmer the ability to more accurately predict the outcomes, as well as most effectively respond to nature's challenges. Farmers around the world are being able to act and react significantly faster – at the speed of 'now' – as patterns and changes can be recognized in much more detail. Growers have the opportunity to more precisely predict the impact of their decisions, such as: choice of seed variety, application rate, or harvest timing, making the risk management of the farm easier and affording higher profitability. Digital Farming solutions from Bayer will enable farmers to optimize the input of crop protection products and achieve a more reliable outcome. These solutions will bring greater transparency and make it easier to comply with regulations. As with any new technology there are still some hurdles to overcome. Bayer has chosen to collaborate and partner with diverse companies and research institutions focusing on climate modeling, soil mapping and farm machinery, to deliver digital solutions which meet different types of farms and needs.

Keywords: Farming- Digital Farming - Youth - Technology.

Introduction

Farming communities can also exchange information with each other through the service's location-based Whats App groups and get advice from agricultural experts on best farming practices. A reality television show called Don't Lose the Plot is aiming to do just that - stem the exodus of rural youth to urban areas and encourage them into agribusiness. Each young farmer had access to a panel of advisors that critiqued their ideas and approach while encouraging them to use modern, labour saving techniques to make the most of their land. After developing a business plan for their farm, they got access to financing, set up their farms, managed them and marketed their produce profitably.

Ten technological innovations that are revolutionizing Indian agriculture

The Minister of State for Agriculture Tariq Anwar had said that as per estimates by the Central Statistics Office, the share of agricultural products/agriculture and allied sectors in the country's Gross Domestic Product (GDP), which was 51.9 per cent in 1950-51, has come down to 13.7 per cent in 2012-13. That contribution is abysmally low for a sector that employs about 50 per cent of the country's population. However, this is mainly due to the farmers' inability to generate income from their crops and curb their growing debt.

1. Barrix Ago Sciences

The Bangalore-based startup offers eco-friendly crop protection methods after much research on products that support organic farming to increase crop produce and quality with minimal expenditure.

Products Barrix Catch Fruit and Fly Lure + trap: Toxic pesticides contaminate water, soil and leave behind harmful residue, besides being expensive. Barrix's pheromone-based pest control traps have artificially synthesised smelling agents that attracts and traps pests. Instead of eating the crops, the pests are attracted to the pheromones in the traps.

Fly pest sticky sheet: Barrix uses bright yellow and blue coloured recyclable sheets of

wavelengths between 500 nm to 600 nm, proven to effectively attract and trap at least 19 high-risk pests from a long distance.

2. AnulekAgrotech

Set up by Mumbai-based entrepreneurs, Anulekh focuses on increasing soil fertility to achieve higher agricultural productivity and crop yield with lower resource use. Product: BIOSAT: BIOSAT (Biochar based organic Soil Amendment Technology), a soil additive, is made of biochar mixed with different organic nutrients. The product preserves soil fertility, traps carbon emissions, maintains the topsoil strength and increases crop production, thus reducing dependency on chemical fertilizers.

3. Mitra

A Nashik-based startup, MITRA (Machines, Information, Technology, Resources for Agriculture) aims to improve mechanization at horticulture farms with the use of R&D and high quality farm equipment.

Products: Air blast sprayers: Developed for fruits and vegetables in general, and grapes and pomegranates in particular, the sprayers, used to add hormones that help the growth of crops, reduce the expenditure on manual labour and are less time-consuming.

4. CropIn Technology Solutions

A farming technology solutions startup founded by a Bangalore software engineer, it provides agri businesses the technology and expertise to create a smarter and safer food supply for consumers around the world.

Product: CropIn offers information on a cloud-based platform, integrated with a mobile app for Android. Called Smart Farms, it allows large food companies to track the growth of crops on farms around the country with details about what the crop is and the conditions it is grown in to help companies remotely monitor farms, interact with farmers and make every crop transparent and traceable. It also aids farmers in adopting global agricultural practices and improves productivity by offering productivity insights and harvest forecasts.

5. Eruvaka Technologies

An organisation based in Vijayawada, Andhra Pradesh, its mission is to accelerate the use of technology in aquaculture, an area where farmers face problems due to unavailability of adequate technology to measure and control water health.

Product: Eruvaka Technologies, to help farmers monitor aquaculture ponds, develops solar-powered floating buoys that measure different water parameters, such as oxygen levels, temperature and pH range, crucial for the growth and survival of fish and shrimp. The collected information is uploaded on the cloud and transmitted to individual customers through an Android app, SMS, voice call or the internet. Farmers can also remotely control automated equipment such as aerators and feeders.

6. Skymet

Skymet is India's largest weather monitoring and agri-risk solutions company. According to their website, they are the experts in measuring, predicting, and limiting climate risk to

agriculture, thus reducing losses incurred due to bad weather conditions.

Product: Launched to aid farmers, Skymet's weather website offers services such as weather forecast, crop insurance and agri-risk management. Prediction of weather conditions can help prepare a farmers for a drought or heavy unseasonal rainfall and help them take appropriate preventive measures, they say and claim to accurately measure and predict yield at the village level for any crop.

7. Ekgaon

A Gujarat-based venture started in 2001, Ekgaon Technologies is an IT based network integrator that provides a technology platform and offers a range of services to farmers in rural areas including financial, agricultural inputs and government assistance.

Products Financial: A mobile phone enabled financial services delivery platform, it provides information on microfinance institutions and banks for delivery of door-step services such as credit, savings, remittance, insurance, investment and mortgage.

Agricultural: Offered in Hindi, Gujarati and Tamil languages, the system uses mobile, voice recognition, interactive voice response system (IVRS) and web technologies to provide information on weather, commodity market prices, soil nutrient management and crop management.

Citizen: The web and mobile applications help citizens monitor the delivery of government programmes and services entitled to them.

8. Digital Green

Digital Green is a not-for-profit international development organisation that focuses on training farmers to make and show short videos where they record their problems, share solutions and highlight success stories as community engagement to improve lives of rural communities across South Asia and Sub-Saharan Africa.

Products : It uses technology-enabled behaviour change communication that is cost-effective, scalable and brings together researchers, development practitioners, and rural communities to produce and share locally relevant information through videos.

Two social online games Wonder Village and Farmer Book: In the games, players simulate a village economy and relate with actual farmers that Digital Green works with, on the field. The players are placed in a resource-constrained setting in which they have to complete quests such as set up paddy and maize farms and supply raw materials to the farmers' markets.

9. FrontalRain Technologies

The Bangalore-based agri-tech startup seeks to deliver affordable advanced technology solutions for emerging companies and take technology to remote corners of the country.

Product: The company's offering Rain+, according to their website, is a comprehensive suite of products on the cloud for food and agribusinesses. Rain+ can help companies at every stage of the value chain starting from growing, processing, logistics, wholesale trade, retail trade and exports. This technology, accessible through desktop, tablet and mobile devices, is used by companies dealing with commodities like spices, herbs, basmati rice, seeds, animal feed, sea food, dairy and edible oil.

10. **Agrostar**

A Pune-based ‘direct to farmer’ m-commerce platform, Agrostar strives to provide quality agro inputs at the farmers’ doorstep.

Product: AgroStar enables farmers to procure a range of agricultural goods such as seeds, crop nutrition, crop protection and agri-hardware products by simply giving a missed call on the company’s 1800 number or through their mobile app to eliminate unavailability of products, substandard products, duplication and adulteration.

Government’s “Digital India” project launched on 1st July 2015 envisions empowering citizens with e-access to government services and livelihood related services, among others. The project has three core components, viz. digital infrastructure, digital services and digital literacy. Mobile phone is the preferred delivery medium with focus on mGovernance and mServices. The mAgriculture and mGramBazar, out of the seven components covered under mServices, directly impact agricultural extension and marketing services.

The project will benefit small farmers. It seeks to

- [i] Transform rural India into a digitally-empowered knowledge economy
- [ii] Provide universal phone connectivity and access to broadband in 250,000 villages
- [iii] Extend timely services to farmers through information technology and its tools
- [iv] Enhance efficiency in agricultural governance through digital literacy and electronic delivery of services. This article briefly highlights government’s initiatives and suggests the need for harnessing potential of digital India for agricultural development.

Low crop productivity & profitability: According to “Situation Assessment of Indian Farmers”, only about 28% of all farmers use any kind of agriculture-related information that is available rather than what they need. While about 72% of farmers do not have any source of information that can help them adopt latest technology, most farmers are unable to access credit, insurance and marketing services from the established institutions. This is primarily responsible for farmer’s low crop productivity and profitability. Despite India has the largest irrigated land and ranks second in terms of arable land the yield crops is 20%-40% of the world’s best levels.

Potential of ICT

Information and Communication Technology (ICT) has the potential to revolutionize Indian agriculture in terms of raising crop productivity and profitability per unit area and resources. By June, 2014, rural India had about 122.4 million [68.32%] households with mobiles exhibiting mobile connectivity has become a basic service in rural areas. Rural mobile subscriber base is growing twice as faster compared to urban subscriber base. As of March 2015, the national teledensity was 79% and rural teledensity 46.5%. Telecom Policy aims to increase rural teledensity to 60% by 2017 and 100% by 2020. Study of the IAMAI revealed 80% using it for communications, 67% for online services, 65% for e-commerce and 60% for social networking. Mobile phones can be effectively utilized for purposes including generating, processing, transmitting, disseminating, sorting, archiving and retrieving critical information and data relating to agriculture. Mobile phones are omnipresent and cost effective means to revolutionize agriculture in India. Several apps are now available and many more can be developed to meet farmers’ following specific needs.

Reference

https://ypard.net/sites/default/files/resources/august_farmletter.pdf
<http://www.icrisat.org/youth-are-the-future-of-agricultural-development/>
<http://www.fao.org/3/a-i3947e.pdf>

S4-P5

AGRICULTURE IN THE FINGERTIPS: THE INDIAN SCENARIO

N. Vinothini¹ and R.K. Bhavyasree²

¹Department of Seed Science and Technology

*²Centre for Plant Breeding and Genetics,
Tamil Nadu Agricultural University,
Coimbatore - 03, Tamil Nadu, India*

Introduction

Digitalization is having its magic touch in the every aspect in the society starting from the daily needs of a common man to the dealings across the globe. It not only makes the things easier and precise but also connects the whole globe through the transfer of information. The deployment of internet for economic betterment, massive communication, knowledge transfer and innovations is also a part of digitalization. The fast paced evolution of the information technology has covered all over the world including the third world countries like India. The digital India campaign is one of the initiatives launched by government of India to ensure the transfer of technology and services to people through internet and also for the digital empowerment of Indian citizens.

Agriculture is the core sector for Indian economy contributing about 14% of the GDP. This sector is revolutionized by several movements those lead to the progress in food production, dairy industries, fisheries, oilseeds, biotechnological applications etc. Recently the Information and communication technology revolution is paving a new way to Indian agriculture. Including the digital technologies for the fast transfer of information in from scientific community to farmers can make India a global leader because it will cause a high impact due to the its heavy manpower. The technology can guide the farmers from the way they plant to the application of new technologies to harvest, process and market the farm goods. A small change can produce high impact in the country as its 50 percent of the population involves in the farming sector.

The Indian agriculture is having many constrains like the lack of attention, insufficient lands, slow transfer of technologies, non providing fair prices to farmers. The recently developed technologies are not reaching the small and marginal farmers. But the advancement in the electronics sector made the technologies like mobile phone and internet affordable to the rural community. So using these, the farmer will get the expert advice and information for the farming practices to the marketing strategies to improve the production and monetary outputs.

Computerized farming techniques including sensors for the application of farm inputs make the concept of 'precision agriculture' to a reality. With this aim, Central, state governments and private organizations have taken information and communication technology measures for agriculture extension which include ITC- e-choupal (Bowonder, 2002), Kisan Kerala (Saravanan, 2012), Aaqua, Rice knowledge management portal, e-krishi, Mahindra Kisan Mitra, IFFCO Agri-portal, Village knowledge centers (VKCs)- M.S Swaminathan research foundation (MSSRF), village resource centres (VRCs)- Indian Space research organisation, etc. Also the mobile applications are developed which can be considered as an easiest way to reach the common society.

Government initiatives to provide e-aid for farmers:

Indian government has taken many initiatives for popularization of information and communication technology in the agricultural sector. "National Policy for Farmers, 2007" formulated based on the recommendations of National Commission on Farmers in 2004 under the chairmanship of Dr. M.S. Swaminathan, has important provision for use of Technology. The new technologies can be used for increasing the productivity per unit of farm inputs. Using mobiles as a tool for socio economic advancement and improving the broadband penetration was the focuses of National Telecom policy, 2012. 'Bharat Nirman' was a base to enable mobile based services to reach the farming community and increased the tele-density in rural areas (Plan, 1956).

Universal service obligation fund (USOF) already launched wireless broadband Scheme in 2009 and also implemented USOF's Sanchar Shakti programme for Mobile value added services (m-VAS) for rural women's Self-help group (SHG). Kisan credit cards (KCC) started by Government of India (GOI), Reserve Bank of India (RBI) and National Bank for Agriculture and Rural Development (NABARD) helped the farming communities to go for cashless transactions and the mobile enabled KCC increased the efficiency (Gulati, 2012). Kisan choupal is one another initiative in Bihar, where the scientific community and the farm community is interconnected by using the awareness videos, expert discussions for solving the problems. The expert advisory systems to the farmers, Kisan Call centers are successfully functioning and the farmers can call to 1800-180-1551 to get expert advice (Koshy, 2016). Likewise, Kisan SMS portal will send the updates and expert advice to the farmer by sending SMS once he register to the portal according to the crop of his preference. The services include the information about the crop production, horticulture, animal husbandry, marketing, weather forecast and soil testing.

There is also another concept called irrigate by smart phones, where the mobile phones are connected to the irrigation systems and he can control and monitor the irrigation without going to his field. The moisture sensors established in the field will communicate the precise value of moisture content in the field, so that the farmer can use the water resource more efficiently. Also GPS mapping for each input is possible to apply those according to their requirements, nothing more or nothing less. Even there is the possibility of using the webcams in the field to monitor and getting the expert advice, which is successfully implemented by the vegetable farmers of Hyderabad.

Farmers' friendly mobile applications (Apps)

The smart mobile phone became affordable to the common community and became a necessity in these days. So there are several mobile friendly apps launched by several companies and

the government to support the farmers with expert advices in crop production and marketing.

The SandeshPathakApp : this is a 'text to speech' app jointly developed by C-DAC Mumbai, IIT-Madras, IIIT Hyderabad, IIT Kharagpur, and C-DAC Thiruvananthapuram to enable the illiterate farmers to read out the messages. So when they receive agriculture related informations or expert advices, this app can read it aloud. It can support five Indian languages viz, Hindi, Tamil, Marathi, Gujarati and Telugu. It can be downloaded directly from the appstore of Mobile seva project of GOI (Thapar, 2014).

KVK mobile app and KVK khoj: The KVK mobile app is interlinked with the KVK portal for easy access of the portal through mobile. This app provides the necessary information about the agricultural trade and farm practices. All sorts of information like seed production, crops, fisheries farming, market and weather data and other notifications related to farming sector. The information about several government programs and schemes are also available in this portal. KVK khoj app is a locator app to find the KVK in a specific location through GPS (Thapar, 2014).

AgriMarket Mobile App: It is a mobile app developed by CDAC Mumbai which can be used to get the market price of crops in the markets within 50 km of the device's location. This also utilizes the mobile GPS and also we can access it by manually entering the location (Bhopal, 2016).

SmartAgri :SmartAgri app is developed by VijayaragavanViswanathan a scientist with the European Organization for Nuclear Research to transfer important information like soil, temperature, minerals present and deficit directly to farmer's mobile phones by using underground sensors for soil moistures and minerals(Delgado, 2013).

KisanSuvudha: It is developed by CDAC Mumbai and launched by Prime Minister Narendra Modi in 2016 for the empowerment of farmers and rural development. It is a simple app with user friendly interface with weather information and forecast including extreme weather alert, market scenario, fertilizer, seed and machineries information, plant protection and available in multiple languages for wide accessibility (Gupta, 2017).

IFFCO Kisan Agriculture: This app is managed by IFFCO Kisan, a subsidiary of Indian Farmers' Fertilizer Cooperative Ltd and launched in 2015. The aim is to help Indian farmers to make decisions using available information according to their need. The information is available in various forms like text, images, videos and audios in various languages and can get connected with kisan call centre services (Patel, 2014).

RML Farmer – KrishiMitr: The app provides the latest commodity and mandi prices, pesticides and fertilizer usage information, farm and farm related news, weather forecast and advisory to the farmers. The news regarding government agricultural policies and schemes are also available in the app. It covers about 450 crop varieties, 1300 mandis, 3500 weather locations across 50000 villages and 17 states of india. The app includes various tools to analyze specific problems like nutrient recommendations, corrective measures etc(Gupta, 2017).

PusaKrishi: this app launched by union agriculture minister launched by 2016 which was

developed by Indian Agricultural Research Institute (IARI) to increase returns to the farmers by providing updates about the recent technologies developed. The new varieties developed by Indian Agricultural research Institute (ICAR), cultivation practices with limited resources etc are made available in this app(Gupta, 2017).

Conclusion

The application of electronic aids in Indian agriculture can result in a huge impact in the farm society. The digitalization facilitates an easy way for transfer of technology. The research can reach the farms in ease and with precision. By providing necessary information in the fingertips, the farmers can take their decisions in an effective manner and they can get the idea to dispose their products effectively with maximum returns. The knowledge about the present market scenario and weather conditions can help the farmer to plan their cultivation accordingly and to allot the contingency fund if there is any possibility for a calamity. The involvement of IT will increase the community involvement and can cause agricultural breakthroughs by causing fast transfer of information. The agricultural technologies will be made available to everyone, not only to farmers but also to anyone who is really interested in agriculture. The precision agriculture or site specific crop management is possible with these advances enables the optimum use of agricultural inputs thereby leading to overall improvement of agricultural systems.

REFERENCES

1. Bhopal, D. C. (2016). CIAE News Letter (Oct-Dec, 2016).
2. Bowonder, B., Gupta, V., & Singh, A. (2002).Developing a rural market e-hub: The case study of e-Choupal experience of ITC.Indian Planning Commission Report.
3. Delgado, J. A., Kowalski, K., &Tebbe, C. (2013). The first Nitrogen Index app for mobile devices: Using portable technology for smart agricultural management. *Computers and electronics in agriculture*, 91, 121-123.
4. Gulati, A. (2012). Role of ICTs in Rural Development.
5. Gupta, S., & Pal, A. K. (2017).Role of cellular phone in rural development in INDIA. *International Journal on Transformations of Media, Journalism & Mass Communication*, 2(1).
6. Koshy, S. M., & Kumar, N. K. (2016).A scale to measure the attitude of farmers towards Kisan Call Centre.*Journal of Extension Education*, 27(4).
7. Patel, V. B., Thakkar, R. G., &Radadiya, B. L. (2014).An android application for farmers to disseminate horticulture information.*International Journal of Computer Applications*, 88(4).
8. Plan, S. F. Y., & Planning Commission.(1956). Government of India.New Delhi, 37.
9. Saravanan, R. (2012). ICTs for agricultural extension in India: policy implications for developing countries. In *Proc. of 8th Asian Conference for Information Technology in Agriculture, AFITA* (pp. 1-11).
10. ThaparKapoor, R. (2014). Application of Information and Communication Technology for Dissemination of Agricultural Information among Farmers: Challenges and Opportunities. *International Journal of Agricultural Science, Research and Technology in Extension and Education Systems*, 4(2), 83-91.

DIGITAL TECHNOLOGIES TRANSFORMING INDIAN AGRICULTURE

¹Ashok, ²Basave Gowda, ³Sudeep Kumar, E. and ⁴Manjunath U. B.

¹PhD Scholar, Dept of Seed Science and Technology, ²Professor (SST) and Special Officer (Seeds), ³PhD Scholar, Dept of Seed Science and Technology and ⁴M.Sc. (Agri.), Dept of Seed Science and Technology, College of Agriculture, University of Agricultural Sciences, Raichur-584 104 Email: npbashokreddy@gmail.com

India is the world's largest sourcing destination for the information technology (IT) industry, accounting for approximately 67% of the US\$124– 130 billion market. However, the emergence of farm technologies integrated with a robust information and communication technology (ICT) framework is still evolving in India, and it holds tremendous potential to both positively impact agricultural performance and enhance farmers' income. The impact of technology in unlocking value for the people at the bottom of the pyramid and improving access to critical services is well demonstrated in the healthcare sector in India, as observed in the case of mobile technology-enabled telemedicine and low-cost devices that can address health conditions such as anaemia in a large section of the population. Technology has powered Indian agriculture time and again by helping overcome productivity stagnation, strengthening market linkages, and enhancing farm management. In the past, Indian agriculture faced a formidable challenge to grow more food, but it faces an even more difficult challenge today and for the future: to grow more sustainably and inclusively. Major challenges confronting Indian agriculture include declining total productivity, diminishing and degrading natural resources, a rapidly growing demand for food (not just for quantity but also for quality), stagnating farm incomes, fragmented land holdings, and unprecedented climate change. It has been established that technology adoption modernizes farmers' production practices and leads to uniform annual returns for farmers, reduced risk of crop failure, and increased yields.

Direct applications of digital technology include remote sensing (via satellites), geographic information systems, crop and soil health monitoring, and livestock and farm management, among other applications. At the pre-harvest stage, digital technology can recommend crop and input selection and assist in obtaining credit and insurance. At the on-farm stage, there is need for weather advisories and disease- and pest-related assistance; and at the post-harvest stage, real-time data on both domestic and export markets are needed. The growth of competitive markets and demand for consistent food quality is making the adoption of such tech-based solutions imperative for the Indian farmer. Much of the scope for application and innovation remains to be exploited. The application of digital technology in agriculture has been instrumental in promoting data generation as well as the advanced analytics that allow farmers to make smart decisions about farming and to benefit from an economical use of inputs and labour.

A successful future growth strategy for agriculture will need to perceive agriculture as a business enterprise involving constant innovation and catering to dynamic market demand. Although agricultural technologies are fast evolving in India and a mix of business models are

driving the ecosystem, there is a need to design the pathway to successful commercialization and to scale it up by utilizing the right incentives and policy support. Technology will continue to play an important role while the dynamics of the agriculture sector changes and produces new challenges. With the private sector playing an increasingly important role in investments, operations, and expertise, agriculture will gain immensely as the public sector catalyses these efforts. The IT revolution in India was brought forward by the private sector, with the public sector creating an enabling environment. Uptake of technologies at market prices in a sector that has traditionally been heavily subsidized remains challenging, but farmers are prompt to identify what works in their interest and are ready to pay for it. Digital technologies offer the potential to achieve the necessary conditions for scale, with distributed low cost and customized delivery, creating a unique opportunity for private enterprise and innovation to thrive. The challenge before India lies in balancing high growth with inclusive growth; leveraging technology to achieve these twin goals will be a fascinating journey to track. A developed agriculture system is based on three key pillars: knowledge, infrastructure, and a robust delivery mechanism. Supporting the research and development ecosystem in agriculture directly contributes to creating knowledge and preparing for the future. To strengthen the supporting framework for growth, it will be important to focus on creating new physical markets, improving storage and transport facilities, making better roads, and ensuring a continued electricity and water supply. These system components also facilitate efficient mechanisms for delivery and the monitoring of relevant government schemes and extension services that will accelerate the pace of development. The public policy regime in India has been supporting technology-led agricultural growth and has been increasingly developing new institutions to ease access and affordability of technology adoption among farmers.

S4-P7

ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGIES (ICTS) IN STRENGTHENING AGRIBUSINESS

Pankaj Thakur^{1*}, Rinku Babu¹, Piyush Mehta¹ and SPS Solanki²

¹*Department of Business Management, Dr. Y. S. Parmar University of Horticulture and Forestry, Nauni-Solan, Himachal Pradesh-173230, India*

²*Department of Fruit Science, Punjab Agricultural University, Ludhiana, Punjab-141004*

**Email: pankajthakur.js@gmail.com*

Agriculture is an important sector which contributes to economic growth and development of the country. It engages more than sixty per cent of the Indian workforce and an average Indian family spends almost half of its expenditure and consumption on food and nourishment respectively. After independence, the government have taken several steps to expand production level in the agriculture sector of the nation and to make agriculture and farming sector more sustainable. Agriculture has changed its inclination from subsistence to high esteem agribusiness. The role of Information and communication technologies (ICTs) in such a scenario is to provide timely information, increase choice, reduce transaction costs and to improve the efficiency of decision making that can result in upgrading production, quality of life, satisfaction and income of the

agriculturists. ICTs are a broad range of technologies that incorporate hi-tech devices such as personal computers with communications technology, telephones and telecommunication networks. In recent years ICTs have been introduced in the agribusiness sector. Significant milestone in the introduction of radio, televisions, computers, internet, email, digital cameras, digital video players, personal digital assistants (PDA), slide projectors and mobile phones, smartphones. Additionally, Global Navigation Satellite Systems (GNSS), wireless communication Wi-Fi, 4G networks, social media networking websites and applications. The utilisation of ICTs is helpful for agribusiness in market and chains because ICTs assume a critical role in encouraging access to knowledge, learning, data and information sharing and communication, opening new frontiers for technology innovation, trade, advertising, market and cooperation. To make it situation win, teaching the farmers particularly small and marginal ones is the need of the hour. Proper training is to be imparted to make them understand how to utilise the techniques of ICTs. In other side agricultural produce has achieved reasonable growth rate in India but efficiency in marketing that produce is still a matter of discontentment. In India, agricultural marketing is characterized by fragmented supply chain, multiple level of intermediation ultimately affecting efficient marketing. The incorporation of ICT tools will greatly contribute in achieving a deeper integration, communication and information flow between the different stakeholders. The information provided by the system must be in user-friendly form easy to access, cost-effective and well protected from unauthorized access. The implementation of the new technologies in food domain, enabling the adequate combination of traditional and modern management processes will definitively satisfy the needs of stakeholders as well as consumers. Increasing the level of involvement of consumers in the processed food value chain by means of the wide adoption of relevant ICT applications helps the firm to gain consumers confidence.



S4-P8

IMPLEMENTING E-AGRICULTURE IN INDIA TO EMPOWER THE FARMERS' AND OTHER STAKEHOLDERS.

HejbinaMehjabin Hussain¹, Jonali Goswami²,Priyanka Roy³ and Banasree Saikia⁴

¹**P.G Student, Department of Extension Education, Assam Agricultural University*

²*Scientist, North Eastern Space Applications Centre, Umiam, Meghalaya*

³*P.G student, Department of Agricultural Biotechnology, Assam Agricultural University*

⁴*P.G student, Department of Agricultural Biotechnology, Assam Agricultural University*

**Email: mehzabinhezbina02@gmail.com*

Information of the required quality always has the potential of improving efficiency in all spheres of life. Today a new paradigm of agricultural development is fast emerging in both developing and developed countries. The overall development of rural areas is expanding in new directions; old ways of delivering important services to citizens are being challenged; and traditional societies are being transformed into knowledge societies all over the world. The application of information and communication technology (ICT) in agriculture sector is increasingly important. Information and communication technology act as a key agent in agriculture sector in addressing the

challenges and enriching the livelihoods of poor rural population which depends on agricultural produce.

E-Agriculture is an emerging field focusing on enhancement of agriculture and rural development. It is one of the action lines defined in the declaration and plan of action of the world summit on the information society (WSIS) 2003-2005. It includes the use of computers, internet, geographical information system, mobile phones as well as traditional media such as radio or T.V. Agricultural extension, as a enabler of knowledge resources is receiving renewed attention across the globe. Most national governments and agricultural stakeholders are trying to revitalize their extension system. Our agriculture in the current century is facing serious challenges. Such challenges are being confronted in the field of extension management. The ICT enabled extension systems are acting as a key agent for changing the agrarian situation and farmers' lives by improving access to information and sharing knowledge. It is believed that ICT based agricultural extension brings opportunities and has the potential for enabling the empowerment of farmers or farming communities. Hence the extension practitioners are interested in experimenting with innovative e-agriculture initiatives in India.

Results and Discussion

Keywords: Agricultural Extension, Geographical Information System, Information and communication Technology (ICT)



S4-P9

INFORMATION AND COMMUNICATION TECHNOLOGY IN AGRICULTURE

Vinay, B. Patil., Jagadish, Prathima, A. S. and Rohini, N. Meti.

Department of Agronomy, University of Agricultural Sciences, Raichur

Department of Agronomy, University of Agricultural Sciences, GKVK, Bengaluru-560 065

**Correspondence author: Email-prathimaas78@gmail.com*

The rapid growth in the use of information and communication technologies (ICT) by governments, businesses, private institutions, and civil society has led to key socio-economic developments globally. This widespread diffusion of ICT has enabled more efficient local and global linkages between governments, businesses, and ordinary citizens. ICT in agriculture is an emerging fields focusing on the enhancement of agriculture and rural development. Information and communication technology in agriculture (ICT in agriculture), also known as e-agriculture is developing and applying innovative ways to use ICTs in the rural domain, with a primary focus on agriculture. ICT can play a significant role in maintaining information related to crop cultivation, water management, fertilizer application, fertigation, pest management, harvesting, post harvest handling, packaging, food preservation, food processing, marketing etc., These technologies are applied for processing, exchanging and managing data, information and knowledge so that the farmers can get access to knowledge to improve their production and even get better price for their produce through variety of ICT systems. The advancements in ICT can be utilized for providing accurate, timely, relevant information and services to the farmers, thereby facilitating an environment for more remunerative agriculture.

Key words: e- agriculture, Communication technology and fertigation

INFORMATION AND COMMUNICATIONS TECHNOLOGY AND ITS IMPORTANCE IN AGRICULTURE

¹Ashok, ²Jagadish and ³Maruthi

¹PhD Scholar, Dept of Seed Science and Technology, ²PhD Scholar, Dept of Agronomy and ³MSc. (Agri.), Dept of Agronomy, College of Agriculture, University of Agricultural Sciences, Raichur-584 104 Email: npbashokreddy@gmail.com

Information and communication technology in agriculture (ICT in agriculture), also known as e-agriculture, is developing and applying innovative ways to use ICTs in the rural domain, with a primary focus on agriculture. ICT in agriculture offers a wide range of solutions to some agricultural challenges. It is seen as an emerging field focusing on the enhancement of agricultural and rural development through improved information and communication processes. In this context, ICT is used as an umbrella term encompassing all information and communication technologies including devices, networks, mobiles, services and applications; these range from innovative Internet-era technologies and sensors to other pre-existing aids such as fixed telephones, televisions, radios and satellites. E-agriculture continues to evolve in scope as new ICT applications continue to be harnessed in the agriculture sector. More specifically, e-agriculture involves the conceptualization, design, development, evaluation and application of innovative ways to use ICTs in the rural domain, with a primary focus on agriculture. Provisions of standards, norms, methodologies, and tools as well as development of individual and institutional capacities, and policy support are all key components of e-agriculture.



PERCEPTION OF RAWEP STUDENTS TOWARDS e-SAP, A KNOWLEDGE DISSEMINATING AND LEARNING ICT TOOL

Tanweer Ahmed, Shwetha, N.V and Shivalingaiah

*Department of Agricultural Extension, UAS, GKVK, Bangalore-560065, Karnataka
Email: ahmedtanweer6@gmail.com*

Information and Communication Technology (ICT) in agriculture is an emerging field which combines the advances in agricultural informatics and agricultural development to provide better agricultural services, enhanced technology dissemination, and information delivery through various tools such as computer based advisory services (off-line), internet based approaches (on-line) and mobile based services. Electronic solution against agricultural pest (e-SAP) is a groundbreaking application built on the backdrop of agricultural pest management. It is a unique IT-enabled handheld device that will provide information to farmers in real time on pest-related problems. The study was carried out in the UAS, Bangalore. 50 final year B.Sc (Agriculture) students undergoing RAWEP were selected for the study. Results revealed that about 60.00 % of the respondents

responded that e-SAP device is moderately useful in resolving pest problem, 76.00 per cent of respondents uttered that device is useful. With respect to ability to diagnose the pests in the field condition using e-SAP system, about 74.00 per cent of the respondents responded that they were able to diagnose the pest in the field condition. With respect to confidence level in handling e- SAP device, 88.00 per cent of respondents were confident in handling the device and 12.00 per cent of them were not confident. About 88.00 per cent of respondents perceived that e SAP device is comfortable and convenient to use, 66.00 per cent of students had responded that they required one week to get acquaint to e SAP device, 94.00 per cent of the farmers were satisfied with the e SAP in diagnosing and management of pests.

S4-P12

A REVIEW PAPER ON ROLE OF ICT FOR YOUTH DEVELOPMENT IN RURAL AREAS

D. Saikia, M. Mudoi and M. Buragohain

Assam Agricultural University, Jorhat
**Email: dipanjalisaikia053@gmail.com*

This paper tries to review the role of ICT for youth development. The rapidly advancing information and communications technologies (ICTs) helps in addressing social and economic problems caused by the fast growth of urban youth populations in developing countries. ICTs offer opportunities to young people for learning, skill development and employment. The production and use of ICTs have become the influential force of change in the modern world. ICTs are playing a pivotal role in reforming the ways in which most of the traditional services are produced, traded and delivered, as well as offering opportunities for the generation of new activities and employment in many service industries. ICT has been extremely important in generating strongly diverging forces for the young workers. It contributed to the automation of processes making some workers unnecessary and closing off jobs many young people could have expected to begin their careers with. ICT changed the economics of many sectors reducing the importance of scale, facilitating an expansion in employment in small and medium enterprises (SMEs), and created new skilled employment opportunities through a number of ICT training initiatives. In the knowledge era continuous education and training is the only way for job security, especially if the education and training is in ICT-related skills.

Equitable access to information, knowledge (know-how) and education is one of the most vital principles in the emerging global knowledge economy. ICTs are practical tools in narrowing knowledge gaps between countries, regions and also people by providing new frontiers in the areas of information exchange, intellectual freedom and online education. ICT can make a great contribution to human development, but only for those that have access.

Key words: ICT, rural youth

ICTS AND AGRICULTURAL PRODUCTIVITY

Jagdish, Rohini, N. Meti, Prathima, A. S. and Prakasha, G

Department of Agronomy, University of Agricultural Sciences, Raichur
Department of Agronomy, University of Agricultural Sciences, Bengaluru
**Email: jmgayakwad@gmail.com*

The productivity in most of the field crops hampered due to non-availability of modern inputs, poor physical infrastructure and more so information on various issues in agriculture. Indian agrarian economy is characterised by low degree of market integration and connectivity, accessibility of reliable and timely information by the farmers on prices of commodities. To fulfill the expectations of the conscious buyers, price and quality, globalisation and liberalisation and maintain the viability of small and marginal farm to retain them in the farming, application of technology in agriculture has become inevitable. The development and application of better customised technologies specific to agro-climatic conditions, farm size and level of agricultural development is the real challenge ahead for the policy makers. The bane of Indian agriculture is not lack of technologies and research and development efforts but inadequate and inefficient dissemination of relevant information to the farming sector. In most of the developing countries, much of the agricultural information has been found out of date and irrelevant that is not applicable to small farmers' needs, leaving such farmers with very little information or resources to improve their productivity. The timely availability of right information and its proper utilisation is as critical as the availability of major inputs required for farming until the produce reaches the consumer. The availability of major inputs required for farming until the produce reaches the consumer. The application of Information and Communication Technology (ICT) can play a pivotal role in efficient dissemination of information. Information and Communication Technologies (ICTs) are any devices, tools that permit the exchange or collection of data through interaction or transmission. ICT is an umbrella term that includes radio, television, mobile phone, internet, electronic money transfer, etc., The ICTs increase productivity, access to markets and adaptability to weather conditions in agriculture. The ICT can deliver fast, reliable and accurate information in a user-friendly manner for practical utilisation by the end user. The information disseminated facilitates the farmers to decide what and when to plan, how to cultivate, when and how to harvest, what post-harvest management practices to follow, when and where to market the produce etc.

Key words: Field crops, Productivity and ICTs

DIGITAL FARMING: AN EMERGING TOOL FOR SUSTAINABLE AGRICULTURAL DEVELOPMENT

RinkuBabu*, Pankaj Thakur and Piyush Mehta

*Department of Business Management, Dr. Y. S. Parmar University of Horticulture and Forestry,
Nauni-Solan, Himachal Pradesh-173230, India*

**Email: rajputji2211@gmail.com*

Digital technologies in agriculture making a farm's field operations more insight driven and efficient. Digital farm services are helping to improve financial performance and boost yield. Government of India launched Digital India Programme on July 1, 2015 to create digital infrastructure for empowering rural communities and promoting digital literacy. Digital Agriculture helps to support the development, timely delivery, information and services to make farming profitable and sustainable (socially, economically and environmentally). The key components to support the implementation of Digital Agriculture is Spatial Data Infrastructure, low-cost smart phones and tablets to support the bidirectional flow of data and information to rural consumers. Advanced agriculture industries help farmers manage production and market risks through the application of spatial temporal data bases. This creates a rich and dynamic data ecosystem that enables advanced analytics to inform farmers that it is the best economic options to maximize profitability and minimize risk. Mobile phones enable farmers to integrate structured markets based on approved grades and standards that can be verified using calibrated photos and settlements made through mobile money. Smartphones are the other key intervention as they are equipped with GPS to track where photos of field infestations, hail damage have taken place for technical support or insurance claims. Digital technology will be key to increasing agriculture productivity by delivering recommendations to farmers based on crop, planting date, variety sown, observed weather and projected market prices. Remote sensing is another big data resource to support the development of derived weather products, improved hydrology and watershed management, soil health, crop coverage and crop health estimates among other application. The greatest impact of Digital Agriculture will have is on democratic of market pricing and compressing transaction costs so that farmers capture a higher portion of the produce's marketable value. Digital Agriculture will also leverage social media platforms to build human capacity. One of the best examples originating from India is Digital Green. It uses participatory videos that have farmers explain best management practices to other farmers. This approach is ten times more cost effective than traditional extension services. In India we need to move with sense of urgency to apply new tools to accelerate the pace of agriculture development to not only realize the vision of the Prime Minister of a Digital India but to facilitate the achievement of Sustainable Development goal.



DIGITAL FARMING FOR DESIRABLE AGRICULTURE

Suresh S. Patil¹ and Yasmeen²

¹*Dean (Agri.) and Prof. & Head, Department of Agricultural Economics, College of Agriculture, Bheemarayanagudi, University of Agricultural Sciences, Raichur*

²*Ph.D Scholar, Department of Agricultural Economics, University of Agricultural Sciences, Raichur*

Email: itsmeyas786@gmail.com

In Indian context, digital technologies and analytics are transforming Indian agriculture, making a farm's field operations more insight driven and efficient. Digital-based farm services are helping farmers to improve financial performance and boost yield. The key components to support the implementation of Digital Agriculture is Spatial Data Infrastructure (SDI) and low-cost smart phones and tablets to support the bi-directional flow of data and information to rural consumers. Agriculture is a data-intense enterprise when one considers soil variability, moisture and nutrient levels, rainfall variability and timing of key operations like planting and harvesting and market price volatility. Advanced agriculture industries help farmers to manage these production and market risks through the application of spatial and temporal data bases which creates a rich and dynamic data ecosystem which enables advanced analytics to inform farmers of the best economic options to maximize profitability and minimize risk - the two critical variables farmers in India would also like to manage. When it comes to large farms, success is mainly derived from four major factors: growing as much per acre of land, reducing the risk of failures, minimizing operational costs and finally selling the crops at the best price. This demands effective management of input resources like fertilizer, water, seed quality and minimizing the impact of unpredictable variables (such as pests and weather). The skill to be developed here is about translating available data into an action. Ultimately, digital agriculture is all about "ICT and data ecosystems that supports the development and delivery of timely, targeted information and services to make the farming profitable and sustainable while delivering safe, nutritious and affordable food of all".

Keywords: Digital agriculture, advancement, database, implementation, profitability.

DIGITAL FARMING: TRANSFORMING AGRICULTURE FOR THE FUTURE

Jagadish, Prathima, A. S., Vinay, B. Patil and Prakasha, G.

Department of Agronomy, University of Agricultural Sciences, Raichur

Department of Agronomy, University of Agricultural Sciences, GKVK, Bengaluru-560 065

**Email: prathimaas78@gmail.com*

The world is becoming ever more connected through digital technology. Smart devices are

getting smaller, faster and cheaper. Medical and defence industries have been taking advantage of this digital innovation to address challenges in their sector. Similarly, smart digital services have the potential to help the agricultural industry meet its productivity and sustainability challenges. In agriculture the greatest need is to deliver targeted and timely information to farmers based on their needs, this is possible through digital farming. Digital farming is the use of new and advanced technologies, integrated into one system, to enable farmers and other stakeholders within the agriculture value chain to improve food production. Technologies used include sensors, communication networks, Unmanned Aviation Systems (UAS), Artificial Intelligence (AI), robotics and other advanced machinery and often draws on the principles of the Internet of Things. These technologies help in data collection, processing, guidance and direction. This integrated system offers new insights that enhance the ability to make decisions regarding input application, intercultural operations, harvesting, marketing etc., Digital farming has the potential to make agriculture more productive, more consistent and to use time and resources more efficiently, this brings critical advantages for farmers and wider social benefits around the world.

Key words: Robotics, Artificial Intelligence and Sensors

S4-P17

DIGITAL FARMING: EXPERIENCE OF UNIFIED MARKET PLATFORM IN KARNATAKA

Praveen Kote¹, Vijaylaxmi B.S² and Shruti Patil³

¹&².Ph.D Scholar, Department of Agricultural Extension Education, UAS, Raichur

³.M.Sc, Department of Agricultural Extension Education, UAS, Raichur

Email: pavikote5@gmail.com

Agriculture in India is the core sector for food security, nutritional security, and sustainable development & for poverty alleviation. It contributes approximately 18.00 % of Gross Domestic Product. Milestones in agriculture development in India include series of revolutions for making agriculture a sustainable profitable venture and the most recent one is Information and communication technology revolution. ICT now is becoming the blood line of socio-economic development in rural India with its effects of immediate services. It can help bridge gaps between service sector and rural India. Karnataka, the first state to step towards major reforms in agricultural marketing through creation of Unified Marketing Platform (UMP), an initiative by the state government. Launched in 2014 by the Rashtriya e-Market Services (ReMS), it facilitates interaction between traders and farmers. For farmers, middlemen have always been a hindrance but this new service has managed to eliminate middlemen from the scene. Traders can quote product prices online, which the farmers then have a right to reject if it isn't satisfactory. Through UMP, farmers receive SMS alerts from their banks when transactions have been confirmed. The payment is almost immediate and transparent. About 1.4 million farmers have been registered with the system. Talking about the success of the UMP, R. Manoj, managing director of the Rashtriya e-Marketing Service (ReMS) said to Deccan Chronicle, "The success of this new online marketing system has created ripples and will revolutionise the agricultural sector in the country, greatly benefiting poor farmers

and other stakeholders in agricultural markets.”Now days the penetration of digital market forces in rural India is increasing and is potential sources of commercialization of farming . With the diverse cultures and languages in India, ICT provides a good platform here. Thus in future there would be substantial upliftment and sustainable development in rural areas.

Key words :Digital markets, UMP and ICT.

S4-P18

DIGITAL AGRICULTURE IS PATHWAY TO PROSPERITY OF FARMERS

Rohini, N.Meti, Jagadish, Prathima, A.S and Prakasha, G

Department of Agronomy, University of Agricultural Sciences, Raichur

**Email: rohinimeti5080@gmail.com*

Milestones in agriculture development in India includes, green revolution, evergreen revolution, blue revolution, white revolution, yellow revolution, bio-technology revolution and the most recent one is digital agriculture. Digital Agriculture can be defined as information and communication technology and data ecosystems to support the development and delivery of timely, targeted (localised) information and services to make farming profitable and sustainable (socially, economically and environmentally) while delivering safe, nutritious and affordable food for all. Given that 68 per cent of India's population is rural and agriculture is the main source of livelihood for 58 per cent of the population, one must consider the role of digital agriculture within digital India. Rural connectivity will be key to providing low cost data and access to information. The greatest need is to deliver targeted and timely information to farmers based on their needs. The empowerment that comes from providing farmers with informed options is transformational, especially for women and youth. It would empower rural youth to realise their full potential, farmers to increase their profitability by accessing equitable markets and rural businesses to offer value added services.

Key words: Digital agriculture, Digital India and Profitability

S4-P19

ICT AND ATTRACTING YOUTH TOWARDS AGRICULTURE

S.Syed Irfan* and M.Jayaraj**

**PG Scholar, Department of Agricultural Extension, Faculty of Agriculture, Annamalai University, Annamalai Nagar-608002, Tamil Nadu.*

***PG Scholar, Department of Agronomy, Faculty of Agriculture, Annamalai University, Annamalai Nagar-608002, Tamil Nadu.*

**Email: irfansyed014@gmail.com*

In India, Agriculture is the core sector for food security, sustainable development and poverty alleviation. It contributes approximately about 18% of GDP. Information Technology supports new methods for precision agriculture like computerized farm machinery for application

fertilizers and pesticides. Farm animals feeding are monitored by electronic sensor and identifying system. E-agriculture technology aids farmers with better information and alternatives. IT used as a host for technologies like remote sensing, computer simulation, assessment of speed & direction of wind, soil quality assays, and crop yield prediction. Advances in technology and global trade are changing agriculture around the world. For social transformation including elevation the role of women in agriculture production, processing and marketing. Increasing productivity and profitability for farmers, and doing so in an environment sustainable fashion; Developing breeds and varieties needed for sustainable production in the context of a planet confronting climate change. Developing efficient agriculture value chains with an emphasis on adding value to commodities and integrating women farmers. A focus on developing students with high ethical values with a vocational interest and commitment to rural activities and in producing graduates who are capable of independently accessing and using knowledge. Agriculture programs must provide students with a market orientation. Agriculture is a key sector in realizing the continent's potential, but to attract young people, the image of agriculture must change from one of drudgery and poverty to one of science, technology, business and opportunity.



S4-P20

AN ATTEMPT TO BRING MARKET TO THE FIELD? YES WE CAN..!

**Mallikarjun Hebbal¹, Dilip Masuthi², Mukund Shiragur³, Jashwitha, S., Vishwas Gowda
and Namisha Arora**

*1M. Sc (Hort.) FLA student, ²Asst. Prof of Seed Technology, ³Asst. Prof of Floriculture and
Landscape Architecture, KRCCCH Arabhavi, UHS, Bagalkot
Email: hebbalhortico@gmail.com*

One third population of our country is depended on the agriculture business directly or indirectly and hence it is proven that we are an agriculture country. In last two decades everything is being converted into digital platforms globally. Being understood the convenience, effectiveness and efficiency of digitalization Indian Government also launched "Digital India" scheme under which Government is promoting the use of technology in organizational function (Waghulkaret al., 2017). Here by we make an attempt to introduce the new system to bring the buyers to the field instead of taking the produce to the market where middleman i.e retailer bargain the rates and buy at a comparatively lower price. So, to overcome this type of problem there is a need to find an alternative way by using IT and digital skills by uploading the samples photos with GPS points and then confirming its quality and allowing the buyers to rate the produce and it goes like flower market auction. Thus it can be alternate form to assure competitive price for quality produce.



APPLICATION OF DRONES IN AGRICULTURE

Tanweer Ahmed¹, Ashokkumar. B¹, Praveen H.G¹ and Praveen Kote²

*¹PhD Scholars, GKVK, UAS, Bangalore, ²PhD Scholar, UAS, Raichur
Email: ahmedtanweer6@gmail.com*

The worldwide farming system faces tremendous challenges. It is expected that food production must be raised by 70 percent in forty years to meet increasing demand due to rising economic welfare and population growth. The main challenge of global agriculture is providing a food to the growing population, which is predicted to increase from seven billion people today to approximately nine billion around the year 2050. In order to keep with the challenges, there is need to find ways to improve our current farming practices and processes with improved technologies. Agricultural drones provide relief for the modern day farmer which are helping to increase productivity level and declining expenses by reducing the need for human labour and other input resources. Drones are Unmanned Aerial Vehicle (UAV) essentially flying robot. The aircraft may be remotely controlled or can fly autonomously through software controlled flight plans in their embedded system working in conjunction with on board sensors and Global Positioning System (GPS). Low Altitude Remote Sensing (LARS) system, Multispectral camera remote sensing imaging technology and integrated specialized softwares are the technologies used in agricultural drones. In agriculture, drones are used in different activities like crop spraying, crop monitoring, soil and field analysis, irrigation etc. Over the past decade there has been a growing number of examples of applications of drones in farming. However, there are still some crucial limitations related to usage of drones in agriculture including like high initial cost, sensor capability, strict aviation regulations and lack of interest from the farmers may impede adoption of drones. Providentially, it is expected that with the development of drone technology, improved image processing techniques, lower costs and may allow drones to hover like tractors in future farms.



CROP SIMULATION MODEL: AN IMPORTANT TOOL IN DIGITAL FARMING

Kuldip Medhi¹, Athar Nishat Islam² and Bikash Jyoti Gharphalia^{3*}

¹ Technical Officer, Department of Agrometeorology, AAU, Jorhat-13

² Technical Officer, RARS Gossaigaon, AAU, Jorhat-13

³ Senior Research Fellow, Department of Agrometeorology, AAU Jorhat-13

**Email: agrian2010@gmail.com*

Crop Growth Simulation models are mathematical, dynamic, computer based representation of complex agronomic, environmental and hydrologic factors on crop growth. It plays an important role in scientific research and resource management and facilitates a better understanding of

cropping systems. DSSAT, a highly performed model developed by a group of researchers under the hood of IBSNAT found operationalized in several countries. Unlike the empirical statistical model, a simulation model demands a large quantum of information with respect to interaction of the soil-plant-atmosphere continuum. However, it needs certain changing genetic coefficients and minor modifications in the model for successful adoptions in varying environment or location. Furthermore, DSSAT model is also found applicable in forecasting crop yield, climate change related studies, evaluation of different best-bet agronomic practices etc.
Key words: Simulation, model, empirical model, genetic coefficients.

S4-P23

DIGITAL INDIA PROJECT ROLE IN INDIAN AGRICULTURE

Dr.R.Vinoth

*National Secretary (GC) AIASA & Teaching Assistant (PBG), Institute of Agriculture,
Tamil Nadu Agricultural University, Kumulur, Trichy, Tamil Nadu-621712
Email:rvinothagri@gmail.com*

Abstract

India is the world's largest sourcing destination for the information technology (IT) industry, accounting for approximately 67% of the US\$124. India is one of the leading contributors to the global food basket. The country's food grain production stood at 252.23 million tonnes in 2015–16, and has a record production of 271.98 million tonnes in 2016 –17. India's horticulture output comprising fruits and vegetables, floriculture, honey, plantation crops, medicinal plants, and spices was around 283.4 million tonnes in 2015–16, surpassing food grains and making India the second largest fruit and vegetable producer in the world. India is also the world's largest producer of milk (155.5 million tonnes in 2015–16) and second largest producer of sugar, and the leading country in coconut production per government estimates. In 2016–17, after two successive years of sub-par monsoons, the growth of agriculture and allied sectors in India. The agricultural growth rate over the years reflects the increasing resilience of the sector to natural shocks and market volatility, an increase that also demonstrates the impact of favourable investments, technology up take, and strategic policy efforts. However, the emergence of farm technologies integrated with a robust information and communication technology (ICT) framework is still evolving in India, and it holds tremendous potential to both positively impact agricultural performance and enhance farmers' income. Technology has powered Indian agriculture time and again by helping overcome productivity stagnation, strengthening market linkages, and enhancing farm management. In the past, Indian agriculture faced a formidable challenge to grow more food, but it faces an even more difficult challenge today and for the future: to grow more sustainably and inclusively. A successful future growth strategy for agriculture will need to perceive agriculture as a business enterprise involving constant innovation and catering to dynamic market demand. Although agricultural technologies are fast evolving in India and a mix of business models are driving the eco- system, there is a need to design the pathway to successful commercialization and to scale it up by utilizing the right incentives and policy support. Technology will continue to play an important role while the dynamics of the agriculture sector changes and produces new challenges. The public policy regime in India has been supporting technology-led agricultural growth and has been increasingly

developing new institutions to ease access and affordability of technology adoption among farmers.
Digital India Project and Agriculture

Government's "Digital India" project launched on 1st July 2015 envisions empowering citizens with e-access to government services and livelihood related services, among others. The project has three core components, viz. digital infrastructure, digital services and digital literacy. Mobile phone is the preferred delivery medium with focus on mGovernance and mServices. The mAgriculture and mGramBazar, out of the seven components covered under mServices, directly impact agricultural extension and marketing services.

The project will benefit small farmers the following ways

- [i] transform rural India into a digitally-empowered knowledge economy
- [ii] provide universal phone connectivity and access to broadband in 250,000 villages
- [iii] extend timely services to farmers through information technology and its tools
- [iv] enhance efficiency in agricultural governance through digital literacy and electronic delivery of services. This article briefly highlights government's initiatives and suggests the need for harnessing potential of digital India for agricultural development.

Information and Communication Technology (ICT) in Agriculture

Information and Communication Technology (ICT) has the potential to revolutionize Indian agriculture in terms of raising crop productivity and profitability per unit area and resources. Telecom Policy aims to increase rural teledensity to 60% by 2017 and 100% by 2020. Study of the IAMAI revealed 80% using it for communications, 67% for online services, 65% for e-commerce and 60% for social networking. Mobile phones can be effectively utilized for purposes including generating, processing, transmitting, disseminating, sorting, archiving and retrieving critical information and data relating to agriculture. Mobile phones are omnipresent and cost effective means to revolutionize agriculture in India. Several apps are now available and many more can be developed to meet farmers' following specific needs. For India, at a time when national, regional and international research institutes have already developed technologies, farmers need motivation and encouragement to adopt these proven yield-enhancing, cost-efficient and environment-friendly technologies. Acknowledging the slow impact of the ICT initiatives of the government and private sector, the digital India project should pay undivided attention to provide accurate information from authentic sources to farmers on time on various aspects as identified by various field studies, viz.

- Details of location-specific crop production technology
- Economics of crop, livestock and fish farming
- Authorized sources of timely availability of standard quality inputs [seeds, fertilizers, pesticides etc.] farm equipment, sprinklers, drippers, among others, along with costs
- Post-harvest management technology and facilities including transport, storage, processing, preservation, packaging and marketing
- Commodity prices, weather, measures to minimize impact of drought and climate change
- Detailed procedure for availing bank credit, crop and livestock insurance cover, government subsidies, land records etc.
- Government's programs providing subsidy and other facilities to develop irrigation

- potential, rainwater harvesting, soil and water conservation measures, soil and water testing facilities, prevention and control of pests and diseases, bio-gas, minimum support prices
- Contract farming, value chain system, warehouse receipt
 - Reclamation of degraded, saline and alkaline land
 - Mechanism to redress grievances. Accordingly, farmers need ICT-enabled portals for following purposes which can be developed, rigorously field tested and made available to farmers.
 - Technology: Production-enhancing proven crop-specific technologies [from pre-sowing to harvesting and post-harvest management] based on soil & water analysis. Separate for dry land & irrigated farming focusing efficient use of seeds, fertilizers, water, pesticides, farm equipment & labor; and reclamation of degraded, saline & alkaline land.
 - Production inputs & farm equipment: Crop-specific reasonably priced standard quality production inputs [seeds, fertilizers, pesticides, etc.] and farm equipment and machinery along with sources of availability
 - Post-harvest services: Storage, transport, processing, packaging,
 - Institutional services: Land records, farm credit, insurance, marketing, weather, farmer-producers' organizations, market yards, procurement centres
 - Government facilities: Availability of subsidies, assistance available to mitigate effects of climate change, drought, floods, earthquake, cyclones
 - Institutions: State government's department of agriculture, state agricultural universities, Krishi Vigyan Kendras, regional research institutes, farmer-producers organizations, corporate/industrial/business houses and multinational companies engaged in manufacturing/production and distribution of farm inputs, farm equipment & machinery, rural financial institutions, insurance companies, among others, have a significant role and added responsibility to contribute their professional knowledge to develop digital ecosystem for agriculture and make available to farmers. An emerging ecosystem of digital technologies in Indian agriculture:
 - The agriculture sector has attracted large conglomerates, leading IT companies, investors, and young innovators in India; the ecosystem for technology and digital solutions is expanding at an impressive pace. The global market for precision agriculture is expected to grow at an annual growth rate of 13.09% to reach a market size of over US\$6.34 billion.
 - Mahindra & Mahindra (M&M), one of India's leading producers of tractors and farm equipment, is innovating alongside expanding its core business. M&M's Tringo, a mobile based app enabling farmers to rent tractors, is a unique example of leveraging technology to help farmers use machinery without having to make the large investment (US\$7,500) of buying tractors.
 - Tata Consultancy Services (TCS), India's leading IT firm, offers personalized advisory services in voice and visual formats using communication devices such as mobile phones through its m KRISHI platform. The growing penetration of mobile phones in rural regions of India is driving the development of several mobile-based applications by government departments, entrepreneurs, and the private sector
 - Digital technology in Indian agriculture is not about big box solutions only. A large number of young entrepreneurs have ventured into this sector to tackle specific challenges. The technology thrust of these ventures has been on reducing the time duration of crop cycles,

saving on water and energy, reducing the usage of agrochemicals, automating for efficient farm management, strengthening farmer market link-ages, and improving cold chain logistics for higher value addition.

- The budget for 2016 –17 announced by the central government confirms its commitment to modernize agriculture systems in India through a slew of measures such as setting up a dedicated micro-irrigation fund, establishing KVKs, agricultural extension centre, ensuring 100% coverage of all 648 KVKs in the country for soil sample testing, and expanding the coverage of the e-NAM from 250 markets to 585 markets.

Government's started following initiatives in Agriculture:

- [I] Government has put in operation three portals viz. farmer portal, kisan call centre and mkisan portal to help farmers take informed decisions for efficient farming under varying agro-climatic conditions
 - [ii] Under the eGovernance program, soil health card software has been standardized and web-based software developed to provide integrated nutrient management recommendations using soil test crop response method for eight states
 - [iii] Under National e-Governance Plan in Agriculture [NeGP-A] information is provided to farmers through multiple channels including Common Service Centres Internet Kiosks and SMSs. Currently, 12 identified clusters of services provide information on weather; soil health; seeds, nutrients, pests; irrigation; crops, good agricultural practices, farm machinery; marketing in frastructure; farm commodity prices, arrivals, procurement points; electronic certification for export & import; drought relief & management; livestock, fisheries management; training; monitoring implementation and evaluation of schemes.
 - [iv] National Bank for Agriculture and Rural Development has also designed agricultural portals for farmers. Public – Private partnerships involving proven ICT led agri initiatives will benefit Indian farmers at scale
1. The uptake of these solutions in the farm sector is significantly dependent on behavioral change at scale, which in turn requires a) end-to-end agri value chain solutions that address the pain points of farmers (instead of just pieces of the solution), and b) long-term effort for the new solutions to be adopted. For such solutions to be economically sustainable, specialized private sector organizations have a key role to play.
 2. Delivery of agri extension services through such public private partnerships will ensure that even small and medium sized farmers will benefit from high quality agri information. E.g. agri commodity market prices provided through public sector initiative, are often either inaccurate or not updated, which negatively impacts farmers' faith in ICT based agri extension services. However, at the same time, private sector players like RML have established an accurate and reliable market price capturing solution using pan-India ICT based on-ground infrastructure and stringent quality controls.

Session 5

**Transforming Agriculture (Quality Production,
Remunerative Agriculture, eNAM, Cooperative Marketing)**

VALUE-ADDITION THROUGH AGRO-PROCESSING IN AGRIBUSINESS

¹Ashok, ²Jagadish, ³Balakrishnareddy, I. and ⁴Maruthi

¹PhD Scholar, Dept of Seed Science and Technology, ²PhD Scholar, Dept of Agronomy, ³Assistant Professor, Department of Agricultural Microbiology and ⁴M.Sc.(Agri), Dept of Agronomy, College of Agriculture, University of Agricultural Sciences, Raichur-584 104
Email: npbashokreddy@gmail.com

The term agro-processing means establishing processing activities to handle the local produce of the basic farmers with a view to generate additional or higher economic returns to them. It means to reduce post-harvest losses, check outflow of rural population to urban centres, offer remunerative prices to basic producers, help transfer improved/advanced technology to rural areas, industrialise the rural areas, generate employment opportunities, help improve productivity, help develop specific 8 commodities through greater soil treatment and appropriate application of fertiliser, bring recognition to the progressive and innovative initiatives of the farmers etc. Value-addition is achieved through an efficient marketing strategy. This means that the basic products need to be transformed into other products which are in high demand in the market. Simple value-addition can be achieved through a careful and systematic handling of the product, its grading, packaging and transportation. Value-addition is also achieved through attractive, informative, branding and its contents and pricing clearly described on labels. Value-addition is also achieved through a better marketing coordination. Another aspect of value-addition is the creation of goodwill for the product to sustain its presence in the market.

It should, however, be noted that value-addition does not take place through undertaking processing activities alone. Marketing plays an important role as well. Marketing of graded, properly packed semi or fully processed products still adds some more value than the marketing of basic material. The JAs have been able to establish 'on-line' contacts with the farmers, farmers' groups, and financing agencies, wholesale markets, major bulk buyers and consumer groups. For that matter, no agricultural cooperative can survive and bring benefits and services to its members if it is unable to market the produce of its members. Members want not only to sell their produce as fast as possible, but also with higher economic returns and take the money home. It thus becomes the responsibility of the cooperative to assist the farmers in not only selling the members' produce but also selling it with advantage. Cooperatives have, therefore, to be on an alert look out for markets and means of marketing the products of their members. The development of value-added agroprocessing industry motivates the farmers for improving productivity and further opens up possibilities of industrial development. The basic requirements are: sound marketing, modern technology, quality control and a better flow of information. Based on the integrated agricultural cooperative marketing network, agriculture can work as the biggest safety net in the process of adjustment by softening the rigors of inflation as well as by raising income and employment for weaker sections of the society in the Region.

Agro-processing leading to value-addition and higher economic returns to farmer members is the key to the success of agricultural cooperatives because through the application of this concept members get more economic returns and they get closer and more involved with their cooperatives. Agricultural cooperatives strive hard to help their members to increase and sustain their income levels through a variety of innovations and services. Economic returns are the key to sustain the relationship between the members and their cooperatives.

Application of sophisticated technology for undertaking value-added activities has ensured the following for the integrated cooperatives and their members:

For Cooperatives:

- Broader membership base;
- Ability to generate higher surplus;
- Enhanced surplus to cover costs on extension staff, and to offer extension services and create facilities for technology transfer at the farm level;
- Surplus resources to undertake rural development, including social and cultural activities;
- Optimum utilisation of members' crops/products and consequently higher returns.

For Membership:

- Higher income levels;
- Higher productivity and production;
- Crops/produce/animal protection through integrated crop/animal-care delivery systems; -
- Opportunity for participation in the social and cultural development processes;
- Sound all-round development and maintenance of infrastructure – road, banks, transport services, schools etc.
- Exposure to modern technologies and opportunities to participate in, and manage the working of larger complex social organisations, thus leading to development of rural entrepreneurs/leadership.

S5-P2

**CONDITIONS NECESSARY FOR THE SUCCESS OF AGRICULTURAL
COOPERATIVES**

¹Ashok, ²Jagadish, ³Balakrishnareddy, I. and ⁴Maruthi

*¹PhD Scholar, Dept of Seed Science and Technology, ²PhD Scholar, Dept of Agronomy, ³Assistant Professor, Department of Agricultural Microbiology and ⁴M.Sc.(Agri), Dept of Agronomy, College of Agriculture, University of Agricultural Sciences, Raichur-584 104
Email: npbashokreddy@gmail.com*

Cooperatives have been promoted in many developing countries including India to build harmonious societies addressing issues such as unemployment, rural development and as a means of creating income generating activities, especially to augment the social and economic condition of the poor community. It is designed to be an easy method of development in these countries.

However, in majority of cases these efforts resulted in failure. Cooperative movement was designed to create harmonious societies by involving and empowering communities, that is, the spirit of cooperation.

There are many factors that help make a successful operation of the cooperatives. However, in some cases specific factors are more dominant than that of general factors. Specific factors can be drawn from the success cases of Amul India, Mondragon Spain, MilkVita Bangladesh and many more.

Cooperatives were institutionalized in India in the beginning of the twentieth century to help the rural peasantry meet its genuine credit requirements by promoting member driven and self governed institutions. The legal basis for Cooperatives was provided through the enactment of Cooperatives Credit Societies Act, 1904. Apart from meeting credit requirements, cooperatives were supposed to herald a new worldview of development through mutual support and encouraging thrift. Over time, they have evolved as an integral part of the multi agency framework for credit delivery in India. With more than 1.06 lakh outlets, averaging one ground level credit cooperative for every six villages, the cooperative system has a total membership of more than 120 million rural people making it one of the largest rural financial systems in the world². Commercial banks and regional rural banks (RRBs), the two other purveyors of credit in the multi agency framework, have also increased their rural penetration with nearly 50,000 rural/semi-urban branches. However, the cooperatives dominate in their reach to the rural hinterland both in terms of the number of clients and accessibility to the small and marginal farmers and other poorer segments of the population. In terms of number of agricultural credit accounts, the short term cooperative credit system (STCCS) has 50% more accounts than the commercial banks and RRBs put together. Notwithstanding their formidable presence in terms of number and reach, their financial health has been a matter of perennial concern. While the commercial banks and RRBs had a gross NPA level of 3.3 percent and 7.26 percent respectively³, the overdues for cooperatives were as high as 32.48 percent as on March 2006. The poor financial health of the cooperatives leads one to surmise whether the cooperatives can be seen as sustainable financial entities. Though their financial condition had been precarious, a lot of hope was pinned on the cooperatives' ability to bring about an all round development of the rural economy in India. This can be appreciated from the legendary statement, 'cooperatives have failed; cooperatives must succeed' made by the All India Rural Credit Survey Committee (AIRCS) way back in the year 1954. State partnership was introduced in the cooperatives around mid 1950s with a view to transform them as effective vehicles of development, after fifty years of their existence. It has been another fifty years since the initial days of state partnership with cooperatives. Notwithstanding the state involvement and guidance in the activities of the cooperatives, their financial performance has been dis-satisfactory. This raises a fundamental concern as to what went wrong with government intervention in the working of the cooperatives and further whether such intervention in case of cooperatives is desirable. Numerous Commissions and Committees have gone into the problems afflicting cooperatives and suggested measures to secure their financial viability. The latest among the Committees is the Vaidynathan Committee, which was mandated to chalk out an implementable action plan for reviving rural cooperative banking institutions. The Vaidynathan Committee has made wide-ranging recommendations including that for retiring government capital from the cooperatives to make them viable. Though the ills associated with

government intervention in cooperatives are well documented there has been little empirical validation to the problems associated with government interventions.

Experiences of agricultural cooperatives and the results of various studies have identified several factors which are responsible for the success of agricultural cooperatives. Some of them are: -

- Cooperatives are member-driven, member-controlled and member-responsive organisations;
- Cooperatives are efficiently managed by experienced, trained and professionally qualified staff under the supervision and control of democratically-elected boards of directors;
- Principles of “accountability” and “answerability”, “role model”, ethical behaviour and good governance are employed;
- Adherence to the “joint-use” concept e.g., joint marketing, joint purchasing, joint use of capital and joint use of facilities;
- Elected officials [board members including the presidents and auditors] are compensated. [It is assumed that honorary elected officials tend to be more expensive to the organisations. Besides, the era of honorary elected positions have gone, as not many people have neither the time nor the inclination to serve in such capacities];
- Cooperatives have integrated their operations with the needs of their member households;
- Well-integrated vertical structures of cooperatives exist and these provide support in order to enable the base level cooperatives to effectively and efficiently service their individual members; the federal cooperatives provide advisory services, technical know-how and back-up support services;
- Cooperatives undertake comprehensive programmes for member education in order to facilitate the process of members’ participation, members’ involvement and empowerment; and for training of staff and members of boards of directors;
- Cooperatives undertake value-added operations: choose, assess and employ appropriate but advanced technologies; and forge forward integration in order to gain competitive advantage in the market place;
- Cooperatives establish viable and strong linkages with external research and development/ extension agencies in the field of agriculture and technology;
- Cooperatives strive to become self-reliant, accumulate capital and develop other resources in order to remain free from all external controls and directions; and
- Cooperatives are open, ethical, caring, and socially-aware institutions. They display social concern in their business operations and in their relations with customers, employees and members, and the community at large.

Factors Enhancing the Impact of Agricultural Cooperatives

The following factors enhance the impact of agricultural cooperatives:

Internal Factors:

Viable and integrated cooperative
single commodity or multi-commodity
but providing input supplies with extension and output marketing, and social and cultural services;
Strong vertical structural support;

Trained professional and motivated staff;
Enlightened, dedicated, and selfless leadership;
Well-honed means to encourage members' involvement and participation;
Comprehensive programmes for members' education and information;
Value-added activities through the use of advance technologies;
Provision for reasonable coverage of risk for loss of crops and deposits.

External Factors:

Positive support and helpful role of the government;
Market reforms; - Reasonable rate of growth in agriculture/economy;
Availability of basic infrastructure;
Healthy linkages with regulatory and development agencies and institutions.

S5-P3

ROLE OF POLLINATORS IN AGRO ECOSYSTEM FOR BETTER CROP PRODUCTION

S. Thangavel*¹, Sheeba Joyce Roseleen² and R. Vinoth³

**¹Ph D Scholar, Department of Agricultural Entomology, B A College of Agriculture, Anand Agricultural University, Anand, Gujarat – 388 110*

²Department of Crop Protection, ADAC & RI, Trichy, TNAU, ³Institute of Agriculture, AEC & RI, Kumulur, TNAU.

**Email: entothanga@gmail.com*

Pollination - Introduction

Pollination refers to the transfer of anther to stigma in flowering plants for sexual reproduction. Approximately 80 per cent of all flowering plant species are pollinated by animals, including vertebrates, mammals. Among these, insects are the main pollinators. Entomophily refers to cross pollination aided by insects.

Crops Pollinated By Insects

Insect aid in cross pollination in fruits, vegetables, ornamentals, cotton, tobacco, sunflower, mustard, plantation crops and many other crops. Insect pollination helps in uniform seed set, improvement in quality and increase in crop yield.

Pollinators Categories

S. No	Pollinator Categories	Type of insects
1	Melitophily	Bees
2	Cantharophily	Beetles
3	Myophily	Syrphid and Bombylid flies
4	Sphingophily	Hawk moths
5	Psychophily	Butterflies
6	Phalaeophily	Small moths

Per Cent Increase In Yield Due To Bee Pollination

S. No	Crops	Per cent
1	Mustard	43%
2	Sunflower	32-48%
3	Cotton	17-19%
4	Lucerne	112%
5	Onion	93%
6	Apple	44%
7	Cardamom	21-37%

Important Pollinators In Agro Ecosystem

Honey bee	- Apis sp. (Apidae; Hymenoptera)
Hover flies	- Syrphus sp. (Syrphidae; Diptera)
Carpenter bee	- Xylocopa sp. (Anthophoridae; Hymenoptera)
Digger bee	- Anthophora sp. (Anthophoridae; Hymenoptera)
Fig wasp	- Blastophaga psenes (Agaonidae; Hymenoptera)
Oil palm pollinating weevil	- Elacidobius kamerunicus (Curculionidae; Coleoptera)
Other pollinators	- Butterflies (Deilaphila sp.), Moths (Acherontia spp.), Ants, Flies, Stingless bees (Tetragonula sp.) and Beetles.

Among many insect pollinators bees play a vital role in crops pollination.

Management of Bees For Pollination

Place hives very near the field (source) - to save bee's energy. Migrate colonies near field at 10% flowering. Place colonies at 3/ha - Italian bee; 5/ha - Indian honey bee. Allow sufficient space for pollen and honey storage

Conservation of Pollinators

Do not use broad-spectrum pesticides. These pesticides kill pollinators. Instead, use selective conventional pesticides and bio-pesticides. Plant and conserve flowering plants near or around the main crops. Nectar and pollen from the flowers used for pollinators survive and reproduce. Providing suitable habitat for pollinators. To attract pollinators, water, food (flowering plants) and shelter must be provided. Avoidance of harmful cultural practices. Provide the alternate hosts. Artificial food supplements. Artificial shelters. Control of honeydew feeding ants. To create favorable temperature

Conclusion

Conservation of existing population of pollinators will lead to better crop production and crop yield with low cost and ecofriendly in nature.

References

1. Insect Ecology and Insect Pest Management, TNAU (ICAR).
2. Food and Agricultural Organization. 1945. Biodiversity-Pollinators.
3. Akhilesh Singh. 2013. Importance of insect pollinators for sustainable agriculture and second green revolution.



RECENT ADVANCES IN GLUCOSINOLATES IN BRASSICA AND ITS SIGNIFICANCE TO HUMAN HEALTH

***Sandeep Adavi B , Milan Kumar Lal and Rajeev Kumar**

Division of Plant Physiology, IARI New Delhi -12

**Email: sandeepadavi11@gmail.com*

The most known species into the Brassicaceae are edible vegetables such as Brassica oleracea, broccoli, cabbage, cauliflower, etc.; B. rapa, turnip; B. nigra, B. napus, canola; Sinapis alba, white mustard; Raphanus sativus, radish; Eruca sativa (salad rocket) and Diplotaxis tenuifolia (perennial wall-rocket) and Brassica rapa (mizuna), salad rockets. Brassicaceae are commonly named as the “mustard” (from the latin mustum ardens) plant family due to the sharp, potent flavour attributable to their main metabolites, the glucosinolates (GLSs), which contain sulfur. When plant tissues of these plants are powdered or crushed, glucosinolates become hydrolyzed releasing the typical hot, pungent mustard components that identify the botanical family

In addition to GLSs, Brassicaceae also produce seed oils of peculiar composition which find application in the food as well as in the oleochemical industry. Chemical investigation of the plant family has also revealed the presence of phytonutrients such as tocopherols, vitamin E forms and carotenoids. Moreover, various bioactive polyphenolics have been identified, among which flavonoids and lignans. While Brassicaceae contain several chemical classes of secondary metabolites potentially important for an industrial application, glucosinolates are however their most studied constituents. Although anti-nutritional effects causing goitre, growth retardation, poor egg production and liver damage in animals have been reported for GLSs , several epidemiological studies have shown that in humans, high consumption of brassica vegetables is inversely linked to cancer risk, with a particular chemoprotective effect against lung, stomach, colon and rectum carcinomas.

Glucosinolates (GSLs) are a major class of secondary metabolites found in the family Brassicaceae. Due to their enhanced plant protection to biotic and abiotic stresses and their preventive effects on several human cancers, they have been extensively investigated. The hydrolytic breakdown products of GSLs, especially isothiocyanates (ITCs), have beneficial effects on human health, such as cytotoxic and apoptotic effects in damaged cells, preventing cancer in humans and reducing risk for degenerative. In contrast, in rapeseed meal, the dominant GSL, progoitrin (2-hydroxy-3-butenyl GSL, PRO) is changed into an oxazolidine-2-thione, which causes goiter and has other detrimental effects on animal health.

GSLs are sulfur-rich plant secondary metabolites with a basic skeleton consisting of a β -thioglucose residue, an N-hydroxy monosulfate moiety, and a variable side. Generally, GSLs are divided into three different classes according to the amino acid precursor in biosynthesis and are called aromatic GSLs (derived from phenylalanine or tyrosine), aliphatic GSLs (derived from methionine, alanine, valine, leucine, and isoleucine) and indolic GSLs (synthesized from tryptophan).

Today the main focus in GSL research is put on application aspects. Efforts are undertaken to take advantage of the biocidal effect of GSLs in agriculture. “Biofumigation” is a term which refers to the release of biocidal compounds from GSL-containing crops during green manure, crop rotation or direct application for example as pellets, which aims at a suppression of soil-borne pests and pathogens. Additionally research is carried out on the health promoting effects of GSLs and so-called nutraceuticals which contain high contents of health promoting substances.

Several studies, have demonstrated that GLSs and their degradation products display beneficial effects in relation to cardiovascular, articular and neurological diseases, asthma, diabetes and cholesterol

In vitro and in vivo studies on sulforaphane bioactivity have disclosed its efficacy against breast cancer cells and it is also been proved that this compound is able to prevent and inhibit gastric tumour formation with a specific action against *Helicobacter pylori*

Another emerging, physiologically bioactive metabolite is indole-3-carbinol, deriving from the breakdown of glucobrassicin, an indolic GLS commonly produced by several brassicas. All ITCs produced by indole GLSs are unstable and originate several downstream products, among them, indole-3-carbinol is a major downstream compound formed by reaction of 3-indolyl-methyl-ITC with water during glucobrassicin degradation. Indole-3-carbinol is reported as inducer of monooxygenases phase I enzymes and also able to bind to the aryl hydrocarbon receptor providing a mechanism for cancer prevention. Due to its biological properties, this compound resulted very active to reduce prostate cancer and mammary tumours.

In addition, brassicas food plants have been demonstrated to alter in humans the metabolism of cigarette nicotine sideproducts, promoting a significant increase of their urinary elimination. The role of phenolic compounds such as hydroxycinnamic acids and flavonoids in the prevention of pathological situations in humans is generally related to their chemical structure giving them redox properties. Therefore, due to their high content of phenolics, and especially of flavonols and anthocyanins, besides to GLSs, Brassicaceae are considered a very good food source with antioxidant properties

GSLs can be also an interesting alternative to recently banned in-feed-antibiotics in animal nutrition as ITCs may unfold anti-microbial effects. GTL from nasturtium is used against urinary tract infections of humans. Just recently a first experiment was conducted with weaning piglets to investigate the effect of different doses of GTL on feed intake, growth performance, intestinal micro-biota and benzyl-ITC concentrations in the urine. For the first time it could be shown that supplementation of animal feed with nasturtium was well-tolerated, had no influence on feed intake and growth rate of the piglets. Benzyl-ITC was found in the urine of those piglets which received nasturtium. With higher rates of supplementation also the ITC excretion increased but the total value depended very much on the amount of urine, which was excreted by the piglets.

Reference:

1. Recent advances in glucosinolate research – GCIRC
2. Sotelo, Tamara et al. “Modification of Leaf Glucosinolate Contents in Brassica Oleracea by Divergent Selection and Effect on Expression of Genes Controlling Glucosinolate Pathway.” *Frontiers in Plant Science* 7 (2016): 1012.

EXTENSION STRATEGIES WITH INFORMATION COMMUNICATION TECHNOLOGIES (ICTS) IN AGRICULTURE: THE YOUTH PERSPECTIVE

¹Sudeep Kumar E., ²Vijaykumar Kurnalliker, ³Maruthi K.

¹Ph.D Scholar, Dept. of Seed Science & Technology, UAS Raichur – 584104

²Assistant Professor, Dept. of Seed Science & Technology, UAS Raichur – 584104

³Assistant Professor, Dept. of Seed Science & Technology, B''Gudi, UAS Raichur

Email: 41.sudi@gmail.com

Globally birth of the modern extension service has been attributed to middle of the 19th century in Ireland. Agricultural extension plays a crucial role in promoting agricultural productivity, increasing food security, improving rural livelihoods and promoting agriculture as a successful entrepreneurship. Perception and adoption of new ideas and technologies by youth is very quick and therefore agricultural extension services should target youth to transform agriculture. Agricultural extension services can effectively address the various issues about farming practice by encouraging and supporting youth participation in agriculture. Improving their capacities and their involvement, youth can be used as ideal catalysts in changing the negative perception about farmers as “uneducated and unskilled, physical labourers engaged in a glamour less jobs with extremely low economic returns”. Hence, agriculture extension services plays key role in developing agriculture system.

Some specific roles of agricultural extension services were listed as below:

- ▲ Improve the wellbeing of individuals and communities
- ▲ Change production systems so that they improve rural livelihoods and sustain the resource base
- ▲ Enhance farmers production
- ▲ Attain higher levels of efficiency in the farm enterprise
- ▲ Attain food security and improve rural livelihoods.
- ▲ Improve agriculture and the social, economic and political status of rural communities
- ▲ Improve the wellbeing of farm families
- ▲ Improve productivity and livelihoods for farmers
- ▲ Increase and improve farmers’ incomes and productivity on a sustainable basis

Information and Communication Technology (ICT) has become lifeline of modern society. Young people are the world’s largest resource and play a vital role in development of the nation. Today more importance is given for developing and applying innovative ways to use ICTs in the rural areas with reference to agriculture. ICT in agriculture offers a wide range of solutions to some agricultural challenges.

Many of the farmers who need to be served in developing countries are illiterate. The information conveyed through extension services are complex consists of data (information),

knowledge (simple skills), training (advanced skills and techniques) and education (where use of information requires critical thinking). The agricultural extension system and advisory services are relevant to selective limited target farmers. Hence, providing timely and relevant information to the farmer related to weather conditions, crops, disease – pest control measures, access to credit institutions and better market prices could definitely help long way in addressing global poverty and improving agricultural productivity. Therefore, ICTs framework integrating with the extension services would help to communicate upto-date information and customize it in the form of illustrations for illiterate farmers and as technical documents for those who can read very quickly and effectively.

The government has set the ambitious target of doubling the farmer's income by 2022. Eyeing this target, the government is restructuring the interventions in the farm and non-farm sectors. The most unique initiative is Attracting and Retaining Youth in Agriculture (ARYA) launched by Indian Council of Agricultural Research (ICAR) it aims at attracting and retaining youth in rural areas through providing sustainable income through value addition establish market linkages to make it attractive for the younger generation to return to villages. Recent initiatives by the government through ICTs can help them to resolve the technical crisis and establish a direct linkage with the consumer providing assured income. In this context, Centre's initiative eNAM (National Agriculture Market) launched in 2016 is very significant. It is a pan India electronic trading portal which networks the existing Agricultural Produce Marketing Committee (APMC) mandis to create a unified national market for agricultural commodities.

ICTs with extension needs to integrate into a continuing flow of information using strategic design and best practices to develop agriculture system in the country.

Reference

1. Karen Vignare, 2013. Options and Strategies for Information and Communication Technologies Within Agricultural Extension and Advisory Services, www.meas-extension.org



**TRANSFER OF KNOWLEDGE IN AGRICULTURE TO FARMER BY
DEMONSTRATION OF GENOTYPES PERFORMANCE IN WHEAT (*Triticum aestivum*
L.) FOR HIGH YIELDING TRAITS UNDER SPACE PLANTING AND TIMELY SOWN
IRRIGATED CONDITION**

Vishal Kumar Gupta^{1*}, Pushpa Yadav², Ashirbachan Mahapatra³

¹ & ³ *BTC CARS (IGKV), Bilaspur (C.G.)*

² *SHUATS, Allahabad (U.P.)*

**Email: vishalgupta030794@gmail.com*

The present investigation entitled “Transfer of knowledge in agriculture to farmer by demonstration of genotype performance in wheat (*Triticum aestivum* L.) for high yielding traits under space planting and timely sown irrigated condition” was carried out during Rabi 2015-16 and 2016-17 with two season, in the All India Co-ordinated Wheat & Barley improvement project, B.T.C. College of Agriculture and Research Station, sarkanda, lodhipara village, Bilaspur (C.G.). The experiment was conducted in RBD involving 14 genotypes of wheat with two replications and spacing used 20 x 10 cm for study of character associated with yield and yield contributing traits under timely sown irrigated condition. Observations were recorded for the different characters viz., days to 50% flowering, days to maturity, plant height, number of tillers, spike length, number of spikelet per spike, number of grains per spike, 1000 seed weight, harvest index and seed yield per plant. The demonstration result in lodhipara village is the genotype MP 1202, Chattisgarh gehu 03 and HW 2045 genotypes are good performance for number of grains per spike. LOK 1 have highest performance for 1000 seed weight and GW 322 is best performance for seed yield per plant. Genotype of LOK 1 is the earliest and HI 1544 maturity earliest. GW 391 genotype have high number of tillers per plant,. Highest number of grains per spike was recorded with DL 803-3 and Chattisgarh gehu 03 recorded highest harvest index. LOK 1 recorded highest 1000 seed weight and GW 2013-507 have highest seed yield per plant. Demonstration in spacing 20 x 10 cm. with timely sown condition the overall performance of wheat genotype is CG-04, HW 2045 and MP 1202 for almost yield traits.

ROLE OF SOIL HEALTH IN AGRICULTURE

Apurva, V¹. and Mallesh, K.U².

Department of Soil Science and Agricultural Chemistry, College Agriculture, Navile 1

University of Agricultural and Horticultural Sciences, Shivamogga

Department of Soil Science and Agricultural Chemistry, College of Agriculture, gkvk².

University of Agricultural Sciences, Bengaluru

**Email: appupatil.266@gmail.com and mallesh913@gmail.com*

Soil health is presented as an integrative property that reflects the capacity of soil to respond to agricultural intervention, so that it continues to support both the agricultural production and the provision of other ecosystem services. Soil health is the capacity of soil to function as a living system, with ecosystem and land use boundaries, to sustain plant and animal productivity, maintain or enhance water and air quality, and promote plant and animal health. Healthy, vibrant soil can help keep the environment cleaner and healthier and soil protects plants from harm. Nutrient cycling, water regulation, and other soil functions are normal processes occurring in all ecosystems. From these functions come many benefits to humans, such as food production, water quality, and flood control, which have value economically or in improved quality of life. So there is need of maintaining soil health in order to balance the stability in agriculture. Healthy agricultural soils are able to balance a range of functions to meet the needs of both farmers and the community. Healthy soils function to sustain soil biota and plant life, store and cycle water and nutrients, decompose organic matter, inactivate toxic compounds, suppress pathogens and protect water quality. Soil health is a systems concept that implies that the soil functions as a balanced living system. Therefore, the concept of soil health, like that of human health, is not difficult to understand or recognize when the system is viewed as a whole. The challenge is to manage soils such that they are able to perform the various uses they are put to without degradation of the soils themselves or the environment.



S5-P8

MUNICIPAL SOLID WASTE MANAGEMENT FOR CREATION OF GREEN INDIA

Darshana Chetia

*¹Department of Family Resource Management
Assam Agricultural University, Jorhat-785013, Assam, India
Email: chetiadarshana@gmail.com*

Municipal solid waste (also called trash or garbage) is defined at the national level as wastes consisting of everyday items such as product packaging, grass clippings, furniture, clothing, bottles and cans, food scraps, newspapers, appliances, consumer electronics, and batteries. These wastes come from homes; institutions such as schools and hospitals; and commercial sources such as restaurants and small businesses. EPA's definition of municipal solid waste (MSW) does not include municipal wastewater treatment sludges, industrial process wastes, automobile bodies, combustion ash, or construction and demolition debris. Once generated, MSW must be collected and managed through different methods for creation of green and sustainable India for transformation of India. Common management methods include recovery for recycling or composting, combustion and landfill disposal. Many wastes that are disposed of in landfills represent a loss of materials that could be reused, recycled, or converted to energy to displace the use of virgin materials. Hence suitable methods are needed to be used for managing the municipal solid waste through the use of knowledge for creating a green India and sustaining our existing environment.

AGRICULTURAL TRANSFORMATION – YOUTH INCLUSIVENESS

Yasmeen¹ and Suresh S. Patil¹

*¹Department of Agricultural Economics, University of Agricultural Sciences, Raichur
Email: itsmeyas786@gmail.com*

The role of youth in agriculture has been increasing on the development agenda. For Indian youth, agriculture is not an attractive avenue of employment. Having seen their parents struggle in subsistence farming, it is often considered hard work without an economic payoff. Especially among educated youth, there is a little incentive to move into agriculture even though the opportunities are often recognized. Agriculture is seen as a last resort and youth tend to leave the sector once they have the opportunity to do so. Moreover, those few who do want to enter the agricultural sector face considerable obstacles. The major obstacle for youth in agriculture is access to finance. Banks (microfinance institutions included) require collateral which is often a great barrier to disadvantaged youths who do not have savings to serve as collateral, nor possess any land or other resources. In addition, microfinance institutions often also only offer credit for start-up capital but youth also need access to finance for operations. Another way of accessing finance could be through friends or informal credit but these also require high stocks of social capital which youths generally do not have. Lack of entrepreneurial skills is another major problem, something many NGOs, companies and government structures continue to highlight. This lack of skills combined with the lack of intrinsic motivation for agricultural entrepreneurship is the main reasons for business start-up failures and for loans are not being repaid. Hence, there should be more of a variety in policies on different aspirations of youth and youth groups regarding their futures, which also includes better matching of market demand and skills for future agriculture as part of economic growth and progress.

Keywords: Transformation, employment, youth, entrepreneurship



S5-P10

FARMING SYSTEM APPROACH FOR FOOD SECURITY AND SUSTAINED RURAL ECONOMY

Palash Thengal^{*1}, Milon Jyoti Konwar², Shyamal Phukon³, Bhargav Baruah⁴ and Anshuman Bordoloi⁵

*^{*1}Department of Nematology, ²Department of Agronomy, ³Department of Tea Husbandry and Technology, ⁴Department of Extension Education, ⁵Department of Soil Science
Assam Agricultural University, Jorhat-785013, Assam, India*

**Email: polu.thengal@gmail.com*

The human population of India has increased to 1.34 billion at a growth rate of 1.2% in 2017 and is predicted to have more than 1.53 billion people by the end of 2030. While our national food grain production for past few years is hovering around 234 million tonnes. It's become very difficult if present condition of farming prevails to feed the increasing population. In Eastern India about 70 percent farmer community comes under the marginal and small farmers category (GOI, 2009). IFS interact appropriately with the environment without dislocating the ecological and socioeconomic balance on the one hand and attempt to meet the farmers need on the other. Thus, IFS is a reliable way of obtaining high productivity with substantial nutrient economy in combination with maximum compatibility and replenishment of organic matter by way of effective •recycling of organic residues/wastes etc. obtained• through integration of various land- based enterprises (Solaiappan et al., 2007). Sustainable development is the only way to promote rational utilization of resources and environmental protection without hampering economic growth and IFS hold special position as in this system nothing is wasted, the by-product of one system becomes the input for other. India has a considerable livestock, poultry population and crop wastes, which can be utilized for production purpose (Radhammani et al. 2003). Thus, Farming system research approach is one of the key aspects needed to know for successful integration of all the inputs and outputs of different components of the system. It provides alternate and sustainable avocation to marginal and sub-marginal farmers. Higher net returns and B:C ratio has also been observed in different farming system components integration in aspects to different areas and prevailing mono-culture practices followed. Hence, to feed the increasing population and to increase the economic returns of the farmers, conjugate farming system approaches to the area are required with good management and technical knowledge.

S5-P11

GROWING VEGETABLES CROPS UNDER LOW COST BAMBOO POLY HOUSE IN NORTH EAST INDIA

Mohd Talha Ansari*, S.D.Warade and A.K Pandey

*College of Horticulture and Forestry, Central Agricultural University, Pasighat-791102,
Arunachal Pradesh*

**Email: ansari.talha0@gmail.com*

The North East India has varied climatic condition. In the whole NE region, about 65% area is in the hills and only 35 % area is under plains. The climate is warm and humid sub-tropical to temperate. Thus, vegetable production does not get optimum conditions for realizing good yield potential. Production of vegetables under protected conditions involves protection of production stages of vegetables mainly from adverse environmental conditions such as temperature, high rainfall, hail storms, scorching sun etc. The greenhouses are constructed essentially as rain shelters to permit off-season vegetable production. Efforts have been made at College of Horticulture and Forestry CAU, Pasighat (Arunachal Pradesh) to grow the vegetable crops during the off season. Protected conditions for vegetable production was created locally by using structure of locally available bamboos and covered with UV stabilized plastic film. It was observed that plants grown under polyhouse had an appreciable vegetative growth. The yield of vegetable crops was found to be

very encouraging. The results indicated that low cost bamboo polyhouse is farmers friendly which can be adopted practically to boost the yield and uplift the socio-economic conditions of rural population. The adoption of the technology will be the boon for the farmers in boosting the vegetable production for supply of vegetables to the people of the region ensuring health security.

Keywords: Green house, polyhouse production, socio-economic conditions, UV stabilized plastic film

S5-P12

TRANSFORMATION OF KNOWLEDGE IN AGRICULTURE

Munish Sharma*, **Saurbh Sonib** , **Ankush Kumarc** and **Ashish Sharmac**

CSK Himachal Pradesh Krishi Vishvavidyalaya Palampur (Himachal Pradesh)

**Email: munishsharma1947@gmail.com*

Keywords: Agriculture, Transformation, Knowledge

Agricultural practices and advancements differ globally—since plants have their own differences and the location plays a role on their development as well. But through the exchange of knowledge from different agriculturally-involved individuals from all over the world, improvement of techniques can be experienced as well. It has made an impact on how information is shared, and being able to use this information for the advancement of the agricultural sector gives a great positive impact that is beneficial for everyone. IT has become a bridge for people from all over the world.

Agriculture in India is the core sector for food security, nutritional security, and sustainable development & for poverty alleviation. It contributes approx. 18 % of GDP. Milestones in agriculture development in India includes: Green revolution, Evergreen revolution, Blue revolution, White revolution, yellow revolution, Bio technology revolution and the most recent one is Information and communication technology revolution. IT supports new methods for precision agriculture like computerized farm machinery that applies for fertilizers and pesticides. Farm animals are fed and monitored by electronic sensors and identification systems. Selling or buying online began to become popular in the world. However, it's most important role remains communication, and the Internet has provided us with an ideal opportunity to do so.

Central, state governments and private organisations have taken ICT measures for agriculture extension which include ITC- e-choupal, Kisan Kerala, Aaqua, Rice knowledge management portal , e-krishi, Mahindra Kisan Mitra, IFFCO Agri-portal, Village knowledge centers (VKCs)- M.S Swaminathan research foundation (MSSRF), village resource centres (VRCs)- Indian Space research organisation, etc.

FARMER PRODUCER ORGANIZATIONS (FPOS): A NEW HOPE FOR INDIAN FARMERS

Vijaylaxmi B.S¹, Praveen Kote² and Naran Goudra Kavitha³

¹&².Ph.D Scholar, Department of Agricultural Extension Education, UAS, Raichur

³.M.Sc, Department of Agricultural Extension Education, UAS, Raichur

Email: pavikote5@gmail.com

Small and marginal farmers constitute the largest group of cultivators in Indian agriculture. However, the increasing number of agricultural suicides among small and marginal farmers is any indication, these farmers' are struggling to survive. While indebtedness is often cited as the immediate reason for distress, deeper issues are related to vulnerability to risks in agricultural production. Cooperatives concept is one of the options available for the farmers to get organized themselves to move up in the value-chain and having business ownership. But an analysis on the performance of cooperative system conclude that they have been infected by political interference, corruption, elite capture, poor efficiency, loss-making ways and declining government support .The challenges faced by the small and marginal farmers are being attempted to solve through the concept of farmer producer organisations that empowers them by economies of scale and access to information, agricultural services, technology etc.

The concept of producer companies in India is a very recent development. These are just like cooperatives, but they are registered as companies. Some of the salient features that provide the FPO a competitive edge are: First, the FPO format provides more legitimacy and credibility in the immediate business environment. It breaks the producer organisation free of the welfare-oriented, inefficient, and corruption-ridden image of cooperatives. Second, it allows registered and non-registered groups, such as self-help groups or user groups to become equity holders in a FPO. This enabling provision is a distinct improvement over the existing legislation on cooperatives, which allows only individual producers to be members. Third, the Act permits only certain categories of persons to participate in the ownership of FPOs, i e, the members necessarily have to be "primary producers" – persons engaged in an activity connected with or related to primary produce. This ensures that outsiders do not capture control of the FPO and allows for raising investments from other players in the supply chain who have stated producer interest. Thus, small and marginal producers can avail of professional management inputs while retaining qualitative governance control. Finally, unlike the cooperatives, FPOs have stronger regulation making statutory demands on the organization for better disclosure and reporting. This empowers the members to demand operational and fiscal disciplines. FPOs also have an edge over other corporate legal entities for small producers.

Key words: FPOs, Small and Marginal farmers.

Session 6

Creation of Green Jobs in Agriculture Sector- Right Person at Right Place

MANAGEMENT LEADERSHIP IN AGRICULTURAL COOPERATIVES

¹Ashok, ²Jagadish, ³Vinay B. Patil and Sudeep Kumar, E.

¹PhD Scholar, Dept of Seed Science and Technology, ²PhD Scholar, Dept of Agronomy, ³PhD Scholar, Dept of Agronomy and ⁴PhD Scholar, Dept of Seed Science and Technology, College of Agriculture, University of Agricultural Sciences, Raichur-584 104
Email: npbashokreddy@gmail.com

In spite of the drawbacks and difficulties faced by them, the cooperatives are the best-suited institutions for agricultural development in the Asia-Pacific Region. To a great extent they are indispensable for accelerating the development in general, and agriculture in particular. The remedy lies in streamlining their activities in a manner in which they could increase their own resources and improve their technical and managerial capabilities to safeguard the interests of their members. Successful examples of cooperatives which have taken such initiatives are not lacking. Such streamlining would be possible only if the leadership responsible for cooperative promotion and development and for managing their day-to-day operations is responsive to the needs and aspirations of the farmers. Of special importance to cooperative functioning is the leadership provided by managerial and technical personnel competent to ensure maximum economic advantages to the producers and to ensure that the cooperatives are member-centred. The staff and board members of cooperatives also lack managerial skills mainly due to inadequate training support available within the Movements. Many precious business opportunities are missed because there was lack of interaction between the board and the managers. Although the cooperatives were in good condition but due to inadequate training, the members could not exploit such advantages. Due to limited resources at the command of primary and secondary level cooperatives, it has been difficult for them to sponsor their staff for training at higher level training institutions even within the country or abroad. The management leaders have very little opportunities to interact with their counterparts in other countries. Their understanding and appreciation of cooperative operations remains limited to their home situations. The need is to expand their horizons of knowledge and understanding to improve the quality of management of their own co-operative institutions. Such opportunities and exposures are considered absolutely essential if the staff and board members are to play effective and fruitful roles in the business activities of their co-operatives and deliver a higher level of economic satisfaction to the members.



CREATION OF GREEN JOBS IN AGRICULTURE

Jagadish, Rohini, N. Meti, Prathima, A. S. and Vinay, B. Patil

Department of Agronomy, University of Agricultural Sciences, Raichur

**Email: jmgayakwad@gmail.com*

Green job is a pivotal issue in the 21st century and assigns it a key role in fostering social development and sustainability. The aim of green job is, to preserve the environment for both present and future generations and to be more equitable and inclusive of all people and all countries. Green jobs hold the promise that humankind will be able to face up to the following two defining challenges i.e., averting dangerous and potentially unmanageable climate change and protecting the natural environment which supports life on earth and providing decent work and thus the prospect of well-being and dignity for all in the face of rapid population growth worldwide and the current exclusion of over a billion people from economic and social development. In agriculture and the food system, a green jobs scenario will require policy interventions to overcome a series of formidable obstacles that threatened livelihoods of small farmers; the energy and chemical inputs used in intensive farming; the expansion of certain plantation crops; the growth of intensive livestock systems as a result of rising meat consumption; the globalization of food and “food miles”; the rising market power of large retailers; and the problem of vast amounts of GHG-producing food waste in the developed world. Apart from policy interventions, eco-friendly agricultural production like organic farming, rehabilitation of degraded land, introduction of technologies that mechanize farming operations so that agricultural productivity will significantly increase, improvements of transport infrastructures and facilities in reducing post-harvest losses, certification and branding for a sustainable productions are required.



GOOD QUALITY SEED PRODUCTION: NEEDS LABOUR OF BEST QUALITY

Dileep Masuthi¹, Mallikarjun Hebbal², Jashwitha, S., Vishwas Gowda and Namisha Arora

¹*Asst. Prof of Seed Technology, ² M. Sc (Hort.) FLA student, KRCCH Arabhavi,*

UHS, Bagalkot (Karnataka)

Email: aodileep@gmail.com

Seed is sexually produced matured ovule consisting of an intact embryo, endosperm and or cotyledon with protective covering. Physical, physiological, genetic, and seed health decides the seed performance (FAO, 2012). Thus, the quality seed production is important and it needs right person at right place like breeder at the crop improvement, seed technologist for overall quality monitoring, statistician to analyze the lines performance, agronomist to maintain and cultivate desired lines, especially farmers/ farm labours who can easily identify odd types, cross the particular lines, skilled seed certification officers to assure quality, talented marketing team to sell the seeds.

But the present Indian seed industry striving hard to manage accurately the men and labour at right place in a right direction. That to in the seed industry of Indian in public sector where the output in in high volume low value crops. Majority of Indian farmers are dependent on the cereals and pulses which are supplied mainly by public sector seed producers. Over all supervision of the seed production and supply will meets it highest only all these departmental persons when they put their cent per cent effort. The restructuring of the men and material in this connection is the need of the hour. The intervention of the government policies and the administration needs the care towards this to performance. Hence, success of seed industry depends on placing the right person at right place.

S6-P4

ATTRACTING FARM YOUTH THROUGH ICT

Balu, D¹., Kavaskar,M², Santha Govind³ and Ravichandran.M⁴

*¹State Coordinator,ALISA, ²Asst. Professor, ³Professor, ⁴Dean
Faculty of Agriculture, Annamalai University*

Abstract

Farmers in India are forcing their sons and daughter to go for higher studies and looking forward a frontier opportunities other than Agriculture. The youth with agriculture graduation are also hesitant to take up agriculture. They feel that farming is not remunerative and perceive it as a socially derecognized occupation. Present food habit, nutritive value of adult and youth is a prime factor to be considered. One segment of society is unable to eke out their livelihood. In contrary, urban areas and high class society facing obesity is an absolute problem which has to be addressed with balanced care. If the same situation prevails, there will be short of food production on the burgeoning population growth. Further, farming sector is facing innumerable problems on production, protection, marketing and value addition. At the same time, the world is in the midst of knowledge revolution, complemented by opening up entirely new vistas in communication technologies. Recent developments in the field of Information and Communication Technologies are indeed revolutionary in nature. By definition, Information and Communication Technologies (ICT) are a diverse set of technological tools and resources to create, disseminate, store, bring value-addition and manage information with feedback. ICT, when used as a broad tool for educating the communities' especially young farmers, entrepreneurs, business graduates and managers, heralds the formation of a new class of society-the knowledge society. Knowledge thereby becomes the fundamental resource for all economic and societal developmental activities in the highly competitive and pluralistic world.

Keeping Information and Communication Technology in Agriculture (ICT-A), how best the youth and young generation farmers could be motivated and ventured into farming and allied enterprises to sustain food self sufficiency for future generations. This paper examines the reach and outreach of ICT-A and benefits obtained by the farm youth through e-Extension viz., Expert system, Precision Farming Project, Agri Portal, Dynamic Market Information, Multiple Video Conferencing Facility, Mobile Based Farm Technology Platform, Social Media and Knowledge Management for Indian Agriculture.

Introduction

Information technology is a systemic study of artefacts that can be used to give form to facts in order to provide meaning for decision making, and artefacts that can be used for organization, processing, communication and application of information.

The term “ICT” describes the use of computer-based technology and the Internet to make information and communication services available to a wide range of users. The term is used broadly to address a range of technologies, including telephones. Central to these is the Internet, which provides the mechanism for transporting data in a number of formats including text, images, sound, and video. Additionally, ICT deals with the application layer, the systems that enable information to be collected and distributed, analyzed, and processed Information and Communication Technology (ICT) consists of three main technologies. They are: Computer Technology, Communication Technology and Information Management Technology. These technologies are applied for processing, exchanging and managing data, information and knowledge. (Asian Development Bank, 2003).

Unique features of ICT

- Access to the astounding store-house of information is free
- The information is available instantaneously round the year and twenty four hours a day,
- Communication can also be interactive
- The information is available from any point on the globe
- The communication is dynamic and ever growing.

Any system applied for getting information and knowledge for making decisions in any industry should deliver accurate, complete, concise information in time or on time. The information provided by the system must be in user-friendly form, easy to access, cost-effective and well protected from unauthorized accesses. (ICT) can play a significant role in maintaining the above mentioned properties of information as it consists of three main technologies. ICT is an integration of the technologies and the processes to distribute and communicate the desired information to the target audience and making the target audience more participative in nature.

ICT tools intervention in agricultural Extension are broadly classified as-

- a) Web Portal service
- b) Mobile Apps based service
- c) Mobile SMS & call service
- d) Interactive Kiosk
- a) Web Portal service

Example:

- TNAU Agritech portal
- mKisan portal
- Farmers portal
- National Agriculture Market Portal (e-NAM)
- Agricoop
- AQUA (almost all questions answered)
- AGRISNET

- ITC-e- choupal
- NDRI Messaging Portal

a) Mobile Apps based service

PUSA KRISHI	The app helps the farmers to find easy solutions to problems in their farm fields and get information about weather and accordingly take measures to save crops. It also offers information related to new varieties of crops developed by Indian Council of Agriculture Research (ICAR), resource conserving cultivation practices as well as farm machinery and its implementation will help in increasing returns to farmers.
KISAN SUVIDHA	The app provide information on various details such as weather, market prices, seeds, fertilizers, pesticides, agriculture machinery, dealers, agro advisories, plant protection and IPM practices <i>etc.</i>
SOIL HEALTH CARD	It aims at promoting Integrated Nutrient Management (INM) through judicious use of chemical fertilisers including secondary and micro nutrients in conjunction with organic manures and bio-fertilisers for improving soil health.
CROP INSURANCE MOBILE APP	Crop Insurance mobile app can be used to calculate the Insurance Premium for notified crops based on area, coverage amount and loan amount in case of loanee farmer. It can also be used to get details of normal sum insured, extended sum insured, premium details and subsidy information of any notified crop in any notified area.
AGRIMARKET APP	The mobile application has been developed with an aim to keep farmers abreast with the crop prices and discourage them to carry-out distress sale. Farmers can get information related to prices of crops in markets within 50 km of their own device location using the AgriMarket Mobile App. This app automatically captures the location of the farmers using mobile GPS and fetches the market prices of crops which fall within the aforesaid range.
BHUVAN	It is a satellite based geo-platform by ISRO, reaching out into the rural people. It has three important applications, which have remote reach for use of rural population viz. <i>CHAMAN (Coordinated programme on Horticulture Assessment and Management using geo informatics)</i> , FASAL (Forecasting

C) **Mobile SMS & call service**

- Kisan Call Centre
- Indian Meteorological Department(IMD) Agromet Services
- Virtual Krishi Vigyan Kendra
- BSNL 'Mandi on Mobile' Service
- Kissan Kerala
- Rubber Market Price in SMS to farmers by Rubber Board, India
- Intelligent Advisory System for Farmers

Role of Social Media for youth in Agriculture

- Social Media in education refers to the area of computing which deals with social networks and the collective human interaction using computational systems for staying connected at all times. Learning is nothing but a social activity. Some of the popular Social networking sites attract farm youths are
- www.twitter.com: Twitter enables text-based posts of up to 140 characters displayed on the user's profile page which are publicly visible by default. The tweets enable the followers to know about the topic instantly in few lines. If the follower is interested in the content, he may refer to the complete story available on the links or can just pass by. Regularly updates the information in learning related to the context of agriculture.
- www.facebook.com: Facebook is a great source to share information with the creation of pages or groups. The interested can join the commodity specific groups created by farmers or some institution for greater information and regular updates. Some of the groups Kalnadai thagaval maiyam, Tamil Nadu, Turmeric farmers association of India etc.,
- www.blogspot.com/ www.wordpress.com/: These are blog-publishing service that allows private or multi-user blogs with time-stamped entries for the ease of locating time specific information. The blog posts can be understood as the traditional diary of past times. The blogs of e-agriculture for latest information on agriculture from around the globe is quite popular among the scientists.
- www.youtube.com: YouTube is a video-sharing website on which users can upload, share, and view videos. YouTube have emerged as a major medium for improved learning experiences. NPTEL are making immense contribution in learning for both faculty members and the student community.

Role of ICT

Three important roles which ICT can play are in enhancing agricultural production, improving market access, and capacity building and empowerment.

1. Enhancing Agricultural Production

Farmers (especially small ones) often face threats from many threats like poor soils, drought, erosion and pests. Key areas where ICT can help improve this is by providing up-to-date

information about pest and disease control, early warning systems, new varieties, new ways to optimise production and regulations for quality control.

2. Improving Market Access

Provides up-to-date information on the market prices of commodities, inputs and consumer trends. This can improve a farmer's negotiating position and their livelihood, while enabling farmers to make better decisions about future crops and commodities, and also the best time and place to sell and buy goods.

3. Capacity-building and empowerment

ICT technologies can be used to strengthen communities and farmer organizations strengthen their own capacities and better represent their constituencies when negotiating input and output prices, land claims, resource rights and infrastructure projects. Rural communities are able to interact with others via the use of ICT which reduces social isolation that they would otherwise be facing. Besides that, ICT technologies are able to make processes like law-making and land-title approvals more transparent.

Constraints faced by youth farmers during access and usage of ICTs

- Lack of confidence in operating of ICTs
- Erratic Power supply
- Poor internet connectivity
- Lack of awareness benefits of ICTs
- Lack of skill in handling of ICTs
- Lack of ICT related training programme
- Negative attitude toward ICTs tools
- High cost
- Lack of information in regional language
- Low literacy
- Insufficient ICT tools
- Problems in repairing of ICT tools at village level
- Failure in backward and forward linkage

Conclusion

ICT offers an exciting new direction in education for both learners and the educators. The past decades have seen a transformation from email to the blog which has at large changed the ways of living of farm youth who are working, and interacting with others. It doesn't have to stop with youth farmers; increasingly, administrators are finding new, creative ways to integrate ICT into their schools and colleges. The ubiquitous nature of networked computers connected through the Internet from homes, schools and colleges creates an exciting opportunity for youth engaged in farming around the world to explore the subject together. With all right things in place, there is also a need for proper facilitation and development of high-level thinking skills so that the youth farmers are accustomed to using internet in the better direction.

References

1. Dhanakumar, V.G. 2011. Strategy for the Promotion of Youth in Agriculture, Lead Paper Presented in National Seminar on “Attracting Farm Youth to Sustainable Agriculture”, Organised by UAS, Bangalore from Aug 26-28th, 2011.
2. Information and Communication Technology For Development in the Pacific, Published by Asian Development Bank, Manila, www.adb.org Philippines, 2003, p. 1.
3. Shah, Mrinalini (2007), E-Governance in India: Dream or reality? International Journal of Education and Development using Information and Communication Technology, Vol. 3, Issue 2, pp. 125-137



Brief Recommendations of Previous Conventions

2nd National Youth Convention on “Agricultural Innovations in Sustainable Food Systems for Improving Rural Livelihood: The Youth Perspective” at UAS- Raichur, Karnataka.

National youth convention on “Agricultural Innovations in Sustainable Food Systems for Improving Rural Livelihood: The Youth Perspective” was organized jointly by All India Agricultural Students Association (AIASA), Indian Council of Agricultural Research (ICAR) and University of Agricultural Sciences (UAS), Raichur on 20th February, 2017 at Raichur, Karnataka. There were several technical sessions on the topics of national importance in youth perspective which mainly includes about the “Strategies for improving food & nutritional policies and livelihood security”; “Knowledge transfer to farmers through agricultural education, research and extension etc”. Besides, the Felicitation and Awards and Oath taking ceremony were also organized, which was presided over by Sh. C.R. Chaudhary, Hon’ble Union Minister of State for Consumer Affairs, Food and Public Distribution,.

The experiences were shared by policy makers, bureaucrats, technocrats, academicians, industrialists, youths and farmers on crucial issues highlighted under each session. Around 250 delegates participated in the convention representing all the stakeholders.

After detailed deliberations based on thematic issues i.e., i) Strategies for improving food & nutritional policies and livelihood security and ii) Knowledge transfer to farmers through agricultural education, research and extension, the major observations and recommendations were emerged as below:

1. AIASA, an agricultural organization, plays pivotal role in retaining the youth in different agricultural sectors aiming at National integration, patriotism and special status to agriculture for youth employment. AIASA provides a link between different organization and the students, for exploration of new areas of research, education and extension. It emphasizes strongly on formation of “Indian Agriculture Service” for the development of agriculture.
2. There is a need of providing basic knowledge of agriculture at the primary level so that children may also get acquainted with the fundamentals of food production. Agriculture should be included as a subject in primary, secondary and higher education system.
3. Quality agriculture education is the most important at every level for country’s development. The qualified agricultural graduates are the backbone of our agrarian country for ensuring the effective and efficient management of the inputs like pesticides, quality control of agro-inputs, fertilizers, quality seed & planting material, financial inputs etc.
4. Youth involvement is very less from Agriculture Sector. Therefore, there is an urgent need to provide the maximum placement of agricultural graduates through various modes like, public sector, private sector, public-private partnership etc.

5. More amount of funding is required for the stability and improvement of the agricultural research, development and production and for the upliftment of farmers.
6. Government should provide financial assistance to the farmers in the form of credits, and provision for construction of warehouses for storage of agri products to prevent market glut.
7. Policy makers should give more exposure to industrial activities thereby creating the employment for rural youth.
8. With the continuous improvement of various facilities, modern education and tools such as para agriculture schools, Agri smart cities, pilot plants for processing and production of value added products, solar equipment centres, modern storage facilities are also the important areas to be worked on.



2nd National Agricultural Convention on Agricultural Skill Development for Doubling Farmer's Income (ASDFI-2017) on 07th October, 2017

State cabinet AIASA Rajasthan organized National Convention on "Agricultural Skill Development on Doubling Farmers Income" on 7th October 2017 at Rajasthan University of Veterinary & Animal Sciences, Bikaner.

The convention was divided in two sessions; first one was inauguration coupled felicitation and awards distribution ceremony which was chaired by Shri Ajay Singh Kilak, Hon'ble Cabinet Minister, Co-Operatives and Gopalan, Govt. of Rajasthan. Second was the technical session on Agricultural Skill Development for Doubling Farmer's Income. Experts from the different field of agriculture expressed their views on this session. Around 550 delegates participated in the convention representing all the stake holders. Several conclusions were made on techno administrative reforms in agriculture including creation of Indian Agriculture Service, separate budget for agriculture, entrepreneurship development through involvement of youth and the collaborative work will now continue to develop these ideas in order to improve the systems for the overall development of agriculture. After detailed deliberations based on technical sessions the major observations and recommendations were emerged as below:

1. The main emphasis was to the issues like creation of employment opportunities for agricultural students to attract more students towards agriculture and empowerment of youth.
2. Rajasthan being a largest state of India and SKRAU being the oldest university of Rajasthan, it was demanded that the SKRAU, Bikaner may be given the status of Central Agricultural University.
3. The need of entrepreneurship development programmes and trainings was felt which should be directly linked to the youth and human resource development institutes and involvement of youth associations associated with agriculture in implementation of schemes needs to be there.
4. Major thrust is required for public and private investments in the agriculture sector and agriculture education in SAUs, CAUs, and DUs to improve the quality of education under National Agriculture Education System.
5. Training on skill development including marketing and value addition need special focus in government plan and budget allocation. Budgetary support may be given to SAUs, DUs, and CAUs for having strong human resource development unit in each campus.
6. There is a need for creation of All India Agriculture Services with robust and transparent system for implementation of right person at right place. The agreement was reached that the youth can only be attracted if the agricultural services are made more lucrative and respectful. This is only possible through inclusion of agriculture in the concurrent list of constitution, provision for separate budget for agriculture, entrepreneurship development and formulation of ways and means for creation of separate agricultural services.
6. Entrepreneurship Incubator Cells at college and university level for guiding students towards entrepreneurship with the involvement of VC's, Directors and Deans and experts may be established. It was recommended that entrepreneurship development programmes need to be implemented in mission mode approach.
7. The special trainings on nursery management, protected cultivation etc. may be given to

rural youth and agriculture students to make them job provider rather than job seeker. Budgetary support may be given to such applicants to start entrepreneurship on zero interest bases.

8. There is a need to establish Central and State Agriculture Councils as regulatory body for giving accreditation to agriculture education throughout the country including private institutions and for granting license to Agriculture degree holders for agriprenurship development.
9. There is a need of innovations in agriculture research and education for Agriprenurship development so that it can be made a more profitable venture and more youth can be attracted towards agriculture.
10. Every year about 1 lakh students of agriculture are passing out all over India but the government jobs are limited. Getting skilled labour for hi-tech agriculture and allied activities is one of the major constraints in better economic returns to the farmers. Hence, there is a need to develop agricultural skill in rural youths not only to make them self-dependent but also to attract and retain youth in agriculture as a profitable venture.





Centurion
UNIVERSITY
*Shaping Lives...
Empowering Communities...*

India's First & Only Gazetted Multi-Sector Skill University

NAAC 'A' Grade | UGC 12(B) Accredited

AICTE & UGC Approved

NSDC Premier Partner for SKILL India

Section 1 University

By Dept. of Education & Training
Government of Australia

CUEE-2018

Apply Online : www.cutm.ac.in

Invites Applications for Centurion University Entrance Examination for B.Tech (Engg.), B.Tech (Agri.), B.Sc (Agri.), M.Sc (Agri.), Diploma



INDUSTRY SPONSORED LABS, WORLD CLASS INFRASTRUCTURE & FACILITIES

15+
PATENTS

16+
INDUSTRY PARTNERS

105600+
STUDENTS

60+
INDUSTRY LABS

200 ACRE+
CAMPUS

100+ COMPANIES
PLACEMENT DRIVE

4+
SOCIAL ENTERPRISES

NEEM
PARTNER

CHOICE BASED
CREDIT SYSTEM

10+ COMPANIES
INTERNATIONAL PARTNERSHIPS



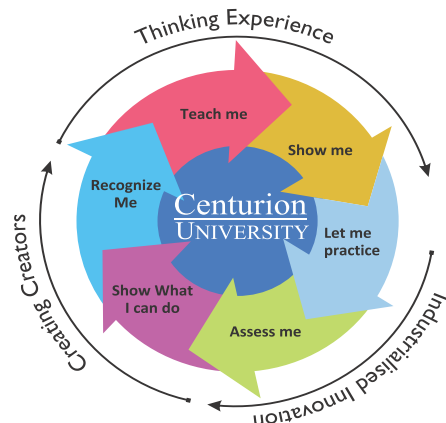
PROGRAMMES OFFERED:

**M. S. Swaminathan
School of Agriculture**

B.Tech | B.Sc | M.Sc | Diploma
(Agriculture) (Ag.) (Ag.) (Ag.)

School of Management

**MDM (MBA in Development Management)
MBA (Agri-Business)**



ADMISSION HELP LINE : 82600-77222 / 98613-33352

ODISHA CAMPUS: PARALAKHEMUNDI | BHUBANESWAR | BOLANGIR | RAYAGADA

ANDHRA PRADESH CAMPUS: VIZAG / VIJAYNAGARAM

join@cutm.ac.in

From FLOURISHING FIELDS to NOURISHING MEALS



Celebrating 40 years of commitment to Indian Agriculture.

Progressive farmers, innovative technology, abundant fibre, wholesome nutrition and strong partnerships. Over the last 40 years, our commitment to these outcomes has only become stronger. Our increasing presence in hybrid bt-cotton seeds, corn seeds, fruit and vegetable seeds, crop protection,

and agronomy improvement solutions has helped us connect with over 10 million farmers regularly. While being a global player in the field of agriculture, we have been committed to ensure that the nation and its farmers progress continually. A commitment that remains unshaken, even today.

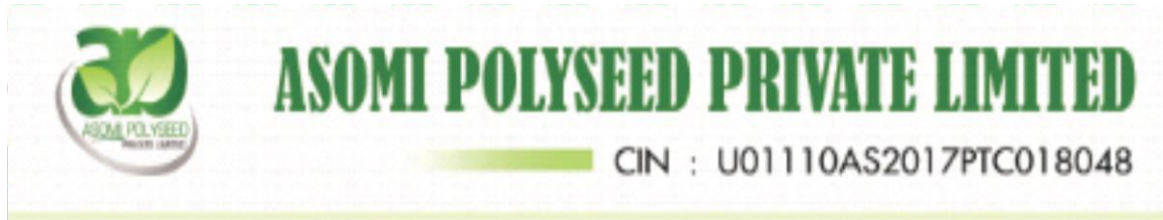


Monsanto and Vine Design® is a registered trademark of Monsanto Technology LLC © 2014 Monsanto Company.

Follow us on: [f](#) Monsanto India [@monsanto_in](#) [in](#) Monsanto Company [You Tube](#) Monsanto India

1959,2015

With Best Compliments From:



**Reg. Office: G.S Road (Near Poddar Car World),
Khanapara, Guwahati, - 781022, Dist.:- Kamrup (Assam)
Telephone/Mobile No. 9101771421
e-mail: asomipolyseed@gmail.com**

With Best Compliments from:

SURADHWANI ELECTRONICS

**Mithapukhuri Road, Jorhat- 785001
Contact No.: 09706055208**

With Best Compliments From:

M/S. MADHU ENTERPRISES

**Deals in : All kinds of sports goods, health and fitness equipments,
cups, shields, trophies, medals
H.C.B. Road, Amolapatty, Sivasagar-785640 (Assam)**

With Best Compliments From:



M/S UD Scientific Pvt. Ltd, Zoo Road Tiniali, Guwahati-24

With Best Compliments From:



**M/S JS INDUSTRIES. HOUSE NO 12. HM DAS ROAD. REHABARI.
GUWAHATI 781008. ASSAM
CONTACT-9435186892/9864072042, EMAIL-jsindustries15@gmail.com**