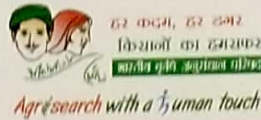


Attracting YOUTH for Agriculture



Brought out in the occasion of Institute Agriculture Education Day
3rd December 2018



Revitalizing Agriculture Education to Attract Youth

Agriculture is crucial for ensuring food, nutrition and livelihood security of India. It engages more than half of the population and two-third of the workforce in gainful employment. Several industries depend on agriculture for raw materials. On account of its close linkages with other economic sectors, agricultural has a multiplier effect on the entire economy of the country. In recent years Indian agriculture has made a significant progress transforming India from a food-shortage, 'ship-to-mouth' country to food sufficient to food surplus nation. However, currently it faces the challenges of stagnating net sown area, deterioration of land quality, reduction in per capita land availability and climate change. India has the unenviable task of ensuring food security for being the most populous country in 2050 with one of the largest malnourished populations.

Youth are the primary human resource of nation development. They are creative and capable of handling emerging challenges. But, majority of youth do not want to take up agriculture as a profession, because of low income, associated risk and poor quality of life. Father of India's Green Revolution, Prof. MS Swaminathan said "the youth

can be attracted to and retained in farming only if it becomes economically rewarding and intellectually satisfying". To encourage, attract and retain youth, agriculture education (Ag-Ed) should be revitalized with the following:

- Ag-Ed should involve everyone: Because of its very nature and importance, agriculture education cannot be confined to any one group in our society, let alone farmers. Everyone from government, industry, media, educational institutions, community groups to the level of the individual should be involved in it.
- Ag-Ed should be continuous: As we develop and apply better technologies, the ability of farmers and scientists to respond effectively also improves. Therefore, it is essential to continue educating for enhanced productivity in the face of emerging challenges of agriculture.
- Ag-Ed should be holistic and about connections: In order to address emerging challenges in agriculture, we need people who think broadly and who understand systems, connections, patterns and causes.

- Ag-Ed should be practical: Ag-Ed should lead to actions, which result in better understanding of the problems and implementable actions. This is ultimate yardstick to measure the effectiveness of Ag-Ed.
- Ag-Ed should be in harmony with environmental, social and economic goals: Ag-Ed should provide people knowledge, understanding and capacity to influence mainstream society in a way, which progresses along with environmental, social and economic objectives.

The basic aim of education is to inculcate among the students and other stakeholders a sense of responsibility and awareness to develop skills by means of which they can bring about a change towards agriculture. To realize the above principles, several Government and Non-Government organizations have taken commendable initiatives in promoting Ag-Ed in the country. Such initiatives are critical and should be upscaled, monitored and evaluated for revitalizing Indian agriculture.

H. Pathak

NANOTECHNOLOGY IN AGRICULTURE

With the rise of global population, the demand for increased supply of food has motivated the scientists and engineers to design new methods and technologies to boost agriculture production. Nanotechnology is the emerging fields which have tremendous potentials to renovate agriculture and allied fields. Nanotechnology is the understanding and control of matter of dimension of roughly 1 to 100 nm, where unique physical properties make novel application possible (EPA, 2007). Researchers suggested that NPs might be defined based on the size at which fundamental properties differ from those of the corresponding bulk materials. Because of the small size, physical, chemical and electrical properties of nano structure changes as a function of size and very different from that of their bulk counterparts. The aim of the use of nanomaterials (NMs) in the field of agriculture is to improve the efficiency and sustainability of agricultural practices by putting less input and generating less waste than conventional products and approaches. The applications of nanotechnology in agriculture include fertilizers to increase plant

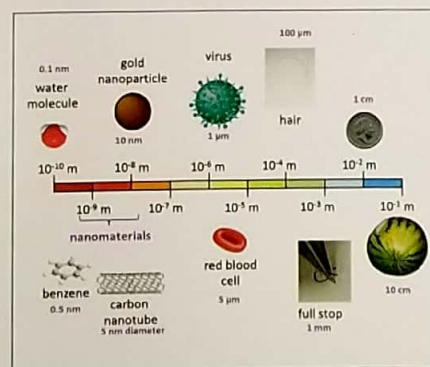
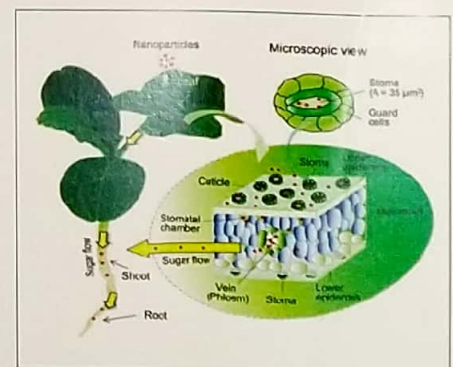


Fig: Size Range of Nano Particles

growth and yield, sensors for monitoring soil quality and pesticides for pest and disease management. Nanoparticles can serve as 'magic bullets', containing herbicides, chemicals, or genes, which target particular plant parts to release their content. Nanocapsules can enable effective penetration of herbicides through cuticles and tissues, allowing slow and constant



release of the active substances. The engineered nanoparticles (ENPs) are able to enter into plants cells and leaves, and can also transport DNA and chemicals into plant cells. It can be concluded that in the field of agriculture, the use of NMs is comparatively new and needs further exploration.

Rubina Khanam

How Integrated Farming System be attractive to Students and Rural Youth

Youth and students constitute a majority of population in our country, mainly living in the rural areas and their involvement in the agricultural activity will provide the future of food security; however, lack of interest among them in agricultural professions becoming a major concern and challenging factors for policy planners. Mahatma Gandhi mentioned over 70 years ago that only rural transformation and agrarian prosperity can lead to prevent migration of brain from village to the city. Our former president, Honourable Dr. APJ Kalam also emphasised that the provision and access of urban amenities (energy, water, sanitation, health care, education etc.) at the rural village with the concept of creation of Smart villages, can attract the youth towards sustainable developments. However, the constraints faced by youth

particularly inadequate rural credit facilities, low returns to agricultural investments, lack of modern farming techniques and lack of access to farming inputs and expertise and knowledge in scientific farming etc are to be addressed suitably. For attracting the youth in agriculture there is a need for agricultural technological transformation to make the agriculture profession to be glamorous, profitable and economically attractive.

Indian Government has taken lot of initiatives to attract youth in farming and its allied activities i.e. animal husbandry, fisheries, agro-forestry, agro-processing and agri-business. ICAR-NRRI has developed a climate smart agricultural technology of rice-fish-horticultural-livestock and agroforestry based integrated farming system to increase the productivity and profitability of rice growers in Eastern India, with provisioning and rationalization of farm resource with energy-efficient, climate resilient and sustainability after in-depth research. Particularly, lowland rice production is comparatively less productive in eastern India, but water source will be available during most of the rice culture period. This water source was effectively utilized after ecological

engineering design of land shaping and utilizing varied components i.e. fish, duckery, goatry, horticultural crops, azolla and agroforestry integration along with rice, which provides an additional 10-15 times higher profit (approx. 1.5 to 2.0 lakhs per ha per year) to the farmers compared to only mono crop of rice cultivation. The above said module was developed in such a way that anyone can easily adopt individually, community or commercial basis to utilize maximum ecological niches towards productivity. This technology is being adopted in eastern India at village level to create employment avenue as well as income generation among youth farmers/unemployed graduates. It provides a holistic approaches of farm management in respect to soil health, water harvesting and storage, judicious utilization of farm resources, increase the farm income, employment generation, nutritional, environmental and livelihood security. In this integrated farming system, the knowledge of agricultural, horticultural, aquaculture, veterinary, home science, engineering and commerce graduates can be jointly utilized to organize Agricultural Transformation Centres in every block to provide demand driven services in technological up gradation of farm operations and farming enterprises etc. Access to various input availability (seed, feed and young ones, organic based fertilizer and pesticides etc.) and their marketing will create an additional employment apart from boosting the productivity. Further, value addition, product processing and marketing strategies of varied product will certainly increase the farmer income to many folds and quite remunerative as compared to the traditional farming. Empowering today's youth is our greatest responsibility. Providing a platform to create professional and business-oriented farming systems for youth will be very important. The highly productive, economically profitable, environment friendly and sustainable successful the said model of integrated farming systems can pave way to attract the youths to work in rural areas even from urban areas having links to the rural system.

PK Nayak

Potential Constraints for youth involvements

1. Lack of glamorous & lucrative income opportunities & sense of pride in farming
2. Inadequate rural credit facilities
3. Low returns to agricultural investments
4. Lack of access to farming inputs
5. Lack of access to modern farming, expertise and scientific knowledge in farming.



Characteristics of IFS
Climate Smart agriculture with providing sustainability, economic, nutritional, employment & environmental security to farm families

Point of attraction of Youth to IFS

1. National pride for Country food security & nutritional security for families
2. Regular income & employments
3. Diversified system, risk involvements are minimized
4. Agri. Graduate for setting of Agri transformation centers in blocks
5. Setting of Inputs production centers and farm produced marketing chain
6. Value chain & value added products & marketing
7. Provision of Agri. Education, training, entrepreneurship & bank credits & modern farming technology

Efi

Characteristics, potential constraints and point of attraction of students and youth towards IFS

Attracting Youth to engage in Agriculture

Rural population in India, accounts to 68% (90.22 Crores), total youth population is 28% (35.6 crores) ranging between the ages of 10-24 years. India is emerging as future young nation in the globe. The youth today are increasingly developing a negative view of agriculture as a source employment. The agriculture industry provides many opportunities which could give them not only a good income but also a good standing in the society. Youth plays a vital role in transforming Agriculture in India. Involvement of youth in agriculture is not only a good idea but crucial for agricultural economic sustainability. This can be achieved through integration of youth in agriculture policy with education policy, young people employment policy and the policies of all relevant government sectors.

Linking social media to agriculture and Improvement of agriculture's image:

The rise of social media and its attraction among young people with access to the appropriate technologies could be a route into agriculture if the two could be linked in some way. Mobile phone use in India is growing rapidly and people are now much more connected to sources of information and each other. Utilizing these technologies to promote agriculture and educate young people into the agriculture sector. 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.

Putting agriculture on the school curricula and strengthening higher education in agriculture:

Primary and high school education could include modules on farming. This could help school children to see agriculture as a potential career. 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.

Greater use of Information and Communication Technologies:

Not only can Information and Communication Technologies be used to educate and train those unable to attend higher education institutions but



Poly house flower farming

It can be used as a tool to help young people spread knowledge, build networks, and find employment. Such technologies can also reduce the costs of business transactions, increasing agriculture's profitability.

Empower young people to speak up and facilitate access to land and credit:

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. Main aims to provide a platform for young people to discuss opportunities in agricultural development,

share experiences and advocate for greater youth engagement and representation. Land is often scarce and difficult to access for young people, and without collateral getting credit to buy land is high on impossible. Innovative financing for agriculture and small businesses is needed.

Greater public investment in agriculture to make agriculture more profitable:

Investment in agriculture is more effective at reducing poverty than investment in any other sector. Making agriculture profitable requires that the costs of farming and doing business are reduced while at the same time productivity increases. Small farms can be highly productive with low labour costs.

L. K. Bose

many of us know, soil is the most microbially dense and diverse habitat on the planet, where ants also live! Therefore, ants need strong antimicrobials to defend them. Ants evolved eusocial (Truly social!) life millions of years ago and are known for their extraordinary chemical diversity and defensive chemicals. Ants basically belongs to the family 'Formicidae', which has >13000 species. A well studied part of the ants resistance mechanism against pathogens is anti microbial peptides (AMP's). AMP's are small, linear produced in the insect fat body as a part of the innate immune defense. Ants produce complex mixture of proteins and peptides in the venom gland secretions and haemolymph. These peptides and proteins exhibit a wide range of activities such as anti-microbial, haemolytic, cytolytic and even insecticidal! So far, only 71 AMP's have been isolated and characterized from ants. Looking at the species diversity and distribution, ants are a potential source for prospecting biologically active compounds particularly AMP's. By the way, interest in insect AMP's is based on the knowledge from ancient times, where different insects were used in the treatment of a number of different ailments. Apart from medicine, transgenic expression of antimicrobial peptides in crops has become a novel approach among the strategies to combat phytopathogens in modern plant protection measures. The first antimicrobial transgenes of insect origin, modified cecropins, have been demonstrated to confer resistance of several transgenic cultivars against both bacterial and fungal phytopathogens. If sincere efforts are made, this area could boost pharmaceutical industry.

Basana Gowda G

Putting the 'ant' in antibiotics: Establishing 'Entomo-Pharma'

Insects represent the largest class within the animal kingdom in terms of species number. Insects are also most successful of all organisms on this earth and virtually occupy every ecological niche. The resistance of insects to pathogens which they come across in everyday life has been known for long time ago. Equally, antibiotic resistance has become a looming threat to modern medicine; hence people are now looking for novel defensive chemicals from eusocial insects like ants, bees, wasps etc. In case of ant colony, if one individual gets infected, it could spread it to thousands of individuals within a few hours. As



Monomorium sp., potential source of AMP's

Attracting Rural Youth or Students for Agriculture

Agriculture is the prime activity which provides major livelihoods to 58% of Indian population. The agriculture and its allied sectors added gross value of Rs.17.7 trillion during the financial year 2018 (<https://www.ibef.org/industry/agriculture-india.aspx>). Green revolution in India resulted in quantum jump in the food production and ensured food security in India. But, climate change, degradation of agricultural lands, price volatility due to supply and demand mismatch is becoming a major threat to feed the growing population in India. Moreover, only 3.4% of farmers in the age group of 18-30 years and 12.62% of farmers in the age group of 31-40 are involved in farming in India as per agricultural census done during 2011-12 (Fig.1). Additionally, 75.95% of farmers have not crossed middle school in India based on survey

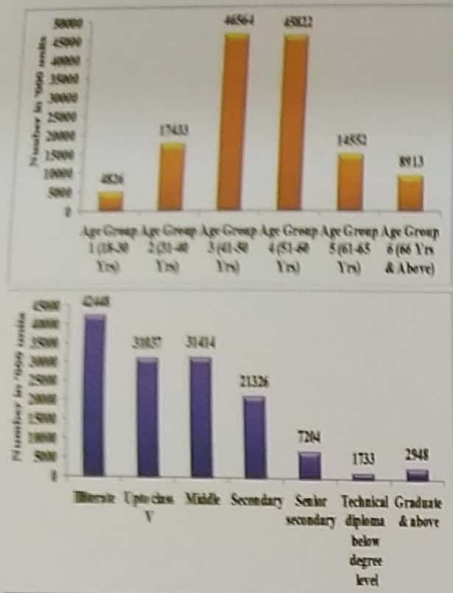


Fig 1: The number of operational holders in different age groups and Educational status of the operational holders

done during 2011-12 (Fig.1). Thus, India may be in the tipping point where youths prefer other business than agriculture. In this scenario, attracting rural youths or students for agriculture is becoming much more important not only for food security but also for transferring agriculture in to profitable work for the small and marginal framers.

National Rice Research Institute, Cuttack major objective of celebrating the Agriculture education day is to promote the awareness among the students and young farmers about the rapid developments of science and technology in agriculture. But, the prominent challenge to involve youths in agriculture needs radical measures to increase the proportion of youths undertaking farming as productive livelihood opportunities. Even before the developments of Start Up culture in India, entrepreneurship potential in agriculture was recognized and several youths started the Agri clinics in various corners of the country. However, the potential of rural start-ups is not exploited where the young farmers can be encouraged and their skills can be

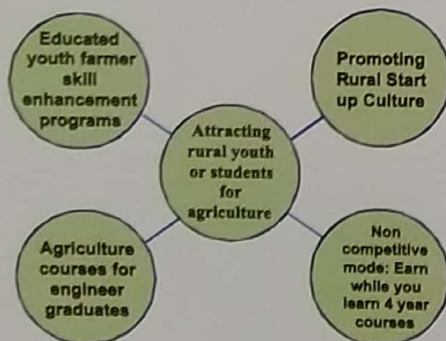


Fig.2: Schematic representation of strategies to attract rural youth or students in Agriculture

improved to initiate the culture of rural start ups. Moreover, it is becoming evident that youths from different field other than agriculture is willing to address the problems faced by the agricultural community. Thus, graduates and post graduates from other field of science and technology should be imparted with the knowhow of agriculture in their course curriculum. This can spread the entrepreneurship potential in rural India. Even though, there is very healthy competition for the agricultural courses after higher secondary level, the competitive mode needs to be changed and skill development mode where students with average marks with interest in agriculture can be encouraged to join in innovative courses similar to earn while you learn programmes available in foreign countries (Fig. 2). Thus, the encouragement of start ups in rural India, spread of agriculture courses to information technology and engineering courses and innovative earn while you learn programmes has the potential to make the youth and children attracted to the agriculture in India.

C. Parameswaran

Opportunities in Agribusiness Management for attracting Youth in Agriculture sector

The business sector encompassing farming and farming-related commercial activities which encompasses large-scale business operation. Agribusiness involves all the steps required to send an agricultural good to market: production, processing, and distribution. Agribusiness treats the different aspects of raising agricultural products as an integrated system. Market forces have a significant impact on the agribusiness sector. Businesses unable to rapidly change in accordance to domestic demand may look to export their product abroad, but if that fails they may not be able to stay in business. Present-day agriculture is substantially depended on commodity chains and food nets that embodied all parts of agribusiness from input suppliers through producers, processors, traders to end users.

Agribusiness denotes the collective business activities that are performed from farm to fork. It covers the supply of agricultural inputs, the production and transformation of agricultural products. Agribusiness includes all the activities within the agricultural food and natural resource industry involved in the production of food.

Some of the best agribusiness management institutes are listed below.

- Indian Institute of Management, Ahmedabad.
- Indian Institute of Management, Lucknow
- Institute of Rural Management, Anand.
- Xavier Institute of Management, Bhubaneswar.

Agribusiness Opportunities in India:

Enormous opportunity exists in India for businesses related to Agricultural commodities.

Some of the opportunities are listed below.

SN	Name of opportunities
1	Vermicompost-Organic Fertilizer Production
2	Dried Flower Business
3	Fertilizer Distribution Business
4	Organic Farm Green House
5	Poultry Farming
6	Mushroom Farming
7	Hydroponic Retail Store
8	Snail Farming
9	Sunflower Farming
10	Guar Gum Manufacturing
11	Bee Keeping
12	Fish Farming
13	Fruits and Vegetables Export
14	Micronutrient Manufacturing: Foliar and Soil Application
15	Florist
16	Livestock Feed Production
17	Frozen Chicken Production
18	Botanical Pesticide Production
19	Basket and Broom Production
20	Flour Milling
21	Fruit juice-Jam-Jelly Production
22	Groundnut Processing
23	Cashew-nut Processing
24	Quail Egg Farming
25	Shrimp Farming
26	Fish Hatchery
27	Piggery
28	Soya Beans Processing
29	Spice Processing
30	Vegetable Farming
31	Chicks Hatchery
32	Tea Growing
33	Grocery E-Shopping Portal
34	Medicinal Herbs Farming
35	Cactus Arrangements
36	Dairy Farming
37	Goatery Farming
38	Jatropha Farming
39	Potato farming
40	Corn Farming
41	Certified Seed Production
42	Soil Testing Lab
43	Horticulture Crop Farming
44	Fodder Farming for Goats and Cows
45	Agriculture Consultancy
46	Rabbit Rearing
47	Coconut Juice Production
48	Agricultural Brokerage and Consulting

Rahul Tripathi

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