

Agronomic education for nurturing skill development and agriprenurship

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Indian agriculture is challenged by climate and production risks, declining factor productivity, low income, and declining interest of youths in farming at large. There is a need for transforming Indian agriculture into knowledge and technology led agriculture. Agronomy as a core discipline of agriculture has to address the current and future challenges of Indian agriculture with sustainable solutions. A redefined and customized agronomy education through customized skill development and agriprenurship not only addresses these challenges but also builds capacities of youth and provides options for livelihoods and sustainable agriculture development. Agronomy education and training system should support appropriate Skilling, Re-skilling and Up-skilling trainings of students, rural youth and farmers on various agricultural aspects from time to time. The possible areas of entrepreneurship in agriculture relevant to customized Agronomy education are Climate services, Agro-service centres, Agro-inputs manufacturing units, Agro-produce processing units, Agro-Produce manufacturing units, Customized farm mechanization, etc. Active involvement of youth in agriprenurship, farm advisory, empowering them with knowledge and skills to serve the society through technology-led business models, incubation models, and value-added services are important to create employment opportunities for the youth in agriculture. All these approaches would help in desired goal of transforming youth from “Job seekers to Job providers”. The agronomy education and training can provide all requisite knowledge and skills to develop a successful entrepreneur.

Keywords: Agriprenurship, Agronomy, Climate services, Farm mechanization, Value added services

AGRICULTURE is the pivotal sector for ensuring food, nutritional and livelihood security; sustainable development and alleviation of poverty in India. Agriculture continues to be the mainstay of Indian economy by providing livelihood to nearly half of the population (54.6%) and accounting 19.9% to the India's GDP, 12% of total exports with a growth rate of 3.5% in agricultural production. But the Scenario of agriculture is changing, as Indian agriculture is facing second generation problems. Climate change is now reality and it is estimated that crop production loss in India by 2100 could be 10-40%. The per capita availability of water will decline to 1140 m³ by 2050 from

1820 m³ in 2001. The growth in human population is affecting the land use pattern available for agriculture and forest. Food habits and consumer preferences are also changing. All these necessitate promoting skills in agriculture and providing new gainful livelihood opportunities by developing agriprenurships.

Challenges of Indian Agriculture

Despite significant increase in production and productivity of food grains, agriculture in India has faced numerous challenges like risks due to climate change/variability, unabated land degradation, poor operational land holdings, yield plateau in most of the crops, poor soil quality, poor total factor productivity; regional

imbalances in agricultural productivity; rising input costs; stagnating/declining profitability; resource poor farmers, globalization of trade and commerce; vulnerable markets; poor technology transfer system. There is about 5-25% food loss in the entire supply-chain besides slower growth in the agriculture sector posing concerns for the future food and nutritional security of the country. Moreover, the demand for food and processed commodities has been increasing due to growing population and rising per capita income.

The real challenge encountered is that despite considerable increase in agricultural production, the desired increase in farm net income and living standard as compared to other

sectors was not registered. NSSO data for 2011-12 reveals that about 23% rural households with self-employment in agriculture as the principal occupation were having income less than the poverty line. It is often felt that disparity between farm income and non-farm income is rising. The rise in prices of inputs, uneconomical farm holdings, production risks, declining net income of farm household have been leading to unprofitable and unsustainable farming. It is really great challenge to retain youths in agriculture occupation. As per NSSO report, about 45% farmers want to quit farming if they were given a choice to pursue some other profitable occupation.

In view of above it is the dire need to increase productivity and contribution of agriculture in national GDP to make India 5.0 Trillion USD economy by 2024 and double the farmers' income through skill development, agripreneurship and agro-exports.

Role of agronomy

Agronomists of country have to comprehend the current and future challenges of Indian agriculture and find sustainable solutions. There is an immediate need to broaden the vision and redefine the role of Agronomy to diversify agriculture activities and focus on post-harvest management, quality, value addition, processing and effective marketing of produce through judicious skill development and agripreneurship so as to ensure better options for livelihoods and sustainable development.

Accordingly, Agronomists have to lead from the front to bring about paradigm transformation in farm production system through appropriate strategies, approaches and interventions as well as shifting the focus. The priority of agronomy research and education besides development of agro-technologies but also should focus on development of appropriate skills and agri-preneurship.

In view of the role and expectations from agronomists, there is a need to reorient present agronomy education and training in tune with the fast

changing national and international scenario to enhance the competency level of scientists, teachers, students, youth and farmers with agribusiness skills and agripreneurship to address the present and future challenges of agriculture in the country. In changing scenario, the horizon of agronomy needs to be widened to include various new courses/programmes like hi-tech agronomy, hydroponic techniques, precision farming, protected agriculture, organic farming, quality production of crops and seeds and e-marketing, value additions, and agro-exports, etc. It is also felt necessary to expose the stakeholders to new science and technological advancements like strategies for climate change adaptation and mitigation; agroecology-specific integrated farming systems; sustainable intensification; enhancing water productivity; modeling; application of nanotechnology and geospatial technologies (remote sensing, GIS and GPS); developing and promoting market oriented competitive agriculture; Carbon sequestration and clean development mechanism, use of artificial intelligence and drones in agriculture, etc. There is need for orienting agricultural students and youth towards agripreneurship and to initiate startups.

Agronomic research and education must enable development of technology, skills and agripreneurship to exploit the following aspects for attaining the desired farm productivity and sustainability, livelihood security through appropriate skills and agripreneurship.

- i. Profit maximization through enhancing productivity levels, effective post-harvest management, value addition, and processing.
- ii. Developing and promoting innovative concepts like Soilless medium; Vertical farming; Hydroponics; Solar farming; Ecosystem services; Eco-tourism, etc.
- iii. Practising precision agriculture.
- iv. Diversification and sustainable management of resource base and inputs.
- v. Energy efficient, cost effective,

environment and gender friendly farm mechanization.

- vi. Effective trade management through efficient value chain management.

The present situation demands a renewed thrust for enhanced quality and relevance of agricultural education so as to facilitate and undertake human capacity building for developing self-motivated professionals and entrepreneurs keeping in view the changing scenario of globalization of education, emergence of new areas of specialization and agripreneurship. Agronomy education and training should provide support to the farmers from sowing to post-harvest management through real-time agro advisories. The graduates are required to possess professional capabilities and skills to be successfully engaged in startups and agripreneurship by:

- Developing innovative curricular structures with Certificate, Diploma and Degree Programmes with specialization in Agronomy;
- Certified Crop Adviser (CCA);
- Certified Professional Agronomist (CPA);
- Distance Agronomy Education with built in practical orientation;
- Strengthening RAWE programme with thrust on hands-on-training;
- Capacity building and competency enhancement of students, youth and farmers through technical and vocational courses;
- Internship orientation focussing on skill development and agripreneurship;
- Design, orient and implement agronomy education suiting commercial needs.

Promoting competency-based framework

Agronomy education and training need to address the gap between the existing and the required competencies and promote competency-based framework for effective skill development and agripreneurship in students, youth and other stakeholders. This would require effective competency mapping of students/rural youths/other stakeholders to understand their competency level particularly in terms

of knowledge, skills and attitude. A fundamental principle of the competency framework is that each job/work should be taken up by a person who has the required competencies for that job/work. There is a need for comprehensive classification of all relevant agronomy skill areas in accordance with the competencies required thereto. Moving towards a competency-based approach, it would be necessary to classify the distinct types of skills with competencies required for developing entrepreneurship. In this way, an individual's development can be more objectively linked to the competencies needed for addressing current or future entrepreneurship and challenges in agriculture. Therefore, the focus should be to build individual competency centric entrepreneurship.

Skill Development

In India, about 90% of current jobs in agriculture are “skill based” whereas only about 6-8% of workforce has received vocational training. Thus, there is a pronounced “skill gap” both in terms of quality and quantity. Without skills even if we have enough knowledge about a task, we may not be able to complete it with adequate dexterity. Skill is the ability which is acquired through deliberate, systematic and sustained efforts in order to smoothly and adaptively carry out complex activities involving ideas (cognitive skills), things (technical skills), and/or people (interpersonal skills). In agriculture, cognitive skills are required to make better decisions, technical skills required for handling various implements/procedures/practices and interpersonal skills required for exchange of farm related information. Agronomy education and training can create many skilled persons in diverse fields of agriculture. Skill gap studies for key agriculture sector have to be systematically initiated. Customized skill-based agripreneurship training programmes have to be developed for potential farmers, entrepreneurs, educated and unemployed rural and urban youth as agripreneurs. Agronomy education and training system should support appropriate Skilling, Re-skilling and Up-skilling

Trainings of students, rural youth and farmers on various agricultural aspects from time to time. These trainings shall be oriented to inculcate managerial and entrepreneurial skills to the aspiring candidates.

The emerging opportunities for trainings are in the following areas:

- High value agriculture - horticulture including high value vegetables, fruits, flowers and speciality enterprises including spices, medicinal, aromatic and organic products
- Improved production and value addition of speciality corn
- Quality seed production
- Organic cultivation
- Protected cultivation
- Soilless cultivation, hydroponics, aeroponics, vertical farming and terrace gardening
- Nursery management techniques for production of quality planting material
- Post-harvest handling and processing
- Apiculture, sericulture, mushroom cultivation
- Biomass generation, Vermi/enriched-composting, etc.
- Agri-warehousing, cold chain, logistics and supply chain
- Digital agriculture, real-time agro-advisories
- Weather forecasting and climate services
- Energy farming (solar)
- Micro Irrigation
- Soil, water and plant analyses
- Maintenance and custom hiring of farm implements/machinery
- Agri-clinics
- Agribusiness Centers
- Integrated farm input services of seeds, biofertilizers, etc.
- Fodder production systems and marketing
- Farm produce marketing.

There is vast scope for Agri - Clinics which could be knowledge and service hubs to provide expert advice and paid services to farmers on diverse aspects that could enhance productivity of crops/animals and ensure increased income to farmers. These centers can advise farmers on climate services including real-time agro-advisories, crop and variety selection, best farm practices, primary

processing of millets, post-harvest value-added options, price trends, market news, risk mitigation and crop insurance, credit and input access, plant protection advisories and services. Agronomy-based specialized training can be provided to agriculture graduates interested in setting up such a center.

Concerted initiatives have been taken by ICAR, SAUs and other institutions of Government of India to empower the youth through formal, informal and vocational training in agriculture and secondary agriculture through programmes like Student READY, Attracting and Retaining Youth in Agriculture (ARYA), Experiential learning, etc. and Skill Development programmes of ICAR, SAUs, ASCI and Ministry of Agriculture and Farmers' Welfare. These initiatives are likely to play a major role in empowering unemployed youth and retain them in agriculture by transforming agriculture into a remunerative venture. A strong sustainable agricultural base with a skilled young workforce could be a success *mantra* towards India playing a major role in global agricultural trade.

Development of agripreneurship

Entrepreneurship is a concept that encompasses transforming an idea or vision into a “new business venture”, or the expansion of an existing business by an individual, a team of individuals, or an established business. Till recently, agriculture used to be treated as just an activity of land tilling and crop harvesting but increasing wasteland, depleting natural resources, growing migration by rural youth to urban areas, negative perception of the children of farmers towards farming, and emerging technologies in agriculture have necessitated redesigning of agricultural activities. Applying the thought and practice of entrepreneurship in the field of agriculture, generates wide range of economic benefits like - increased agri-productivity, creation of new business ventures, new jobs, innovative products and services, development of rural areas and increased wealth. It is being realized that developing

entrepreneurs in agriculture will address issues like (a) reducing the burden of agriculture, (b) generating employment opportunities for rural youth, (c) controlling migration from rural to urban areas, (d) increasing national income, (e) supporting industrial development in rural areas, and (f) reducing the pressure on urban cities. It is emphasized that entrepreneurship is a feasible approach for upward mobility, as a 1% increase in entrepreneurial activities decreases the poverty rate by 2%.

Agripreneurship program is crucial to build entrepreneurs and management staff to deal agricultural industry across the world. Agripreneurship is greatly affected by the economic situation, education and culture. Agripreneurship is important for national economy in following ways:

- 1) It helps in achieving productivity, profit by small farmers and integrating them into local, national and international markets.
- 2) Helps in decreasing the food costs, and provides high quality diets to the rural and urban poor.
- 3) Accelerates growth, diversifies income and develops entrepreneurial opportunities in rural and urban areas.

The possible areas of entrepreneurship in agriculture relevant to customized Agronomy education are:

- i. Agro-service centres - These include the workshops and service centre for repairing and serving the agricultural implement used in agriculture.
- ii. Agro-inputs manufacturing Units- Fertilizers/biofertilizers production units, food processing units, agricultural implements, etc.
- iii. Agro-produce processing units - Rice mills, Dal mills, decorticating mills, etc. may mechanize further processing and value addition of these products.
- iv. Agro-Produce manufacturing units - Sugar factories, Bakery, Straw board units, etc.
- v. Fodder production units
- vi. Seed production units
- vii. Miscellaneous areas - setting up of apiaries, feed processing units,

seed processing units, commercial vermicomposting units, organic farm produce retail outlet, soil and water testing centres, custom hiring centres, ethanol production units, Eco-tourism, etc.

These entrepreneurs and startups can bridge the gaps in the agri-value chain and in delivering of quality services and products, technologies to the farmers on one hand and benefit the consumers on the other. These activities are anticipated to bring about transformation from apps to farm automation; from protected cultivation to innovative food processing and packaging; and from conventional farming to precision and smart agriculture. The proliferation of all innovations and technology driven powerful startups and agripreneurship can revolutionize the food and agriculture sector. Active involvement of youth in agripreneurship, farm advisory, empowering them with wide range of agronomy knowledge to serve the society through technology-led business models, incubation models, value-added services are important to create employment opportunities for the youth in agriculture. Hence, the overall goal is to transform youth from "Job seekers to Job providers".

SUMMARY

Despite increase in farm productivity and self-sufficiency in food grains, Indian agriculture is encountering challenges of reducing factor productivity, vulnerability to climate change, resource degradation, etc. in general and decreasing profitability and declining interest of youths in farming at large. Agronomy as a core discipline of Indian agriculture has the capacity to accept these current and future challenges of Indian agriculture to find appropriate sustainable solutions. There is dire need to broaden the vision and redefine the role of present Agronomy to diversify agriculture activities through customized skill development and agripreneurship so as to ensure better options for livelihoods and sustainable development. Agronomy needs to be visualized in broader perspective beyond crop production and it

focuses on post-harvest management, quality, value addition, processing and effective marketing of produce through appropriate skill development and agripreneurship.

The present situation demands a renewed thrust for enhanced quality and relevance of agricultural education so as to facilitate and undertake human capacity building for developing self-motivated professionals and entrepreneurs in view of the changing scenario of globalization of education, emergence of new areas of specialization and agripreneurship. The agriculture graduates are required to possess professional capabilities and skills to successfully promote start-ups and agripreneurship. Agripreneurship is the need of hour to make agriculture a more attractive and profitable venture. Agripreneurship is not only an opportunity but also a necessity for improving the production and profitability in agriculture and allied sector where agronomy has a pivotal role. There is a greater scope for entrepreneurship in agriculture and this potentiality can be tapped only by effective management of agri-elements such as - soil, water, agri-inputs, post-harvest issues and market needs. Active involvement of youth in agripreneurship, farm advisory, empowering them with knowledge and skills to serve the society through technology-led business models, incubation models, and value-added services are important to create employment opportunities for the youth in agriculture. All these approaches would help in desired goal of transforming youth from job seekers to job providers. The agronomy education and training can provide all requisite knowledge and skills to develop a successful entrepreneur. Thus, the agriculture sector has a large potential to contribute to the national GDP and simultaneously provide direct employment and income to the larger and vulnerable section of the society.

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