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**A Review**

# Quality education for quality production in agriculture

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**SUMMARY :** It is clear, the conventional agricultural education system is now not fulfilling the requirements of agricultural development. Education has become a focus area for policy makers so that it could bring on a fast track of skill development. The agriculture curricula should be flexible, cross-disciplinary, demand driven and yet must provide skills through hand on training and promote entrepreneurship. The course curricula must be learning- centric rather than exam centric with emphasis on self study, group studies and assignments. The SAUs and private sector must have a strong linkage between education, research and extension. Promotion of off-campus, distance and education through open learning with the help of ICTs. Formal agricultural education is one component of agricultural knowledge systems. This paper emphasised that present agricultural education systems are need of improvements in sense of its quality. Higher education faces the challenges in overcoming the stagnation in agricultural production, poor allocated resources and outdate policies, underutilized sources of knowledge and the need for globalization of educational content.

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## BACKGROUND AND OBJECTIVES

Agriculture continues to remain as a major sector and the backbone of the Indian economy and the role of education (Agricultural education) in strengthening the agriculture is extremely significant. Technological progress in agriculture is, therefore, crucial for the overall economic development of the country. On world-wide basis, in India, today has 17.4 per cent (1.22 billion) population, 11per cent livestock population, remaining 4.2 per cent water and 2.4 per cent area. The country has a total of 329 million hectares land, of which 142 million ha cultivated and 157 m ha. net irrigated area with 138 per cent cropping intensity and 58 per cent of population earning livelihood in agriculture. Since 1950-51 population growth rates is 1.4 per cent per annum and 31 per cent of the population is under 14 years. The development in agriculture over the years increased food grain production by 4 times, horticultural commodities and milk by 6 times, fish by 9 times and eggs by 27 times. Agricultural production has increased drastically, especially since 1960s with the onset of 'green revolution', Food grain production increased from 50 million tons in 1950-51 to 257 in 2011-12 (Ahmed and Haseen, 2012). The employment in agriculture has its great role in sustainability of rural livelihood through sustainable growth of agriculture, social development, poverty alleviation and nutritional security.

During last few decades, the extent and scope of agricultural education has been enormously expanded. Education is simply the soul of the society as it passes from one generation to another and it is the major source of livelihood, promotion and its welfare. Shrinking resources on one hand and added challenges on the other, made the task of bringing excellence in education a stupendous

on. The trust of education has been shifted. The process, products and management of agricultural education are of paramount important for indices where majority of people live in rural and depending on agriculture as their main source of income and livelihood. India does require education at all levels so that our farmers are better equipped to handle the threats of globalization. Now with the entry of foreign direct investment (FDI) in this sector many MNCs have forayed into the segment with several agricultural products, which became a threat to Indian farmers who lack professional expertise and capital to deal with the issue. Hence, the need of the hour is to give agricultural education a high priority. The food grain production was the neglected area of them. Thus, we inherited a food deficient agricultural situation since the time of independence.

China is a country where much progress has been made in terms of internationalization, and where the pursuit of a deliberate strategy to achieve it is under way (Huang, 2007). Despite much effort, yet several farmers have committed suicide especially in the states of Andhra Pradesh and Maharashtra because of indebtedness and repeated crop failures. Keeping in view the fact that increased productivity and production must be the sole objective of agricultural education, research and extension. Our scientific community is leaving no stire unturned for bringing about paradigm changes in agricultural education in the country. Education plays a specific role in addressing these challenges. Therefore, the aim of this paper was to focus the importance and need for improved, relevant, demand-driven, and mission-oriented 'agricultural education system' in India.

**Important views on agricultural education :**

McCracken (1983) stated that agricultural education be further developed as a profession. We need leaders in our profession who will work together in charting a new course for future and nature of the programme.

Shin and Cheek (1981) views that leaders in agricultural education must be able to synthesize technical agricultural information and plan programmes which helps in solving the problems associated with energy, productivity and world trends in the agricultural industry.

Osborne (2011) suggests that we need to embrace the notion that agricultural education is a single, broad social and behavioural science discipline that includes teaching and learning in formal and non-formal settings; reaching widely varied target audiences through interpersonal, group and mass communications and strengthening the leadership capacity and effectiveness of individuals and organizations – education, communication and leadership all within an agriculture and natural resources context.

Dailey *et al.* (2001) advocates that the purpose of agricultural education is to develop love and understanding towards agriculture, educating students and adults regarding its importance, and the promotion of literacy throughout educational and community systems.

Swortzel (1996) opined that SAEs bridge the gap between the class room and work by providing students opportunities to apply what they have learned in the classroom and to transfer those knowledge and skills to the real world situation.

It is to mention here that agricultural education in USA is made up of three integrated parts: Classroom instruction, future farmers of America (FFA) and supervised agricultural experience (SAE) (Ghadei *et al.*, 2011).

**Agriculture development in India: Issues of concern :**

The share of the agricultural sector in over all GDP has fallen from 30 per cent in 1990-91 to less than 15 per cent in 2011-12 (GOI, 2011). This itself has not been regarded as an issue of development, rather it has been regarded as an indicator of industrial as well as economic development. Yet, it has continuously been the issue of concern of the government because of the continuation of surplus labour problem, persistent poverty and vulnerability in rural India.

The Ministry of Agriculture, in its recent publication, strongly asserts that achieving 89 per cent growth rate in overall GDP may not deliver much in terms of poverty reduction unless agriculture grows at least by 4 per cent per annum (GOI, 2011). This view reflects that the 1per cent growth in the agricultural sector is much more effective in reducing poverty than the same percentage growth in the non-agricultural sector and the declining employment elasticity in both sectors over time.

In fact, according to our recent study based on the NSS data, out of 15 states covering 85 per cent of population in India except Assam which did record employment elasticity over 0.5 (1999-2000), which is the required condition to be able to absorb the incremental labour force growing at the rate of 2 per cent when the agriculture sector growth at the rate of 4 per cent (Hirashima, 2009). The initiative stems from the result of a survey conducted by National Academy of Agriculture Research Management (NAARM) in Hyderabad which pointed out deficiency of at least 50,000 agricultural scientists by 2010 (Ashwathi, 2012).

**Higher agricultural education in pre-independence period :**

It is believed that agriculture was formally taught at Taxila and possibly Nalanda. In the early years of the 20$^{th}$ century, the British introduced formal education in agriculture, which was modeled on the European knowledge base because the traditional Indian knowledge base was considered hopefully outdated and unscientific. Also the education was to be imparted primarily to revenue workers and landlords leaving the farmers. By 1947, India had 17 colleges of agriculture with these included the colleges at Coimbatore, Pune, Nagpur,

Kanpur and Pusa. The Royal Commission of Agriculture proposed the constitution of Imperial Council of Agricultural Research (ICAR) in 1905. The food crisis created by the Second World War and Bengal famine of 1943 were of very great concern which leads to the institution of "Grow More Food" Campaign in 1943 itself.

**In post-independence period :**

Indian University Education Commission was appointed and was headed by Dr. S. Radhakrishnan. The commission urged that the country needed a continuous flow of scientific workers in all the fields including agriculture. It was in 1954, that the first Indo-American joint team was appointed; the Indian team was headed by Dr. R.K. Domle. The second Indo-American joint team appointed in 1959, made supplementary recommendations, which were a preface to setting up agricultural universities on a modified basis of Land Grant College pattern universities in the U.S. on the basis of recommendations of Dr. Ralph Cummings Committee, the first agricultural university was established in 1960 at Pantnagar, Uttaranchal (now Uttarakhand). Unfortunately, the status of SAU's has deteriorated in last two decades. As pointed out by Millor (2011), the journey of higher agricultural education got interrupted in this phase where self-reliance in agriculture had been the prime goal of agricultural development. The accelerated production of agricultural commodities, especially food grains has been the main trust of agricultural development in this period. The strategic approaches to achieve these goals were centered on evaluation of appropriate technologies, policy interventions and institutional support. The systematic efforts in this direction paid rich dividends.

**Scenario of higher agricultural education :**

Agricultural universities have the intake capacity of 40,000 students and imparting education in 13 major disciplines at undergraduate and about 93 subjects at post graduate level. In higher agricultural education, it is heartening to note that about 59 per cent students are from rural background and on an average 36 per cent are the girls' students (Kumar *et al.,* 2013). However, every year the number of girls students are increasing. Higher education in agriculture in the country has made significant contribution in the food security as well as in the overall growth of the country.

**Education for agricultural extension :**

India has moved away from the earlier old extension services to a new structure of ATIC, KVK, ATMA in its place. At present four types of Agricultural Education or Extension System such as ICAR system, SAUs, Ministry of Agriculture and Private Agencies are running in India and the yield gap between demonstrated yield and actual yield achieved on farm, ranged 5 to 100 per cent in many crops and this shows ineffectiveness of the agricultural extension/transfer of technology programmes as the fragmentation and disconnects among education, research and extension. The reason is lack of qualified human resources engaged in extension work at farm level. Efforts now are on way to improve the extension system through improving the knowledge of extension workers through various trainings, repeated demonstrations for sustainable technology improvement on farms and making the inputs available for increasing farm productivity (Kumar *et al.,* 2013). Combining all the efforts we see that the transfer of technology is only around 40-45 per cent in the society (Ghadei *et al*., 2011).

**Components of quality education :**

In the country, higher education system has been evolved over a period of time with consistent manner. The universities and institutions by virtue of their long experiences of working have evolved the system or academic practices and at many places these practices are highly vibrant, effective, and functional and are being followed by many other organizations. To import education to the students, UGC has designed the action plan for the consideration of Central and State universities, colleges and other educational institutions of higher education.Semester system curriculum development, admission procedure, examination reforms, teaching, education and research, education and extension, students counseling and placement cell/centre, international and national conferences. With these institutional infrastructure facilities, students and teacher were made available with enriched library facilities, upgraded classrooms, equipped seminar room, well furnished ICT centre, well equipped modern laboratories, students' academic museum, well planned instructional form, students counseling and placement cell, stadium and gymnasium (sport complex), students hostel facilities and guest house facilities.

**Strength of agricultural education system in India :**

India has one of the largest agricultural research and education system in the world. ICAR is the apex scientific organization at national level to plan, promote, execute and co-ordinate agricultural education, research and extension over the country to combat emerging challenges through network of 45 research institutions, 5 deemed universities, 61 AICRPs and 17 network projects, almost 56 SAUs, one central Agricultural Universities, 44 ATICs and 631 KVKs with four central universities with strong agriculture faculty. Agricultural universities setup in India were multi-faculty mono-campus universities initially. With time, most of them have become multi-campus. 18 universities have become single discipline universities (Animal and Veterinary Sciences 12, Fisheries Sciences 2 and Horticulture and Forestry 4). Many states have now more than one SAU with Karnataka alone having six

universities. Presently, the number of colleges stand at 623 (360 in SAUs/DUs, 160 colleges were affiliated to SAUs and 103 colleges were in general universities and other institutions).

**ICT for networking and distance education/ e-learning :**

Advances in ICTs and globalization make networking, collaborations and partnership increasingly feasible strategy for promoting the agenda of reforms and restructure knowledge, innovations and experience easily across geographical and institutional boundaries. The IT revolution can provide many technological tools like multimedia PCs, storage of huge data, distance education through e-courses, automation of libraries, networking of institutes and sharing of resources and information for education delivery. ICAR has initiated through mission made consortia approach based project on e-course development under NAIP in different streams of agriculture in NARS. The delivery of knowledge in this manner will have a competitive advantage and well allow agriculture and allied colleges to share information including class material, more efficiently and address some of the constraints in achieving excellence in agricultural education like faculty shorting, content creation, teaching quality and lack of systematic feedback and evaluation.

**Challenges and issues :**

Joshi (2011) expressed concern that the quality of agricultural research and education in India has been on the decline over the years. Further, pointing out the declining intensity of agriculture research in different states, about 51 per cent of faculty members have the degree from the same university. In agriculture universities, only 17 per cent recruits are new and 46 per cent faculty has served the same university for more than 15 years. Thus, most of the universities have been ageing. The initiative steps from the result of a survey conducted by NAARM pointed out deficiency of at least 50,000 agricultural scientists by 2010. Different standards for university professors and elected officials concerning the use of public funds under the amendment violate the principle of equality.

**Decreasing/ stagnation in agricultural production :**

The situation of agriculture has gone down badly. Today, agriculture faces many difficulties such as decreasing profitability in farming, mounting threat to sustainability arising from depleting quality of natural resources, biotic and abiotic stresses and inefficient use of agro-inputs, rising quality competitiveness under the pressure of globalization and a general lack of qualified manpower in the frontier areas to deliver at grassroots level.

**Poor allocated resources and outdate policies :**

The resources and educational policies has more role in making quality education but at present facing with inadequate investment and imbalances in resource allocation funding crunch, inflexibility in choice of courses, no peer or student evaluation of teaching. Policies and recommendation together is going outdated, therefore, it is right time to make effective higher education policies with the required modern resources (labs, buildings, electricity etc.).

**Decreasing the quality of higher education :**

Declining quality of students admitted to agricultural universities, a funeral lack of manpower in the frontier areas of science and technology, inadequate hands-on skill/ experience, lack of research exposure, diminishing core of universities, depleted faculty strength, extensive inbreeding in faculty, weakness in teaching learning process, new universities without matching resources, inadequate employability, faculty competence in emerging areas, lack of modern infrastructure, lack of required faculty in many institutions, lack of motivation, low morale and lack of incentives, climate change, increasing population, large number of vacancies. Ineffective and poor governance, political interference, lack of transparency, provincialism and favouritism, in addition, the teaching methods are exam-centric rather than learning centric. The emphasis is on teacher completing the syllabus rather than students learning the concepts and skills in learning centric approach. There is no uniformity in course structure and pattern of examination system. The universities could be regional but not specialized ones (any one field of agriculture)," said Mayee (one of the members of the ICAR committee and former chairman of Agriculture Scientists Recruitment Board) reported by (Srivastava, 2012). He also said that today there are no uniform quality standards in agricultural education. Thus, bringing uniformity in agricultural education is the first priority. Though there is a model Act of ICAR, it is not being implemented across the country in right manner. Hence, there is a need for accreditation and upgradation of the colleges and the universities.

Curricula and infrastructure were often described by participants were outdated, with quality deteriorating at a time when students urgently need to be taking up agricultural careers to deal with tomorrow's challenges (XI Agricultural Science Congress, 2013).

**Considerations for improving agricultural education :**

Agriculture subject must be made the central subject instead state, as we have witnessed that the quality of education is not up to the mark from last five decades, indeed going below average, which will be going to affect the total cycle of the agricultural system of our country. It is the need of the hour to take-up policy changes as paradigm shift from single discipline orientation to multidisciplinary approach by

encouraging privatization, making co-ordination, sharing in activities, planning, monitoring, evaluation and assessment as sole component of research management process; if at all India wants to be in the race with china and other countries in food production and marketing.

Joshi (2011) suggested some measures, such as, higher allocation of resources, faculty up- gradation, adopting ICTs in teaching, promoting networking in higher education and review of centre-State relations in higher education and setting up of National Agricultural Education Council, among others. Universities would also be prompted to generate their own funds for their development. ICAR could also work out a uniform fee structure for the universities and affiliated colleges. There is need of involvement of various stake holders for making agriculture more useful, enterprising and employable (Ghadei *et al*., 2011).

**Towards improving the curricula: "STREAM-Learning ICAR" :**

As a business the agricultural enterprise is influenced by complex interaction among a series of stakeholders ranging from farmers and scientists to retailers, grocers and risk managers. Both research and education must play a pivotal role in promoting this crucial enterprise. The research must be innovative (I), cutting edge (C), anticipatory (A) and rewarding (R), ICAR Research and education funds must be provided on a competitive grant basis. Healthy competition among peers is essential in developing a high-class programme. Similarly, education must be strategic (S), transferring skills (T), resource enhancing (R), effective in teaching (E), agricultural profile raising (A) and managerial skill promoting (M) STREAM. Thus, agricultural curricula must be developed on the principle of "STREAM-Learning ICAR (Lal, 2013).

The education system in SAUs must be broad-based, flexible and accessible to all. It must teach knowledge, skill and entrepreneurship. The competing development in agricultural education is important to prepare graduates for the complexities outlined (Ghadei *et al.,* 2011). Demand-oriented curriculum to improve relevance of SAUs, requires reforms, investments in staff running (including overseas training) and education infrastructures, and increase in the quality and diversity (beyond the state borders) of staff and faculty (Maguire, 2012). Agricultural research and education must be a cross-disciplinary programme based on concepts and methods taken from diverse discipline (Vale *et al.,* 2012). The importance of post harvest technology cannot be over-emphasized in view of the several million tons of wheat rotting when stored outside every year (Parsai, 2012).

There are few takers for agriculture as a career option of late. So it is high time proper policies were formulated to make agriculture education more attractive and contemporary, he further said the first career choice of any bright student is either medicine or engineering or management. Agriculture rarely figures in the top five. This has resulted in shortage of human resources in the field. We need to address this problem on a priority basis," Said president of National Academy of Agricultural Sciences NAAS while addressing the media here on Wednesday on the eve of XIth National Agricultural Science Congress. As suggested by Bill Gates of Microsoft, who was in the country recently, said that the ICAR was also considering interfacing agriculture with IT or ICT in a big way, which would benefit the farmers.

To properly address these challenges, competent human resource in sufficiently large numbers would be required in the near future and for that a renewed thrust for higher agricultural education is necessary with enhanced financial support to the ICAR-AU system.

**Distinctive profile of India- 2020 by, Dr. APJ Abdulkalam :**

- A Nation where the rural and urban divide has reduced to a thin line.
- A Nation where there is an equitable distribution and adequate access to energy and quality water.
- A Nation where agriculture, industry and service sector work together in symphony.
- A Nation where education with value system is not denied to any meritorious candidates because of societal or economic discrimination.
- A Nation, which is the best destination for the most talented scholars, scientists, and investors.
- A Nation where the best of health care is available to all.
- A Nation where the governance is responsive, transparent and corruption free.
- A Nation where poverty has been totally eradicated, illiteracy removed and crimes against women and children are absent and none in the society feels alienated.
- A Nation that is prosperous, healthy, secure, devoid of terrorism, peaceful and happy and continues with a sustainable growth path.
- A Nation that is one of the best places to live in and is proud of its leadership.

**Conclusion :**

The developed technologies should be applicable locally in farmers field situation and transfer of technologies is based on group approach and farmer's participatory approach. At every step private stakeholders and progressive farmers should be involved in dissemination of technologies. More emphasis should be given on training need-based, problem-solving, skill-based vocational training for self-employment for farmers, farm women and rural youth in group approach. A model farm at each village Panchayat should be necessary. Importing extension knowledge through extension education, continuing education, non-formal education by making a

strong relation with the education and research for providing the link between research and farmers. For fulfilling the requirement of education, distance education, vocational education and e-learning modes should be more emphasised. For increasing quality education, re-orienting and modifying the course curriculum to suit the demands of the sustainable environments, compatible with available resources, globally adjustable.

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