AGRICULTURAL EDUCATION AND RESEARCH - AN OVERVIEW

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2.0 INTRODUCTION

Agriculture and education serve basic human needs. For any nation to prosper, an adequate supply of wholesome food must be available to maintain a healthy population and education keeps extending new horizons of knowledge, skills and creativity. Agricultural productivity, national security, balance of trade, and human health relate to technological development in food and agriculture. Technological development in food and agriculture follows scientific research which is dependent ultimately upon the academic productivity of human resource.

Formal instruction in agricultural education began at the turn of the eighteenth century. While the initial efforts may have lacked the scholarly luster of a university but they did form a basis for further growth and expansion of "Agriculture" as an important discipline throughout the world.

2.1 EARLY HISTORY

Among the early protagonists of the introduction of agriculture into regular school programmes were the outstanding Morovian educator J.A. Cumenius (1592 - 1670) who emphasized peoples direct contact with nature / environment and J.H. Pestalozzi (1746 - 1827) of Switzerland, who stressed education towards creative work and vocational training. Also J.S. Rousseau’s
(1712-1778) ideas of the return to nature had a strong influence on the inclusion of agricultural activities in educational programmes. Benjamin Franklin proposed in 1749 to teach agricultural practices and to take youth to study the best plantations in the United States of America\(^{(1)}\).

2.1.1. Germany

German agriculturists have most significantly contributed to the early agricultural education concepts. The development of agricultural programmes and curricula in instructions of higher education began in 1772 and within a hundred years, spread to all other European countries, British Isles and North American Continent. In 1722 King Friedrich Wahelm I, established a school for training farmer's daughters, and established professorships of public administration at the Universities of Halle/Salle and Frankfurt. Agricultural science as a part of public administration was introduced as a new subject. First university institute with agricultural discipline was established during 1771. In 1807 a private Agricultural Academy was founded by Albrecht Daniel Von Thaer, who latter was appointed as Professor of Agriculture in Berlin University. Prof. Thaer dedicated himself for agricultural education and the Agricultural Academy founded by him and Royal University of Gottingen were the two most notable institutions contributed for the development of agricultural education throughout Europe\(^{(2)}\).
2.1.2 France

First school was established in 1763 at La Rochette, near Melun followed by another school during 1771 at Annel near Compiegne. Demonstrations made by Mathieu de Dombasle in 1822 on alternate cropping had a great impact which led for establishing three regional agricultural schools at Montpellier in Southern France, (1872); Gran Joun (1841) in Britany and Grignon (1826) in Siene-et-Oise and the Institute National Agronomique de France (National Agricultural Institute of France) (1848) at the palace of Versailles. Due to change in political climate the national Agricultural Institute was closed. In 1876, a law was passed by the National Assembly and the former institute was renamed as Institut National Agronomique and moved to Paris from the Palace of Versailes.\(^2\)

2.1.3 Belgium

In Belgium agricultural education was initiated by establishing schools similar to the schools of France and Germany.

2.1.4. Netherlands

In Netherlands, agricultural education was introduced in 1842, with the establishment of a free school in agriculture at Haren in the province of Groningen. This school was closed during 1863 due to dissension that developed over diversified instruction. During 1873 a communal school was established in
Wageningen and this school became later a State School of Agriculture in 1876 with a purpose to provide four levels of instruction in agriculture.\(^{(2)}\)

2.1.5 Denmark

In Denmark the role of agriculture was to promote the phases of rural industry. In 1769, the Rural Agricultural Society, Denmark was established with the purpose of holding meetings on scientific importance, publication and distribution of books on rural economy etc., In 1801 a Professor of agriculture was appointed in the University of Copenhagen to give lectures in agricultural subjects. After the war in 1856 a complete course of instruction in agriculture was added at the Royal Veterinary School at Copenhagen and the institution was renamed as Royal Agricultural and Veterinary Academy of Copenhagen.\(^{(2)}\)

2.1.6 England

In England English Agricultural Society was established during 1838. This was granted with a royal charter of incorporation and renamed as Royal Agricultural Society of England. The purpose of this society was to implement measures for the improvement of education of those depending on cultivation of soil. The Royal Agricultural College was chartered with the purpose of teaching the science of agriculture and other related sciences and the practical application of these sciences to the cultivation of the soil and the rearing and management of
livestock. In 1880 a college of Agriculture was established to provide instructions in agricultural sciences and other practical training in farming. (2)

2.1.7 Scotland

Scotland provided the first University Chair of Agriculture in Edinburgh during 1790. It was followed by University of Aberdeen by introducing lectureship in Agricultural Chemistry during 1840. Examination for granting diplomas was made during 1876 by the Aberdeen University. Universities of Edinburgh and Glasgow followed suit in 1888. Agricultural education, farm training etc., through agricultural colleges was well recognised and established by 1904. (2)

2.1.8 Canada

Ontario provided leadership to stimulate the growing of grain, the importance of livestock and the improvement of agricultural production methods in Canada. A Chair of Agriculture was established by statute in the University of Toronto in 1844. A College of Agriculture was established during 1874 at Guelph under the title Ontario Agriculture and Experimental Farm. In 1887 Ontario Agricultural College was affiliated to University of Toronto and began to emphasize reaching more people through extension courses. This stimulated the development of similar institutions of higher learning in agriculture in the other Canadian provinces in the early 20th century. (2)
2.1.9 United States

Importance of agriculture was recognized in the United States of America before the colonies broke their political ties with England. The American Philosophical Society founded in 1743, published numerous articles on agricultural subjects. While this society was developed to promote scientific development in the country, it led to the organization of the Philadelphia Society for the Promotion of Agriculture in 1785. This encouraged the establishment of other societies throughout the country and Gardiner Lyceum at Gardiner, Maine.

The New York State Agricultural College was incorporated by an act of the New York State Assembly in 1853. Due to civil war it was closed in 1860. In 1863 New York College of Agriculture, Ithaca, New York was established. Similar efforts to establish agricultural schools were made in Michigan, Maryland, Iowa, Minnesota and Pennsylvania. In 1856 the Maryland legislature passed legislation to establish an agricultural college which later became the University of Maryland. The Agricultural College of Pennsylvania was chartered in May of 1862 and later (1874) renamed Pennsylvania State College. The Iowa legislature passed a bill providing for a state agricultural college and farm in 1858.
Interest in agricultural education grew rapidly in the United States during this period. Riding the crest of a wave of public support for this national trend, J. B Turner, then professor at Illinois Jackson College, Jacksonville, Illinois, and publisher of the journal "Prairie Farmer", proposed in 1852 that Congress grant public lands to each state for the establishment of industrial universities. In 1851 and 1852 Turner’s plan for an industrial university in each state attracted wide spread attention throughout the country. In 1853 the Governor of Illinois approved resolutions passed by both houses of the state legislature asking the Congress to support and make provisions for public lands for industrial universities. After much public discussion and political manoeuvring, the Morrill-Wade Act was passed by Congress in 1862. The act was referred to as the Morrill Land-Grant Bill.

Iowa was the first state to accept the provisions of the act on September 11, 1862. Similar actions were taken by Vermont and Connecticut in the same year. Later many of the states started accepting the provisions of the Act(2).

2.2 AGRICULTURAL RESEARCH DEVELOPMENT IN INDIA - PRE INDEPENDENCE PERIOD

Agriculture the main occupation in the country received very little attention during British rule.(3) Disastrous famines occurred at intervals of about 12 years in the 19th Century affecting at least 200 million people. In the
famine of 1876 - 78 about 60 million people were affected and mortality reached 5,250,000\(^4\). On the conclusion of the work of Bengal and Orissa Famine Commission, it was mooted to have a Department of Agriculture to look after the improvement of Indian agriculture to meet the threats of recurrent famines. Lord Mayo (1869 - 72) took active interest in starting agricultural department in the Government of India with branches in the Presidencies\(^5\).

The Famine Commission Report 1880 revived interest in improvement of agriculture. In 1889 Dr. J.A. Voelcker, Agricultural Chemist of the Royal Agricultural Society of England was sent to India to advise on the best course to be taken for improving Indian agriculture. In his report on "Improvement of Indian Agriculture", he recommended systematic prosecution of agricultural enquiry, and the spread of general and agricultural education. During the period 1880 - 1891 Departments of Agriculture were established in the provinces.

A Cattle Commission was appointed in 1869 and sporadic efforts were made in the provinces to deal with cattle diseases. In 1889 Civil Veterinary Departments were constituted. In 1890 Dr Lingard was appointed as Imperial Bacteriologist at the College of Science, Poona. As the climate of Pune was not suitable for bacteriological research the Imperial Bacteriological laboratory was shifted to Mukteswar. Veterinary Colleges were started at Bombay, Lahore, Calcutta and Madras\(^5\).
During Viceroy Lord Curzon’s period (1898 - 1905) an Imperial Agricultural Research Institute was founded at Pusa, Bihar in 1905.

2.2.1 Birth of Indian Council of Agricultural Research

The Government of India appointed a Royal Commission on Agriculture in 1926 headed by Lord Linlithgow to examine the conditions of agriculture and rural economy in India. The Commission proposed to establish Imperial Council of Agricultural Research with the primary function of promoting, guiding and coordinating agricultural research throughout India. The Government of India accepted this recommendation and set up the Imperial Council of Agricultural Research in May 1929. This later was renamed as Indian Council of Agricultural Research, (ICAR).

2.3 AGRICULTURAL EDUCATION IN INDIA

The report of the University Education Commission (1948-49) headed by Dr. Radhakrishnan contains a vivid account of higher education in India up to 1857\(^6\). The ancient and mediaval centres of learning, says Commission, contributed very little to the universities of modern India. Taksasila University had the curriculum which included 18 arts including medicine, agriculture, astronomy, snake charming etc.,
Medieval Colleges and universities established by Mohammedan rulers were concerned with the teaching of Arabic and Persian literature and the curriculum paralleled, according to the University Education Commission, the *trivium* and *quadrivium* of the European institutions and included grammar, rhetoric, logic and law, natural philosophy etc. Most of these institutions have disappeared although some still carry on the tradition of these colleges and are better known as Madrasahs.

**2.3.1 Early British attempts**

Calcutta Madrasah intended "to qualify the sons of Mohammedan gentleman for responsible and lucrative offices in the state" was established by Warren Hastings, the first Governor General of British India, The second important educational institution established by British was at Banaras for "the preservation and cultivation of laws, literature and religion of the nation, to accomplish the same purpose for the Hindus as the madrasah for the Mohammedans and specially to supply qualified Hindu assistants to European judges." During 1811 it was observed by the British that literature and science was neglected in India. Lord Minto made special efforts for the revival and improvement of literature and promotion of knowledge of the sciences.(7)

**2.3.2 Founding of Colleges**

Opportunities opened for public employment in the civil administration in India provided a motive force for founding of colleges and many
colleges were established by the Christian missionaries. The Serampore college established in 1818 got the status of university to confer degrees during 1827 with the charter from the Danish King. During 1856, the Government of India approved the establishment of universities at Calcutta, Madras and Bombay from 1857.

Agricultural education and research in India was scarcely touched by the national programmes. Agricultural training/diploma courses were initiated at Coimbatore (1868) and Poona (1890) to offer diploma courses. Agricultural research and education in India was initiated systematically during 1905 with the establishment of the Imperial Agricultural Research Institute at Pusa (Bihar) and six agricultural colleges and research institutes at Lyallpur (now in Pakistan), Kanpur (U.P), Poona (Maharashtra), Coimbatore (Tamilnadu), Nagpur (Maharastra) and Sabor (J&K). These Institutions offered diploma courses and undertook research in some broad disciplines related to agriculture. In the field of veterinary sciences, the Veterinary Colleges at Bombay, Madras and Calcutta were the first to be established in the latter part of the last century. By 1948, there were only 17 agricultural colleges in the country. Central institutes like the Indian Agricultural Research Institute (IARI) and the Indian Veterinary Research Institute (IVRI), which were primarily developed as research institutes, over the years performed certain educational functions, offered specialized post graduate courses in agriculture and veterinary sciences respectively.
2.3.3 **Genesis of Agricultural Universities**

The need to bring about a rapid increase in food production in the years after independence necessitated for the re-examination of the existing system of agricultural research and education. It was realized that the goals of increased production could be achieved only through application of science and technology to agriculture and that the trained personnel were vital for promoting scientific agriculture by the farming community.

The first Education Commission (1948) headed by Dr. S. Radhakrishnan examined and recommended that a system of rural universities be established\(^{(9)}\). The concept of rural universities represented the germ of the idea that led for the establishment of agricultural universities in India. The concept of rural university included a ring of small resident undergraduate colleges with specialized and university facilities in the main campus. Each rural university was visualized to be autonomous institution, free to work out its own programme in terms of syllabi, curricula, evidence of completion of work and examinations.

The first joint Indo-American team appointed by the Government of India in 1955\(^{(10)}\) endorsed the recommendations of the University Education Commission that each state should develop a rural university. The team also suggested that post-graduate schools be established at the Indian Agricultural Research Institute (IARI), New Delhi, Indian Veterinary Research Institute (IVRI),
Izatnagar (U.P) and other places. The establishment of post-graduate school at Indian Agricultural Research Institute in 1958 marked the first step in modernisation of higher agricultural education in India\(^{(11)}\).

2.3.4 Establishment of Agricultural Universities

Dean, H. W. Hannah in 1956 prepared a blueprint on agricultural universities while he was stationed at Tarai farm in Uttar Pradesh. The report of the Second Joint Indo - American Team (1960) headed by Dr. M.S. Randhawa provided the basic principles for the establishment of agricultural universities\(^{(12)}\). The basic principles identified were the integration of teaching by offering courses in any of these institutions to provide a composite course and integration of education, research and extension. It was a happy augury that the first agricultural university was also established in 1960 at Pantnagar (Uttar Pradesh)\(^{(13)}\). Following this, six agricultural universities were established during the period 1960-65. The report of Kothari Commission on Education (1964-66) recommended the establishment of at least one agricultural university in each state\(^{(14)}\). The agricultural universities system grew substantially with the establishment of eight universities during 1969-71 and six universities during 1972-78. By now, there are 27 agricultural universities in the country and four deemed to be university research institutes\(^{(15)}\).
2.3.5 Features of Agricultural University System

The agricultural university system in the country has been adopted on model of Morrill Federal Land Grant Bill (USA) system of education by the respective state government through legislation. In 1960, the Government of India appointed a Committee headed by R.W. Cummings to advise the state governments on the legislation for the establishment of agricultural universities. On the basis of the recommendations made by this Committee, the Indian Council of Agricultural Research (ICAR) developed a Model Act in 1966 for the functioning of the agricultural universities (16).

The distinctive features of the State Agricultural Universities are:

a. State wide responsibility for teaching, research and extension education;
b. Integration of teaching, research and extension functions at all levels of university administration;
c. Unified administration, complimentarity of colleges and departments and multidisciplinary team work in the development of programmes for education, research and extension;
d. The colleges as the constituent units of the university for ensuring proper standards and quality; (no affiliation is allowed);
e. Education based on a flexible course credit system and continuous internal evaluation;
f. Acceptance of the philosophy of service to agriculture and rural community and emphasis on programmes which are directly and immediately related to the solution of the social and economic problems of the rural people;

g. Specialized training programmes for rural youth and adult men and women who are not degree candidates;

h. Quick communication of new knowledge to students; extension workers and farmers;

i. Corporate board of management with adequate powers under the University Act; and

j. Organisational and operational autonomy.

2.3.6 Agricultural Education System

The main stream of agricultural research and education in India is the agricultural universities. The following detail provides the present status of the agricultural university education system in India leading to the award of graduate and post-graduate degrees and advanced training in agricultural education and Research Management(18)

1. Twenty seven Agricultural Universities located in all states. The establishment of one university in each state was based on the agroclimatic zones. Most of these 27 universities now established are mono and multicampus institutions. States of Uttar Pradesh and Maharashtra were the first to deviate from
the normal practice by establishing more than one agricultural university and now is followed by Karnataka, Madhya Pradesh and Bihar. In these states there are more than one State agricultural university.

2. Four Research Institutes of Indian Council of Agricultural Research (ICAR) i.e. (a) Indian Agricultural Research Institute (IARI), New Delhi; (b) Indian Veterinary Research Institute (IVRI), Izatnagar; (c) National Diary Research Institute (NDRI) and (d) Central Institute of Fisheries Education (CIFE), Bombay.

3. National Academy of Agricultural Research Management, an advanced centre established for conducting research on agricultural research management and education in India. This Academy has linkages with all ICAR institutes and State Agricultural Universities (SAUs) and is a coordinating national body for providing advanced training in Research Management and Educational Technology.

4. Institutes like Central Marine Fisheries Research Institute (CMFRI), Indian Institute of Horticulture Research (IIHR), Indian Agriculture Statistical Research Institute (IASRI), Central Soil Salinity Research Institute (CSSRI) and Central Avian Research Institute (CARI) have United Nations Development Programme’s (UNDP) Centres for advanced studies and are conducting regular post-graduate degree and continuing education programmes.
2.4 AGRICULTURAL RESEARCH SYSTEM IN INDIA

As per the Indian constitution, the major responsibility for executing research, education and extension programmes in agriculture rests with the State Governments. However, the Central Government provides assistance to the States in the form of both resources and personnel for these activities.

The Indian Council of Agricultural Research (ICAR) at the national level and the Agricultural Universities at the regional level are the two main streams of agricultural research in the country. Besides these two organisations, there are many other agencies who either directly undertake research or indirectly promote research by sponsoring programmes related to agriculture. The components of the agricultural research system in India is shown in Figure 1.

2.4.1 Indian Council of Agricultural Research (ICAR)

The ICAR was started as a central agency by the Federal government mainly for coordinating various activities associated with agriculture in the country and supported some research programmes through Agricultural Produce Cess Fund. The recommendations of various bodies constituted from time to time formed the basis for bringing about modifications towards improving its research system to make it increasingly efficient for fulfilling its national mandate.
Fig. 2.1. AGRICULTURAL RESEARCH SYSTEMS IN INDIA

NATIONAL AGRICULTURAL RESEARCH SYSTEM

ICAR

Res.Mgt.Academy

National Institutes

Central Institutes

Natl.Res.Centres

AGRICULTURAL UNIVERSITIES

All India Coordinated Research Projects

National Agricultural Research Project

Adhoc Schemes

Centres of Excellence

Special Schemes
  - Prof.of Eminence
  - Natl.Res.Fellows
  - Emeritus Professor

Colleges
  - Agriculture
  - Vet.Sciences
  - Home Science
  - Horticulture
  - Agril.Engineering

CENTRES OF EXCELLENCE

DEPARTMENTS

GOVERNMENT DEPARTMENTS

Science & Technology, Space, Environment, Ocean Development etc.

RELATD SCIENTIFIC ORGANISATIONS

- CSIR,BARC,ICMR,FRI etc.

OTHER MINISTRIES

- Education,Labour,Irrigation &Power, Defence, etc.

VOLUNTARY/PRIVATE ORGANISATIONS

Departments

Faculties/Colleges

In addition to its coordinating function at the national level, it now undertakes research through its own network of institutes mainly on problems of national importance.

The aims and objectives of the ICAR are:

a. To undertake aid, promote and coordinate agricultural and animal husbandry education, research and its application, development and marketing, to increase scientific knowledge and to secure its adoption in everyday practice;

b. To act as a clearinghouse of information not only in regard to research but also in regard to agricultural and veterinary matters generally;

c. To establish a research and reference library with reading and writing rooms and furnish the same with books, reviews, magazines, newspapers and other publications; and

d. To do all other things as the Society may consider necessary, incidental and conducive to the attainment of the above objectives.

Among the major scientific organisations in the country, the ICAR is unique in having concurrent responsibility for both research and education in agriculture and allied areas. It essentially promotes and coordinates the research
work being carried out in the Agricultural Universities and others engaged in research related to agriculture by providing development grants, fellowships and through Coordinated Research Projects, Ad-hoc Research Schemes and UNDP Centres for Advanced Studies.

2.4.2 Research Institutes of ICAR

Depending on the research mandate, ICAR Institutes are broadly grouped under the following categories.

a] Research Management Academy: The National Academy of Agricultural Research Management, established in 1976 as one of the National Institutes, provides management training to the agricultural scientists and research administrators of the ICAR as well as the Agricultural Universities. In addition to conducting training programmes for different levels of scientists the Academy also organises seminars, conferences and workshops based upon the scientific study and review undertaken by it. It has also a mandate for publishing high quality training material and to function as a repository of information in the field of agricultural research and education management.

b) National Institutes: The four National Institutes - Indian Agricultural Research Institute (IARI), Indian Veterinary Research Institute (IVRI) and National Diary Research Institute (NDRI) and Central Institute of Fisheries Education
(CIFE) have responsibilities for both research and post-graduate education in agriculture animal husbandry and fisheries. These institutes have deemed university status.

c) National Bureaux on Resource Conservation: In order to collect, conserve and initiate such measures which would lead to long term productivity of basic agricultural resources such as plants, animals, fisheries and soils, the ICAR has established four National Bureaux, one in each of these areas.

d) Central Institutes: The ten Crop Science Institutes have a general mandate to carry out basic and applied research on all aspects of the crops they deal with and for transferring the results thereof. The five Horticultural and Plantation Crops Institutes have a mandate to conduct and coordinate research on crops they deal with. The eight Resource Management Institutes have the primary responsibility of undertaking research on soil and water conservation for optimising production of crops under different conditions. The four Technological Institutes deal mainly with technological and engineering problems in crop production and quality of commercial crops. The four Animal Science Institutes have the mandate of breeding animals for higher productivity and suggest better management practices. The six Fisheries Institutes are primarily responsible for conducting training programmes and undertaking research. The two Social Science Institutes undertake studies on Statistics and Economics, and are involved in building up a data base needed for agricultural research.
Each institute has specific mandate for research either on single or multiple crops/commodities or disciplines. Most of the institutes have substations in different parts of the country mainly to provide testing facilities under different agro-ecological situations and to conduct research on some of the regional problems wherever the local research infrastructure is not yet fully developed.

2.4.3 National Research Centres of ICAR

In addition to the existing research infrastructure of Research Institutes, the ICAR has also established single campus National Research Centres. The basic philosophy of these Centres revolves round the need for concentrated attention with a mission-approach by a team of scientists from different disciplines working under a senior leader on selected topics which have direct or indirect relevance to resolving national problems in particular crop or commodity or species. Unlike the institutes, these centres have neither the divisional set up nor regional stations. The National Research Centre for Groundnut was the first to be set up by the ICAR and there are now nine such centers in the country. It is also proposed to set up some more Centres in different fields like crops, horticulture, animal science, agro-forestry and fisheries.

In addition to the above there are many Project Directorates and All India Coordinated Research Projects.
Such great impetus on agricultural education, research and development and creation of universities, national centres, research institutes and colleges, has lead to the development of agricultural institutional libraries. These libraries have been catering to the needs of students, teachers, researchers who are in pursuit of education, research and extension. In addition to the services to the users, some of the libraries have been engaged in educating the user for the maximum utilization of the resources available in their own specialized areas.

In the next chapter an attempt has been made to introduce many concepts related to information management/user education programmes and some related references have been reviewed.
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