UNIT 12 AGRICULTURAL RESEARCH, EDUCATION AND EXTENSION IN INDIA

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12.0 OBJECTIVES

After going through this unit, you will be in a position to:

• describe the structural growth of agricultural research, education, and extension;

• assess their impact on the country’s economy at different periods in recent history;

• define their role and importance within the broad infrastructure of institutions and development systems described; and

• work out ways and means by which the system can function more effectively as the engine of growth.

12.1 INTRODUCTION

India, like other Third World countries was a late entrant in the development race. From the nineteenth century onwards, developed countries had unlocked nature’s secrets one by one. The evolutionary process, the factors causing growth and decay, the causes of diseases, were discovered by vigorous pursuit of scientific enquiry. Techniques were found by which nature could be harnessed to human needs. Raised to optimum levels, farm production easily overtook the requirements. Food shortages became a dim memory of the past.
In stark contrast, Indian agriculture suffered from continued neglect, the farmer burdened by unjust land tenures, was exploited and deprived of even human dignity. Agriculture policy which over a century, was to meet the basic requirement of food for the population, now includes strategies for a variety of rural infrastructure, trade and services, investment, credit management, value-addition services, and import/export strategies.

The lessons of our development programmes help us to understand the nuances of planning for agricultural growth so that it not only raises production but ensures the nutritional security and wellbeing of millions of people subsisting on the land.

Scientific breakthroughs backed by administrative measures have already shown the potential of our agriculture for round the year production, agri-business ventures, diversification, exports for earning foreign exchange and providing stability in the economy.

Both the successes and failures of the past help to plan and organise for the future. Balanced economic growth at macro and micro levels will be determined by scientific breakthroughs as well as infrastructural/administrative changes.

12.2 AGRICULTURAL RESEARCH

The different component of agriculture research which contributed in the agriculture development of the country is discussed briefly in this section.

12.2.1 Planting the Roots

The tiny roots of agricultural research in India which grew into a mighty tree were laid in the nineteenth century by Allan Octavian Hume. An agriculturist and social reformer, he was appointed by the Viceroy Lord Mayo, as the first Secretary of the Department of Revenue, Agriculture and Commerce in 1871. Hume (who founded the Indian National Congress in 1883), proposed a separate department of agriculture with eminent scientists who would start research and development in farms, where scientific experiments could be seen by farmers, because “For many generations to come, the progress of India in wealth and civilization, must be directly dependants on the progress in agriculture.”

An admirer of the methods which transformed German agriculture, he proposed a new type of University in which research would be oriented to practical use. “Knowledge is empirical” he wrote “It must be put to use in soil testing, improving soil fertility, prolonged experiments with seeds and plant materials by which cereals, pulses, oilseeds and fibres can be improved”.

He closely studied and worked with farmers because he believed that true development could take place only by improving on the indigenous knowledge and experience of farmers.

12.2.2 Early Research Work in Royal Botanical Garden

The Royal Botanical Garden at Sibpur, near Calcutta, was established in 1787. The honorary Superintendent, Colonel Robert Kyd developed a collection of seeds,
Institutional Infrastructures: Public, Private and Public-Private Partnerships

plants, bulbs, birds and animals from all parts of the country, for study, classification, naming, and numbering by scientists. A mini-zoo and aviary were set up at Barrackpore where teams of scientists studied the species. Artists were engaged to sketch each of the flora and fauna. 2660 folios of these sketches can be seen in the India Office Library at London.

Botanical expeditions were sent abroad for collecting plants which were acclimatized to Indian conditions and propagated commercially. The Royal Agri-Horticulture Society was established at Calcutta in 1820. Organised on the pattern of the British Agri-Horticulture Society, it had branches and Expert Committees to collect and study flora and fauna. The famous collection of Himalayan medicinal plants in the Saharanpur Botanical Garden was a centre of research in medicinal plants. Standard text-books on Botany and Zoology were written.

Some of the plants which were imported and commercialized by the Gardens and the Society in the eighteenth and nineteenth century were: Mahogany from Jamaica, Nutmeg from the Molucca islands, Camphor from the Dutch colonies in Southern Africa, and Cinnamon from Ceylon. Other notable additions to Indian horticulture were rubber, cotton, flax and hemp, coffee, wheat, maize and numerous fruits, vegetables, and flowers.

12.2.3 Impact of Famines: A National Strategy for Agriculture

More than 5 million people had died in the famines of 1876-78. The recommendations of the Famine Enquiry Commission of 1880 laid the cornerstone of administrative reforms in agriculture. Departments of Agriculture were formed in the centre and in the provinces. Their duties were to pursue scientific research, improve agricultural production, and prevent recurrence of famine. The British administration was forced to take measures to reconstruct the collapsing agrarian sector. The Punjab Tenancy Act was passed in 1869 to protect tenant farmers from exploitation by land-owners. A Cattle Commission was set up in 1869 under a distinguished scientist to save and improve indigenous breeds and control cattle diseases and epidemics.

The Lord Mayo, who became Governor-General and Viceroy of India in 1869 had practical experience in farming in Ireland. He believed that famine should not be dealt within an ad hoc manner, but should be prevented by continuous and effective action by the government. In a famous noting, he said “We have in our power.....to render impossible the return of those periodical famines which have disgraced our administration and cost an incredible amount of suffering.....”. The means for saving lives in vast rural areas were applying science to agriculture, constructing canals, roads, and railways.

12.2.4 Agricultural Development and J.A. Voelcker’s Enquiry

J.A. Voelcker’s Enquiry’s was to institute a Department of Knowledge and Statistics in the centre. The first census of India was done by this department. Settlement officers went far and wide for research into all aspects of rural life. Detailed maps of physical and geological resources were prepared. Distinguished botanists, chemists and agricultural scientists mapped out the natural resources of each district for promoting production of food crops, commercial crops, animal products, and products for export.
In 1882, a Veterinary college was started at Lahore. The Pasteur method of vaccination against deadly anthrax disease of cattle was successfully adopted. In 1895, the Imperial Bacteriological Laboratory was established at Poona, later it was shifted to Mukteswar. Pioneering work was done to control both cattle and human diseases, like rinderpest, cholera, malaria, and blackwater fever. Veterinary colleges were started in 1893 in Madras and Calcutta, for research and teaching.

An Imperial Chemist J.A. Voelcker was called to India in 1889 to make a thorough enquiry into agriculture. His book “Improvement of Indian Agriculture” written after travels throughout the country contains useful suggestions for reclaiming saline soils, and sequence of crops for maintaining soil fertility. He urged the government to set up an expert agency for organized scientific enquiry into agricultural resources and requirements, which alone could lead to improvement.

12.2.5 Lord Curzon, Henry Phipps and the I.A.R.I.

When Lord Curzon became the Viceroy of India in 1899 he launched a comprehensive movement for the application of scientific enquiry and education in agriculture. The Imperial Agricultural Research Institute (I.A.R.I.) was set up at Pusa, Bihar in 1905. He said that “Our real reform has been to endeavour for the first time to apply science on a large scale to study and practice of Indian agriculture”. His friend Mr. Henry Phipps, an American philanthropist, (after whom a laboratory is named in the I.A.R.I.), gave a generous grant of 30,000 British pounds. A research institute, experimental farm, and agriculture college were set up. Distinguished scientists headed the I.A.R.I. and worked towards the goal of solving fundamental problems of tropical agriculture. Indian scientists were trained and achieved distinction in their specializations.

Agricultural research was done by dividing each Province into circles on the basis of differences in soil and climate. Funds were provided for setting up an experimental farm and a depot for sale of seed, implements and manures to farmers in each circle.

12.2.6 Early Research and Study Centres

In 1902 a cattle breeding farm was set up at Incharodi, Gujarat to save the magnificent Kankrej cattle which had been decimated by famine. A horse breeding farm was set up in 1904 under the army.

In 1907, agriculture colleges were set up at Poona, Sabour, Nagpur, Lyallpur, and Coimbatore, for research and teaching.

12.2.7 Pioneers of Research

Some of the achievements by the scientists of the time were:

Sir Albert Howard: Pioneering work on the root systems of all plants, discovery of the needs of growing plants from soil, water and air, selection and breeding of improved wheat varieties, and promotion of composting of farm and animal waste by farmers.

Sir E.J. Butler: Discoveries in taxonomy and plant pathology, study of fungi, identification of nematode diseases in paddy, book on 200 diseases of plants (a classic reference even today).
Dr. C.A. Barber and Sir T.S. Venkataraman: Evolving high-yielding hybrid canes which led to self-sufficiency in sugar.

Dr. Ramdhan Singh: Evolution of Punjab wheat strains.

Dr. B.P. Pal: Discovery of wheat varieties resistant to rust disease.

### 12.2.8 The Royal Commission on Agriculture

A fresh impetus for agricultural research came in 1926, when the Royal Commission on Agriculture was set up to revive the rural economy shattered by drought and famine, observed “However efficient an organization for demonstration and propaganda, unless it is built on the solid foundations of science, it is but a house built on sand”. The detailed recommendations included assisting the small landholder through scientific research, education and training which would be within his reach, and administrative steps like setting up of institutions e.g., regulated markets, land-mortgage banks, and cooperative banks.

### 12.2.9 The Imperial Council of Agricultural Research

On 23\textsuperscript{rd} May, 1929 the Imperial Council for Agricultural Research was set up. Its primary function was to promote, guide and co-ordinate agricultural research throughout India. A non-lapsing fund of Rs.5 million was provided. Its mandate also included training of researchers and acting as a clearing house for scientific information for all matters related to agriculture. Later, education and development work was added. The organizational setup was of a Chairman, two eminent scientists, one each for agriculture and animal husbandry and thirty six members representing central and provincial agriculture departments, Indian Universities, and the planter community.

From 1926 to 1931, the activities were widened to include market intelligence reports, organising crop planning conferences for provincial agriculture departments, and development of export trade. Commodity Committees were set up with panels of experts to research into mainly cash crops.

The available infrastructure was used for systematic study of productivity so that scientific crop planning could be initiated.

As a result, a large area was brought under linseed an oilseed crop and uneconomic cultivation of wheat and rice was reduced. All research findings were examined and finalised by the ICAR and then sent to provincial departments for demonstration to farmers.

### 12.2.10 I.A.R.I Shifts to Delhi

The economic depression of 1929 hit India as it did in other countries of the world. Prices of wheat already low fell further. Wages and earnings of farm families dropped below subsistence level. By 1931, driven by debt, thousands of farmers had sold their land and became landless and assetless labourers.

In 1934, when the Bihar earthquake destroyed a big portion of the Pusa, the President of the ICAR, Mian Fazl-i-Husain, proposed shifting the IARI to a new campus in
Delhi, where the soil and climate allowed research on a great variety of crops. He succeeded, and the Viceroy, Lord Willingdon laid the foundation stone in February 1935.

12.2.11 Need for Rural Universities

The research infrastructure grew rapidly after the first University Education Commission of 1948 in which the former President Sir S. Radhakrishnan and a panel of eminent Indian and foreign experts gave its recommendations. Paying special attention to the weak infrastructure for education in rural areas, it was proposed to set up rural universities which would provide scientific and practical knowledge to the farm community. The Indo-US Technical Cooperation team and experts of subsequent Review Committees endorsed the view and a blueprint for an agricultural university was drawn up. The model of the Land-Grant Universities of the United State was suggested.

12.2.12 Growth of Agriculture Universities

In 1960, the first Agriculture University named after the veteran national leader Govind Ballabh Pant was set up at Pantnagar on 16,000 acres of reclaimed forest land in the Terai Region. The second University Education Commission headed by the eminent educationist Dr. D.S. Kothari recommended setting up of one Agriculture University in each state which would deal with all the agricultural concerns of the region. One of the main elements for agricultural improvement suggested by the Commission was research for developing appropriate technology. Other Review teams including the Indo-US Technical Co-operation Team prepared blue-prints for setting up rural universities. During the 5th and 6th Five Year Plans, 21 Universities were set up in 16 major states. Some Universities like the Haryana Agriculture University at Hissar, the Punjab Agriculture University at Ludhiana, and the Himachal Pradesh University at Palampur, were set up by expanding and upgrading agriculture colleges. A Central Agricultural University for the North-east region was set up at Imphal in Manipur in 1993. Now there are 44 agricultural universities in the country catering to the teaching, research and extension requirements of rural economy.

12.2.13 Agricultural Research Institutes

The Various Agricultural Research Institutes established up to 1987 are given in the Tables 12.1, 12.2 and 12.3. The Institutes function under the Indian Council of Agricultural Research (ICAR) and have research stations and sub-stations with research facilities. Research in specialized areas is also done at government research centres. Thus there is a strong research base for developing the scientific capability for dealing with complex issues and problems of the farm economy.

Table 12.1: Agriculture Research Institutes/Laboratories with their Controlling Authority in Pre-independence India

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Institute/Laboratory</th>
<th>Year of Establishment</th>
<th>Controlling Authority</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Imperial Bacteriological Laboratory, Pune (Indian Veterinary Institute, Izatnagar)</td>
<td>1889</td>
<td>Civil Veterinary Department, Research Government of India</td>
</tr>
</tbody>
</table>
### Institutional Infrastructures: Public, Private and Public-Private Partnerships

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Institute</th>
<th>Year of Establishment</th>
<th>Controlling Authority</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Imperial Agricultural Research Institute, Pusa</td>
<td>1905</td>
<td>Department of Agriculture, Government of India</td>
</tr>
<tr>
<td>3.</td>
<td>Sugarcane Breeding Institute, Coimbatore</td>
<td>1912</td>
<td>Directorate of Agriculture, Madras</td>
</tr>
<tr>
<td>4.</td>
<td>Cotton Technological Research Laboratory, Matunga</td>
<td>1924</td>
<td>Indian Central Cotton Committee</td>
</tr>
<tr>
<td>5.</td>
<td>Imperial Lac Research Institute, Namkum (Ranchi)</td>
<td>1925</td>
<td>Indian Lac Cess Committee</td>
</tr>
<tr>
<td>6.</td>
<td>Jute Technological Research Laboratory, Calcutta</td>
<td>1938</td>
<td>Indian Central Jute Committee</td>
</tr>
<tr>
<td>7.</td>
<td>Central Rice Research Institute, Cuttack</td>
<td>1946</td>
<td>Imperial Council of Agricultural Research</td>
</tr>
<tr>
<td>8.</td>
<td>Central Inland Fisheries Research Institute, Barrackpore</td>
<td>1947</td>
<td>Imperial Council of Agricultural Research</td>
</tr>
</tbody>
</table>

### Table 12.2: Agricultural Research Institutes Established during 1947-1966, before Reorganization of ICAR

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Institute</th>
<th>Year of Establishment</th>
<th>Controlling Authority</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Indian Institute of Sugarcane Research, Lucknow</td>
<td>1952</td>
<td>Indian Central Sugarcane Committee</td>
</tr>
<tr>
<td>2.</td>
<td>Jute Research Institute, Barrackpore</td>
<td>1953</td>
<td>Indian Central Jute Committee</td>
</tr>
<tr>
<td>3.</td>
<td>National Dairy Research Institute, Karnal</td>
<td>1955</td>
<td>Indian Council of Agricultural Research</td>
</tr>
<tr>
<td>4.</td>
<td>Central Potato Research Institute, Shimla</td>
<td>1956</td>
<td>Indian Council of Agricultural Research</td>
</tr>
<tr>
<td>5.</td>
<td>Central Institute of Fisheries Technology, Cochin</td>
<td>1957</td>
<td>Department of Agriculture, Government of India</td>
</tr>
<tr>
<td>6.</td>
<td>Indian Agricultural Statistics Research Institute, New Delhi</td>
<td>1959</td>
<td>Indian Council of Agricultural Research</td>
</tr>
<tr>
<td>7.</td>
<td>Central Arid Zone Research Institute, Jodhpur</td>
<td>1959</td>
<td>- do -</td>
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<tr>
<td>8.</td>
<td>Indian Grassland and Fodder Research Institute, Jhansi</td>
<td>- do -</td>
<td>- do -</td>
</tr>
<tr>
<td>9.</td>
<td>Central Sheep and Wool Research Institute, Avikanagar</td>
<td>1962</td>
<td>- do -</td>
</tr>
<tr>
<td>10.</td>
<td>Central Tuber Crops Research Institute, Trivandrum</td>
<td>1963</td>
<td>- do -</td>
</tr>
</tbody>
</table>
Table 12.3: Agricultural Research Institutes/Bureaus Established During 1967-1987 under Reorganized ICAR

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Institute/ Bureau</th>
<th>Place</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Indian Institute of Horticultural Research</td>
<td>Bangalore</td>
</tr>
<tr>
<td>2.</td>
<td>Central Soil Salinity Research Institute</td>
<td>Karnal</td>
</tr>
<tr>
<td>3.</td>
<td>Central Plantation Crops Research Institute</td>
<td>Kasargutta</td>
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<tr>
<td>4.</td>
<td>Central Soil and Water Conservation Research and Training Institute</td>
<td>Dehradun</td>
</tr>
<tr>
<td>5.</td>
<td>Vivekananda Parvatiya Krishi Anusandhan Shala</td>
<td>Almora</td>
</tr>
<tr>
<td>6.</td>
<td>ICAR Research Complex for North-Eastern Hills Region</td>
<td>Shillong</td>
</tr>
<tr>
<td>7.</td>
<td>Central Institute of Agricultural Engineering</td>
<td>Bhopal</td>
</tr>
<tr>
<td>8.</td>
<td>Central Agricultural Research Institute for Andaman and Nicobar Group of Islands</td>
<td>Port Blair</td>
</tr>
<tr>
<td>10.</td>
<td>National Bureau of Plant Genetic Resources</td>
<td>New Delhi</td>
</tr>
<tr>
<td>11.</td>
<td>National Bureau of Animal Genetic Resources</td>
<td>Karnal</td>
</tr>
<tr>
<td>12.</td>
<td>National Bureau of Fishery Genetic Resources</td>
<td>Allahabad</td>
</tr>
<tr>
<td>13.</td>
<td>Central Institute for Cotton Research</td>
<td>Nagpur</td>
</tr>
<tr>
<td>14.</td>
<td>Central Institute of Horticulture for Northern Plains</td>
<td>Lucknow</td>
</tr>
<tr>
<td>15.</td>
<td>Central Research Institute for Dryland Agriculture</td>
<td>Hyderabad</td>
</tr>
<tr>
<td>16.</td>
<td>Central Institute for Research on Buffaloes</td>
<td>Hisar</td>
</tr>
<tr>
<td>17.</td>
<td>Central Institute for Research on Goats</td>
<td>Makhdoom</td>
</tr>
<tr>
<td>18.</td>
<td>Central Avian Research Institute</td>
<td>Izatnagar</td>
</tr>
<tr>
<td>19.</td>
<td>Central Institute for Brackish water Aquaculture</td>
<td>Madras</td>
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<tr>
<td>20.</td>
<td>Central Marine Fisheries Research Institute</td>
<td>Cochin</td>
</tr>
<tr>
<td>21.</td>
<td>Central Institute of Freshwater Aquaculture</td>
<td>Dhauli</td>
</tr>
<tr>
<td>22.</td>
<td>Central Institute of Fisheries Education</td>
<td>Bombay</td>
</tr>
<tr>
<td>23.</td>
<td>Central Institute of Animal Genetics</td>
<td>Karnal</td>
</tr>
<tr>
<td>24.</td>
<td>Indian Institute of Soil Sciences</td>
<td>Bhopal</td>
</tr>
<tr>
<td>25.</td>
<td>Indian Institute of Agricultural Economics</td>
<td>New Delhi</td>
</tr>
<tr>
<td>26.</td>
<td>National Academy of Agricultural Research Management</td>
<td>Hyderabad</td>
</tr>
</tbody>
</table>
12.2.14 Research Projects/Schemes of the ICAR

In order to strengthen the research base of different crops/productive resources, ICAR has started a number of research projects/schemes. Some of the schemes are of continuous nature and some are adhoc schemes. Let us discuss some of the research projects operating at the National level.

i) All India Co-ordinated Research Projects: The first All India Co-ordinated Project on Maize was set up with the assistance of the Rockefeller Foundation of the USA in 1957. Now there are 9 Project Directorates and 69 All India Co-ordinated Projects covering various disciplines and commodities such as soils, crops, livestock, fisheries, home science and agricultural engineering. These projects coordinate the research done on the subject by various scientists in different institutes and disciplines.

The co-ordinated approach enables economical and effective use of research facilities for solving local, regional and national problems. It has led to breakthrough in varietals improvement, control of diseases through screening of germplasm and multi-discipline and multi-location tested foundation seeds for crops which can be successfully grown by farmers under different agro-climatic conditions.

ii) The National Agricultural Research Project (NARP): It was launched in 1979, with the help of the World Bank. It covers 120 agro-climatic regions of the country through 343 zonal research stations and sub-stations. The project has helped in developing manpower and infrastructural facilities for research and development in Agricultural Universities and Research Centres all over the country. In the beginning, the focus of the project was in raising the production of cereals, pulses, and oilseeds under irrigated conditions. Now the scope has been widened to cover other areas like unirrigated farming, horticulture, farm implements, commercial crops and agro-forestry, food and nutrition, animal health and other subjects which contribute to the well-being of the farm community in the region.

12.2.15 Research by Agriculture Universities/Agriculture Colleges/Government Research Centres

Agriculture Universities have had a significant role in developing location-based technologies and varieties. Research in experimental farms and laboratories is tested for several years in farmers' fields before being finalised and released to farmers, agriculture departments and field functionaries. Agronomic practices and package of practices have been developed for all the major crops in the region and conveyed to farmers through seasonal crop demonstrations and Krishi Melas. Some notable achievements were the development of high-yielding varieties of grains like sorghum (jowar), pearl millet (bajra) which are the staple food for poor communities as well as developing wheat and maize which give best results in the region. Research has helped farmers to overcome constraints like saline or alkaline soil conditions, and adopt water conservation methods in low rainfall areas.

The content of academic programmes has changed over the years. Courses in Home Science, Horticulture, Fishery, Banking, Cooperatives, Marketing and other disciplines have been added to meet the demand. Agriculture colleges in several general universities also do pioneering research work relevant to the needs of the region.
12.2.16 Research Leading to the Green Revolution

In the sixties, a break-through in wheat cultivation came with the successful introduction of the dwarf variety of Mexican wheat in farmers' fields. Since then 122 disease resistant wheat varieties have been evolved resulting in sustainable, high quality wheat crops. In rice, the introduction of the dwarf, Taichung Native and release of High Yielding IR 8 in 1966, was followed by the release of over 260 varieties which responded to low-cost inputs and were resistant to numerous pests and diseases. The boost in the production of cereals enabled the country to withstand severe drought, and maintain a buffer stock of food-grains. The break-through in the cultivation of oilseeds and pulses have enabled these high-value crops to be cultivated in non-traditional areas, and raised their production in poor resource areas.

12.2.17 Research by Private Agencies/NGOs

The research infrastructure has gained in strength due to the entry of a large number of input agencies like fertiliser cooperatives and research foundations, industrial houses, private firms and NGOs. Apart from research in agriculture, horticulture, and dairy production, the development of processing, grading, quality control, storage, and packaging of products have helped to develop numerous services which add to the value of the produce and domestic and export marketing potential.

Agricultural research in India has stood the test of time. For over a hundred years the objective of research was the growing of adequate foodgrains. Now research scientists must also find the answer to rural poverty and unemployment. Apart from crop technology, other areas needing scientific inputs are dry land agriculture, packages for diversified farming, production of adequate quality seeds, post-harvest technology and the adaptation of bio-technology. Scientists have to find ways of raising production without adding to the pollution and depletion of natural resources in the interests of the future of Indian agriculture.

Check Your Progress 1

Note: a) Use the spaces given below for writing your answers.
   b) Check your answer with those given at the end of the unit.

1) State the early research and study centres.

2) Give the name of researchers who did pioneering work in research.
12.3 AGRICULTURAL EDUCATION

Agricultural education covers a broad spectrum from formal education in schools, colleges and universities to informal education given by public and private agencies and individuals to all those engaged in agriculture and allied occupations, industries, and services. Agricultural education scenario in India is discussed as under:

12.3.1 Agricultural Education before 1947

During the nineteenth century, Ashram schools were set up in rural areas by social reformers, educationists and philanthropists in many parts of the country. They followed the traditional pattern of teaching, training and character-building. Ashram schools in rural areas gave free non-formal education and practical skills in agriculture, rural crafts and trades.

In 1871, the efforts of distinguished British administrators like Viceroy Lord Mayo led to the setting up of Departments like Revenue, Agriculture, and Commerce at the Centre and in the Provinces. Guidelines were drawn up for teaching agriculture sciences in rural areas to improve the competence of those working in farming and farm-based occupations. A number of agricultural schools were set up to give formal education in agriculture. Gradually, these schools were either upgraded to agriculture training institutes or merged into the general school system.

12.3.2 The Gandhian and Other Movements for Rural Education

The Gandhian movement led to the opening of several schools which gave “Nai Talim”, or new education. Junior schools, basic education schools, higher Secondary schools, and multi-purpose schools provide combined teaching of core subjects in science and arts with training in crafts and trades. Composite education generally followed a pattern of a six week course in agriculture, three months course in a specialised subject like poultry farming or dairy farming, and a six month to one year technical training in a trade or a skill like maintenance of farm machinery.

In 1947, the first school giving vocational training to rural youth was set up at Manjri, near Poona. An Industrial Training Institute was set up at Rudrapur (now in Uttarkhand State), where courses were organized in all kinds of trades including barbering and cooking.

12.3.3 Start of Higher Education in Agriculture

In the earlier part of this Unit, you learnt about the setting up of the first five agriculture colleges in the country from 1907 onwards. Research and higher education were given priority by the British government in order to accelerate scientific research and train Indian scientists to carry forward the work in all sectors of agriculture. The objective was to revive the agrarian economy from the ravages of drought and famine.

Distinguished British scientists and veterinarians headed these colleges, conducted research, education and development works, set priorities for works in different sectors and pursued these vigorously. Premier central government research institutes, like the Indian Agricultural Research Institute, Delhi and the Indian Veterinary Research
Institute, Izatnagar did path-breaking research and also provided specialised education in their respective subjects.

12.3.4 Post-Graduate Education

In 1947, there were 17 agricultural colleges and four veterinary colleges affiliated to the Universities in the country.

12.3.5 University Education Commissions

A transformation in the agriculture education came as a result of the first University Education Commission headed by the former President Sir S. Radhakrishnan in 1948, which urged that only Rural Universities could meet the educational needs of the vast rural community and help to raise the agricultural production. The second University Education Commission headed by the eminent educationist Dr. D.S. Kothari proposed at least one University in each state with the ICAR as the apex body for planning and coordinating agricultural studies and providing funds to universities.

12.3.6 Growth of Universities, ICAR as the Apex Body for Education

A senior post of Deputy-Director General was created in the ICAR to co-ordinate planning of study courses and to implement a plan for integrated research, education, and extension in each region. During the 5th and 6th Five Year Plans, many universities were set up. The academic courses in Agriculture Universities have been widened by addition of subjects like Agriculture Marketing, Banking and Cooperation, Food Science and Technology, Home Science, Fishery, Sericulture, Agro-forestry etc. Several general universities have full-fledged Agriculture colleges for research and teaching. IRMA, an Institute for Rural Management (IRMA) was set up at Anand, by the National Dairy Development Board in 1979. The Institute offers a two year diploma course.

12.3.7 Krishi Vigyan Kendras (KVK)

These are farm science centres started by the ICAR in 1974. They are polytechnics which impart education in a variety of subjects to post-matriculates. They give short courses in various subjects through classroom and correspondence methods, and training to farmers and extension workers. The training design is of “Teaching by Doing” and “Learning by Doing”. The objective is to provide scientific know-how to development workers, farmers, rural youth and women. Now there are around 541 KVKs giving innovative vocational training.

12.3.8 NARM, MANAGE, NIAM

NARM: Agriculture has entered in an era of competition in domestic and global markets. The need for integrating technology with management practices was met by starting three national level institutes. The National Academy for Research Management (NARM) was started in 1976 at Hyderabad. It provides management skills to Agricultural Scientists.

MANAGE: The National Institute of Agricultural Extension Management (MANAGE) was started in 1987 at Hyderabad. It has a two year course in
Institutional Infrastructures:
Public, Private and Public-Private Partnerships

Agri-business for agricultural graduates. A number of short courses are also available for in-service training on selected subjects like management of input services for input suppliers, agri-clinic and agri-business scheme for unemployed graduates, and small farmers.

NIAM: The National Institute of Agricultural Marketing (NIAM) established at Jaipur in 1988, coordinates with MANAGE, NABARD (the National Bank for Agriculture and Rural Development) and marketing agencies to meet the demand for trained personnel in various sectors like warehousing, cold storage and market information services.

12.3.9 Education through the Private Sector/NGOs

There is now a network of public, private and co-operative agencies which provide knowledge of technologies and skills. Over a thousand NGOs, information technology companies and industrial corporations have come forward to enable the farm sector to meet future challenges. These efforts are supplemented by All India Radio and Television channels educating farmers in a wide spectrum of agricultural technologies and skills.

12.3.10 Present Educational Infrastructure

You can get an idea about the growth of agricultural education by a comparison with the situation in 1947. Agriculture universities have grown to 44. There are three horticulture universities, the number of veterinary colleges rose from 4 to 22. In addition these, there are 10 agriculture engineering, 7 Dairy Management, 5 Fishery, 13 Home Science and 2 Marketing and Banking, 1 in Food Science Technology, 1 in Sericulture, and 14 in Forestry colleges.

Agriculture Universities and Research Centres produce 11,000 graduates in a year. Add to this, the qualified personnel of agriculture departments of all the states and of research institutions, KVKs and field staff of development agencies such as banks, and input agencies. You will find that we have the second largest agriculture-technology manpower in the world of about half a million persons.

Check Your Progress 2

Note: a) Use the spaces given below for writing your answers.
   b) Check your answer with those given at the end of the unit.

1) Who gave the idea for establishment of Rural Universities?

2) The first Agricultural University in India was established at .................

3) There are 44 agricultural universities in the country. (True/False)
12.4 AGRICULTURAL EXTENSION

Any scientific innovation has no meaning unless it reaches to the ultimate users. Extension plays an important role in transfer and diffusion of innovations of practical importance at grass root level. The extension system in the country has been changing over time depending upon the changes in information and communication technology. The developments in extension system of the country are discussed as follows.

12.4.1 Agricultural Extension before 1947

Agriculture technology is continuously growing. New challenges lead to the addition of new dimensions in research and management. Agriculture extension is a means by which technologies are continuously transferred from scientific institutions to the farmers. The objective is to encourage farmers to individually or collectively adopt scientific methods and reap the benefits. The effectiveness of an extension service is assessed by the promptness with which farmers adopt new practices.

Provincial Agriculture Departments had the dual role of location-based research and development. The Departments had model farms for crops, livestock, and horticulture crops. Farmers days were organized in each season when best crops and best practices were shown to farmers. Seeds, compost, implements and other inputs were sold. Improved cattle breeds were exhibited and sold from government livestock farms.

In every region, publicity (then known as “propaganda”) of improved agriculture was generally done in traditional fairs and exhibitions through folk-plays and songs. Annual vegetable, fruit, flower, and livestock shows and competitions were held where the best produce from both departmental farms and farmers fields could be seen. On these occasions, farmers-growers and livestock owners could interact with experts and buy their requirements from the counters where seeds and other inputs were sold. There was no infrastructure for follow-up at the field level; hence there was no lasting impact.

12.4.2 Early Experiments in Knowledge Transfer to Farmers

Experiments in a systematic transfer of knowledge to farmers were done in different ways in many parts of the country from the start of the twentieth century. These were pioneered by eminent personalities, spiritual leaders or social reformers. Some examples are: (a) the application of social sciences and extension techniques by the American architect Albert Mayer in 64 villages in Etawah district (1948), which transformed the rural scene, (b) Gandhian Rural Reconstruction Projects in the 1920s like the Vedchi project in 6 tribal talukas of Surat district, (c) Rabindranath Tagore’s Integrated Development Programme (1921) in the predominantly tribal area at Sriniketan in Birbhum district of Bengal, (d) the Whole Village/Whole District Development of Gurgaon by the Deputy Commissioner E.L. Brayne (1920-1927), (e) the Baroda Rural Reconstruction Movement (1932) of Maharaja Sayaji Rao Gaekwad in which the school teacher was the pivot of community education and village institutions were geared up for development, and (f) the Firka Development Project (1946) in which comprehensive scheme was prepared for each Firka (the administrative unit smaller than a Tehsil). It was managed by a Firka Development Committee having both official and non-official members, and was successfully implemented in villages near Madras.
These programmes were taken up in limited areas; they were initiated by dedicated leaders helped by devoted volunteers. They gave valuable guidelines on motivating self-help and an integrated approach, which are relevant even today. You will find some of their ideas replicated in rural development programmes of later years.

12.4.3 Extension by Early Research Centres

Transfer of technology was one of the duties of scientists in research institutes and centres. Following the extension model of the American Land-Grant Universities, they did experimental research in farmers’ fields and addressed critical agricultural issues of the region. An example is the scheme of the IARI in 1947, called the Delhi Intensive Cultivation Scheme. The success of the scheme led to its extension throughout the state.

12.4.4 Extension during the First Three Five Year Plans

The first three Five Year Plan periods from 1950 to 1965 were eventful for agricultural extension. A broad frame work was prepared for nation-wide extension work. Several models with both short-term and long-term objectives were implemented and operational strategies were tested and modified.

12.4.5 The ICAR System

The first-line extension system is the part of the nation-wide research, education and extension system of the ICAR. It promotes farm demonstrations, testing technologies in farm conditions, re-orienting research to solve problems, training scientists and development workers and studies in appropriate extension methods. As you can see the system is linked to the main extension system of the Departments of Agriculture, Rural Development and Non-Government Organizations (NGO) working in the region.

In the ICAR, one out of 8 Divisions deals with transfer of technology. There is a Deputy Director-General assisted by Assistant Director-General, scientists / specialists in relevant disciplines. There are 8 Zonal Co-ordination units, each functioning under a specialist Zonal Co-ordinator for decentralized planning and monitoring.

12.4.6 Four Transfer of Technology Projects of the ICAR

There are four main Transfer of Technology (TOT) Projects:

i) National Demonstration Projects: These were started in 1965 and are now being implemented in selected districts by Agricultural Universities. Under this scheme about 5,000 demonstrations mostly of food crops are arranged annually in selected districts at the rate of about 100 demonstrations per annum per district. After every two years the project shifts to another group of farmers. Farmers are invited on the field where they can see the results of best cultivation practices. Training is given to farmers and extension workers. The potential yields of many varieties have been established through these demonstrations, which help in preparing relevant agriculture production plans for the area.

ii) Operational Research Projects (ORP): These Projects were started in 1972 with the objective of testing and identifying appropriate technologies for specific problems. ORPs are also operating for special groups like tribal communities
and scheduled caste farmers. Some achievements of the scheme are conservation of water for agriculture in dry areas through watershed management programmes, increasing rice yield in water-logged areas by changing varieties and practices, sustained record yields of oilseeds in dry areas, raising socio-economic status of poor farmers by introducing mixed farming e.g., by combining cereal and horticulture crops with animal husbandry and fishery.

iii) **Krishi Vigyan Kendras and Trainers' Training Centres:** The Education Commission of 1964-66 had recommended setting up of a large number of agricultural poly-technique institutes to improve the knowledge of vast numbers of illiterate farmers, women and youth, and to train post-matriculates for extension work. The first KVK was established in Pondicherry in 1974 under the Tamil Nadu Agriculture University. Over 541 KVKs are now established. Several research sub-stations and centres have been converted into KVKs. Each has 10 to 12 specialists, supporting staff, laboratory and a 50 acre farm where demonstrations are held and skill practice is given. Promotion of agricultural science at the grass-roots and innovative training methods have been a feature of KVKs. A target of one KVK per district is to be achieved.

iv) **Lab-to-Land Project:** The project started by the ICAR in 1979. The focus is on resource poor farmers and landless labourers who have been by-passed in many development programmes. The programme is implemented by existing institutions and staff. A team of scientists works with adopted families in their own locations for a two year period. Knowledge and facilities are provided to create economic opportunities and skills which will lead to sustainable livelihood. The project brought benefits to neglected farm communities and valuable information to scientists on adoption of technology to meet the constraints of farmers.

### 12.4.7 Extension Co-ordination of Universities with Government Departments

Research Institutes and Agriculture Universities are all engaged in extension and transfer of technology programmes in co-ordination with Departments of Agriculture. The research institutes is more in giving training and maintaining Farm Advisory Services, while the Departments of Agriculture take up field work up to the village level through their extension personnel.

### 12.4.8 Extension through Government Agencies

The setting up of a structure for field level agriculture work by the government was mainly due to the Grow More Food Enquiry Report of 1952 which proposed one multi-purpose worker for 5 to 10 villages who would function as a joint agent for all development work and work under the District Collector.

**Community Development (C.D.) Programme:** On October 2\textsuperscript{nd} 1952, Prime Minister Jawaharlal Nehru launched the ambitious and historic Community Development Programme to transform Indian farming. Fifty five projects were started. Each project covered about 300 villages with a total population of about 2,00,000 persons and an area of about 1,50,000 acres. Each project area was divided into three blocks each of about ten villages. You can see from the organisation chart below that administration at the district level was done by the Development
Commissioner who co-ordinated the work of all the development departments. At the project level there was a Project Officer, assisted by three Block Development Officers, Extension Officers (EO) and Village Level Workers (VLW).

Additional EOs and VLWs were appointed depending on the size of the farm population and requirement. The same structure was followed in the National Extension Service launched on October 2nd, 1953, by which the scheme was gradually extended to the entire country.

**Organisation of the C.D. Programme**

Development Commissioner

Directors, District Development Departments

Project Officers for every 3 Blocks

Block Development Officers, one Block for ten villages

4-5 Extension Officers in each Project office/Block

7-8 Village Level Workers in each Block

Farmers

The Community Development Programme was based on the principle that all aspects of rural life are inter-related. Hence, it had multi-purpose workers trained to help farmers in all socio-economic aspects and motivate self-help and leadership. The National Institute for Community Development (NICD) was set up at Hyderabad to train batches of supervisory and field functionaries, farm radio and television personnel and others.

**12.4.9 New Development Strategies and Changes in the Extension System**

Two important development projects started in the early sixties to increase agriculture production in order to meet out the foodgrains shortages are discussed below.

i) **Intensive Agriculture District Programme (IADP):** In the 1950’s, a series of droughts led to the lowest ever foodgrain production of 66 million tonnes in 1961. Wheat had to be imported under the PL 480 scheme from the US. It was a time when the common saying was that India lived from ship to mouth. Scientists felt that the only way to deal with the serious situation of rising population and chronic food shortages was to approach high potential areas and systematically raise productivity. They found an ideal method in the form of package of practices method which had been a great success in the maize growing areas of the US. In this method, a full set of cultivation practices were worked out for a crop in a particular region, knowledge and inputs supplied to farmers.

Assisted by scientists of the Ford Foundation, the scheme of IADP (Intensive Agriculture District Programme) was launched in 1961 in seven irrigated districts and was later extended to 9 more irrigated districts. In this scheme, the extension agency tested the soil of each farm, prepared a package of the best inputs and provided these through a subsidy scheme. Electric power and irrigation were assured. The work required the appointment of additional extension workers at each Block office.
ii) **Intensive Agriculture Areas Programme (IAAP):** When there was another period of drought and food shortages, the IAAP (Intensive Agriculture Areas Programme) was launched in 114 blocks in 1964. The Programme kept in mind the entire crop cycle of the farmer but the emphasis was on rapidly raising productivity of selected food crops like wheat, rice, millets and pulses through the package approach and timely provision of subsidised inputs.

The extension structure included five additional village level workers, one additional Agriculture Extension Officer (AEO) and a Project Officer at the Block level. The extension staffs were free from the control of the Block Development Officer (BDO). A single line of command up to the Collector or Deputy Commissioner was established.

For the first time, it was considered essential to have a systematic media support to convey timely information to farmers. A Farm Information Bureau was established in the Directorate of Extension in the Ministry of Agriculture. State development departments appointed staff in new area of Information and Communication. Farm Radio Services were launched through the Farm Radio Unit in All India Radio, in which agriculture graduates were appointed as Farm Radio Officers. Thus there was an infrastructure for extension through media.

**12.4.10 Special Schemes and Extension Support**

Resource poor areas of the country did not come within the scope of the intensive agriculture development programmes. Hence, special sector schemes came into being in the seventies. The Small Farmers Development Agency (SFDA) and Marginal Farmers and Landless Labour Development Agency (MFAL) were initiated in which extension personnel were appointed for transfer of technology to poor farmers and also arrange for supply of subsidised inputs.

**12.4.11 Integrated Rural Development Programme and Extension Support**

The growth pattern in the early sixties revealed that 100 districts in the country remained backward with the greatest number of the poor and landless. C. Subramaniam, Ministry of Agriculture from 1964-67 launched a prestigious scheme, the Integrated Rural Development Programme (IRDP). Adopting the Gandhian vision of “Wiping every tear from every eye”, it involved micro-level planning at Block level, optimum use of the natural resources and integrated growth of village level institutions, rural trades and crafts, roads, minor irrigation, Cooperative credit. Extension staff like village level workers and panchayat officers worked under the key functionary, the BDO, to implement the scheme.

The operation of these schemes showed that small farmers were as responsive as big farmers to new ideas and quickly adopted practices. It was found that in addition to the practices, the “package” provided by extension services should include such essentials as credit, marketing and an efficient administration. This led to the recognition of management services as an essential part of extension services.
12.4.12 Re-organised Agriculture Extension (T&V Programme)

Agriculture extension in India took a fresh turn in 1970. The re-organised agriculture extension scheme also called the Training and Visit (T&V) scheme combined intensive training of extension workers with regular visits for transferring their knowledge to farmers.

Extension workers were assigned only the work of crop development under a single line of command of Agriculture Departments. At the district level, the District Agriculture Officer coordinated the tight schedule of training and visits. He was helped by a team of Subject Matter Specialists (SMS).

The schedule of T&V which was rigorously followed and monitored by World Bank and Ministry of Agriculture was:

- Training of district level SMS by specialists in nearby Agriculture Universities or Research Centres once in a month
- Training of about 40 Village Extension Workers (VEW) by SMS in selected centres like Taluk Agriculture office once in a fortnight
- Visits by SMS and University scientist to fields Periodic
- Visits by VEWs to 10 or 12 contact farmers 8 days every fortnight

During the training, VEWs were given point-wise scientific inputs to convey to farmers in the next fortnight, as well as posters and charts to explain these points. In addition, they learnt about critical non-priced inputs which they conveyed to 10-12 selected farmers who were to pass on the messages to others. He also relayed their problems to the scientists at the monthly training.

The T&V programme was adopted under the VI and VII Five Year Plans. By the middle of the VII Plan it had been extended to 17 states under World Bank funding which was gradually phased out.

The weakest link in the transfer of technology chain proved to be the contact farmers who did not make adequate efforts to pass on the messages to others. The T&V system also by-passed rural women, youth and poor farmers.

12.4.13 NGOs as Extension Partners

The severe drought of 1966-67, costly imports of food, fertilisers and oil led to inflation. The cost of inputs rose to high levels. Voluntary organisations also called non-government organisations (NGOs) who had already been working in rural areas, were brought into development effort in their respective regions to work in coordination with the government machinery.

Over thousand NGOs coupled up with Agriculture and Rural Development Departments. A variety of extension efforts were made to deal with all the constraints faced by farmers in the region. According to the priorities of the region, special schemes were launched for raising productivity in agriculture, agro-based products like sericulture, bee-keeping, fisheries and poultry.
In two priority areas, water conservation and forest conservation, the implementation was through community participation. For example, in the forestry project in Himachal Pradesh, users groups in villages were trained to manage the nearby forest area for their fuel needs and do replanting. In watershed management projects, farmer groups were trained to create small water collection systems for their needs. Round the year cultivation became possible in hitherto dry areas.

In the interesting PURA (Providing Urban Facilities in Rural Areas) project, a leading NGO has given the infrastructure of credit, storage, farm machinery, marketing, water and power management and electronic connectivity to agriculture markets (mandis). Self-help groups in villages avail these facilities at a low cost. Extension workers help the groups to work out farm plans and regulate the use of resources. As a result thousands of poor farmers in scarcity regions of Gujarat and Tamil Nadu are practising diversified farming, agriculture business and services. Village youth have found profitable employment in managing the water, power, inputs and marketing agencies.

12.4.14 National Agricultural Technology Project (NATP)

The Project was launched in 1998 in 28 districts in 7 states. In this system, an autonomous district level Agricultural Technology Management Agency, popularly known as ATMA coordinates with farmers groups, Block Technology Teams (BTTs) and Farmers Information and Advisory Committees (FIACs). The development plan combines production and marketing strategies. Training for the functionaries and farmers is done at the State Agriculture and Management Training Institute (SAMETI), set up in all the states. Team-building, marketing management and use of information technology are important features of ATMA. The VLW who was earlier the key functionary in transfer of technology has been replaced by specialists and farmers trained in business management.

12.4.15 Kisan Call Centres – Electronic Extension

The Ministry of Agriculture and private agencies launched a network of Call Centres on 21st January, 2004. Farmers make free telephone calls to 1551 and get replies to their queries in the local language from an agriculture graduate or expert at the Call centre. For complex problems, there are three levels of experts who are located at the nearby research centre, KVK, Agriculture Department or Agriculture University. The reply is given to the farmer by phone or fax within 72 hours. The speedy electronic media can help in to an important part of extension services.

Check Your Progress 3

Note: a) Use the spaces given below for writing your answers.
   b) Check your answer with those given at the end of the unit.

1) Name the special scheme and extension support.

____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

____________________________________________________________________________________
2) **Explain the main features of T&V programme.**

12.5 **LET US SUM UP**

After going through this Unit, you can see how the hardwork of farmers, scientists and administrators changed the face of Indian Agriculture. Once it was despised as a low-grade economic activity practiced by poor, illiterate farmers. Many facts of Indian agriculture now have the potential engines of growth and prosperity. The nation-wide system of research, education and extension is preparing to face the task of raising the rate of growth of agricultural production from 2 per cent per annum to 4 per cent per annum which will meet our needs of food, rural employment and poverty alleviation.

12.6 **KEY WORDS**

<table>
<thead>
<tr>
<th>Kisan Call Centres</th>
<th>Farmers make free telephone calls to 1551, and get replies to their queries in the local language.</th>
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</thead>
<tbody>
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<td>These are farm science centres started by ICAR in 1974.</td>
</tr>
<tr>
<td>MANGE</td>
<td>The National Institute of Extension Management was started in 1987 at Hyderabad. It has a two year course in Agri-business for agricultural graduated.</td>
</tr>
<tr>
<td>NIAM</td>
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</tr>
<tr>
<td>ORP</td>
<td>Operational Research Project was started in 1972 with the objective of testing and identifying appropriate technologies for specific problems.</td>
</tr>
<tr>
<td>T&amp;V Programme</td>
<td>Scheme combined intensive training of extension workers, with regular visits for transferring their knowledge to farmers.</td>
</tr>
</tbody>
</table>

12.7 **SOME USEFUL BOOKS/REFERENCES**

*Agriculture Summit,* 2005 Ministry of Agriculture.

*Annual Report,* Department of Agricultural Research and Education, 2002-03.

Check Your Progress 1

1) Establishment of Cattle Breeding Farm at Incharodi (Gujarat) and Agriculture Colleges at Poona, Sabour, Nagpur, Lyallpur and Coimbatore.

2) Sir Albert Howard, Sir E.T. Batier, Dr. C.A. Barber and Sir T.S. Venkataraman, Dr. Ramdhan Singh and Dr. B.P. Pal.

Check Your Progress 2

1) Sir S. Radhakrishnan, the former president.

2) Pant Nagar, District Udhampur, Uttaranchal.

3) True.

Check Your Progress 3

1) Small Farmers Development Agency (SFDA) and Marginal Farmers and Landless Labour Development Agency (MFAL).

2) The T&V programme combined intensive training of extension workers with regular visits for transferring their knowledge to farmers.