

**NABARD GRADE A (AGRICULTURE)**

# **CHAPTER 4 - AGRICULTURE**

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## Agriculture

✚ The term agriculture is derived from the two **Latin** words:

*Ager = Soil*

*Cultura = Cultivation*

Hence Cultivation of soil is called agriculture.

- Agriculture is a very broad term encompassing all aspects of crop production, Livestock farming, fisheries, forestry etc.
- Agriculture may be defined as the art, the science and the business of producing crops and livestock for man's use and employment.
- Agriculture is the cultivation of lands for production of crops for a regular supply of food and other needs for progress of the nation.

✚ **Sustainable agriculture/eco-farming**

- Sustainable agriculture is one which makes use of low cost inputs, lower amounts of chemical fertilizers; maintain soil fertility and ecological harmony
- It is also known as ecological farming/natural farming or organic farming/permaculture.

✚ **Shifting cultivation/ land rotation/ jhuming:**

- The productivity of soil is lost due to cultivation of same crop generally rice on the same forest land year after year hence, the crop is **shifted** to other **burnt land**.
- It causes **soil erosion**.
- It is practiced in **Jharkhand, MP** and **hilly areas** of Northern states of India.

✚ **Response farming:**

- **Stewart, 1988**, coined this term based on analysis of weather data.
- It refers to the **prediction of monsoon season** (rainfall), based on analysis of weather data of pre-monsoon period and managing crops accordingly.

#### ✚ Precision farming/site specific farming:

- The target **specific** use of **inputs** (like seeds, fertilizers, pesticides etc.) for crop production according to crop requirement on localized basis.

#### ✚ Advantages of precision farming:

- Minimize the cost of production
- Maintains ecological balance
- Conserve resources

#### ✚ Ideotype (modal plants):

- The concept of Ideotype was given by **Donald** in 1968.
- The single plant would give better result in a group when the crop has least competition with the same type of the crop.
- Ideotype is the model plant which may be defined as “a biological modal” which is expected to perform or behave in a predictable manner within a defined environment

#### ✚ Terra-forming:

- To develop the mars (**planet**) according to the earth's environment is called terra-forming.
- At present bacteria and plants are being developed by creating the environmental condition of mars on the earth.

✚ **Hydroponics:**

- Growing of plants under soil less condition is called **hydroponics**.
- Solution culture is being used for raising **flowers and vegetables** at homes.

✚ **Response curve:**

- The **relationship** between **plant population & yield**

✚ Two types of response curve-

1. **Asymptotic response:**

- Where entire dry matter is the economic product as in the case of fodder crops or most of dry matter as in tobacco.
- It means increase plant density with increase yield e.g. **cereal** crops for **fodder**.

2. **Parabolic:** after reaching a level, increase plant density with decrease yield (wide space between plants cereals/pulses for grain purpose.

✚ **Zero Tillage:**

- Primary tillage completely **avoided**.
- Secondary tillage **restricted** to seedbed preparation in the zone only.
- Keeps **50-100%** of residue on soil surface.
- Before sowing, herbicides **Paraquat, Glyphosate** are used weed control.
- Till planting is adopted.

✚ **Till planting:** It is the practice in zero tillage including four operations

- Cleaning the crop row
- Opening of soil for seed insertion
- Placing of seed
- Covering the seed
- These functions are accomplished in one tillage operation.

#### ✚ Minimum tillage:

- Can be **defined** as a method aimed at reducing tillage to minimum necessary **for ensuring a good seedbed**, rapid germination, satisfactory crop stand and favorable growing conditions.
- Started in **USA**, because of **high cost** of tillage due to steep rise in **oil price in 1974**.
- Tillage operation is done only for **seed bed preparation**.
- **Keep 30-50 %** crop residues on soil surface.
- **It improves soil condition** due to in situ decomposition of plant residue.
- Weed control can be done by herbicide

#### ✚ Global warming:

- Surface of the **earth** is **warmed** from **sun heat**
- Earth absorbs most of sun energy but **reflects** back some energy in the form of **infra-red radiation**.
- Greenhouse gases e.g. CO<sub>2</sub> (55%), Methane (25%), CFC (11%) and N<sub>2</sub>O (4%).
- These gases are present in atmosphere, **transmit the infrared radiation** and reflect back to the earth.

- This reflected energy falls on the earth surface and keeps it **warmer**.
- This is called **global warming** or greenhouse effect.

🚩 **Source of greenhouse gases:**

- In **developed** countries: **Emission** from **automobiles** & factories contains **CFCs**.
- In **developing** countries: Deforestation cases result in rise in CO<sub>2</sub> level, methane gas from paddy field & livestock and nitrous oxide from N base fertilizer.

🚩 **Effect of global warming on world and agriculture:**

- Increase overall **temperature** on earth e.g. earth's surface temperature has increased **1.4° F** (It has been forecasted that **5 °F** will rise in next Century).
- Cause changes in **climate** tremendously.
- Results in **melting** of ice in polar region.
- Increase sea level resulting in **submerging** of coastal areas.
- Drought in warmer regions.

🚩 **Importance Events of Agriculture In India**

<b>1788</b>	First attempt at cotton crop improvement in Bombay province
<b>1827</b>	First agricultural society at Calcutta
<b>1864</b>	First model agricultural farm at Saidapet, Tamil Nadu
<b>1871</b>	Department of Agriculture created
<b>1878</b>	Higher Education in Agriculture at Coimbatore
<b>1880</b>	First Report of Famine Commission (Famine during 1876-77)
<b>1893</b>	Second report of Famine Commission

<b>1901</b>	Third report of Famine Commission
<b>1901</b>	First Irrigation Commission
<b>1902</b>	Introduction of large scale cultivation of groundnut
<b>1903</b>	Imperial Agricultural research Institute at Pusa, Bihar
<b>1904</b>	Introduction of Cambodia cotton
<b>1912</b>	Imperial Sugarcane Breeding Station at Coimbatore
<b>1926</b>	Royal Commission on Agriculture
<b>1929</b>	Imperial (Indian) Council of Agricultural Research at Delhi
<b>1936</b>	IARI shifted to Delhi
<b>1942</b>	Grow More Food Campaign
<b>1946</b>	Central Rice Research Institute
<b>1947</b>	Fertilisers and Chemicals, Travancore
<b>1956</b>	Project for Intensification of Regional Research on Cotton, Oilseeds and Millets (PIRRCOM)
<b>1960</b>	Intensive Agriculture District Programme (IADP)
<b>1963</b>	National Seed Corporation
<b>1965</b>	Intensive Agriculture Area Programme (IIAP)
<b>1965</b>	National Demonstration Programme
<b>1965</b>	All India Coordinated Rice Improvement Project, Hyderabad
<b>1966</b>	HYV Programme
<b>1966</b>	Multiple Cropping Schemes
<b>1970</b>	Drought Prone Area Programme
<b>1971</b>	All India Coordinated Project for Dryland Agriculture
<b>1972</b>	ICRISAT
<b>1973</b>	Minikit Trails Programme
<b>1974</b>	Command Area Development
<b>1975</b>	Release of first cotton hybrid in India
<b>1976</b>	Report of National Commission on Agriculture
<b>1976</b>	Integrated Rural Development Programme (IRDP)

<b>1977</b>	Training and Visit (T&V) System
<b>1979</b>	National Agriculture Research Project (NARP)
<b>1982</b>	National Bank for Agriculture and Rural Development (NABARD)
<b>1986</b>	Establishment of Technology mission on oilseeds
<b>1993</b>	Release of First rice hybrid in India
<b>1998</b>	National Agricultural Technology Project (NATP)

**🚩 National Research Institutes in India**

<b>1.</b>	<b>CAZRI</b>	Central Arid Zone Research Institute, Jodhpur, Rajasthan
<b>2.</b>	<b>CFTRI</b>	Central Food Technological Research Institute, Mysore, Karnataka
<b>3.</b>	<b>CICR</b>	Central Institute for Cotton Research, Nagpur, Maharashtra
<b>4.</b>	<b>CPRI</b>	Central Potato Research Institute, Simla, H.P.
<b>5.</b>	<b>CRIJAF</b>	Central Research Institute for Jute and Allied Fibres, Barrack Pore, West Bengal
<b>6.</b>	<b>CIAE</b>	Central Institute of Agriculture Engineering, Bhopal, Madhya Pradesh
<b>7.</b>	<b>CPCRI</b>	Central Plantation crops Research Institute, kasargod, Kerala
<b>8.</b>	<b>CRIDA</b>	Central Research Institute for Dryland Agriculture, Hyderabad, Andhra Pradesh
<b>9.</b>	<b>CRRI</b>	Central Rice Research Institute, Cuttack, Orissa
<b>10.</b>	<b>CSWCRTI</b>	Central Soil and Water Conservation Research and Training Institute, Dehradun, Uttar Pradesh
<b>11.</b>	<b>CTCRI</b>	Central Tuber Crops Research Institute, Thiruvananthapuram, Kerala
<b>12.</b>	<b>CSSRI</b>	Central Soil Salinity Research Institute, Karnal, Haryana



13.	CTRI	Central Tobacco Research Institute, Rajahmundry, Andhra Pradesh
14.	DOR	Directorate of Oilseeds Research, Hyderabad, Andhra Pradesh
15.	DRR	Directorate of Rice Research, Hyderabad, Andhra Pradesh
16.	DWR	Directorate of Wheat Research, Karnal, Haryana
17.	DWMR	Directorate of Water Management Research Institute, Jhansi, Uttar Pradesh
18.	FRI	Forest Research Institute, Dehradun, Uttar Pradesh
19.	IARI	Indian Agriculture Research Institute, Pusa, New Delhi
20.	IGFARI	Indian Grassland Fodder and Agroforestry Research Institute, Jhansi, U. P.
21.	IISR	Indian Institute of Sugarcane Research, Lucknow, Uttar Pradesh
22.	IISS	Indian Institute of Soil Science, Bhopal, Madhya Pradesh
23.	IIPR	Indian Institute of Pulse Research, Kanpur, Uttar Pradesh
24.	IIHR	Indian Institute of Horticultural Research, Bangalore, Karnataka.
25.	ILRI	Indian Lac Research Institute, Ranchi, Bihar
26.	JTRL	Jute Technological Research Laboratory, Kolkata, West Bengal
27.	NCMRT	National Centre for Mushroom Research and Training, Solan, H.P.
28.	NRCG	National Research Centre for Groundnut, Junagadh, Gujarat
29.	NRCS	National Research Centre for Sorghum, Hyderabad, Andhra Pradesh

30.	<b>NRC</b>	National Research Centre for Soybean, Indore, Madhya Pradesh
31.	<b>NRC</b>	National Research Centre for Spices, Calicut, Kerala
32.	<b>NRC</b>	National Research Centre for Cashew, Pattur, Karnataka
33.	<b>NRC</b>	National Research Centre for Citrus, Nagpur, Maharashtra
34.	<b>NRC</b>	National Research Centre for Rapeseed and Mustard, Bharatpur, Rajasthan
35.	<b>NRC</b>	National Research Centre for Oil Palm, Pedavegi, Andhra Pradesh.
36.	<b>NCWS</b>	National Centre for Weed Science, Jabalpur, Madhya Pradesh
37.	<b>NBPGR</b>	National Bureau of Plant Genetic Resources, New Delhi
38.	<b>NAARM</b>	National Academy of Agricultural Research Management, Hyderabad
39.	<b>NBSSLUP</b>	National Bureau of Soil Survey and Land Use Planning, Nagpur, Maharashtra
40.	<b>NPPTI</b>	National Plant Protection Training Institute, Hyderabad, Andhra Pradesh
41.	<b>PDCSR</b>	Project Directorate for Cropping Systems Research, Meerut, Uttar Pradesh
42.	<b>SBI</b>	Sugarcane Breeding Institute, Coimbatore, Tamil Nadu

#### 🌐 International Research Institutes

1.	<b>CGIAR</b>	Consultative Group on International Agricultural Research, Washington, D.C.
2.	<b>CIFOR</b>	Centre for International Forestry Research, Bogor, Indonesia
3.	<b>CIAT</b>	Centre International de Agricultural Tropical, Cali, Columbia

4.	<b>CIMMYT</b>	Centre International de la Mejoramientode Maizy Trigo, Mexico
5.	<b>CIP</b>	Centre International de la papa (International Potato Centre) Lima, Peru
6.	<b>IBPGR</b>	International Board for Plant Genetic Resources, Rome, Italy
7.	<b>ICARDA</b>	International Center for Agricultural Research in the Dry Areas, Aleppo, Syria
8.	<b>ICRAF</b>	International Centre for Research in Agro-Forestry, Nairobi, Kenya
9.	<b>ICRISAT</b>	International Crops Research Institute for Semi-Arid Tropics, Hyderabad, India
10.	<b>IFPRI</b>	International Food Policy Research Institute, Washington, U.S.A
11.	<b>IITA</b>	International Institute for Tropical Agriculture, Ibadan, Nigeria
12.	<b>IIMI</b>	International Irrigation Management Institute, Colombo, Sri Lanka
13.	<b>ILRI</b>	International Livestock Research Institute, Nairobi, Kenya
14.	<b>IRRI</b>	International Rice Research Institute, Manila, Philippines
15.	<b>ISNAR</b>	International Service for National Agricultural Research, The Hague, The Netherlands
16.	<b>WARDA</b>	West Africa Rice Development Association, Ivory Coast, West Africa