



General Agriculture

Agriculture is derived from two Latin words **Agar** – soil, **Culture** – cultivation,

- Father of agronomy **Peter Decresenzi**
- Union minister of agriculture and president of the ICAR **Dr. Mangi Lal Jat Primary resource for agriculture**
- Land, water and air

Secondary resource for agriculture

- Fertilizer
- Tractor
- Pesticide
- Seed

History of Agriculture

S. No.	Event	Date
1.	Hunting and gathering	Earlier than 10,000 B.C.
2.	Domestication of Sheep	8700 B.C.
3.	Domestication of Goat	7700 B.C.
4.	Cultivation of Barley & Wheat	7500 B.C.
5.	Cultivation of Maize	4400 B.C.
6.	Cultivation of Potato	3500 B.C.
7.	Invention of Wheel	3400 B.C.
8.	Invention of Plough	2900 B.C.
9.	Domestication of Silk worm (in China)	2700 B.C.
10.	Cultivation of Rice	2200 B.C.
11.	Cultivation of Sorghum	1725 B.C.
12.	Use of Iron	1400 B.C.

Origin of Agriculture and Related Terms

The literally meanings of agriculture and related terms, which derived from different languages, are follows:-

1. **Agriculture** Latin word- '**AGER**' meaning 'soil' and '**CULTURA**' meaning 'cultivation'.

2. **Agronomy** Greek word- '**AGROS**' meaning 'field' and '**NOMOS**' means 'manage'.
3. **Horticulture** Latin word- '**HORTUS**' meaning 'garden' and '**CULTURA**' meaning 'culture or growing
4. **Truck gardening-** French word truck- '**TORQUER**' meaning 'to barter or exchange of goods'.
5. **Biodynamics-** Greek word '**BIOS**' meaning 'life' and '**DYNAMICS**' meaning 'energy'
6. **Monsoon-** Arabic word- '**MAUSIM**' meaning 'change of season'.
7. **Soil-**Latin word- '**SOLUM**' meaning 'ground 'or floor of earth crust.
8. **Extension-** Latin word '**EX**' meaning 'out' and '**TENSIO**' meaning 'stretching'.
9. **Floriculture** Latin word- '**FLORIS**' meaning flower, concerned with cultivation of flowering & ornamental plants.
10. **Olericulture** Latin word '**OLERIS**' meaning 'pot herb' and english word '**CULTURE**' meaning 'cultivation'
11. **Pomology-** Latin-Greek word- Combination of Latin word '**POMUM**' meaning 'fruit' and Greek word '**LOGOS**' means 'discourse.
12. **Pulses-** Latin word '**PULSUS**' means protein rich edible grains
13. **Legume-** Latin word '**LEGUMEN**' means 'bean'.
14. **Credit-** Latin word- '**CREDO**' meaning 'I trust you'.
15. **Enzyme-** Greek word- '**EN**' meaning 'in' and '**ZYME**' meaning 'ferment/living'.
16. **Evolution-** Latin word '**EVOLUTIO**' meaning 'unrolling or rolling out'.
17. **Market-** Latin word- '**MARCATUS**' meaning 'place of trade, traffic or merchandise'.



18. **Edaphology:** Greek word 'EDAPHOS' means 'influence soil for plant growth and LOGOS' means 'Study or discourse'
19. **Pedology-** Greek word- 'PEDON' meaning 'soil or earth'.
20. **Nematode-** Greek word- 'NEMA' meaning 'thread' and 'TOID' meaning 'form'

Important Concept and Related Person

Concepts/terms/theory	Related person/Fathers
Concept of foliar fertilization	Rajat De
Term zero tillage	Jethro Tull
Term ever green revolution	M.S. Swaminathan
Term greenhouse effect	J.B. Fowler
Theory of evolution	Charles Darwin
Term harvest index	Donald
Term remote sensing	Fisher
Term green revolution	William Gaud
Concept of CRI	Dr. B.L. Bhardwaj
Concept of Bio-climate law	Hopkins
Concept of PET	Thornthwaite
Concept of response farming	Stewart
Concept of slow release N fertilizer	Rajendra Prasad
Insecticidal property of DDT	P. Muller
Concept of pH	Sorenson
Concept of alley cropping	B.T. Kang
Concept of PWP	Briggs and Shantz
Concept of aggressivity	M.C Gihrist
Discovery of penicillin	Flaming
Father of white of revolution	V. Kurian
Father of of modern microbiology	Luis Pasteur
Father of hybrid cotton in India	C.T. Patel
Father of physiology in India	J.C. Boss
Father of sociology	Agust Comte
Father of zero tillage	J.B. Triplet
Father of sociology	Agust Camte
Father of hybrid rice	Yaun Long Ping
Father of super rice	G.S. Khus
Father of tillage	Jethro tull
Father of relay cropping	S.S. Bains
Father of golden rice	Ingo Porthchus

Father of agro meteorology in India	L.A. Ramdas
Father of modern organic agriculture	Albert Howard
Zn deficiency in rice reported (khaira)	Dr. Y.L. Nane
Criteria of essentially	Arnon and Stout
Law of diminishing returns	Mitsherlich
Crop logging in sugar cane	H.F. Clements
Trench method for preparing FYM	C.N. Acharya
Functional nutrient	D.J. Nicholas
Critical soil test level approach	Cate and Nalson
Discovered BGA as a N fixer in paddy	P.K. Dey
Nutrient mobility concept	R. Bray
Law of physiological relationship	Mitsherlich
Father of sociology	Agust Comte
pF value	Schofield
Father of safeners	Hotto L. Hoffman
Principle of experimental design	R.A. fisher
A value concept	Fried and Dean
Law of minimum	J.V. Liebig
Inverse yield nitrogen law	O.W. Wilcox
Father of agro climatology	Koppen
Center of origin	N.I. Vavilov
Seed plot technique	Puskar Nath
Scientific study of mixed cropping	La filtze
Isolate organism responsible for Nitrogen fixation	S. Winogradsky
Discovery of Norin dwarf gene	S.S. Salmon
Father of extension education	A. Seaman & Knapp (USA) & J.P. Leggens (India)
Father of Indian rust	K.C. Mehta

Land Use Pattern in India

S. No.	Category	Area
1.	Total Geographical Area (TGA)	328.7 million hectares
2.	Reported Area	306.54 million hectares



3.	Gross Cropped Area	219 million hectares
4.	Net Sown Area	141 million hectares
5.	Area Sown More than Once	78 million hectares
6.	Gross Irrigated Area	122.38 million hectares
7.	Net Irrigated Area	80 million hectares
8.	Rice Crop	45 million hectares
9.	Wheat Crop	30 million hectares
10.	Area of Degraded Land	147 million hectares (NBSS & LUP)
11.	Forest Area	21.76%
12.	Forest & Tree Area	25.36%
13.	Fallow Land	15 million hectares
14.	Pasture	4% of TGA
15.	Cropping Intensity	155.4%

Note

- The suffix "-culture" is often associated with the words of Latin language and the suffixes "-logy" and "-my" indicate Greek origin of words. For example–
- **Latin words:** Agriculture, Horticulture, Olericulture, Floriculture etc.
- **Greek words:** Entomology, Nematology, Pedology, Pathology, Agronomy etc.
- **Exceptions:** The terms "Pomology" and "Sociology" are derived from both Latin + Greek roots.

Important Instruments Related to Agriculture Measurement

Parameter	Instruments
Root pressure	Manometer
Density of liquid	Hydrometer
Maturity of fiber	Arealometer
Soil strength or soil mechanical resistance	Cone penetrometer
Metric suction	Tensiometer
Total soluble solid (TSS)	Refractometer
ET or leaching	Lysimeter
Leaf temperature	Atomometer

Ground water	Piezometer
Crop canopy temperature	Infra-red thermometer
Water flow	Parshall flume
Purity of milk	Lactometer
Density of Soil (Particle Density)	Pycnometer

ICAR Institutions

Acronym	Name	Headquarters	Year
IARI	Indian Agricultural Research Institute	New Delhi	1905
NDRI	National Dairy Research Institute	Karnal, Haryana	1923
CIRCOT	Central Institute of Research on Cotton Technology	Mumbai, Maharashtra	1924
NISA	National Institute of Secondary Agriculture	Ranchi, Jharkhand	1924
NRRI	National Rice Research Institute	Cuttack, Odisha	1946
CTRI	Central Tobacco Research Institute	Rajahmundry, Andhra Pradesh	1947
CIFRI	Central Inland Fisheries Research Institute	Barrackpore, West Bengal	1947
CMFRI	Central Marine Fisheries Research Institute	Kochi, Kerala	1947
CPRI	Central Potato Research Institute	Shimla, Himachal Pradesh	1949
IISR	Indian Institute of Sugarcane Research	Lucknow, Uttar Pradesh	1952
CRIJAF	Central Research Institute for Jute and Allied Fibres	Barrackpore, West Bengal	1953
CIFT	Central Institute of Fisheries Technology	Cochin, Kerala	1957
IIMR	Indian Institute of Millets Research	Rajendranagar, Hyderabad, Telangana	1958
CAZRI	Central Arid Zone Research Institute	Jodhpur, Rajasthan	1959
CIFE	Central Institute on Fisheries Education	Mumbai, Maharashtra	1961
CSWRI	Central Sheep and Wool Research Institute	Avikanagar, Tonk, Rajasthan	1962
IGFRI	Indian Grassland and Fodder Research Institute	Jhansi, Uttar Pradesh	1962
CTCRI	Central Tuber Crops Research Institute	Trivandrum, Kerala	1963



IIRR	Indian Institute of Rice Research	Hyderabad, Telangana	1965
IHR	Indian Institute of Horticultural Research	Hesaraghatta, Bengaluru	1967
CSSRI	Central Soil Salinity Research Institute	Karnal, Haryana	1969
CPCRI	Central Plantation Crops Research Institute	Kasargod, Kerala	1970
IASRI	Indian Agricultural Statistics Research Institute	New Delhi, Delhi	1970
CISH	Central Institute of Sub Tropical Horticulture	Lucknow, Uttar Pradesh	1972
IISWC	Indian Institute of Soil and Water Conservation	Dehradun, Uttarakhand	1974
ICAR-RCNEH	ICAR-Research Complex for North Eastern Hill Region	Umiam (Barapani), Meghalaya	1975
IISR	Indian Institute of Spices Research	Kozhikode (Calicut), Kerala	1975
CIAE	Central Institute of Agricultural Engineering	Bhopal, Madhya Pradesh	1976
CICR	Central Institute of Cotton Research	Nagpur, Maharashtra	1976
NAARM	National Academy of Agricultural Research & Management	Hyderabad, Telangana	1976
IIR	Indian Institute of Oilseeds Research	Hyderabad, Telangana	1977
CIARI	Central Island Agricultural Research Institute	Port Blair, Andaman & Nicobar	1978
CARI	Central Avian Research Institute	Izzatnagar, Uttar Pradesh	1979
CIRG	Central Institute for Research on Goats	Makhdoom, Mathura, Uttar Pradesh	1979
CCARI	Central Coastal Agricultural Research Institute	Ela, Goa	1979
IISS	Indian Institute of Seed Science	Mau, Uttar Pradesh	1979
CIRB	Central Institute for Research on Buffaloes	Hissar, Haryana	1985
CRIDA	Central Research Institute for Dryland Agriculture	Hyderabad, Telangana	1985
CCRI	Central Citrus Research Institute	Nagpur, Maharashtra	1985
NIPB	National Institute for Plant Biotechnology	New Delhi, Delhi	1985

IISR	Indian Institute of Soybean Research	Indore, Madhya Pradesh	1987
CIFA	Central Institute of Freshwater Aquaculture	Bhubaneswar, Odisha	1987
CIBA	Central Institute of Brackishwater Aquaculture	Chennai, Tamil Nadu	1987
IISS	Indian Institute of Soil Sciences	Bhopal, MP	1988
CARI	Central Agroforestry Research Institute	Jhansi, Uttar Pradesh	1988
IWM	Indian Institute of Water Management	Bhubaneswar, Odisha	1988
CIPHET	Central Institute on Post Harvest Engineering and Technology	Ludhiana, Punjab	1989
IIFSR	Indian Institute of Farming Systems Research	Modipuram, Meerut, Uttar Pradesh	1989
NIAEPR	National Institute of Agricultural Economics and Policy Research	New Delhi, Delhi	1991
CIAH	Central Institute for Arid Horticulture	Bikaner, Rajasthan	1993
IIPR	Indian Institute of Pulses Research	Kanpur, Uttar Pradesh	1993
CITH	Central Institute of Temperate Horticulture	Srinagar, Jammu & Kashmir	1994
NIANP	National Institute of Animal Nutrition and Physiology	Bengaluru, Karnataka	1995
IIOPR	Indian Institute of Oil Palm Research	Pedavegi, West Godavari, Andhra Pradesh	1995
CIWA	Central Institute for Women in Agriculture	Bhubaneswar, Odisha	1996
IIVR	Indian Institute of Vegetable Research	Varanasi, Uttar Pradesh	1999
ICAR-RCER	ICAR-Research Complex for Eastern Region	Patna, Bihar	2000
NIASM	National Institute of Abiotic Stress Management	Baramati, Malegaon, Maharashtra	2009
NIBSM	National Institute of Biotic Stress Management	Raipur, Chhattisgarh	2012
IWBR	Indian Institute of Wheat and Barley Research	Karnal, Haryana	2014
IIMR	Indian Institute of Maize Research	Ludhiana, Punjab	2015



NOFRI	National Organic Farming Research Institute	Gangtok, Sikkim	2016
IIAB	Indian Institute of Agricultural Biotechnology	Ranchi, Jharkhand	-

CGIAR Centres: 15

CGIAR Centres		Situated at	Year & Remar
Acronym	(Full name)		
ARC	Africa Rice Centre (Formerly, WARDA: West Africa Rice Development Association)	Ivory coast	
ICARDA	International Center for Agricultural Research in the Dry Areas	Beirut, Lebanon	1977
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics	Patancheru, Hyderabad	1972
CIFOR	Centre for International Forestry Research	Bogor, Indonesia	1993
IFPRI	International Food Policy Research Institute	Washington, D.C.	1975
CIAT	International Centre for Tropical Agriculture	Colombia, South America	
IITA	International Institute of Tropical Agriculture	Ibadan, Nigeria	
ILRI	International Livestock Research Institute	Nairobi, Kenya	1994
IPGRI	International Plant Genetic Resources Institute	Rome, Italy	1974
CIMMYT	International Maize and Wheat Improvement Centre	Mexico	1966
CIP	International Potato Centre	Lima, Peru	1971
IRRI	International Rice Research Institute	Los Banos, Philippines	1960
IWMI	International Water Management Institute	Colombo, Sri Lanka	1985
WAC	World Agroforestry Centre	Nairobi, Kenya	1978
WFC	World Fish Centre	Penang, Malaysia	

Mandate crops of ICRISAT: Chickpea, Groundnut, Sorghum, Pigeon pea, Pearl Millet, Finger Millet and Small millets.

ICAR- National Research Centres (NRCs): 15

- The first NRC established in India was the NRC for Groundnut (1979) in Junagadh, Gujarat.

National Research Centre	Headquarters	Year of Establishment
National Research Centre for Banana	Trichy (Tiruchirappalli), Tamil Nadu	1993
National Research Centre for Grapes	Pune, Maharashtra	1997
National Research Centre for Litchi	Muzaffarpur, Bihar	2001
National Research Centre for Pomegranate	Solapur, Maharashtra	2005
National Research Centre on Camel	Jodbeed, Bikaner, Rajasthan	1984
National Research Centre on Plant Biotechnology (NRCPB)	New Delhi	1986
National Research Centre on Equines	Hisar, Haryana	1999
National Research Centre on Meat	Hyderabad, Telangana	1988
National Research Centre on Mithun	Medziphema, Nagaland	1996
National Research Centre on Orchids	Pakyong, Sikkim	2002
National Research Centre on Pig	Guwahati, Assam	2002
National Research Centre on Seed Spices (NRCSS)	Tabiji, Doomara, Ajmer, Rajasthan	2000
National Research Centre on Yak	Dirang, West Kameng, Arunachal Pradesh	1989
National Centre for Integrated Pest Management (NRCIPM)	New Delhi, Delhi	1988
Mahatma Gandhi Integrated Farming Research Institute (MGIFRI)	Motihari, Bihar	2015

ICAR- National Bureaux: 6

Acronym	Name of Bureau	Headquarters	Year of Establishment
NBPGR	National Bureau of Plant Genetics Resources	New Delhi	1976
NBAIM	National Bureau of Agriculturally Important Micro-organisms	Mau Nath Bhanjan, Uttar Pradesh	2001



NBAIR	National Bureau of Agricultural Insect Resources	Bengaluru, Karnataka	1992
NBSS & LUP	National Bureau of Soil Survey and Land Use Planning	Nagpur, MH	1976
NBAGR	National Bureau of Animal Genetic Resources	Karnal, Haryana	1984
NBFGP	National Bureau of Fish Genetic Resources	Lucknow, Uttar Pradesh	1983

ICAR - Directorate/Project Directorate: 13

Directorate	Headquarters	Year
Directorate of Groundnut Research (DGR)	Junagarh, Gujarat	1979
Directorate of Soybean Research	Indore, Madhya Pradesh	1987
Directorate of Rapeseed & Mustard Research (DRMR)	Bharatpur, Rajasthan	1993
Directorate of Mushroom Research (DMR)	Solan, Himachal Pradesh	1983
Directorate on Onion & Garlic Research	Pune, Maharashtra	1994
Directorate of Cashew Research	Puttur, Karnataka	1986
Directorate of Medicinal & Aromatic Plants Research	Anand, Gujarat	1992
Directorate of Floricultural Research	Pune, Maharashtra	2009
Directorate of Weed Research (DWR)	Jabalpur, Madhya Pradesh	1989
Project Directorate on Foot & Mouth Disease (FMD)	Mukteshwar, Uttarakhand	1968
Directorate of Poultry Research	Hyderabad, Telangana	1988
Directorate of Knowledge Management in Agriculture (DKMA)	New Delhi	2011
Directorate of Cold-Water Fisheries Research	Bhimtal, Nainital, UK	1987

ICAR - All India Coordinated Research Projects (AICRPs): 60

The first AICRP in India was the All India Coordinated Research Project on Maize, established in 1957.

1. AICRP on Nematodes: New Delhi (1977)
2. AICRP on Pesticide Residues: New Delhi

3. AICRP on Maize: New Delhi (1957)
4. AICRP on Rice: Rajendranagar, Hyderabad (1965)
5. AICRP on Chickpea: Kanpur, Uttar Pradesh (1993)
6. AICRP on MULLARP (Mungbean Urdbean, Lentil, Lathyrus and Rajma, Pea): Kanpur, Uttar Pradesh (1993)
7. AICRP on Pigeon Pea: Kanpur, Uttar Pradesh
8. AICRP on Arid Legumes: Kanpur, Uttar Pradesh
9. AICRP on Wheat & Barley: Karnal, Haryana (1965)
10. AICRP on Sorghum: Hyderabad, Telangana (1969)
11. AICRP on Pearl Millet: Jodhpur, Rajasthan (1965)
12. AICRP on Small Millet: Bangalore, Karnataka (1986)
13. AICRP on Sugarcane: Lucknow, Uttar Pradesh (1970)
14. AICRP on Cotton: Coimbatore, Tamil Nadu (1967)
15. AICRP on Groundnut: Junagadh, Gujarat
16. AICRP on Soybean: Indore, Madhya Pradesh (1967)
17. AICRP on Rapeseed & Mustard: Bharatpur, Rajasthan (1993)
18. AICRP on Sunflower, Safflower, Castor: Hyderabad, Telangana
19. AICRP on Linseed: Kanpur, Uttar Pradesh
20. AICRP on Sesame and Niger: Jabalpur, Madhya Pradesh
21. AICRP on IPM and Biocontrol: Bangalore, Karnataka.
22. AICRP on Honey Bee and Pollinators: IARI, Pusa, New Delhi, Delhi
23. AICRP on Forage Crops: Jhansi, Uttar Pradesh
24. AICRP on Fruits: Bengaluru, Karnataka
25. AICRP Arid Zone Fruits: Bikaner, Rajasthan
26. AICRP Mushroom: Solan, Himachal Pradesh
27. AICRP Vegetables including NSP vegetable: Varanasi, Uttar Pradesh
28. AICRP Potato: Shimla, Himachal Pradesh.
29. AICRP Tuber Crops: Thiruvananthapuram, Kerala
30. AICRP Palms: Kasaragod, Kerala
31. AICRP Cashew: Puttur, Karnataka
32. AICRP Spices: Kozhikode (Calicut), Kerala



33. AICRP on Medicinal and Aromatic Plants: Anand, Gujarat
34. AICRP on Floriculture: Pune, Maharashtra
35. AICRP in Micro Secondary & Pollutant Elements in Soils and Plants: Bhopal, Madhya Pradesh
36. AICRP on Soil Test with Crop Response (STCR): Bhopal, Madhya Pradesh
37. AICRP- Long Term Fertilizer Experiments (LTFE): Bhopal, Madhya Pradesh
38. AICRP on Salt Affected Soils & Use of Saline Water in Agriculture Karnal, Haryana
39. AICRP on Water Management Research: Bhubaneshwar, Orissa
40. AICRP on Ground Water Utilisation: Bhubaneshwar, Orissa
41. AICRP on Dryland Agriculture: Hyderabad, Telangana (1970)
42. AICRP on Agrometeorology: Hyderabad, Telangana (1983)
43. AICRP on Integrated Farming System Research: Modipuram, Meerut, Uttar Pradesh
44. AICRP on Weed Control: Jabalpur, Madhya Pradesh (1978)
45. AICRP on Agroforestry: Jhansi, Uttar Pradesh (1983)
46. AICRP on Farm Implements & Machinery: Bhopal, Madhya Pradesh
47. AICRP on Ergonomics and Safety in Agriculture: Bhopal, MP
48. AICRP on Energy in Agriculture and Agro Based Industries: Bhopal, Madhya Pradesh
49. AICRP on Utilization of Animal Energy (UAE): Bhopal, Madhya Pradesh
50. AICRP on Plasticulture Engineering and Technologies: Ludhiana, Punjab
51. AICRP on Post Harvest Technology (PHT): Ludhiana, Punjab
52. AICRP on Goat Improvement: Mathura, Uttar Pradesh
53. AICRP on Improvement of Feed Sources & Nutrient Utilisation for raising animal production: Bangalore, Karnataka
54. AICRP on Cattle Research: Meerut, Uttar Pradesh (1987)
55. AICRP on Poultry: Hyderabad, Telangana.
56. AICRP on Pig: Izzatnagar, Uttar Pradesh
57. AICRP Foot and Mouth Disease: Mukteshwar, Uttarakhand

58. AICRP ADMAS (Animal Disease Monitoring & Surveillance): Bangalore, Karnataka
59. AICRP on Home Science: Bhubaneshwar, Odisha

Central Agricultural Universities

1. Central Agricultural University (CAU): Imphal, Manipur
2. Dr. Rajendra Prasad Central Agricultural University (RPCAU): Samastipur, Bihar
3. Rani Laxmi Bai Central Agricultural University (RLBCAU): Jhansi, UP

Deemed Universities under ICAR:

1. Indian Agricultural Research Institute, New Delhi
2. National Dairy Research Institute, Karnal, Haryana
3. Indian Veterinary Research Institute, Izzatnagar, Bareilly, Uttar Pradesh
4. Central Institute on Fisheries Education, Mumbai

CGIAR

- Full form: Consultative Group on International Agricultural Research
- Headquarter: Washington, DC.

Indicator Plants

Nutrients	Indicator plants
N and Calcium	Cauliflower and Cabbage
Phosphorus	Rapeseed
K and Mg	Potato
Zn	Maize
Fe	Cauliflower, Cabbage and Potato
Mn	Sugar beet and Oats
Boron	Sunflower
Cu	Wheat
Sulphur	Lucerne

Critical Limit of Major Plant Nutrient in Soil

Component	Low (kg/h)	Medium (kg/h)	High (kg/h)
N	<280	280-560	>560
P	<11	11-25	>25
K	<120	120-280	>280
Organic matter	<0.5%	0.5-0.75%	>0.75%



Types of Loans

Type of loan	Time of repayment
Short term loan	6 - 18 Months
Medium term loan	2 - 5 Year
Long term loan	5 - 20 Year

*KCC is a short term loan

Deficiency of Particular Nutrient in Indian Soils

Nutrient Deficiency	Per cent	Nutrient Deficiency	Per cent
N	50	Fe	11.5
Zn	50	Cu	4.8
B	33	Mn	4.1

Type of Transpiration

Transpiration trough	Per cent
Stomata	90%
Cuticular	8-9%
Lenticular	1%

Soil Type and Porosity

Soil	Porosity	Soil	Porosity
Alluvial	47.2	Laterite	46.4
Black	55.8	Red	35.8

Soil Texture and Their Porosity

Type of soil texture	Porosity per cent
Clay	50-60
Loamy	30-50
Sandy	20-30

Water Requirement of Important Crops

Crop	Crop water requirement in (mm)	Crop	Crop water requirement in (mm)
Maize	500-800	Sesame	300-350
Wheat	450-650	Mustard	350-400
Pigeon pea	300-350	Cotton	500-1300
Cowpea	250-300	Jute	500-600
Soybean	450-700	Tobacco	400-600
Gram	250-300	Sugarcane	1500-2500
Rice	1500-2500	Barley	250-600
Groundnut	500-700	Pulse	350

Mechanical Measurement of Soil

Measurements	Slope	Measurements	Slope
Contour bunding	>6	Ground trench	10-16
Graded bunding	6-10	Bench trench	16-33

Trade Name of Important Plants Hormones

Hormone	Trade names	Hormone	Trade names
Ethephone	Cepa	IAA	Rhizopton A
2,4-D	Plant guard	IBA	Seradex
M.H.	Spout stop	CCC/ Chlormequat	Cycocel
NAA	Fruitom -N		

Agro-Climatic Zones of India

- ICAR- NARP (National Agricultural Research Project, 1979) demarcated the geographical area of country into 126 agro-climatic zones. Later, three more zones were added. So, according to ICAR - NARP the total agroclimatic zones in India is.
- Agroclimatic Regional Planning approach was initiated by Planning Commission in 1988. In 1989, NITI Aayog (Erstwhile planning commission) broadly divided the area of country into 15 Agroclimatic regions based on homogeneity in agro- climatic features particularly, climate (temperature & rainfall), soil, water resources, length of growing period, topography, cropping pattern and cropping system etc. These are further divided into 72 agroclimatic sub- zones. The 15 agroclimatic zones of India are as follows:

S. No.	Agroclimatic Zone	Description and States Included
1.	Western Himalayan Region	Jammu & Kashmir, Himachal Pradesh, and Uttarakhand represent hilly regions with cold, temperate climates, suitable for apples, cherries, wheat, and barley.
2.	Eastern Himalayan Region	Eight North- Eastern states. Shifting cultivation (Jhoom) is prevalent.
3.	Lower Gangetic Plains	This zone covers parts of West Bengal, Bihar, and Jharkhand, with fertile alluvial soils prone to floods, ideal for rice, jute, and sugarcane.
4.	Middle Gangetic Plains	This zone spans parts of Uttar Pradesh, Bihar, Jharkhand, and West Bengal, with salt-affected lands and a subtropical monsoon climate, suitable for rice, wheat, and oilseeds.
5.	Upper Gangetic Plains	This zone covers parts of Uttar Pradesh, Uttarakhand, Haryana, and Delhi, favorable for wheat, maize, and pulses.



6.	Trans-Gangetic Plains	This zone includes Punjab, Haryana, Delhi, Chandigarh, and Ganganagar district of Rajasthan. It has fertile alluvial soils, high irrigation, cropping intensity, and groundwater use, with a rice-wheat system dominating. Major crops are wheat, rice, and cotton.
7.	Eastern Plateau and Hills	This largest agroclimatic zone spans Chhattisgarh, and parts of Maharashtra, Jharkhand, Odisha, and West Bengal, suitable for rice, pulses, oilseeds, and horticultural crops..
8.	Central Plateau and Hills	This zone covers Madhya Pradesh and parts of Chhattisgarh, Maharashtra, and Rajasthan, with a subtropical climate, suited for oilseeds, pulses, and coarse grains like jowar and bajra.
9.	Western Plateau and Hills	This zone covers most of Maharashtra and parts of Gujarat, Karnataka, and Rajasthan, with major crops being sorghum, cotton, oilseeds, and pulses.
10.	Southern Plateau and Hills	This semi-arid zone spans Andhra Pradesh, Telangana, and parts of Karnataka, Tamil Nadu, and Kerala, with 81% rainfed farming. It has a tropical climate, ideal for rice, sorghum, groundnut, cotton, and minor millets.
11.	East Coast Plains and Hills	This zone covers coastal Andhra Pradesh, Odisha, and parts of Tamil Nadu, with a humid tropical climate suited for rice, sugarcane, coconut, and horticultural crops.
12.	West Coast Plains and Ghat	This zone spans Kerala, Goa, and parts of Karnataka and Maharashtra, with a tropical maritime climate, ideal for plantation crops, spices, fisheries, and multi-storeyed cropping.
13.	Gujarat Plains & Hills Region	This zone covers most of Gujarat (19 districts) with a semi-arid climate, suitable for cotton, groundnut, oilseeds, and horticultural crops; also called the oilseed zone.
14.	Western Dry Region	Spanning 9 districts of Rajasthan and parts of Gujarat, this agro-climatic zone is characterized by an arid to semi-arid climate. hot sandy desert with erratic rainfall, high evaporation, and no perennial rivers, supports only scanty vegetation

15.	The Islands Region	This smallest agroclimatic zone covers the Andaman & Nicobar Islands and Lakshadweep, with a tropical maritime climate. Nearly half the cropped area is coconut, and it is suitable for coconut, palm oil, fisheries, and tropical fruits.
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Agro- Ecological regions

Agro- ecological regions was classified by the National Bureau of Soil Survey & Land Use Planning (NBSS & LUP) in 1999. NBSS & LUP divided the country into 20 Agro-ecological zones (earlier, 21). These twenty agro- ecological zones were sub- divided into 60 agro- ecological sub-zones. The 20 Agro- ecological regions are:

1. Western Himalayas
2. Western Plain, Kachchh, and part of Kathiawar Peninsula
3. Deccan Plateau
4. Northern Plain and Central Highlands including Aravallis
5. Central Malwa Highlands, Gujarat Plains, and Kathiawar Peninsula
6. Deccan Plateau, hot semi-arid ecoregion
7. Deccan (Telangana) Plateau and Eastern Ghats
8. Eastern Ghats, Tamil Nadu Plateau and Deccan (Karnataka)
9. Northern Plain, hot sub-humid (dry) ecoregion
10. Central Highlands (Malwa, Bundelkhand, and Eastern Satpura)
11. Eastern Plateau (Chhattisgarh), hot sub-humid ecoregion
12. Eastern (Chotanagpur) Plateau and Eastern Ghats
13. Eastern Plain
14. Western Himalayas
15. Bengal and Assam plains
16. Eastern Himalayas
17. North Eastern Hills (Purvanchal)
18. Eastern Coastal Plain
19. Western Ghats and Coastal Plain
20. Islands of Andaman Nicobar and Lakshadweep

Important Facts

- According to ICAR, India has agro-ecological zones: **8**
- The largest agroclimatic zone in India is: **Eastern Plateau and Hills**



- The smallest agroclimatic zone in India is: **Islands region**
- The Rajasthan falls under total Agroclimatic zones: **4 (6th, 8th, 9th & 14th)**
- The most of the geographical area of Rajasthan is falls under: **Western Dry Region.**

Standings of India in the World

Rank	Sectors
First	Total livestock population, Buffalo population, Milk production, Mango production & Banana production
Second	Cattle population, Goat population, Aquaculture, Tea production & Tobacco production
Third	Egg production, Coconut production & Fish production

Toxin Found in Some Crops Plants

Toxic Compound	Crop
Saponin	Lucerne
Lapoxidase	Soybean
Aflatoxin	Groundnut
HCN/Dhurin	Sorghum (>200 ppm is toxic for animal)
BOAA	Lathyrus
Gossypol	Cotton
Solanin	Potato
Poly Unsaturated Fatty Acid (PUFA)	Safflower, sunflower and soybean

Protein Content in Important Crops

Crop	Protein and oil%	Crop	Protein and oil %
Soybean	42 and 20	Wheat	13.00
Groundnut	26 and 45	Barley	11.50
Green gram	25.00	Pearl millet	11-12
Cowpea	23.40	Maize	10.00
Pea	22.50	Rice	06-07
Gram	21.00		

MSP on Crops (Information from text)

- Government announces MSPs for 22 mandated crops and fair and remunerative price (FRP) for sugarcane. These mandated crops include 14 crops of the Kharif season, 6 Rabi crops, and two other commercial crops.

- MSP on wheat: **2425/quintal** (For 2024-25).
- MSP on paddy: Common: 2369/quintal & A-grade: 2389/quintal (2025-26).

Important Committees

The Indian Central Cotton Committee was the first commodity committee in India established in 1921.

S. No.	Year	Committee
1.	1921	Cotton committee
2.	1931	Lac committee
3.	1936	Jute committee
4.	1944	Sugarcane committee
5.	1945	Coconut committee
6.	1945	Tobacco committee
7.	1947	Oilseeds committee
8.	1958	Spices committee

Important Days in the Agriculture and Allied Sciences

S. No.	Day	Date
1.	World Wetland Day	2 February
2.	National Science Day	28 February
3.	International Women's Day	8 March
4.	Water Resource Day	11 March
5.	Consumer Day	15 March
6.	World Forest Day	21 March
7.	World Water Day	22 March
8.	World Meteorological Day	23 March
9.	World Health Day	7 April
10.	Earth Day	22 April
11.	World Labour Day	1 May
12.	World Environment Day	5 June
13.	National Agriculture Day	1 July
14.	ICAR Day	16 July
15.	World Literacy Day	8 September
16.	World Ozone Day	16 September
17.	Women Farmers Day	15 October
18.	World Food Day	16 October
19.	Agriculture Education Day	3 December
20.	Women in Agriculture Day	4 December
21.	Farmer's Day	23 December



Important Years

- 2003 - International Year of Freshwater
- 2004 - International Year of Rice
- 2005 - International Year of Microcredit
- 2006 - International Year of Deserts and Desertification
- 2008 - International Year of Potato
- 2009 - International Year of Natural Fibres
- 2010 - International Year of Biodiversity
- 2011 - International Year of Forests
- 2012 - International Year of Cooperatives
- 2013 - International Year of Quinoa and International Year of Water cooperation
- 2014 - International Year of Family Farming
- 2015 - International Year of Soils
- 2016 - International Year of Pulses
- 2020 - International Year of Plant Health
- 2021 - International Year of Fruits & Vegetables
- 2022 - International Year of Artisanal Fisheries and Aquaculture
- 2023 - International Year of Millets
- 2024 - International Year of Camelids (Camels, llamas, alpacas, vicunas and guanacos)
- National Year of Millets (Nutri Cereals): 2018

Basic concepts

A. About solutions

- 1 PPM solution = 1 mg/1000 ml water
- 1% solution = 1 g/100 ml water
- Convert PPM into% = PPM/10000
- Convert% into PPM = % x 10000
- Sugar requires to raising 1°Brix is 10 g/l.

B. About areas

- 1 ha = 2.47 acre

C. About water

- 1 cusec = 28.3 liter/sec
- 1 cumec = 1000 liter/sec
- 1 mm/ha = 10000 liter
- 1 cm/ha = 1,00,000 liter water

Origin of Important Agronomic Crops

Crop	Origin	Crop	Origin
Wheat, Gram	South West Asia	Sesame	S.W. Africa
Rice	Indo-Burma	Castor	Ethiopia
Maize	Mexico	Sunflower	Mexico
Groundnut, Rubber	Brazil	Jute	Africa
Bajra, Sorghum, Arhar	Africa	Tobacco	Mexico and C. America
Soybean, Rai, Tea, Mustard	China	Sugarcane/ Tropical or Indian cane	New Guinea
Potato	South America	Sugar beet	Mediterranean region
Oat	Asia minor	Safflower	Mediterranean region
Moong, Finger millet, Cotton, Urd	India	Lucerne	Iran
Barley	Abyssinia (Ethiopia)	Rapeseed	Pakistan, India
Field pea	Mediterranean region	French bean	S. America
Cowpea	Central Africa		

Conversion Factors Table

P ₂ O ₅	P × 2.29	NH ₄	N × 1.28
P	P ₂ O ₅ × 0.43	N	NH ₄ × 0.77
K	K ₂ O × 0.83	NO ₃	N × 4.43
K ₂ O	K × 1.20	N	NO ₃ × 0.22
Organic matter	Organic carbon × 1.724	CaCO ₃	Ca × 2.5
Organic matter	N × 20	Ca	CaCO ₃ × 0.4
N	OM × 0.05		

Nursery For Rice

S. No.	Type of nursery	Area (Meter sq.)
1.	Dry bed	1000 m ²
2.	Wet bed	1250-1500 m ²
3.	SRI	100 m ²
4.	Dapog	25-30 m ²



Revolutionary Developments in Agricultural Sectors and Related Fields

Revolution	Field	Father of Revolution
Rainbow revolution	Overall development of agriculture sector	
Evergreen revolution	Reduction in food wastage & productivity improvement in perpetuity.	Dr. M.S. Swaminathan
Golden revolution	Fruit production (Apple)	
Green revolution	Food grain production (Rice & Wheat).	M.S. Swaminathan
Black revolution	Crude oil/ Petroleum/Biofuels (Jatropha)	
Yellow revolution	Oilseeds (Especially Mustard & Sunflower)	Sam Pitroda
Round revolution	Potato	
Blue revolution	Fisheries production	Dr Arun Krishnan
Red revolution	Meat/ Tomato	
Silver revolution	Eggs/ Poultry	Indira Gandhi
Gray revolution	Fertilizer and manures	
White revolution	Milk production	Verghese Kurien
Pink revolution	Prawn/ Onion	Durgesh Patel
Golden fibre revolution	Jute	
Brown revolution	Non- conventional products (coffee, cocoa, leather etc. Food-processing.	
Silver fibre revolution	Cotton	

Conversion Factors for Fertilizers

Particulars	Conversion
DAP to N	5.55
Urea to N	2.17
DAP to P ₂ O ₅	2.08 (48% P ₂ O ₅) 2.17 (46% P ₂ O ₅)
Ammonium Sulphate to N	4.76

SSP to P ₂ O ₅	6.25
Potassium Sulphate to K ₂ O	2.0
KCl to K ₂ O	1.66

Note: Fertilizer requirement = Recommended dose x Conversion factor

Food Grain Production (as on 25/10/2024)

Commodity	Production (Million ton) 2022-23	Production (Million ton) 2023-24 (3rd estimate)
Rice	135.75	136.7
Wheat	110.55	112.92
Bajra	11.43	10.66
Maize	38.08	35.67
Sorghum	3.81	4.74
Barley	1.91	1.65
Coarse cereals	57.31	54.73
Cereals	303.62	304.35
Total pulse	26.05	24.49
Total food grain	329.68	328.85

Source: Directorate of Economics and Statistics, DoA, C and FW, MoA and FW, GOI.

Largest Producing State of Important Crops (2023-24)

Commodity	State (Which having 1st position)
Rice	Telangana
Wheat	UP
Maize	KN
Groundnut	Gujarat
Soybean	MP
Sunflower	Karnataka
Sugarcane	UP
Cotton	Gujarat
Jute and Mesta	West Bengal
Rapeseed and Mustard	Rajasthan
Total coarse cereals	Rajasthan
Total pulses	MP
Total food grains	UP
Total oilseeds	Rajasthan



Total Area and Production of Major Fruits in India 2023-24

Commodity	Area (in '000 ha)	Production (in '000 MT)
Banana	995	37474
Mango	2406	22548
Apple	304	2675
Citrus (Lemon)	317	3903
(Mandarin)	446	6170
(Sweet orange)	233	3946
Guava	345	5449
Grapes	176	3896
Litchi	99	765
Papaya	149	5342
Pineapple	105	1802
Pomegranate	235	2934
Sapota	73	897
Ber	48	512
Custard Apple	56	510
Strawberry	2	14
Total fruits	7046	112628

Source: Indian Horticulture Database, National Horticulture Board (NHB).

Total Area and Production of Major Vegetable In India 2023-24

Commodity	Area (in '000 ha.)	Production ('000 T)
Potato	2327	56762
Onion	1537	24212
Tomato	873	21238
Brinjal	681	12810
Cabbage	436	10254
Cauliflower	501	9687
Okra	554	7253
Capsicum	40	632
Radish	200	3146
Peas	607	6609

Commodity Area and Production Data

Commodity	Area (in '000 ha.)	Production ('000 T)
Sweet potato	111	1306
Bitter guard	135	1751

Bottle guard	223	3720
Cucumber	140	1922
Mushroom	NA	336
Beans	312	2834
Carrot	126	2664
Total vegetable	11112	204958

Source: Indian Horticulture Database, National Horticulture board (NHB).

Leading State in Area and Production of Horticulture Crops 2023-24

Commodity	Leading state in area	Leading state in production
Fruits	MH	AP
Vegetable	UP	UP
Flower (Loose)	—	TN
(Cut)	—	KN
Aromatic	Rajasthan	MP
Spices	Rajasthan	MP
Plantation	Karnataka	KN
Total Horticulture produce	KN	UP

MSP of Important Crops (As on April-August 2022)

Commodity	Variety	2023-24	2024-25
Paddy	Common	2183	2300
Paddy	Grade 'a'	2203	2320
Jowar	Hybrid	3180	3380
Jowar	Maldandi	3225	3421
Bajra		2500	2625
Ragi		3846	4099
Maize		2090	2225
Tur (arhar)		7000	7500
Moong		8558	8682
Urad		6950	7400
Groundnut		6377	6783
Sunflower seed		6760	7280
Soyabean (yellow)		4600	4892
Sesamum		8635	9267
Nigerseed		7734	8717
Cotton	Medium staple	6620	7121



Cotton	Long staple	7020	7521
Wheat		2275	2425
Barley		1850	1980
Gram		5440	5575
Masur (lentil)		6425	6700
Rapeseed & mustard		5650	5950
Safflower		5800	5940
Toria		5650	5950
Copra	Milling	10860	11160
Copra	Ball	11750	12000
De-husked coconut		2930	3013
Jute		5050	5335

Source: Directorate of Economics and Statistics, C and FW, MoA and FW, GOI.

* Including bonus of R 100/quintal

** Including bonus of R 75/quintal

^ Including bonus of R 200/quintal

^^ Including bonus of R 425/quintal

@ Including bonus of R 150/quintal

Total Production, Import and Consumption of Fertilizer 2022-23

Fertilizer	Total production (000 Tonnes)	Total import (MT)	Total consumption (MT)
Urea	28495.3	7580	35725.1
Ammonium sulphate	–	–	842.9
Ammonium chloride	–	–	62.1
SSP	–	–	517.5
Rock phosphate	–	–	38.0
Total NPK	20745.5	10259.7	29844.3

Source: Fertilizer Association of India (FAI).

- Maximum per hector fertilizer use = 229.0 Kg/ha (Telangana)
- Maximum fertilizer use (Total) = UP (5256080 tons)
- Fertilizer consumption in Rajasthan = 1826230 tons (66.4 Kg/ha)

Production, imports and consumption of fertilizers

(Thousand tonnes of nutrients) 2023-24

A.	Nitrogenous fertilizers	
	Production	17066
	Imports	4575
	Consumption	20456
B.	Phosphatic fertilizers	
	Production	4881
	Imports	3046
	Consumption	8307
C.	Potassic fertilizers	
	Imports	2019
	Consumption	1879
D.	All fertilizers (NPK)	
	Production	21947
	Imports	9640
	Consumption	30642

Source: Department of Fertilizers, Ministry or Chemicals & Fertilizers.

Conversion Factors & the Units of Measurement

- The metric system is the most commonly used measurement system in India.
- The MKS system, which is close to SI units, includes meter, kilogram, and seconds.

Parameters	CGS/French/Metric system (Centimetre, Gram, Seconds)	FPS/British system (Foot, Pound, Seconds)
Length	Meter	Foot
Area	Square centimetre	Square foot
Volume	Cubic metre	Cubic foot (cft.)

Weight

- 1 tonne (metric ton) = 1000 kg
- 1 short ton = 907 kg
- 1 ounce = 28.3 gram
- 1 long ton = 1016 kg
- 1 pound = 454 gm = 0.454 kg
- 1 Tg (Tera gram) = 1 million tonne


Area

- 1 hectare = 10,000 m²
- 1 hectare = 2.47 acre
- 1 acre = 4046 m² (0.4046 hectare) or 4840 sq. yard
- 1 hectare = 4 Pucca bigha
- 1 square mile = 2.59 km²
- 1 km² = 100 hectare
- 1 Pucca Bigha = 2530 m²
- 1 Kaccha Bigha = 1618 m²
- 1 hectare = 6 Kaccha bigha

Length

- 1 yard = 3 feet
- 1 inch = 2.54 cm
- 1 furlong = 201 m or 220 yards
- 1 cm = 10 mm
- 1 micrometre (μm) or micron (μ) = 1000 nm or 10⁻⁶ m or 10⁻⁴ cm.
- 1 Picometer (pm) = 1000 Femtometre (fm)
- 1 Angstrom (Å) = 0.1 nm or 10⁻¹⁰ m or 10⁻⁸ cm
- 1 nm = 10 Angstrom (Å)
- 1 feet = 12 inch = 30.48 cm
- 1 mile = 1.6 km
- 1 metre = 100 cm
- 1 milli metre (mm) = 1000 μm
- 1 nanometre (nm) = 1000 pm

Pressure

- 1 MPa = 10 bar.
- 1 Bar = 100 Kilo Pascal (kPa) = 0.1 MPa
- 1 Bar = 1.019 kg/cm²
- 1 Atm = 1.013 bar (1013 mb)
- 1 Bar = 1020 cm height of water column
- 1 ATM = 1033 cm height of water column.

Parts Per Million (ppm)

- Parts per million is a unit of measurement representing the number of parts of a particular substance in a million parts of the whole.
- Conversion from ppm to percent (%): Percent (%) = $\frac{\text{ppm}}{10,000}$
- Conversion from percent (%) to ppm: ppm = Percent (%) × 10,000
- 1 ppm is equivalent to 1 milligram per liter. For example, if the concentration of a salt in the water is 50 ppm, it means there are 50 mg of salt present in 1 liter of water.

Parts Per Billion (ppb)

1 ppb = 1 microgram (μg)/ litre (or Kg)

Jones Factor

- The specific factor used for converting nitrogen content to protein content is called Jones factor. 6.25 is used as a standard jones factor considering 16% N content in the protein. (100/16 = 6.25). E.g.- If the N content (%) in a foodstuff is 5.6%, then the protein content will be 6.25 × 5.6 = 35%.
- Eggs, meat, maize, sorghum: 6.25
- Milk: 6.38 (BHU PET 2019)
- Barley, wheat, millets: 5.83
- Rice: 5.95

Bio- Fortification

Biofortification refers to the process of enhancing the nutritional content like vitamins and minerals (Fe, Zn & vitamin A) in staple food crops such as rice, wheat & vegetables.

1. **Agronomic Biofortification:** Through soil management, and fertilization techniques. Ex.- Application of micronutrient rich fertilizers can improve nutrient content of crops.
2. **Genetic Biofortification:** Through traditional breeding methods or modern biotechnology. E.g. - Golden rice

Per Capita Recommendations (As per ICMR-NIN) & Availabilities in India:

Food group	Requirement (g/day)	Availability (g/day) in India
Cereals	275 g	460 g (2021-22)
Pulses	80 g	54 g (2021-22)
Food grains	355 g	515 g (2021-22)
Fruits	120 g	47 g
Vegetables	300 g (with 115 g of green leafy vegetables)	-
Fats & Oil	27 g/day	58.90 g (2021-22)
Milk	300 g	459 g (2023)
Egg	180 eggs/year	101 eggs/year(2023)

- Protein requirement for an adult: 43 g/day


Father (Associated Person)

Field	Father	Field	Father
Agronomy	Pietro De Crescenzi	Golden revolution	K.L. Chadha
Soil Science & Pedology	V.V. Dokuchaev	Golden rice	Ingo Potrykus and Peter Beyer
Soil Science (India)	J.W. Leather	Fertilizer Chemistry	Justus Von Liebig
Weed & Tillage	Jethro Tull	Hybrid rice	Yuan Longping
Field Plot Technique	Jean Baptiste (J.B.) Boussingault	Super rice	Dr. Gurdev Singh (G.S.) Khush
Super Wheat	Subrahmaniam Nagarajan	Hybrid rice in India	E.A. Siddiq
Zero tillage	Garber/ Glubler B. Triplets	Minimum tillage	E.H. Faulkner
Term Hydroponics	Gericke	ZBNF (Zero Budget Natural Farming)	Subhash Palekar
Yellow Revolution	Sam Pitroda	ATP Cycle	Lipmann
Horticulture (world)	Liberty Hyde Bailey	Horticulture (India)	M.H. Marigowda
Agricultural Chemistry	Justus Von Liebig	Agricultural Chemistry (India)	J.W. Leather
Systematic Pomology	De Candolle	Ornamental Gardening	M.S. Randhawa
Soil Chemistry	Thomas	Soil Physics	Daniel Hillel
Hybrid cotton	C.T. Patel	Bt. Cotton (in India)	C.D. Mayee
Biochemistry	Carl Neuberg	Indian Ornithology	Salim Ali
Agroclimatology	Koppen	Indian Palaeontology	Birbal Sahani
Agrometeorology	D.N. Walia	Indian Remote Sensing	P.R. Pisharoty
Agrometeorology (India)	L.A. Ramdas	Indian Rust	Karam Chand (K.C.) Mehta
Antibiotics	Alexander Fleming	Modern Composting (Indore Method)	Albert Howard
Plant Pathology	Anton De Barry	Mutation theory	Hugo De Vries
Plant Pathology (India)	E.J. Butler	Nematology	N.A. Cobb

Forest Pathology	Robert Harting	European Nematology	H.C. Bastian
Mycology	P.A. Micheli	Soil Microbiology	Winogradsky
Indian Mycology	E.J. Butler	Parasitology	Platter
Organic Farming	Albert Howard	Host- Plant Resistance	R.H. Painter
Biodynamic Farming	Rudolf Steiner	Plant Anatomy	Grew
Natural Farming	Masanobu Fukuoka	Biology & Zoology	Aristotle
Botany	Theophrastus	Plant Tissue Culture	Haberlandt
Plant Physiology	Stephan Hales	Polygenic Inheritance	Kolreuter
Plant Physiology (India)	J. C. Bose	Fruit & Vegetable Preservation	Nicholas Apart
Modern Botany	Carolus Linnaeus	Pure Culture Technique	Oscar Brefeld
Blood Circulation	William Harvey	Safeners	Hoffman
Blood Group	Karl Landsteiner	Nitrogen Fixation	Winogradsky
Soil Conservation/ Soil Erosion Control	H.H. Bennett	Modern Soil Conservation	Wollny
Green Revolution (World)	Norman E. Borlaug	Green Revolution (India)	Dr. M.S. Swaminathan
White Revolution (Operation Flood)	Vergheese Kurien	Krishi Vigyan Kendra (KVK)	Chandrika Prasad
Modern Agriculture Science (Dryland)	Dr. K. Suseela	Dryland Agriculture	Kantakar
Crop Rotation	Norfolk	Taxonomy	Carolus Linnaeus
Mixed Farming	La Flitze	Intercropping	Ayyar
Founder of Relay Cropping	Dr. Biwant Raj	Response Farming	Stewart
Relay Cropping	S.S. Bains	Soil Testing	ML Troug
Cytology/ Cell biology	Robert Hooke	Economics	Adam Smith
Soil Taxonomy	G.D. Smith	Statistics	R.A. Fisher



Modern Cytology	Swanson	Indian Statistics	P.C. Mahalanobis
Vital Statistics	Captain John Graunt	Sociology	Auguste Comte
Cytology in India	A.K. Sharma	Modern Sociology	R.K. Merton
Cytoplasmic Inheritance	Carl Correns	Genetics	Gregor Johann Mendel
Endocrinology	Thomas Addison	Modern Genetics	W. Bateson
Extension	J.P. Leagans	Experimental Genetics	T.H. Morgan
Extension Education	Seaman A. Knapp	Cooperative Movement (World)	Robert Owen
Extension (in India)	Kedar Nath (K.N.) Singh	Cooperative Movement (India)	F. Nicholson
Method Demonstration	Seaman A. Knapp	DNA Fingerprinting	Alec Jeffrey
Fermentation & Pasteurization	Louis Pasteur	Genetic Engineering	Paul Berg
Cytoplasmic Inheritance	Carl Correns	Economic Ecology	M.S. Swaminathan
Immunology	Edward Jenner	Term ecology	Ernst Haeckel
Plant Breeding (India)	Dr. B.P. Paul	Ecology (India)	Ramdeo Mishra
Eugenics	Francis Galton	Ecology	Humboldt

Non-vascular thallus plants	Bryophytes
Plants growing well under acidic conditions	Acidophiles
Plants preferring alkali soil	Basophiles
Salt-tolerant plants	Halophytes
Gypsum (Calcium sulphate) loving plants	Gypsophytes
Plants growing in moderate conditions (neither excessively wet nor dry soil)	Mesophytes
Calcium sensitive plants	Calcifuges
Light-loving plants	Heliophytes
Plants growing in warm and moist climates	Phanerophytes
Seeded vascular plants	Spermatophytes
Plants able to grow on rocks	Pterophytes
Plants roots capable of penetrating into rock fissures/crevices	Chasmophytes
Seedless vascular plants	Pteridophytes
Plants growing on rock surfaces	Lithophytes
Plants growing on land	Terrestrial plants
Water-loving plants	Hydrophytes
Plants growing under extremely cold climates	Chamaephytes
Plants able to grow in two contrasting conditions, e.g., both land and water	Amphiphytes
Plants growing on another plant for physical support but not securing nutrition from them	Epiphytes
Plants showing the presence of subsurface water	Phreatophytes
Plants growing in hot and dry conditions	Therophytes
Plants growing under desert/dry conditions	Xerophytes

Classification of plants based on ecological or environmental preferences

Condition	Plants
Plants growing on ice or snow	Cryophytes
Calcium-loving plants	Calciphytes
Plants tolerant to high acidity conditions	Oxylophytes
Plants preferring sandy soils	Psammophytes
Shade-loving plants	Sciophytes

