



Chapter 1

The Genesis of Agriculture

“We are all born with a divine fire in us. Our effort should be to give wings to this fire”
- Dr. A. P. J Abdul Kalam

1.1 Introduction to Indian Agriculture Heritage

Definition: Agriculture heritage is defined as “The techniques and ways of growing crops and rearing animals which are constantly adapted to time, place and local culture that are handed over as a tradition”.

Human being (*Homo sapiens*) has been on the earth for approximately 2 million years. He has been a hunter gatherer for 99.5 per cent of existence and this period is considered as the most successful. Only, 12,000 years ago he started domesticating plants and recognized weather as the most precious natural resource. He managed environments in which he lived for generations by following environmental friendly agricultural practices and without significantly damaging local ecologies. This indicates that ancient knowledge has immense potential to manage the risks in agriculture. However, in the past 200 years of scientific agriculture there has been an over exploitation of natural resources and the environment has degraded.

History unveils that the genesis of agriculture in India as a means of sustaining human life can be traced back to 10,000 BC or 12,000 years ago. However, in the absence of written records about the beginning of agriculture in the pre historic India, one has to depend on archeo-botanical materials obtained during several archaeological excavations conducted in India.

In ancient times India was primarily referred to by two names *viz.*, (a) Bharatvarsh and (b) Jambudweep. To the west of India is the land of

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“pariha”, which evolved into modern Iran. The history of agriculture and civilization go hand in hand as the food production made it possible for primitive man to settle down in areas leading to formation of society and initiation of civilization. The development of civilization and agriculture had passed through several stages (ages).

1.2 Stages / Ages

Archaeologists initially classified the stages (ages) as (a) stone age (b) bronze age and (c) iron age.

(a) **Stone age:** The scholars split up the stone age into (i) *Paleolithic age (old stone age)* (ii) *Mesolithic age (new stone age)* (iii) *Neolithic age*

- *Paleolithic age (old stone age):* This period is characterized by the food gatherers and hunters. The man started making stone tools, choppers and rude choppers
- *Mesolithic age (new stone age):* The transitional period between the end of paleolithic age and beginning of neolithic age is called mesolithic age. It began about 10,000 BC and ended with the rise of agriculture (7500 BC to 6500 BC). This period is characterized by stone implements called microliths. People lived as food gatherers and hunters. The domestication of animals was the major achievement of the mesolithic age hunter
- *Neolithic age:* This age is also known as agricultural revolution age (7500 BC to 6500 BC), because during this period discovery of agriculture took place in western Asia (Israel, Jordan, Iran etc). In this region wild ancestors of two cereals wheat and barley and of domesticated animals like goat, sheep, pig and cattle were found. Polished stone axe and sickle were used for cultivation of crops like wheat, barley, rice, maize and millets. Horse and ass were used as draught and transport animals. The distinguishing feature of this age is that the farmers built their houses with locally available material. Pots for storing of food grain and weaving with wool are other developments. This age brought major changes in techniques of food production which gave the farmer control over his environment and saved him from the precarious existence of mere hunter and gatherer of wild berries and roots
- The main features of neolithic culture in India
 - economic and technological development

- use of polished stone axes for clearing and cleaning bushes
 - handmade pottery for storing food grains
 - invention of textile weaving
 - the discovery of silk
 - cultivation of rice, banana sequence and yam in eastern part of India
 - cultivation of millets and pulses in South India.
- (b) **Bronze age** (*Chalcolithic culture 3000-1700 BC*): In this age, stone implements along with copper and bronze were used. The chalcolithic revolution began in Mesopotamia and spread to Egypt and Indus valley. The significant features are (a) invention of plough (b) shifting of agriculture from hilly areas to lower river valley areas (c) flood water were stored for irrigation and canals were dug (d) sowing of seed by dibbling with a pointed stick.
- (c) **Iron age**: The Aryans knew the use of iron. India entered iron age during Vedic period. When Rigveda was composed the iron age already commenced. Farmers used iron for making implements.

1.3 Periods

The periods in agricultural heritage are A. Ancient period B. Medieval period and C. Modern period

A. Ancient period: 10,000 BC to beginning of Anno Domini (AD)

B. Medieval period: beginning of AD to 18th Century

C. Modern period: 19th Century to date

1.4 The Genesis of Agriculture and its Chronological Arrangement

A comprehensive account of ancient agricultural practices, from prehistory to 1200 AD, is given in "Agriculture in ancient India-a report" written by S P Raychaudhuri and Mira Roy, published by the Indian Council of Agricultural Research (ICAR) in 1993. This report uses the following chronological arrangement:

(A) Prehistory: (6600 BC-1000 BC)

(B) Protohistory: Chalcolithic and iron age (2320 BC-450 BC)

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(C) Historic period: (500 BC-1200 AD)

- Early historic period (500 BC-100 BC)
- Mid historic period (start of the Christian era-1200 AD).

A. 12000 to 9500 years ago

- Hunters and food gatherers stage existed
- Stone implements were seen throughout the Indian subcontinent
- Tribals of Madhya Pradesh (Bastar, Betul, Chhindwara, Jhabua) have never experienced famine. However, if experienced they ate 165 edible tree products, shrubs, and climbers; seeds of 31 plants were roasted for eating; roots/tubers of 19 plants were eaten after roasting/boiling. Honey was used for sugar
- Earliest agriculture was by vegetative propagation (e.g., bananas, sugarcane, yam, palms and ginger)

B. 9500 to 7500 years ago

- Neolithic agricultural revolution occurred in western Asia (9500-8500 years ago) mainly in the “fertile crescent” (hilly regions embracing Israel, Jordon, Anatolia in Turkey, Iran, Caspian basin, and adjoining Iranian plateau)
- In the “fertile crescent”, wild ancestors of wheat and barley, goat, sheep, pig and cattle were found

C. 7500 to 5000 years ago

- Significant features were invention of plough, irrigated farming, use of wheel, and metallurgy and in Egypt seed dibbling
- Rigveda was composed 5700 years ago. Agriculture was well developed
- Earliest record of rice was from Non Nok Tha in Thailand, 5500 years ago

D. 5000 to 4000 years ago

- Harappan culture existed in India
- Excavations in Kalibangan (western Rajasthan) revealed ploughed field. Mostly post rainy season crops were grown
- Early evidence of a seed drill has been found in Lothal
- Wheeled carts were commonly used in the Indus valley
- Bullock carts from Lothal had solid wheels

- River boats were used for carrying grain. Agriculture, fishing and trade were the main occupations
- Gram (chickpea) remains have been found in Kalibangan; sesame which originated in west Africa was brought to India directly or via Mesopotamia; later, sesame was taken from India to China

E. 4000 to 2000 years ago

- Original focus of settlements in south India was Raichur/Bellary
- There is a record of sorghum grain from Inamgaon, Maharashtra
- Fingermillet found at Hallur dated 1800 BC
- Also minor millets, *Setaria* and *Panicum* were eaten
- In Inamgaon (Maharashtra), people cultivated wheat, *kulthi*, mung bean, and pea. Channels from the river were made for irrigation
- In eastern India, rice, bananas, and sugarcane were cultivated
- Excavations at Pandu, Rejar, and Dhibi in West Bengal revealed that rice, fish, meat of neelgai, deer and pig were consumed as food

F. The Vedic, Buddhist, and Jain Age

- Carpenters made ploughs, chariots and doors. Aryans used copper and leather
- Ploughing was mentioned frequently in Rigveda
- Irrigation was practiced from rivers. Wells were also used
- Farm land was measured
- The harvesting tool was sickle
- Rice was cultivated
- Benefits of crop rotation were appreciated
- Plant protection against moles, birds, and "blight" has been mentioned in Atharvanaveda
- Krishi-Parashara was written around 400 BC, in Takshsila-Sialkot region
- Artha Shastra (400 BC) and the Pali texts, Mahavagya and Kallavagya (300 BC) were sources of information on agriculture

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- Artha Shastra mentions river beds for cultivation of cucurbits, and planting in furrows between two rows of Vetiver. Crops mentioned are
 - rice, sesame during the beginning of rainy season
 - *mung* and blackgram during mid-rainy season
 - safflower, lentil, horsegram, barley, wheat, pea, chickpea, linseed, mustard during end of post rainy season
 - seed treatments were recommended to ensure good germination
 - sugarcane cut ends were plastered with honey, ghee, and cow dung
 - cotton seeds were treated with cow dung
 - sprouts of seeds were manured with a fresh haul of minute fishes and irrigated with milk of *snuhi*.

G. Emperor Ashoka (274-237 BC)

- Emperor Ashoka prohibited burning of forests
- He promoted and adopted a state policy on arboriculture and horticulture—first ever in the world
- He built houses in every 9 miles for men/animals to take rest
- He encouraged planting of mango, banana, grapevine, jack fruit, palm and wild datepalm.

H. Satavahanas (Andhras) (100 BC-200 AD)

- The Satavahanas ruled Andhra, Karnataka, Vidarbha, Malwa, and western Rajasthan
- Coconut was propagated first on the east coast during this period. The Satavahana king, Nahapana, gifted large coconut plantations to people
- Takshasila became a centre for development of iron technology and iron was exported to west Asia
- The variety of farm implements increased
- Cultivation of rice, fingermillet, sugarcane, cotton, pepper, and turmeric was common. Tank irrigation was developed and practiced widely. In drylands *ragi* and other minor millets were planted

- Varahamihira (astrologer, astronomer, encyclopedist) wrote Brihat Samhita (agriculture, plant protection, and manuring)
- Amarkosha written by Amar Simha contains information on soil, irrigation and agricultural implements; describes 12 types of land
- **1500-1000 years ago**
- Information on agriculture was based on the book of Hiuen Tsang (Chinese scholar) and in Harshacharita, written by Banabhatta
- Fertile soils of Magadh and Malwa were productive and suitable for wheat in winter
- Cereals such as wheat, rice, millets, and fruits were extensively grown. A 60-day variety and fragrant varieties of rice were mentioned
- Arecanut, nutmeg, and camphor oil were mentioned
- Ginger, mustard, melons, pumpkin, onion and garlic were also mentioned.

1.5 Homes of Evolution of Agriculture “Old and New” World

Researchers have identified seven (7) homes of evolution of agriculture in the "old" world and three (3) in the "new" world.

A. In the "old" world

- Oldest center of diversity and origin of cultivated species of plants in southeast Asia comprising Thailand, Malaysia and adjoining areas for rice, sugarcane, banana, coconut, cardamoms and turmeric
- Second oldest center was the “fertile crescent” in west Asia for wheat, forages, olive, grapes and almond
- Third was south India for rice, jute, *desi* cotton, pulses, mango, citrus species and black pepper
- Fourth was China for soybean, apricot, litchi and some citrus species
- Fifth was northern India, Afghanistan and Iran for bread wheat, rye, linseed and walnut
- Sixth was the center bordering the Mediterranean for oats, temperate zone fruits, vegetables, cabbage and cauliflower

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- Seventh was Ethiopia for wheat, sorghum, castor, barley, coffee and watermelon.

B. In the "new" world

- Mexico for maize, sweet potato, cotton, chillies, guava, pumpkin, and beans
- Peru and Bolivia for potato, tomato, and tobacco
- Argentina and Brazil for rubber, cashewnut, cocoa, groundnut and pineapple.

1.6 Early Indigenous and Other Domesticated Crops

Besides rice, the indigenous people of India domesticated minor millets, grain legumes, oilseeds and other crops.

A. Southwest Asian domesticates

Several species of winter cereals (wheat, barley), legumes and other crops were domesticated in southwest Asia and several of those crops diffused into India.

B. African domesticates

Sorghum, fingermillet and pearlmillet were domesticated in Africa. These crops diffused into India around 2000 BC, and were identified from several archaeological sites.

