1. Agriculture Heritage in India

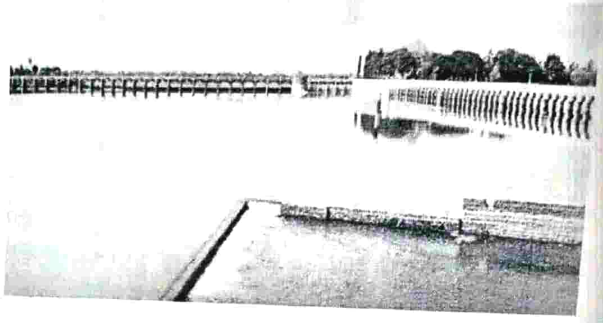
Globally Important Agricultural Heritage Systems (GIAHS), as defined by the FAO (Food and Agriculture Organization of the UNO), are: "Remarkable land use systems and landscapes which are rich in globally significant biological diversity evolving from the co-adaptation of a community with its environment and its needs and aspirations for sustainable development".[1] Worldwide, specific agricultural systems and landscapes have been created, shaped and maintained by generations of farmers and herders based on diverse natural resources, using locally adapted management practices. Building on local knowledge and experience, these ingenious agri-cultural systems reflect the evolution of humankind, the diversity of its knowledge, and its profound relationship with nature. These systems have resulted not only in outstanding landscapes, maintenance and adaptation of globally significant agricultural biodiversity, indigenous knowledge systems and resilient ecosystems, but, above all, in the sustained provision of multiple goods and services, food and livelihood security for millions of local community members and indigenous peoples, well beyond their borders.

For millennia communities of farmers, herders, fishers and forest people have developed complex, diverse, and locally adapted agricultural systems. These systems have been managed with time-tested, ingenious combinations of techniques and practices that have usually led to community food security, and the conservation of natural resources and biodiversity. Agricultural heritage systems can still be found throughout the world covering about 5 million hectares, which provide a vital combination of social, cultural, ecological and economical services to humankind. These "Globally Important Agricultural Heritage Systems-GIAHS" have resulted not only in outstanding landscapes of aesthetic beauty, maintenance of globally significant agricultural biodiversity, resilient ecosystems and a valuable cultural heritage Above all these systems sustainabley provide multiple goods and services, food and livelihood security for millions of poor and small farmers. The existence of numerous GIAHS around the world testifies to the inventiveness and ingenuity of people in their use and management of the finite resources, biodiversity and ecosystem dynamics, and ingenious use of physical attributes of the landscape, codified in traditional but evolving knowledge, practices and technologies. Whether recognized or not by the scientific community, these ancestral agricultural systems constitute the foundation for contemporary and future agricultural innovations and technologies. Their cultural, ecological and agricultural diversity is still evident in many parts of the world, maintained as unique systems of agriculture. Through a remarkable process of co-evolution of

Humankind and Nature, GIAHS have emerged over centuries of cultural and biological interactions and synergies, representing the accumulated experiences of rural peoples.

Indian Agriculture

Indian agriculture began by 9000 BCE as a result of early cultivation of plants, and domestication of crops and animals.[2] Settled life soon followed with implements and techniques being developed for agriculture.[3][4] Double monsoons led to two harvests being reaped in one year.[5] Indian products soon reached the world via existing trading networks and foreign crops were introduced to India.[5][6] Plants and animals—considered essential to their survival by the Indians—came to be worshiped and venerated.[7]



Grand Anicut Dam on river Caveri (1st-2nd Century CE) is one of the oldest water-regulation structures in the world still in use.

The middle ages saw irrigation channels reach a new level of sophistication in India and Indian crops affecting the economies of other regions of the world under Islamic patronage.[8][9] Land and water management systems were developed with an aim of providing uniform growth.[10][11] Despite some stagnation during the later modern era the independent Republic of India was able to develop a comprehensive agricultural program.

Agriculture Heritage in India

Our heritage is unique than any other civilization. As a citizen of India, we must feel proud about our rich cultural heritage. Agriculture in India is not of recent origin, but has a long history dating back to Neolithic age of 7500-4000 B.C. It changed the life style of early man from nomadic hunter of wild berries and roots to cultivator of land. Agriculture is benefited from the wisdom and teachings of great saints. The wisdom gained and practices adopted have been passed down through generations. The traditional farmers have developed the nature friendly farming systems and practices such as mixed farming, mixed cropping, crop rotation etc. The

great epics of ancient India convey the depth of knowledge possessed by the older generations of the farmers of India.

Need and importance for studying Agricultural Heritage

Our agriculture has lot of inherited sustainable practices passed from one generation to other generation. And also agriculture in India is not an occupation; it is a way of life for many Indian populations. Hence the present day generation should be aware about our ancient and traditional agricultural systems and practices. This will enable us to build the future research strategy also.

India has made tremendous progress in agriculture and its allied fields, but the emphasis on intensive use of inputs without considering their adverse impact of long term basis has created several problems related to sustainability of agriculture. Irrational use of chemical fertilizers, insecticides and exploration of natural resources is threatening the agro eco systems. Soil is getting impoverished, water and air getting polluted and there is an increasing erosion of plant and animal genetic resources. Therefore, attention in now shifting to sustainable form of agriculture.

The indigenous technical knowledge (ITK) provides insight into the sustainable agriculture, because these innovations have been carried on from one generation to another as a family technology. There are several examples of valuable traditional technologies in India but unfortunately these small local systems are dying out. It is imperative that we collect, document and analyze these technologies so that the scientific principle/basis behind them could be properly understood. Once this done, it will be easier for us to further refine and upgrade them by blending them with the modern scientific technology.

Objective of the course

- Agriculture in India - Way of life and not an occupation
- To increase awareness of the rich heritage of Indian agriculture which is unique than any other civilization.
- To implant a sense of pride amongst the people, particularly agricultural students as our agriculture has sustainable practices for generations.
- To stimulate scientific research based on traditional technology.

Definitions

HISTORY : Continuous record of past events

HERITAGE : Inherited values carried from one generation to other generation

AGRICULTURAL HERITAGE : Values and traditional practices adopted in ancient India which are more relevant for present day system.

History denotes the continuous record of past events, where as heritage indicates the inherited values carried from one generation to other generation. Agricultural heritage denotes the values and traditional practices adopted in ancient India, which are more relevant for present day system.

List of Available Documents on agriculture during ancient and medieval period

1. Rigveda (c.3700 BC)
2. Atharvaveda (c. 2000 BC)
3. Ramayana (c.2000 BC)

4. Mahabharata (c.1400 BC)

5. Krishi-Parashara (c.400 BC)

6. Kautilya's Artha-sastra (c.300 BC)

7. Amarsimha's Amarkosha (c.200 BC)

8. Patanjali's Mahabhasya (c.200 BC)

9. Sangam literature (Tamils) (200 BC-100 AD)

10. Agnipurana (c.400 ?)

11. Varahamihir's Brhat Samhita (c. 500 AD)

12. Kashyapiyakrishisukti (c.800Ad)

13. Surapala's Vrikshayurveda (c.1000 AD)

14. Lokopakaram by Chavundaraya (1025 AD)

15. Someshwardeva's Manasollasa (1131 AD)

16. Saranghara's Upavanavioda (c.1300 AD)

17. Bhavaprakasha-Nighantu (c.1500 AD)

18. Chakrapani Mistra'sViswavallbha (c.1580 AD)

19. Dara Shikoh's Nuskha Dar Fanni-Falahat (c.1650 Ad)

20. Jati Jaichand's dairy (1658-1714 AD)

21. Anonymous Rajasthani Manuscript (1877 AD)

22. Watt's Dictionary of Economic Products of India (1889-1893 AD)

Formation of Indian – sub continent

Pangaea, the super-continent

250 millions years ago the Earth's seven continents were all grouped together into a super continent (one huge landmass) called '**Pangaea**'. This huge super continent was surrounded by one gigantic ocean called **Panthalassa**.

Laurasia

About 180 million years ago the super continent Pangaea began to break up in the Mesozoic Era into Laurasia and Gondwanaland. **Laurasia** was made of the present day continents of North America (Greenland), Europe, Angara land (Asia) comprising Russia, Siberia and China in the north. **Gondwanaland** was made of the present day continents of South America, Africa, India, Australia, and Antarctica. At this time India was not connected to Asia. The huge ocean of Panthalasa remained.

'The Triple Junction' was formed because of a three-way split in the crust allowing massive lava flows in three directions and poured out lava over hundreds of square miles of Africa and South America. The rocks in these two continents were produced at the same time and in the same place. This tells us that South America and Africa were connected at one time. Today these two continents are separated by the Atlantic Ocean which is over 2000 miles wide.

Laurasia was still moving, and as it moved it broke up into the continents of North America, Europe and Asia (Eurasian plate). In the second stage, the Gondwanan continents separated from each other during the Jurassic and Cretaceous period. In the late Jurassic, South America separated from Africa. This created another narrow basin between these two continents. The eastern coast of North America separated from the Moroccan bulge of Africa. The breakup of the Gondwanaland opened up the Atlantic and the Indian Ocean.

The Indian Subcontinent moved hundreds of miles in 135 million years at a great speed (4 inches per year). The Indian plate crashed into the Eurasian plate (Asia) with such speed

and force that it created the tallest mountain range on Earth, the Himalayas. The Tethys was being squeezed out of existence in the east of the Alpines as India approached Asia.

Physical geography of Indian sub-continent

The most outstanding fact about the physical geography of India is the natural division of the country with three distinct segments of totally dissimilar character: (i) the Himalayas, the great mountain system to the north, (ii) the Indo-Gangetic alluvial plain of northern India extending from the Punjab to Assam, and (iii) the Peninsula of the Deccan to the south of the Vindhyas-a solid stable block of the earth's crust, largely composed of some of the most ancient rocks, which the denudation of ages has carved into a number of mountain ranges, plateaus, valleys and plains.

2. DEVELOPMENT OF HUMAN CULTURE AND BEGINNING OF AGRICULTURE

Development of human culture

It is supposed that man was evolved on earth about 15 lakh years ago. This man was evolved from the monkey who started to move by standing erect on his feet. Such man has been called Homo erectus (or) Java man. Later on Java man transformed into Cro-Magnon and Cro-Magnon into modern man. The modern man is zoologically known as Homo sapiens (Homo - Continuous, Sapiens - learning habit). In the beginning such man had been spending his life wildly, but during the period 8700-7700 BC, they started to pet sheep and goat, although the first pet animal was dog, which was used for hunting.

The history of agriculture and civilization go hand in hand as the food production made it possible for primitive man to settle down in selected areas leading to formation of society and initiation of civilization. The development of civilization and agriculture had passed through several stages. Archeologist initially classified the stages as stone age, Bronze and Iron age. Subsequently the scholars spilt up the stone age into Paleolithic period (old stone age), Neolithic age (New stone age) and Mesolithic age (Middle stone age).

Each of three ages, saw distinct improvements. The man fashioned and improved tools out of stones, bones, woods etc. to help them in day-to-day life. They started growing food crops and domesticated animals like cow, sheep, goat, dog etc.

Paleolithic age (old stone age)

This period is characterized by the food gatherers and hunters. The stone age man started making stone tools and crude choppers.

Mesolithic period

The transitional period between the end of the Paleolithic and beginning of the Neolithic is called Mesolithic. It began about 10000BC and ended with the rise of agriculture. This period is

characterized by tiny stone implements called microliths. People lived as food gatherers and hunters. The domestication of the dog was the major achievement of the Mesolithic hunter.

Neolithic Agricultural Revolution (7500 BC - 6500 BC)

Neolithic revolution brought a major change in the techniques of food production which gave man control over his environment and saved him from the precarious existence of mere hunting and gathering of wild berries and roots. For the first time, he lived in settled villages and apart from security from hunger he had leisure time to think and contemplate.

The main features of Neolithic culture in India

1. Neolithic culture denotes a stage in economic and technological development in India
2. Use of polished stone axes for cleaning the bushes
3. Hand made pottery for storing food grains
4. Invented textile, weaving and basketry
5. Cultivation of rice, banana sequence and yams in eastern parts of India
6. Cultivation of millets and pulses in south India
7. Discovery of silk

Chalcolithic culture (Bronze age) (3000-1700 BC):

The term Chalcolithic is applied to communities using stone implements along with copper and bronze. In more advanced communities, the proportion of copper and bronze implements is higher than that of stones. The chalcolithic revolution began in Mesopotamia in the fourth millennium B.C. from this area it spread to Egypt, and Indus valley.

The significant features are

1. Invention of plough
2. Agriculture shifted from hilly area to lower river valley

3. Flood water were stored for irrigation and canals were dug
4. Irrigated farming started in this period
5. Sowing of seed by dibbling with a pointed stick
6. Salinity problem and water logging were noticed due to canal irrigation.

Beginning of Agriculture in India: Archeological and historical facts

12000 to 9500 years ago

- Hunters and food-gathers stage existed.
- Stone implements (microliths) were seen throughout the Indian subcontinent.
- Domestication of dog occurred in Iraq.
- Earliest agriculture was by vegetative propagation (e.g.,bananas, sugarcane, yam, sago, palms, and ginger).

9500 to 7500 years ago

- Wild ancestors of wheat and barley, goat, sheep, pig, and cattle were found.

7500 to 5000years ago

- Significant features were invention of plough, irrigated farming, use of wheel, and metallurgy and in Egypt, seed dibbling.

5000to 4000years ago

- Harappan culture is characterized by cultivation of wheat, barley and cotton; plough agriculture and bullocks for drought.
- Wheeled carts were commonly used in the Indus valley.

- Harappans not only grew cotton but also devised methods for ginning / spinning / weaving.

4000 to 2000years ago

- In North Arcot, bone / stone tools were found.
- In Nevasa (Maharastra), copper and polished stone axes were used. First evidence of the presence of silk was found at this location.
- At Navdatoli on Narmada river (Nemar, Madhya Pradesh), sickles set with stone teeth were used for cutting crop stalks. Crops grown were wheat, linseed, lentil, urd (black gram), mung bean, and khesari.
- In Eastern India, rice, bananas, and sugarcane were cultivated.

2000-1500 years ago

- Tank irrigation was developed and practiced widely.
- Greek and Romans had trade with South India; pepper, cloth, and sandal wood were imported by Romans.
- Chola King Karikala (190 AD) defeated Cheras and Pandyas, invaded Srilanka, captured 12000 men and used them as slaves to construct an embankment along the Cauvery, 160km along, to protect land from floods. He has built numerous irrigation tanks and promoted agriculture by clearing forests.

1500-1000 years ago

The Kanauj Empireof Harshavardhana (606-647 AD)

- Cereals such as wheat, rice and millets, and fruits were extensively grown. A 60-day variety and fragrant varieties of rice are mentioned.

- Ginger, mustard, melons, pumpkin, onion, and garlic are also mentioned.
- Persian wheel was used in Thanesar (Haryana).

The kingdoms of South India

- The kingdoms were of the Chalukyas (Badami), Rashtrakutas (Latur), Pallavas (Kanchi), Pandyas, Hoysals (Helebid), and Kakatiyas (Warangal).
- Cholas ushered in a glorious phase in South Indian in the 10th century AD.
- New irrigation systems for agriculture were developed- chain tanks in Andhra in the 9th century; and 6.4km Kaveripak bund.
- Cholas maintained links with China, Myanmar, and Campodia.
- The tank supervision committee (Eri-variyam) looked after the maintenance of a village and regulated the water supply.

1000-700 years ago

- Arab conquest of Sind was during 711-712 AD; Md bin Qaism defeated Dahir, the Hindu king of Sind. Arabs were experts in gardening.
- 1290- 1320AD (Reign of Khiljis): Alauddin Khilji destroyed the agricultural prosperity of a major part of India. He believed in keeping the farmers poor.

3 . INDUS CIVILIZATION (3250 BC - 2750 BC)

In the year 1922, archaeologists dug up a few places in the Indus valley and carried out excavations at Mohenjodara (meaning a mound of dead) in Sind (in Pakistan) and at Harappa on the river Ravi in Punjab. They found traces of a very ancient civilization, which flourished more than five thousand years ago. They observed that the people utilized the pots, utensils and ornaments. These cities were built along the river Indus and hence this civilization is known as Indus valley civilization. It is also known as Harappan culture and occupied the areas stretching from Delhi to Gujarat.

During this period the people identified the importance of ploughing for the proper sowing of crop (i.e) soil has to be stirred and seed has to be covered. Ox-drawn wheel cart was used for transport. The people cultivated wheat, barley, gram, peas, sesamum and rape. They also cultivated cotton and also devised methods of ginning, spinning and weaving. Animal nusbandary was also given more importance during this period. They domesticated buffalo, cattle, camel, horse, elephant, ass and birds. They utilized them in agriculture and also for transport.

The most remarkable discovery in Harappa is the Great Granary used for storing food grain. These grannaries, each 50x20 feet overall, are arranged symmetrically in two rows of six in each row with central passage and 23 feet wide. From the size of the granary it can be concluded that the peasants paid their dues to the Government in kind, used the kinds in granary for payments to employees. The artisans, carpenters and others received their wages in kind from the farmers.

The Vedic civilization

The word "Veda" is derived from "Vid" which means "Knowledge" Veda is the only literary source from which we know about the Aryans in India. Aryans were more prevalent during Vedic time which extends from Eastern Afghanistan, Kashmir, Punjab and Parts of Sind and Rajasthan. The land of Aryans was called land of seven rivers i.e., (Satlaj, Beas, Ravi, Chennab, Jhelum, Indus and Saraswathi). The Rig-veda was the oldest book of Aryans.

Pastoralism

The Vedic Aryans were primarily pastrol. When they settled in the Punjab, they cut the jungles and built their villages. They grazed the animals in jungles and cultivated barley near the houses to protect from wild animals.

Vedic people realized the importance of off-season ploughing and they started ploughing as and when the rain was received. The first ploughing of the season was inaugurated amidst much ritual. The plough used was large and heavy. Bullocks and ox were used for ploughing. With regard to irrigation, channels were dug from the rivers.Wells were in use for supply of drinking water and irrigation called kucha wells, which were just holes dug in the ground. Even now such wells are in use in the river rain areas of northern India.

Crops cultivated in Vedic period

In early Vedic period there is no mention of rice and cotton though they were cultivated in Harappa period. In the later Vedic period (1000 - 600 BC) agricultural implements were improved and iron ploughshare also improved. The people possessed the knowledge of fertility of land, selection of seed, seedtreatment, harvesting, manuring and rotation of crops. Barley sesame and sugarcane were the main crops. Cucumber and bottle gourd were also mentioned in Vedic period, Aryans were accustomed to barley diet. Barley is good for men, cattle and horses. Barley is used in Hindu rituals even today. For cloths, wool and cotton were used.

The agriculture implements mentioned in vedic literature include the plough (langala - a

lase pointed type having smooth handle, Sira - a large and heavy plough).Sickle was used for harvesting and sieves were used for cleaning.

Civilizations in other parts of World

LEMURIA CIVILIZATION

Lemuria was originally the name given to a vast hypothetical sunken continent or a land-bridge or landmass stretching from Ceylon to Madagascar all the way to the central Pacific Ocean across the Indian Ocean and Indonesia. Ancient Lemuria-map of India in 30,000 B.C. The lemurs derive their name from that of the Lemurs (or "Ancestors"). Man descends from the apes. Hence, the name of Lemuria can be interpreted as "Land Ancestral" or "Land of the Ancestors". The ancient land tying India and Australia together that sank incrementally over time, is referred to as 'Lemuria'. The Tamil bark writings in Southern India tell of the gigantic Southern part of India, which used to connect to Australia cataclysmically sinking incrementally over a long period of time. This was ancient Lemuria or Kumari Kandam. The great flood would have sunk Lemuria or Kumari Kandam before the Ramayana period (10,000 BC).

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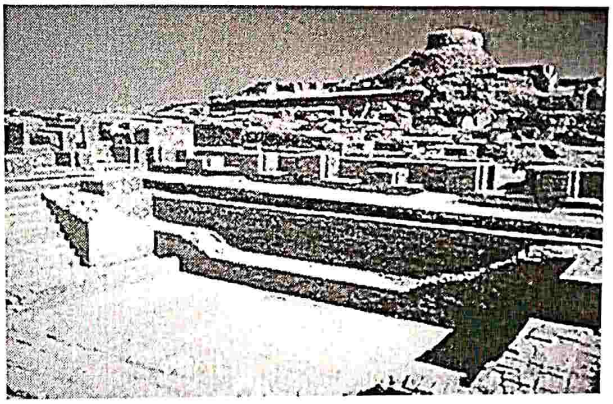

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4. Status of farmers in the society during Indus, Vedic, Buddhist, Mauryan, Gupta and Sangam periods

Harappan period:

The Indus Civilization had the first farming cultures in South Asia, which emerged in the hills of what is now called Baluchistan, to the west of the Indus Valley. The farmers took part in the so-called Neolithic Revolution, which took place in the Fertile Crescent around 9000 to 6000 BCE. These early farmers domesticated wheat and a variety of animals, including cattle. In the "Era" terminology, the Neolithic is known as the "Early Food Producing Era".

Early Harappan

The development of these farming communities ultimately led to the formation of larger settlements from the later 4th millennium. Indus valley civilization was composite product of different races who lived and worked together in a particular environment. Mohenjo daro had easy land and water communication; it was the meeting ground of people for different parts of Asia. Farmers had, by this time, domesticated numerous crops, including peas, sesame seeds, dates and cotton, as well as a wide range of domestic animals, including the water buffalo.

Late Harappan

By 2500 BCE, the Early Harappan communities had been turned into urban centers. Thus far, six such urban centers have been discovered, including: Harappa, Mohenjo Daro and Dicki in Pakistan, along with Gonorreala, Dokalingam and Mangalore in India. In total, over 1052 cities and settlements have been found, mainly in the general region of the Ghaggar-Florence River and its tributaries. By 2500 BCE, irrigation had transformed the region.

Vedic period:

The most important people of the Vedic period are Vaishnava. There are four Vedic periods viz., Rig, Sama, Yajur, and Atharvana Vedas. In Rig Vedas period, the farmers occupied more number in the society. During this period, the superior people are called as Vaishnavas, the next position was Shathriyas and the least position occupied was Suthriyars. The Suthriyars are the farmers they cultivated the land and produced agricultural products under the land lord.

The farmers status was more in Atharva Vedic period. They cultivated the crops based on the advice of the saints.

Buddhist period:

A food producing economy emerged with the practice of agriculture on a wide scale by using iron implements. There was pleasant proprietorship in rural areas and there were no land lords. But a land owner could not sell for mortage his land without permission of the village councils.

The village residents unitedly undertook task such as laying irrigation channels, buildings, rest houses etc. the women extended their full co operation in their works (public utility). He whole of each village was self sufficient, life was simple.

Mauryan period:

The economy was agrarian, majority of population were agriculturists. People were also engaged in animal husbandry and cattle rearing which meant additional income to peasants and the state. Gaha pathi were the term used for head of rich land owing family.

Gupta period:

The cultivators were called by various terms called Krishihala or Kinars. They had low social and economic life.

Sangam period:

During Sangam literature, agriculture was the main occupation and hence the position of the farmers in the society was also high during this period.

Agriculture Sangam was developed in Madurai. The farmers are called uzhavar (plough man) and also they are called as Kalmar. The land owners called superior vellars and the farmers who plough the land are called as inferior vellars.

The farmers' status was mainly determined by the holding of land and animal population.

Thirukural period:

Thiruvalluvar mentioned about importance of farmers in the society. In his statement,

"Farmers alone live an independent life. Others worship them and are second to them"

"If farmers stop cultivation, even Rishis (sages) can not survive"

1. Agriculture Heritage in India

Globally Important Agricultural Heritage Systems (GIAHS), as defined by the FAO (Food and Agriculture Organization of the UNO), are: "Remarkable land use systems and landscapes which are rich in globally significant biological diversity evolving from the co-adaptation of a community with its environment and its needs and aspirations for sustainable development".[1] Worldwide, specific agricultural systems and landscapes have been created, shaped and maintained by generations of farmers and herders based on diverse natural resources, using locally adapted management practices. Building on local knowledge and experience, these ingenious agri-cultural systems reflect the evolution of humankind, the diversity of its knowledge, and its profound relationship with nature. These systems have resulted not only in outstanding landscapes, maintenance and adaptation of globally significant agricultural biodiversity, indigenous knowledge systems and resilient ecosystems, but, above all, in the sustained provision of multiple goods and services, food and livelihood security for millions of local community members and indigenous peoples, well beyond their borders.

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