

Research paper on Sustainable Agriculture: A Study on Ancient Indian Knowledge System

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Abstract—Agriculture is the primary economic activity of Human being, since the advent of civilization. It started in different places of the world at different times or ages. In India, it started, more or less 10 thousand years ago, during Mehrgarh Civilization, as its excavation reveals in 1970s. Through passage of time and process of development, the self-Sustenance agricultural system has reached to an industrial /commercial agricultural system today, causing a lot of problems to the lives of nature including human being. Human Civilization is now at stake, throughout the world. Therefore, our research question Is-What is the remedy or way-out to overcome this problem? To get answer we will search our ancient books and literatures like Veda, Upanishad, Parashar Samhita, Manu Samhita, Arthashastra by Koutilya etc. where there is the way of attainment of Sustainable Agriculture, through the use of soil friend- fertilizer, limited water- use for irrigation and limited consumption for thinking of other's needs. The sustainable development goal of United Nations might be fulfilled with the adoption of the Indian Knowledge System in Agriculture.

Index Terms—Nature, ecological balance, Humanism, Upanishadic thought

I. Introduction

The word 'Sustainability' we get first, defined by Gro Harlem Brundtland, the chairperson of 'The World Commission on Environment and Development' in her Report 'Our Common Future' submitted in 1987. She defined – Sustainable Development is "that meets the needs of the present without compromising the ability of the future generations to meet their own needs" In this connection UNO in 2015 declared 17 global targets to be achieved by 2030. We are concerned with the 'Sustainability of Agriculture'. The attainment of which may fulfill partially the UNO targets 1) no poverty--End Poverty Everywhere, 2) zero Hunger—End hunger and promote smart farming, 3) Good Health and Wellbeing—Help all people live healthy lives, 6) clean water and sanitation--Keep water clean and sanitation safe for use, 12) Responsible consumption and production—use and make goods without waste 15) Live on land—save trees. Land, and wild animals. (Welcome to United Nations). Agriculture is the primary economic activity since the advent of civilization. The primitive men became food producer with the advent of the civilization and bit by bit, they left their uncertain food gathering life in the forest. In India, agriculture production system, though primitive, started more or less 10 thousand years ago. "The earliest settlement at Mehrgarh located in the North-East corner of the 495 acre (2.00 KM square) site, was a small farming village dated from 7000 BCE or 5250 BCE". (UNESCO- world heritage, 2004). Through the passage of time the system of primitive, self-reliant agriculture production system developed to a commercial and industrialized agriculture system of today, causing a lot of problems to the lives on the earth, including human being. Modern agriculture is now followed with the western philosophy of material thought where the use of machine technology at the cost of labor use, Involvement of MNCs in the input market of agriculture like supply of seed, fertilizer, pesticides etc. Exploitation of Nature and rampant use of natural resources to make over-production of crops and thereby wastage of food causing wastage of natural resource used for production, etc. Resultantly, we see, cost of production of food crops is increasing day by day, thereby a class of have nots are facing starvation and causing social inequity, acute misbalance in ecosystem, overall environment is facing

degradation. We see, the Indian agriculture system has lost self-reliance in her system of production. Water pollution, soil pollution, and human health problems are now very common in our life and society, due to over use of chemical fertilizer and pesticide and insecticides etc. As a result, the system itself face an utter unsustainability and the human civilization is now at stake. Academicians and researchers are in a grave thought –How we can overcome the situation and make our primary occupation, that supplies us the basic needs of human being, our food, for living on this earth? To find answer we can search ‘Indian Knowledge System’ in regard to agriculture. Our ancient history and literatures may give us light on these problems and our primary occupation be restored from the grip of crisis, and our future generation will be survived with the crisis- free agriculture system of food production.

II. Observation of Problems of modern agriculture

Academicians and researchers and different organizations are afraid of the fact that the development of agriculture has brought it from self-reliant, cultural production process, sustainable primary occupation, food supply activity of human being to an industrialized and commercial, unsustainable agriculture process of production. “Modern agriculture relies heavily on the use of chemicals such as pesticides, herbicides and fertilizers to increase production. The process has led to soil degradation, water contamination, and adverse effects on human health.” (Layers 2023). These chemicals are contaminating the water bodies like river, lands and wetlands etc. causing land degradation, water pollution, that affect human health drastically, specially the vulnerable section of the community. Layers 2023). It “has now become the world’s largest industry, it employs more than one billion people and generates over\$1.3 trillion dollars’ worth of food annually. Already the world population has reached the figure, more than 7 billion. By the year 2050 our planet will be home of another 2 billion people. It is the challenge of the 21st century to feed them and keep them well on the earth. It has become a pertinent issues of the social thinkers like- the pollution, poverty, water consumption, climate change land conservation etc. the problems(WWF)

Global market economy is very closely related to the agriculture. It has become a commercial production center, for “growing cash crops such as coffee, cotton, Soybeans and palm etc. are replacing food crops as farmers can earn more money from cash crops than from staple food. Resultantly communities may rely on food imports making them more vulnerable to price rise. Bio-fuel crops like maize, sugarcane etc. may reduce the food crops area. It may cause food shortage in the local area, that may cause food shortage to unaffordable to low income communities. (Allister Margot, 2025).

Lack of management in different phases of agriculture production is also have become a crucial factor of present day agriculture problem- they are monoculture in the field, improper irrigation management, insincere seed management, faulty soil management etc. are to be mention worthy. A Margot refers to the mismanagement of irrigation van damage soil and reduce long term production, over irrigation can wash away top soil, the more fertile layer of soil. This removes essential nutrients and organic matters, excess irrigation may cause salt deposit on soil and less irrigation may cause plants lacks oxygen and crops may die. In a word less attention to phases of agriculture may cause less production, and sincere attention may yield more production.

Theory of overproduction is a faulty notion which is generated from the greed of the directors (the MNCs) of agriculture. It caused extensive cultivation causing deforestation. A Margot opines that “overproduction may encourage farmers to expand farmland more deforestation or habitat destruction”. Production requires need base. not greed based, because overproduction causes wastage of food crops whether in the store, or as thrown away if they cannot be sold. Wasting of food materials does not mean wastage of food only, it means wastage of energy, water and land that are used to grow it. Thus the environmental footprint of agriculture is increasing day by day, causing a lot of pollution in air, water, soil, etc.

Food and Agricultural Organization identified five root causes of unsustainable practices of agriculture: These are a) Policy failures-inappropriate pricing policies and tax policies which encourage the excessive

and uneconomic use of inputs like chemical use and land exploitation etc. b) Rural inequalities- where most of the rural people, in spite of knowing the conservation of nature, the circumstances made by large land owner and the MNCs often causes environmental degradation and in pursuit of higher profits. C) Resource imbalance—FAO feels that the future growth of population will be higher in poor countries than developed countries, so then there will be in equal resource availability in the poor countries for their consumption or investment. D) Unsustainable technology—FAO observed that the technology enhances the increase of production though out the world but some of them are harmful which should be changed, like the chemical use, land machine technology causing land degradation, nutrient depletion, poor irrigation management and loss of biological diversity. E) Trade relations- Low cost raw materials from developing and poor countries encouraged their government to boost income by expansion of crop production and timber sales that have damaged environment.

III. Solution of problems through Indian Knowledge System/IKS

1. Iks about management of agricultural inputs--

- a) Land resource management-- Ancient seer- rishis, and scientists whole-heartedly tried to pay due respect to the elements in agriculture work. They were very scientific in land management. They divided the land as follows— “Land was classified into two main categories- Kshetra--settlement and Vana- forest. Urvara was the fertile land and Anurvara was the barren land. Land quality was divided as –Sarkara means salty, Aikata means sandy, and Asman means stony area. Kshetra was also used in the sense of farmland which was carefully measured and protected. Khila denotes waste land, Suave signified a pasture. Gavyuti or grave was the grassland for cattle grazing.” (V S Datye, 1986). Considering all the above noted divisions of land area of agricultural production, they would identify what seed to be used to what type of land area. In the Mourya era, In Koutily’s Arthashastra” the analysis of Indian agriculture is made in the 24th chapter of Arthashastra. “Koutilya believes that all land is not suitable for cultivation. He meant’ the banks of rivers are meant in the first category, which he termed as ‘Phenaghata land’. In his time multiple cropping pattern (instead of mono-cropping as of today) was followed. (T.S. Madhu 2016). In this connection we can refer the culture of food production was started on the bank of river, in Harappa civilization flooded area was the fertile land for cultivation. Name of the urvara land was changed but the selection and management was gradually progressing in all the ages from mehergarh to Harappa civilization and then from Vedic to Mourya era. So Land selection and land management was very scientific and meticulous which is very rare today.
- b) Water resource Management and irrigation. –In the Harappan agriculture irrigation was mostly depended on rain water and flooded water “though people of Indus Valley had harnessed the power of irrigation system and water supply” (J s Naulakha 2021). In the Vedic era, they were very aware of the irrigation in the agriculture field. In “Krishi Parashar” it is stated that “All types of agriculture has rainfall at its root, life too, has rainfall as its source. Therefore, at the outset, acquire knowledge of rainfall very carefully.” (Krishi parashar SL-10). Rishi Parashar was the grandson of rishi Bashistha and father of Rishi Vyas adeb, he is the author of this book on agriculture, here he has given us the pros and cons of agriculture from land making to grain storing. Pointing out the position of planet and star to have rainfall more or less. This will be helpful for the agriculturists to sow seeds and get the maximum output from agriculture. The Rigveda informs that the peasants depended mainly upon rain for irrigating their fields. They prayed to parjanya (the cloud) and Indra for pouring adequate rain water for the production of sufficient grains. Excess of rain as well as inadequate rain both were harmful to the plants. So prayer was offered for timely and adequate rain water. Besides the rain waters, the cultivators depended upon flood- irrigation. Like wells, tanks, ponds, canals and lakes are also mentioned

in the Vedic literature. (Atharva Veda 1.6.4) (V S Datya, 1996), Rainwater fed irrigation was called 'Syamja' whereas the artificial irrigation was called 'Khanitrima'. Besides, in Rigveda, there were other two types of water supply in agriculture. They were Divvy apa – Water from rain through cloud, Samudratha apa- water from the river that mixed with the sea. Besides, Koutilya also trusts that rain is crop. The author opines- "Because of agriculture being a man related matter it can't be natural or purely environmental, in its fuller extent. But it must be nature-friendly to an extent. Arthashastra introduces small eco-friendly agricultural lands." He is of opinion— "The agricultural India (which was the flourishing land of self-sufficiency and self-help) of koutilya is a model for the present world which is faced with draught and irregular weather, dismantled environment and inflation." (T S Madhu 2016). There are more types of irrigation referred in the Rik Veda. It should be noted, all the modes of irrigation were free from water pollution and water misuse as to day.

- c) Management in agricultural Implements and Systematic Functions— In Harappa civilization agricultural implements were the plough, the wheeled cart, Saddle quern etc. but it was an age of bronze metal, so the implements in Harappa were made of wood. (J S Naulakha 2021). In Vedic era, in its later part, it was then iron age, then the agricultural implements referred to as—spade, picks, plough, and sickle which were mostly made of copper rarely iron. Abhari a tool used like spade also used in digging, plough was fitted with plough-share made of iron and copper. They knew the utility of cow-dung which they used as manure. The agricultural functions were—Sowing, manuring, cutting, bundle making, thrashing etc. There were four phases of work as referred in Shatapatha Brahmana—KRISHANTA-the method to make land for sowing seeds, BAPANTA- the system of sowing seeds, LUNANTA—the cutting rules, MRINANTA- the threshing method. Oxen were used for separating grain from stems by treading them. Then with the help of winnowing basket grains were separated from chaff, and then they are stored in houses. Storing of grain was a systematic process following a lot of rules for which the seeds would have been preserved for the next sowing. Thus agriculture, the cultural activity, was followed by different methods as noted by Rishi Parashar. The agricultural implements were more or less the same in the Mourya era." Lands prepared for may be given to the tax payers" as it was state managed occupation with the direction of 'Sitadhyaksha', and as it was the one of the main sources of revenue. With the help of sincere management of it, "In Kausalya's Arthashastra agriculture finds a prominent position. According to him Indian economy is basically agricultural in nature based on the system of present farming." (P. K. Aithal 2023)
- d) Management in Seed selection for sowing or transplantation—In parashar krishi there is ample direction regarding seed selection, as we know the proverb 'as you sow so shall you reap.' In sloke no 159 he said- "Seeds, which are uniform yield a plentiful harvest; hence, carefully make them of the same kind". Seed preservation technique which today is not done, as now seeds are supplied by a particular MNC and due to problem of seed, farmers are to depend on the company for these seeds cannot be preserved for the next sowing. The Arthashastra of Koutilya also mention process of seed processing and preservation and finally selection. It was then a self-reliant cultural activity of human being. In Mourya era, Agriculture was a state regulated highly organized framework managed by the Superintendent of Agriculture (Sitadhyaksha) featuring systematic irrigation management, scientific seed treatment and clear land administration. (Prasanna kumar Aithal 2023). In relevance with the sustainable farming Manikant shah jotted down- " The seeds of grains are to be exposed to mist and heat for seven nights; the seeds of kosi(mung bean, black gram etc. are treated similarly for three to five nights; the seeds of the seeds of sugarcane and the like are plastered at the cut end with the mixture of honey, lard, ghee and cow dung; seeds of bulbous roots with honey and ghee cotton

and hard seeds with cowdung; and pits for trees are burnt and manured with bones and dung of cows on proper occasions.” (Manikant Shah)

- e) Variety of crops and crop rotation in farming- Barley was main crops during Mehargarh civilization. Harappan cultivated bread wheat, barley, sesame, peas, melons, date –palm, species of brassica, and cotton. (j Sing). In the Vedic era crops were Rice (Brihi / shali), Barley (Java) Wheat (godhum), sesame (til) pulses (various legumes like black gram (or Masha lentil or masura, mung beans etc. besides there were neem, Turmeric, tulsi and Dhatri trees (krishi parashar). During Mourya era variety of crops increased and there was a crop rotation found in agriculture since Vedic period.

There are so many rules, in Vedic literature, especially in Parashar krishi and in Kausalya's Arthashastra, regarding agriculture operation from soil making to grain collection, at every step of its function. The process of agriculture from top to bottom is full of sincerity, skillful and Knowledgeable management and a sense of spirituality was there. This is very necessary for the agricultural system of today. In other words, we can say today the problems that we find in this process, are--soil pollution, water pollution, air pollution, and so many problems like this, are generated from our insincerity in this process, our target is toward the maximum yielding without loving our mother nature. Today increasing population may be the cause, but here lies the opportunity of producing more with heart felt activity as in ancient Indians, would follow. In Arthashastra of Kotilya stated—The high quality seeds are the cape of life which holds the treasure of prosperity. (T S Madhu, 2016). In regard to the question of management of natural resources, modern agriculture is not so sincere as revealed in the review of literature and our IKS reveals that since the days of the Ramayana and the Mahabharata Agriculture plays an important role, management of resource in Vedic and Mourya era was minute and sincerely made. Thus we can say that the problems of modern agriculture, we may overcome with the ancient Indian Knowledge System.

2. IKS in development of Humanism

Problems of Modern Agriculture is related to over production and excess consumption, thereby wastage of food grains and increasing poverty and social inequity. It is due to greed and self centricism of a few men who are directing the agricultural system throughout the world for their self-end. Hence Inculcation of spiritual Humanism following Indian Knowledge System may be helpful. Upanishadic thought of oneness of soul of all the beings of the universe. The thought-Sarvam khalidam Brahma- can change the mentality of human being, or the shlok from MahaUpanishad- “Who is mine and who are others, it thinks the small minded souls, liberal minded thinks the whole of the universe is his own family.” One should follow the ancient Indian thought— “Sarve vabantu sukhinoha sarve santu niramaya, sarve vadrani poshyantu ma kaschit dukhavab vabet,” The ancient seer Rishis said so, this is Indian ancient culture, which we the Indians possess by hereditary. In Ishabasyaponishad (Sl no 1) it is said – “whatever you see in this universe are created by Him, you may consume, giving others.” Whatever wrong you are doing for others, you yourself will have to suffer for that. Because you have no difference with others.

IV. Concluding observations

In conclusion we can say- agriculture is human action with nature. It is the basic or primary economic, social and cultural activity of human being. It is not important for the employment only, rather it is the main source of our life, it supplies us our necessary food for living. Unsustainable agriculture should be made sustainable one at the cost of our greed, temptation and lavishly profit making aspirations, if we want to keep on our civilization progressive and live on this world for a long while with our future

generations. Our Bharat Dashawn, one day had shown the whole of the world, the way of life. Today based on our ancient knowledge system we shall have to make ourselves, through proper education that can solve today's problems in all sorts of nature related human activity whether agriculture or Industry or any other service oriented activity that can bring sustainability in the related section of production as well as the social, cultural aspect which we belong to.

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