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Practicing Sustainable Agriculture: Lessons to Learn From Ancient Texts[1]

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For millennia, farmers in India have been developing, modifying, and adopting practices that have ensured the continued sustainability of agriculture. The Rigveda (c. 8000 BCE) has a verse "May *sita* (ploughed land) give us plenty of grain and wealth. Let Indra support *sita* and give her the good fortune through plenty of rain year after year." The verse refers to regular rains "year after year" to ensure sustained food security. In the following paragraphs, I wish to share some of the lessons that I believe we must relearn from our ancient and medieval literature – lessons that would enable us to vastly enrich our current knowledge in the practice of sustainable agriculture.

Genuine respect to farmers

Several ancient texts reveal that farmers were held in high esteem millennia ago. In the Ramayana (c. 5000 BCE), Sri Rama advises Bharata (in Chitrakuta): "Dear Bharata, have you ensured that all those engaged in agriculture and animal husbandry receive your special care and attention? The world attains happiness and prosperity only on the foundation of Varta" (the term *Varta* includes crop and animal husbandry, and trade). Similar sentiments have been expressed in the Mahabharata (c. 3000 BCE), and the Krishi-Parashara (c. 400 BCE). In Tirukural (c. 70 BCE), and the Kashyapiyakrishisukti (c. 800 CE), the farmer has been variously described as '*annadata*' (provider of food), 'king of the kings', etc.

What is the scenario today? Indian farming is most mismanaged. Through millennia, farmers gradually were made a subject of looting. Alauddin Khilji (1296–1316) followed the policy of keeping farmers poor in order to "consolidate his empire". The Sultans, Mughals, and their Hindu vassals followed the same policy and shattered the morale of farmers. Then the British destroyed the basic fabric of Indian agriculture, thus reducing a very large number of farmers to the status of landless farmers or paupers. The Indian farmer, who was held in high esteem in the ancient times, was exploited in every possible way. This scene has not changed much in the post-Independence India. Although a large number of projects to assist farmers have been launched from time to time, implementation at the farmers' level has

1. A slightly different version of this write-up was published in NAAS News 12(3):4–6 (2012).

always been deficient. Billions of rupees have been spent without much benefit to the needy farmers. Today, it is not uncommon to read about agitations by farmers in some part of the country or the other, and a few farmers get killed in police firings. What a way to treat our "*annadatas*"! Indians urgently need to relearn the advice of our ancients; that is, farmers should be given high respect. A drastic change must occur in the attitude of our politicians, ministers, civil servants, agricultural scientists, field workers, and representatives of companies that sell agricultural inputs. As a first step, each of the decision/policy makers or agencies mentioned above could start responding promptly to the innumerable appeals, requests, and queries received from farmers. Let us remind ourselves daily the sage Parashara's exhortation, "May the farmers be happy, healthy, and wealthy."

Two definitions, used internationally, which are currently "in fashion", need to be examined:

1. "*Sustainable agriculture*" should involve successful management of resources for agriculture to satisfy changing human needs while maintaining or enhancing the quality of the environment and conserving natural resources.
2. "*Conservation agriculture*" is a concept for resource-saving agricultural crop production that strives to achieve acceptable profits together with high and sustained production levels while concurrently conserving the environment.

In both these definitions, a key ingredient that the ancient Indian civilization had stressed is missing. Where is the *farmer* in these definitions?

Soil to be nurtured perennially

A few verses of Parashara (Paras.) and Kashyapa (Kash.) need to be quoted in this context:

- "Land (soil) is intended to receive excellence in every age." (Kash.)
- "A good-quality land yields good results to everyone, confers good health on the entire family, and causes growth of money, cattle, and grain." (Kash.)
- "Crops grown without manure will not give yield." (Paras.)

The messages are obvious in these verses. In the euphoria that followed the much-needed "Green Revolution" of the post-1960s, we apparently forgot the basic principles of soil management. We started "exploiting" soil for getting higher and higher yields, and stopped giving "rest" to the soil, contrary to Parshurama's advice quoted in the Krishi Gita (1500 CE) of "deep summer plowing". We depended almost solely on chemical

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fertilizers, ignoring the truth that soils operate efficiently with optimum amounts of organic matter. Soils of the Pantnagar (Uttarakhand) region, after clearance of forests, had around 2.5% organic matter content; today, that figure has dropped to around 0.6%. Wherever irrigation became available, excessive quantities of water were given to crops. With these and a few other mistakes, we have landed ourselves into trouble as the soils have stopped giving higher yields. We must daily repeat the "mantra" of Kashyapa that soil must receive careful attention on a perennial basis, and follow that advice.

Seed quality and seed and grain storage

I quote below a few verses from the texts of Parashara (Paras.), Manu (c. 200 BCE), and Kashyapa (Kash.):

- "The origin of plentiful yield is seed. Uniform seeds produce excellent results." (Paras.)
- "Phenotypic seed selection leads to developing varieties." (Paras.)
- "One who sells seed of an inferior quality for sowing in the farmers' fields (telling that it is of good quality) deserves to be punished through physical torture; i.e., chopping of hand, foot, ear, nose, etc." (Manu)
- "Kings should arrange the preservation and distribution of seeds in time. The collection of seeds is the first valuable reward of agriculture." (Kash.)

Parashara had stressed the importance not only of the seed itself, but also of the varieties of seed developed on the basis of phenotypic selections. Such phenotypic selections would have retained genetic heterogeneity, which, as we know today, is desirable to prevent pestilences. Kashyapa stressed the importance of proper seed storage and availability of seed to farmers in time for sowing. Facilities for storage of grain are criminally inadequate today, and each year, large quantities of seed are destroyed by the monsoon rains. Availability of seed in time is also a problem for many farmers today. Manu's recommendation is highly significant in the present-day context. Many farmers have been victims of spurious seed, and some farmers have committed suicide as a consequence of failure of major crops. Severe punishments of the kind that Manu had prescribed are a must to stop the sale of

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spurious seed. However, it is futile to expect implementation of severe punishments as long as we have weak-kneed governments in power. Manu's thoughts, however, reveal that great importance was attached to seed quality in the ancient times.

Importance of manure, especially a liquid ferment from animal wastes

A verse from the text of Parashara (Paras.) is reproduced below:

"Crops grown without manure will not give yield." (Paras.)

Six verses of Surapala are put together and reproduced below:

- "The excreta, marrow of the bones, and flesh, brain, and blood of a boar mixed with water and stored underground is called *kunapa.*"
- "As per the availability the fat, marrow, and the flesh of fish, the ram, the goat, and other horned animals should be collected and stored."
- "These should be boiled after mixing with water and the mixture should be stored in an oiled pot after adding sufficient quantity of husk."
- "After roasting it in an iron pot, sesame oil cake and honey should be added. Soaked black gram of good quality should also be added. A little ghee should then be poured."
- "The items stated above should be taken at random as there is no measure for anything. One by one these should be placed in the pot in a warm place by a competent person."
- "This *kunapa* is highly nourishing for the trees. This is stated by the ancient sages and I (Surapala) repeat it here after verifying the same."

Parashara emphasized the use of manure for nourishing plants. Mainly cattle dung and excreta of sheep and goats were used fresh or heap-dried. Farmyard manure and compost were not thought of. The idea of using a liquid ferment from predominantly animal wastes was a brilliant one, because its use gave excellent and quick results. I see a great future for *kunapa* not only in arbori-horticulture and floriculture but in field agronomy as well. Tea estates in Darjeeling area and many farmers in Tamil Nadu are already using *kunapa*.

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Newer agricultural technologies for adoption

The following verse from Kashyapa is a very significant one, especially in the context of the current agricultural scenario of our country:

"As time changes the King should take into account a change in the manner and mode of agricultural techniques."

The import of this verse is very deep. Most of the world and India have depended on natural organic manures for millennia. Mined inorganic fertilizers were also used here and there for many centuries, whereas chemically synthesized inorganic fertilizers were widely developed only during the Industrial Revolution in Europe (18th and 19th centuries). In 1950–51, the average fertilizer use in India was only 0.58 kg per hectare, and the net sown area was 118.75 million hectares. In 2008–09, a rough estimate was 143 million hectares of net sown area, and 24.9 million tons of total fertilizer consumption. Fertilizers have wrongly been labeled as the culprit in creating problems for soil health. What was wrong was that farmers were not properly trained to use fertilizers; they followed wrong methods and time of application, as also excessive application. On the top of all this was that farmers were provided adulterated fertilizers. Kashyapa had used the words "take into account a change in the manner and mode of agricultural techniques". Thus correct application of fertilizers is implied. There is nothing wrong in using chemical fertilizers "correctly and prudently". The ongoing debate today about exclusive organic farming versus predominantly fertilizer farming is a waste of time. Also, genetically modified (GM) seeds are a result of new knowledge and techniques. Kashyapa was in favor of everything new that was useful to farmers. I am sorry to point out that some NGOs (non-government organizations) have made it their business to oppose anything new and thus mislead the general public and policy makers. This is very unfortunate. All concerned with farming policies of the country should listen to Kashyapa's sound advice and ignore the tumult created by these NGOs. The need of the hour is to initiate firm action to raise the productivity of our soil in a scientifically correct way.

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Building water reservoirs for irrigation

I am quoting below four verses from Kashyapa's text, which are very significant for present-day farming:

- "To the west, north, east, or south of the villages and cities at the most convenient places, he (the King) should prepare reservoirs of water according to the condition of the land."
- "The King should plan its construction at such places as not to cause fear of danger from flooding. Such reservoirs should be regularly examined."

The idea of using a liquid ferment from predominantly animal wastes was a brilliant one, because its use gave excellent and quick results. I see a great future for* kunapa *not only in arbori-horticulture and floriculture but in field agronomy as well.

- "Even more than the ponds, lakes, wells, etc., the protection of canals should be treated by them as their 'dharma', said the sages who know the truth."
- "In a country where canal water is not adequate in summer season for grain fields or for gardens, the king should order construction of wells everywhere."

The lessons that we learn from these verses are: (i) small reservoirs should be constructed wherever possible around villages; (ii) steps should be taken to avoid breaching of reservoirs so that people do not suffer from floods; (iii) regular inspection of these reservoirs and timely repairs should be undertaken; and (iv) canals should be protected as an ordained duty.

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I do not have to elaborate on the lethargy of the present-day administration throughout the country. Urbanization is taking the toll of many old reservoirs. I wish there would be a permanent moratorium on "drying" any reservoir in cities and villages.

Plant protection using farmer-friendly herbal preparations

There are a large number of prescriptions in different ancient texts on Vrikshayurveda. I am quoting below only two verses from Vishvavallabha of Chakrapani Mishra (c. 1577 CE):

- "Decoctions prepared from barks of *plaksa (Ficus lucescens), arjuna (Terminalia arjuna), udumbari (Ficus glomerata), saptaparna (Alstonia scholaris),* and *nimba (Azadirachta indica)* as also of *vasa (Adhatoda vasica), ghana (Cyperus rotundus),* and *rohita (Tecomella undulata)* are prescribed for trees suffering from phlegm (*kafa,* which could lead to fungal and bacterial rots, nutrient deficiencies, and toxicities, etc.)."
- Fumigated with a mixture of *nimba (Azadirachta indica), siddhartha (Brassica alba),* in combination with *tila*

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> *(Sesamum indicum),* milk, and water, and sprinkled with a mixture of milk and water, a tree infested with insects [is freed from the pest and] once again becomes green with [a new growth of] branches and tender leaves."

There are literally hundreds of prescriptions involving herbals, cow urine, cow dung, animal wastes including horns, fish, crab shells, ghee, oils and oilcakes, asafetida, mustards, and many other materials that villagers can easily procure. These prescriptions were recorded by our sages after the formulations were successfully tested in field tests to validate as many of these prescriptions as possible. It is unfortunate that currently almost no plant protectionist wants to undertake work on these prescriptions. Indian funding agencies and university authorities must demonstrate genuine patriotism and trust the wisdom of our ancestors. They should encourage scientists through liberal grants for research on validating ancient and medieval farm techniques and practices. Many insecticides currently used today are very effective but highly poisonous, and most of our farm laborers are inadequately trained and equipped to handle these chemicals. It is better to confine ourselves to less toxic materials, and laborers must not be asked to handle insecticides without protective gear. If we use effective herbal remedies (wherever possible), farmers and workers would be safe.

Animal management and health

Texts by Parashara, Kautilya, and Chavundaraya (Lokopakara – 1025 CE) provide substantial information on the principles of domestic animal management including veterinary science. What we need to do is to validate the diets prescribed for cows and buffalos, bulls, draft animals, and heifers, and modify them to seek advantage, where available. Likewise, herbal remedies for cattle diseases and disorders should be validated.

There are many other aspects, such as novel grafts and other horticultural prescriptions, and annual forecast of monsoon, etc. It is up to us to learn as much as we can from the wisdom documented in texts by our sages and scholars centuries ago. We should remember that our farmers are still linked to India's millennia old agricultural heritage.

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