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Course: Principles of Organic farming

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Organic farming - Concept and definition, its relevance to India and globalagriculture and future prospect

Sustainable development has caught the imagination and action all over the world. Sustainable agriculture is necessary to attain the goal of sustainable development. The word "sustain," from the Latin sustinere (sus-, from below and tenere, to hold), to keep in existence or maintain, implies long-term support or permanence. As it pertains to agriculture, sustainable describes "farming systems that are capable of maintaining productivity and usefulness to society indefinitely. Such systems must be resource-conserving, socially supportive, commercially competitive, and environmentally sound". According to the Food and Agriculture Organization (FAO), "**sustainable agriculture is the successful management of resources for agriculture to satisfy changing human needs while maintaining or enhancing the quality of environment and conserving natural resources**". All definitions of sustainable agriculture lay great emphasis on maintaining an agriculture growth rate, which can meet the demand for food of all living things without draining the basic resources. Over time, the International Alliance for Sustainable Agriculture and an increasing number of researchers, farmers, policy-makers and organizations worldwide have developed a definition that unifies many diverse elements into a widely adopted, comprehensive, working definition: **A sustainable agriculture is ecologically sound, economically viable, socially just and humane**. **T**hese four goals for sustainability can be applied to all aspects of any agricultural system, from production and marketing to processing and consumption. Rather than dictating what methods can and cannot be used, they establish basic standards by which widely divergent agricultural practices and conditions can be evaluated and modified, if necessary to create sustainable systems. The result is an agriculture designed to last and be passed on to future generations. **C**onceived in this sense, sustainable agriculture presents a positive response to the limits and problems of both traditional and modern agriculture. It is neither a return to the past nor an idolatry of the new. Rather, it seeks to take the best aspects of both traditional wisdom and the latest scientific advances. This result in integrated, nature-based agro-ecosystems designed to be self-reliant, resourceconserving and productive in both the short and long terms.

Organic farming is one of the several approaches found to meet the objectives of sustainable agriculture.

Organic farming is often associated directly with, *"Sustainable farming."* However, ‘organic farming’ and ‘sustainable farming’, policy and ethics-wise are two different terms. Many techniques used in organic farming like inter-cropping, mulching and integration of crops and livestock are not alien to various agriculture systems including the traditional agriculture practiced in old countries like India. However, organic farming is based on various laws and certification programmes, which prohibit the use of almost all synthetic inputs, and health of the soil is recognized as the central theme of the method. Organic products are grown under a system of agriculture without the use of chemical fertilizers and

pesticides with an environmentally and socially responsible approach. This is a method of farming that works at grass root level preserving the reproductive and regenerative capacity of the soil, good plant nutrition, and sound soil management, produces nutritious food rich in vitality which has resistance to diseases.

Organic farming is the form of agriculture that relies on crop rotation, green manure, compost, biological pest control, organically approved pesticide application and mechanical cultivation to maintain soil productivity and control pests, excluding or strictly limiting the use of synthetic fertilizers and synthetic pesticides, plant growth regulators, livestock antibiotics, food additives, and genetically modified organisms. Organic agricultural methods are internationally regulated and legally enforced by many nations, based in large part on the standards set by the International Federation of Organic Agriculture Movements (IFOAM), an international umbrella organization for organic organizations established in 1972.

IFOAM defines the overarching goal of organic farming as follows:

"Organic agriculture is a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic agriculture combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved." —IFOAM.

Principles

The principles of organic agriculture serve to inspire the organic movement in its full diversity. They are the roots from which organic agriculture grows and develops. They express the contribution that organic agriculture can make to the world and a vision to improve all agriculture in a global context. The Principles of Organic Agriculture serve inspire the organic movement in its full diversity.

The IFOAM definition of Organic agriculture is based on:

The principle of health – Organic Agriculture should sustain and enhances the health of soil, plant, animal, human and planet as one and indivisible. This principle points out that the health of individuals and communities cannot be separated from the health of ecosystems - healthy soils produce healthy crops that foster the health of animals and people. Health is the wholeness and integrity of living systems. It is not simply the absence of illness, but the maintenance of physical, mental, social and ecological well-being.

Immunity, resilience and regeneration are key characteristics of health. The role of organic agriculture, whether in farming, processing, distribution, or consumption, is to sustain and enhance the health of ecosystems and organisms from the smallest in the soil to human beings. In particular, organic agriculture is intended to produce high quality, nutritious food that contributes to preventive health care and well-being. In view of this it should avoid the use of fertilizers, pesticides, animal drugs and food additives that may have adverse health effects.

The principle of ecology – Organic Agriculture should be based on living ecological systems and cycles, work with them, emulate them and help sustain them. This principle roots organic agriculture within living ecological systems. It states that production is to be

based on ecological processes, and recycling. Nourishment and well-being are achieved through the ecology of the specific production environment. For example, in the case of crops this is the living soil; for animals it is the farm ecosystem; for fish and marine organisms, the aquatic environment. Organic farming, pastoral and wild harvest systems should fit the cycles and ecological balances in nature. These cycles are universal but their operation is site-specific.

Organic management must be adapted to local conditions, ecology, culture and scale. Inputs should be reduced by reuse, recycling and efficient management of materials and energy in order to maintain and improve environmental quality and conserve resources. Organic agriculture should attain ecological balance through the design of farming systems, establishment of habitats and maintenance of genetic and agricultural diversity. Those who produce, process, trade, or consume organic products should protect and benefit the common environment including landscapes, climate, habitats, biodiversity, air and water.

Concept of organic farming:-

Organic farming endorses the concept that the soil, plant, animals and human beings are linked. Therefore, its goal is to create an integrated, environmentally sound, safe and economically sustainable agriculture production system. Soil is a living system linked to an organism with different components. Human interact with these natural components (minerals, organic matter, micro-organisms, animals and plants) to achieve harmony with nature and create a sustainable agricultural production. A key feature of organic farming is the primary dependence on natural resource and those developed locally (green manures, crop residues, farm wastes etc.), rather than external inputs (especially synthetics).

The concept of organic farming is based on following principles:

- Nature is the best role model for farming, since it does not use any inputs nor demand unreasonable quantities of water.
- The entire system is based on intimate understanding of nature's ways. The system does not believe in mining of the soil of its nutrients and do not degrade it any way for today's needs.
- The soil in this system is a living entity.
- The soil's living population of microbes and other organisms are significant contributors to its fertility on a sustained basis and must be protected and nurtured at all cost.
- The total environment of the soil, from soil structure to soil cover is more important.

Thus in today's terminology it is a method of farming system which primarily aims at cultivating the land and raising crops in such a way, as to keep the soil alive and in good health by use of organic wastes (crop, animal and farm wastes, aquatic wastes) and other biological materials along with beneficial microbes (biofertilizers) to release nutrients to

crops for increased sustainable production in an eco-friendly pollution free environment. Organic farming describes two major aspects of alternative agriculture:

- Substitution of manures, farm organic resources and biofertilizers (INM) for inorganic fertilizers.
- Biological and cultural pest, diseases and weed management (IPM, IDM and IWM) instead of chemical control.

The key characterization of organic farming in relation to soil fertility and crop production includes:

- Protecting the long-term fertility of soil by maintaining soil organic matter levels, fostering soil and biological activity and careful mechanical inversion,
- Plant nutrients supply through relatively insoluble nutrient sources (organic sources) made available by the action of soil microbes,
- Meeting crop need of nitrogen through nitrogen fixation by leguminous crops in the cropping systems and recycling of farm organic materials including crop residues and livestock wastes,
- Importance of crop rotation, natural predators, resistance varieties and other agronomic manipulations of plant protection including weed management, and
- Biodiversity management, soil and environmental health. Organic agriculture is viable alternative to conventional agriculture. It protects the soil from erosion, improves natural resource base and sustains production at levels commensurate with carrying capacity of managed agro-ecosystem because of reduced dependence on fertilizers and plant protection chemicals.

Relevance in present context

There are three categories of opinions about the relevance of organic farming for India. The first one simply dismisses it as a fad or craze. The second category, which includes many farmers and scientists, opines that there are merits in the organic farming but we should

proceed cautiously considering the national needs and conditions in which Indian agriculture functions. They are fully aware of the environmental problems created by the conventional farming. But many of them believe that yields are lower in organic cultivation during the initial period and also the cost of labour tends to increase therein. The third one is all for organic farming and advocates its adoption wholeheartedly. They think that tomorrow's ecology is more important than today's conventional farm benefits. However, among many a major reservation, the profitability of organic farming vis a vis conventional farming, is the crucial one from the point of view of the Indian farmers, particularly the small and marginal. Organic farming involves management of the agro-eco system as autonomous, based on the capacity of the soil in the given local climatic conditions. In spite of the ridicule poured out on organic farming by many, it has come to stay and is spreading steadily but slowly all over the world. India has been very slow to adopt it but it has made Inroads into our conventional farming system.

The International Scene

The negative effects of modem chemical based farming system were first experienced by those countries, which introduced it initially. So, naturally, it was in those countries organic farming was adopted in relatively large scales. There are very large number of organizations promoting the organic farming movement in European countries, America, Australia and rest of the world. These organizations, for example, the International Federation of Organic Agriculture Movements (IFOAM) and Greenpeace have studied the problems of the chemical farming methods and compared the benefits accruing to the organic farming with the former. Organic farming movements have since spread to Asia and Africa too.

IFOAM was founded in France in 1972. It spearheads and coordinates organic farming efforts the world over by promoting organic agriculture as an environment friendly and sustaining method. It focuses on organic farming by highlighting the minimum pollution and low use of non-renewable natural resources through this method. It has about 600 organizational members spread over about 120 countries including India. IFOAM undertakes a wide range of activities related to organic farming such as exchanging knowledge and thoughts among its members; representation of the movement in governmental, administrative and policy making forums in the national and international arena; updating of production, processing and trading standards; formulation and coordination of research projects; and holding of international conferences and seminars. IFOAM participates in the activities related to organic farming under the auspices of the United Nations and keeps active contacts with several international NGOs.

The Food and Agriculture Organization (FAO) of the United Nations provides support to organic farming in the member countries. It also attempts the harmonization of national organic standards, which is absolutely essential to increase international trade in organic products. The FAO has, in association with the World Health Organization (WHO), evolved the Codex Alimentarius for organic products. Organic farming has several advantages over the conventional one apart from the protection of both the environment and human health.

Need for Organic Farming in India

The need for organic farming in India arises from the un-sustainability of agriculture production and the damage caused to ecology through the conventional farming practices.

The present system of agriculture which we call 'conventional' and practiced the world over evolved in the western nations as a product of their socio-economic environment which promoted an overriding quest for accumulation of wealth. This method of farming adopted by other countries is inherently self destructive and unsustainable.

The modern farming is highly perfected by the Americans who dispossessed the natives of their farms right from the early period of the new settlers in US (Wadia, 1996). The large farms appropriated by the immigrants required machines to do the large scale cultural operations. These machines needed large amount of fossil fuels besides forcing the farmers to raise the same crops again and again, in order to utilize these machines to their optimum capacities. The result was the reduction of bio-diversity and labour. The high cost of the machines necessitated high profits, which in turn put pressure to raise productivity. Then, only those crops with high productivity were cultivated which needed increased quantities of fertilizers and pesticides. Increasing use of pesticides resulted in the damage to environment and increased resistance of insects to them. Pesticides harmed useful organisms in the soil.

The theme of consumer welfare has become central in the economic activities in the developed countries in the world. Sustainable agriculture based on technologies that combine increased production with improved environmental protection has been accepted as absolutely essential for the maximization of the consumer welfare.

The consumers are increasingly concerned about the quality of the products they consume and food safety has become a crucial requirement. Safety, quality and hygienic standards are increasingly being made strict. The mad cow disease and the question of genetically modified food production are the recent instances, which made the countries to tighten the laws. Mycotoxin contamination, unacceptable levels of pesticide residues and environment degradation are the problems on which the attention is centred. Keeping the interests of the consumers, the European

Union has taken tough measures including criminal prosecution to ensure food safety. Another area to increase the consumer welfare is promotion of the eco-friendly methods in agriculture. No-till, or conservation agriculture, lower input approaches of integrated pest or nutrient management and organic farming are some of them.

The Indian agriculture switched over to the conventional system of production on the advent of the green revolution in the 1970s. The change was in the national interest which suffered setbacks because of the country's over dependence on the foreign food sources.

The national determination was so intense that all the attention was focused on the increase in agriculture production. The agriculture and allied sectors in India provide employment to 65% of the workers and accounts for 30% of the national income. The growth of population and the increase in income will lead to a rise in demand for foodgrains as also for the agricultural raw materials for industry in the future. The area under cultivation, obviously, cannot be increased and the present 140 million hectares will have to meet the future increases in such demands. There is a strong reason for even a decline in the cultivated area because of the urbanization and industrialization, which in turn will exert much pressure on the existing, cropped area.

Science and technology have helped man to increase agricultural production from the natural resources like land.

But the realization that this has been achieved at the cost of the nature and

environment, which support the human life itself, is becoming clear. It has been fully evident that the present pattern of economic development, which ignores the ecology and environment, cannot sustain the achievement of man without substantial erosion of the factors that support the life system of all living things on the Earth. The evidence of the ill effects of development is well documented. As said earlier, we in India have to be concerned muchmore than any other nation of the world as.

Organic Farming:-

Agriculture is the source of livelihood of more than 6-7 million of our people and it is the foundation of the economic development of the country.

There were times when people lived close to nature with access to flora and fauna in healthier and cleaner surroundings. One has to look back at our present metropolitan cities or other large towns before the past fifty years as recorded in history/memories of the present elder generation to see the striking differences in the surroundings in which the people lived there. Land, water and air, the most fundamental resources supporting the human life, have degraded into such an extent that they now constitute a threat to the livelihood of millions of people in the country.

Another turn of the events has been the blame game for ecological problems stated at the Earth Summit and other international conferences. The developed countries, it is true, are to a great extent instrumental to degrade the environment. However, the poorer countries of the world including India cannot delay or ignore the need for remedial measures, which areto be effectively implemented. We cannot gloss over the fact that we have also contributed to the degradation of ecology; look at the droughts and floods, disappearance of forests, high noise level and air pollution in the cities which are our own creations.

The organic agriculture movement in India received inspiration and assistance from IFOAM which has about 600 organizational members from 120 countries. All India Federation of Organic Farming (AIFOF) is a member of IFOAM and consists of a number of NGOs, farmers' organizations, promotional bodies and institutions.

The national productivity of many of the cereal crops, millets, oilseeds, pulses and horticultural crops continues to be one of the lowest in the world in spite of the green revolution. The fertilizer and pesticide consumption has increased manifold; but this trend has not been reflected in the crop productivity to that extent. The country's farming sector has started showing indications of reversing the rising productivity as against the increasing trend of input use.

Organic agriculture has grown out of the conscious efforts by inspired people to create the best possible relationship between the earth and men. Since its beginning the sphere surrounding organic agriculture has become considerable more complex. A major challenge today is certainly its entry into the policy making arena, its entry into anonymous global market and the transformation of organic products into commodities. During the last two decades, there has also been a significant sensitization of the global community towards environmental preservation and assuring of food quality. Ardent promoters of organic farming consider that it can meet both these demands and become the mean for complete

development of rural areas.

Rishi Krishi

Drawn from Vedas, the Rishi Krishi method of natural farming has been mastered by farmers of Maharashtra and Madhya Pradesh. In this method, all on-farm sources of nutrients including composts, cattle dung manure, green leaf manure and crop biomass for mulching are exploited to their best potential with continuous soil enrichment through the use of Rishi Krishi formulation known as "*Amritpani*" and virgin soil. 15 kg of virgin rhizosperic soil collected from beneath of Banyan tree (*Ficus bengalensis*) is spread over one acre and the soil is enriched with 200 l Amritpani. It is prepared by mixing 250 g ghee into 10 kg of cow dung followed by 500 g honey and diluted with 200 l of water. This formulation is utilized for seed treatment (*beej sanskar*), enrichment of soil (*bhumi sanskar*) and foliar spray on plants (*padap sanskar*). For soil treatment it need to be applied through irrigation water as fertigation.
The system has been demonstrated on a wide range of crops i.e. fruits, vegetables, cereals, pulses, oilseeds, sugarcane and cotton.

Panchgavya Krishi

Panchgavya is a special bio-enhancer prepared from five products obtained from cow; dung, urine, milk, curd and ghee. Dr Natrajan, a Medical practitioner and scientist from Tamilnadu Agricultural University, has further refined the formulation suiting to the requirement of various horticultural and agricultural crops.
Panchgavya contains many useful microorganisms such as fungi, bacteria, actinomycetes and various micronutrients. The formulation act as tonic to enrich the soil, induce plant vigour with quality production.
Physico-chemical studies have revealed that panchgavya possess almost all macro and micronutrients and growth hormones (IAA, GA) required for plant growth. Predominance of fermentative microorganisms such as yeasts and Lactobacillus helps improve the soil biological activity and promote the growth of other microorganisms. For foliar spray 3-4% panchgavya solution is quite effective. Four to five sprays ensure optimum growth and productivity:
(a) two sprays before flowering at 15 days interval, (b) two sprays during flowering and pod setting at 10 days interval and (c) one spray during fruit/pod maturation. Application of panchgavya has been found to be very effective in many horticultural crops such as mango, guava, acid lime, banana, spice turmeric, flower-jasmine, medicinal plants like Coleus, Ashwagandha, vegetable like cucumber, spinach, okra, radish and grain crops such as maize, green gram and sunflower. Panchgavya has also been found to be reducing nematode problem in terms of gall index and soil nematode population. As due to application of panchgavya a thin oily film is formed on the leaves and stem, it reduces evaporation losses and ensures better utilization of applied water.

Natural farming

Natural farming emphasizes on efficient use of on-farm biological resources and enrichment of soil with the use of Jivamruta to ensure high soil biological activity. Use of Bijamruta for seed/ planting material treatment and Jivamruta for soil treatment and foliar spray are important components. Jivamruta has been found to be rich in various beneficial microorganisms. As per the studies conducted by Bio Centre Bangalore the Jivamruta contains following microorganisms:

- Azospirillum 2 x 106
- PSM 2 x 106
- Pseudomonas 2 x 102
- Trichoderma 2 x 106
- Yeasts and moulds 2 x 107

500 l jivamruta is needed for one application in one hectare. It can be applied through irrigation water by flow, by
drip or sprinkler or even by drenching of mulches spread over the field or under the tree basin.

Natueco Farming

The Natueco farming system follows the principles of eco-system networking of nature. It is beyond the broader concepts of organic or natural farming in both philosophy and practice. It offers an alternative to the commercial and heavily chemical techniques of modern farming. Instead, the emphasis is on the simple harvest of sunlight through the critical application of scientific examination, experiments, and methods that are rooted in the neighborhood resources. It depends on developing a thorough understanding of plant physiology, geometry of growth, fertility, and biochemistry. This can be simply achieved through: **`Demystification of Science'**. Prayog Pariwar has demonstrated that dissemination of relevant and often sophisticated science can be achieved in the local idioms of the common man. This can be very effective in bringing about a `gray matter revolution'. With a new techniracy (technical literacy) for the management of soil, water, and canopy of leaves, it promises high yields with minimal external inputs and optimal harvesting of sunlight.

Understanding Natueco Farming Science

- Natueco Farming methods go beyond natural farming and organic farming.
- In natural farming, farming is done trusting nature through the empirical wisdom of ages. However,

Natueco methods emphasize farming by knowing nature more and more through critical scientific inquiries and experiments. It is an ever growing, novel, unique, participatory tryst between man and nature.

Moreover, Natueco Farming in no way related to the present commercial techniques of farming.

- It has a new vision of infinite resource potentials in Nature and sunlight and promises ***Plenty for all*** through harvesting all available resources by increasing the human activity.
- This depends on critical understanding of greening and recycling of biomass within the

neighborhood to enrich the structure and fertility of soil in a calculated way.

- It promises record assured yields in a mathematic precision by understanding plant's geometry, cycles of growth and canopy (leaf area) management with little or no external inputs and ensuring optimum harvesting of sunlight.
- It visualizes that in the near future, the present money market system will have to give way to a new eco-economic system of Nature, i.e. energy market system.