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Organic Farming: A Boon for Earth

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The term "organic" defines the methods used for production and growth of agricultural products. Organic food production adopts a holistic approach and designed for optimizing the diverse community's productivity within the agro-ecosystem, such as plants, livestock, soil organisms, and people. Production of organic products carried out at large industrial farms. Those are unsustainable. At the same time, the non-certified organic farm can produce the food by using techniques, which will sustain the productivity of the farm for generations. Organic farming is a profitable task. Consumers get appealed from organic food because they consider it as an ethical and healthy choice. Apart from ethics and money, the practices of organic farming result in various benefits related to the environment. According to the Organic Trade Association, if every farmer starts using organic farming practices, it becomes possible to eliminate five hundred million harmful pesticides to enter the environment annually.

History

The concepts of organic agriculture were developed in the early 1900s by Sir Albert Howard, F.H. King, Rudolf Steiner, and others who believed that the use of animal manures (often made into compost), cover crops, crop rotation, and biologically based pest controls resulted in a better farming system. Howard, having worked in India as an agricultural researcher, gained much inspiration from the traditional and sustainable farming practices he encountered there and advocated for their adoption in the West. Such practices were further promoted by various advocates—such as J.I. Rodale and his son Robert, in the 1940s and onward, who published *Organic Gardening and Farming* magazine and a number of texts on organic farming. The demand for organic food was stimulated in the 1960s by the publication of *Silent Spring*, by Rachel Carson, which documented the extent of environmental damage caused by insecticides. Organic food sales increased steadily from the late 20th century. Greater environmental awareness, coupled with concerns over the health impacts of pesticide residues and consumption of genetically modified (GMO) crops, fostered the growth of the organic sector. In the United States retail sales increased from \$20.39 billion in 2008 to \$47.9 billion in 2019, while sales in Europe reached more than \$52 billion (45 billion) in 2019. The price of organic food is generally higher than that of conventionally grown food. Depending on the product, the season, and the vagaries of supply and demand, the price of organic food can be anywhere from less than 10 percent below to more than 100 percent above that of conventionally grown produce.

Need of organic farming

In recent years, the need for organic farming has grown significantly due to the harmful impacts of conventional agricultural practices. The excessive use of synthetic fertilizers, pesticides, and genetically modified organisms (GMOs) has led to severe environmental damage, declining soil health, and various human health issues. In this context, organic farming offers a sustainable and eco-friendly solution that not only protects the environment

but also ensures the production of safe and nutritious food. One of the primary reasons for adopting organic farming is the alarming degradation of soil. Years of chemical farming have stripped the soil of its natural fertility, leading to poor crop yields and increased dependency on artificial inputs. Organic methods, such as composting, crop rotation, and green manuring, help restore soil health and maintain its productivity in the long term. Another major concern is the pollution of water bodies due to the runoff of chemical fertilizers and pesticides. Organic farming reduces this threat by using natural alternatives that are safe for both the environment and aquatic life. It also promotes biodiversity by creating a balanced ecosystem where beneficial organisms thrive.

Human health is also at risk due to the consumption of chemically treated food. Organic produce is free from harmful residues and often contains higher levels of vitamins and minerals, making it a healthier choice. Moreover, organic farming supports farmers by lowering input costs and opening up markets for premium organic products.

Soil health management

Soil building practices such as crop rotations, intercropping, symbiotic associations, cover crops, organic fertilizers and minimum tillage are central to organic practices. These encourage soil fauna and flora, improving soil formation and structure and creating more stable systems. In turn, nutrient and energy cycling is increased and the retentive abilities of the soil for nutrients and water are enhanced, compensating for the non-use of mineral fertilizers. Such management techniques also play an important role in soil erosion control. The length of time that the soil is exposed to erosive forces is decreased, soil biodiversity is increased, and nutrient losses are reduced, helping to maintain and enhance soil productivity. Crop export of nutrients is usually compensated by farm-derived renewable resources but it is sometimes necessary to supplement organic soils with potassium, phosphate, calcium, magnesium and trace elements from external sources.

Crop Rotation: Crop rotation is a process of planting different crops sequentially on the same plot of land to improve soil health, optimize nutrients in the soil, and fights pest and weed pressure.

Summer Ploughing: Summer ploughing means ploughing the agricultural field across the slope during summer with the help of ploughing machinery like inter cultivator that have attachments like ridge and plough. The main primary purpose of summer ploughing is to open the soil crust with deep plough while at the same time turning the soil for disinfection with help from sunrays. Summer ploughing is a ploughing to a depth greater than 50 cm as compared to ordinary ploughing which rarely exceeds 20 cm.

Inter-Cropping: Growing of two or more crops simultaneously on the same piece of land with a definite row pattern. E.g. growing maize + black gram in 1:2 ratio i.e. after every one row of maize two rows of black gram is sown. Thus, cropping intensity in space dimension is achieved. Intercropping system could promote the full use of crop land water by plant root. Increases the water storage in root zone and increase the crop yield per unit area greatly without increase of water consumption, so as to promote the crop water use efficiency effectively.

Organic fertilizers: Organic fertilizers are fertilizers that are naturally produced. Fertilizers are materials that can be added to soil or plants, in order to provide nutrients and sustain growth. Typical organic fertilizers include all animal waste including meat processing waste, manure, slurry, and guano; plus plant based fertilizers such as compost; and bio solids. Inorganic "organic fertilizers" include minerals and ash. The organic-mess refers to the Principles of Organic Agriculture, which determines whether a fertilizer can be used for commercial organic agriculture, not whether the fertilizer consists of organic compounds.



Legume Crops: Legumes fix the atmospheric nitrogen, release in the soil high-quality organic matter and facilitate soil nutrients' circulation and water retention. Based on these multiple functions, legume crops have high potential for conservation agriculture, being functional either as growing crop or as crop residue.

Type of Organic Fertilizer

Animal sources: Animal sourced materials include both animal manures and residues from the slaughter of animals. Manures are derived from milk-producing dairy animals, egg-producing poultry, and animals raised for meat and hide production, or sport and recreation.

Vermicompost: Vermicompost (vermi-compost) is the product of the decomposition process using various species of worms, usually red wigglers, white worms, and other earthworms, to create a mixture of decomposing vegetable or food waste, bedding materials, and vermicast. This process is called vermicomposting, with the rearing of worms for this purpose is called vermiculture.

Compost: Compost is a mixture of ingredients used as plant fertilizer and to improve soil's physical, chemical, and biological properties. It is commonly prepared by decomposing plant and food waste, recycling organic materials, and manure. The resulting mixture is rich in plant nutrients and beneficial organisms, such as bacteria, protozoa, nematodes, and fungi. Compost improves soil fertility in gardens, landscaping, horticulture, urban agriculture, and organic farming, reducing dependency on commercial chemical fertilizers. The benefits of compost include providing nutrients to crops as fertilizer, acting as a soil conditioner, increasing the humus or humic acid contents of the soil, and introducing beneficial microbes that help to suppress pathogens in the soil and reduce soil-borne diseases.

Bone Meal: Bone meal is a natural and organic fertilizer that is derived from the bones of animals, usually cattle or fish. The bones are processed and ground into a fine powder, which is then used as a nutrient-rich additive for plants and soil. The of bone meal can vary slightly depending on the source, but it generally contains high amounts of phosphorus, calcium, and other essential minerals. Phosphorus is particularly important for strong root development, flowering, and fruiting in plants. Calcium, on the other hand, helps to promote healthy cell division and overall plant growth. In addition to these primary nutrients, **bone meal also contains trace elements** such as nitrogen, potassium, and magnesium, which are necessary for balanced plant nutrition.

Liquid manure: Liquid manure is a mixture of animal waste and organic matter used as an agricultural fertilizer, sometimes thinned with water. It can be aged in a slurry pit to concentrate it. Liquid manure was developed in the 20th-century as an alternative to fermented manure. Manure in both forms is used as a nutrient-enriched fertilizer for plants, containing high levels of nitrogen, phosphorus, and potassium present in farm animals' excretions and originating from the food they consume.

Chicken manure: Chicken manure is the feces of chickens used as an organic fertilizer, especially for soil low in nitrogen of all animal manures, it has the highest amount of nitrogen, phosphorus, and potassium. Chicken manure is sometimes pelletized for use as a fertilizer, and this product may have additional phosphorus, potassium or nitrogen added. Optimal storage conditions for chicken manure include keeping it in a covered area and retaining its liquid, because a significant amount of nitrogen exists in the urine.

Slurry Pit: A slurry pit, also known as a farm slurry pit, slurry tank, slurry lagoon or slurry store, is a hole, dam, or circular concrete structure where farmers gather all their animal waste together with other unusable organic matter, such as hay and water runoff from washing down dairies, stables, and barns, in order to convert it over a lengthy period of time into fertilizer that can eventually be reused on their lands to fertilize crops.

Peat: Peat, or turf, is plant material that is only partially decomposed. It is a source of organic matter. Soil with higher levels of organic matter are less likely to compact, which improves the soil aeration and water drainage, as well as assists in supporting soil microbial health. It is sometimes credited as being the most widely use organic fertilizer and by volume is the top organic amendment.

Integrated Weed Management

Organic farming does not allow the use of harsh chemicals. As a result, weed control is carried out through other methods of integrated weed management, such as: Preventing weed penetration onto the field with machinery, animals, and irrigation waters; Manual weeding, Crop rotation, Mulching, Natural chemicals to stop germination, Haymaking prior to weed seeding, Introducing populations of birds/insects to consume weed seeds.

Benefits of Organic Farming

Economical: In organic farming, no expensive fertilisers, pesticides, or HYV seeds are required for the plantation of crops. Therefore, there is no extra expense.

High demand: There is a huge demand for organic products in India and across the globe, which generates more income through export.

Nutritional: As compared to chemical and fertiliser-utilised products, organic products are more nutritional, tasty, and good for health.

Environment-friendly: The farming of organic products is free of chemicals and fertilisers, so it does not harm the environment.

Sustainability over the long term: Many changes observed in the environment are long term, occurring slowly over time. Organic agriculture considers the medium- and long-term effect of agricultural interventions on the agro-ecosystem. It aims to produce food while establishing an ecological balance to prevent soil fertility or pest problems. Organic agriculture takes a proactive approach as opposed to treating problems after they emerge.

Water: In many agriculture areas, pollution of groundwater courses with synthetic fertilizers and pesticides is a major problem. As the use of these is prohibited in organic agriculture, they are replaced by organic fertilizers (e.g. compost, animal manure, green manure) and through the use of greater biodiversity (in terms of species cultivated and permanent vegetation), enhancing soil structure and water infiltration. Well managed organic systems with better nutrient retentive abilities, greatly reduce the risk of groundwater pollution.

Air and Climate Change: Organic agriculture reduces non-renewable energy use by decreasing agrochemical needs (these require high quantities of fossil fuel to be produced). Organic agriculture contributes to mitigating the greenhouse effect and global warming through its ability to sequester carbon in the soil. Many management practices used by organic agriculture (e.g. minimum tillage, returning crop residues to the soil, the use of cover crops and rotations, and the greater integration of nitrogen-fixing legumes), increase the return of carbon to the soil, raising productivity and favouring carbon storage. A number of studies revealed that soil organic carbon contents under organic farming are considerably higher.

Biodiversity: Organic farmers are both custodians and users of biodiversity at all levels. At the gene level, traditional and adapted seeds and breeds are preferred for their greater resistance to diseases and their resilience to climatic stress. At the species level, diverse combinations of plants and animals optimize nutrient and energy cycling for agricultural production. At the ecosystem level, the maintenance of natural areas within and around organic fields and absence of chemical inputs create suitable habitats for wildlife. The frequent use of under-utilized species (often as rotation crops to build soil fertility) reduces erosion of agro-biodiversity, creating a healthier gene pool - the basis for future adaptation. The provision of structures providing food and shelter, and the lack of pesticide use, attract new or re-colonizing species to the organic area (both permanent and migratory), including wild flora and fauna (e.g. birds) and organisms beneficial to the organic system such as pollinators and pest predators. .

Ecological Services: The impact of organic agriculture on natural resources favours interactions within the agro-ecosystem that are vital for both agricultural production and nature conservation. Ecological services derived include soil forming and conditioning, soil stabilization, waste recycling, carbon sequestration, nutrients cycling, predation, pollination and habitats. By opting for organic products, the consumer through his/her purchasing power

promotes a less polluting agricultural system. The hidden costs of agriculture to the environment in terms of natural resource degradation are reduced.

Conclusion

The ‘Organic Farming’ is the only solution to regenerate the soil by going back to our traditional method of farming i.e., free from chemicals, pesticides and fertilizers. Thus, organic food perhaps ensures food safety from farm to plate. The organic farming process is more eco-friendly than conventional farming. Organic farming keeps soil healthy and maintains environment integrity thereby, promoting the health of consumers. Moreover, the organic produce market is now the fastest growing market all over the world.