

ROLE OF ECO-FRIENDLY AGRICULTURAL PRACTICES IN INDIAN AGRICULTURE DEVELOPMENT

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Abstract

Green revolution technologies have more than doubled the yield potential of rice and wheat, especially in Asia. These high input production systems requiring massive quantities of fertilizers, pesticides, irrigation and machines, however, disregard the ecological integrity of land, forests and water resources, endanger the flora and fauna and cannot be sustained over generations. To a great extent, future food security and economic independence of developing countries would depend on improving the productivity of biophysical resources through the application of sustainable production methods, by improving tolerance of crops to adverse environmental conditions and by reducing crop and post-harvest losses caused by pest and diseases. Indigenous agricultural practices can play a key role in the design of sustainable and eco-friendly agricultural systems, increasing the likelihood that the rural population will accept, develop and maintain innovations and interventions. In this context, those eco-friendly methods are being considered as environmentally safe, selective, biodegradable, economical and renewable alternative for use in organic farming system. Organic farming implies, that the use of organic nutrients and adoption of natural methods of plant protection in place of fertilizers and pesticides. To the maximum extent feasible organic farming system rely upon crop rotations, crop residues, animal manures, legumes, green manures, mineral baring rocks and aspects of biological pest control to maintain soil productivity and tilth to supply plant nutrients and to control insects, weed and other pests.

Introduction:

Eco-friendly approaches for sustainable agriculture:

Agriculture is the most important enterprise in the world. Agriculture is the process of producing food, feed, fiber and other desired products by the cultivation of plants and the raising of domesticated animals. In a true sense, it is a productive unit where human get the free gifts of nature namely, land, light, air, temperature, rain water, humidity etc. are integrated into a single primary unit indispensable for human beings. The effect of prolonged and over usage of chemicals in crops production has resulted in human health hazards and pollution of environment and ground water. At present, the issue is whether to continue with the chemical inputs-based intensive technologies or to go back to the traditional environment friendly farming practices like organic farming for sustainable production, income and socio-economic development of the farming community. In this context that biological pesticides are being considered as environmentally safe, selective, biodegradable, economical and renewable alternative for use in organic farming system.

Green Pesticides or ecological pesticides which are believe to be environmentally friendly and thus cause less harm to the eco system and animal health. In agrology, pesticides are evaluated for minimal average environmental effects. Biocides include germicidal, antibiotic, antibacterial, antiviral, antifungal, antitrozoaols and antiparasites. Pesticides typically came in the form of sprays and dusts. Many ecological pesticides are biological pesticides. Environmental friendly agricultural technologies for food safety appropriate technologies, which do not assault the nature, would have key roles to play in ensuring food security, in improving human health and in rehabilitating and conserving the environment to safeguard the well being of the posterity. Instead of striving for more “green revolutions” with emphasis on miracle seeds, hard-hitting, synthetic and engineered pesticides and increased use of fertilizers, the future must look to natural ways and processes for augmenting agricultural productivity. In fact, all development efforts and activities should be within well defined ecological rules rather than within narrow economic gains. Sustainable agricultural systems must be ecologically sound for long-term food sufficiency, equitable in providing social justice, and ethical in respecting path future generations and other species.

Goal of Eco-Agriculture: (Methods/Procedure)

The aim of eco-agriculture is to manage the resources of rural communities to improve their welfare, preserve biodiversity and ecosystem services, and develop more productive and sustainable farming systems.

Eco-agriculture, now emerging as a holistic approach to ecologically and socially responsible land use, represents a vision of rural communities managing their landscape and resources to jointly achieve three goals:

- Enhance rural livelihoods
- Conserve or enhance biodiversity and eco-system services
- Develop more sustainable and productive agricultural system

The core of this ecological-based farming is ensuring that business or agricultural activity is consistent with the natural functions of ecosystems, where for instance, the cycle of soil nutrients and biodiversity structure are maintained so as to create a system of agriculture that is resistant to pests and has self-maintained natural soil nutrients. Thus, farmers will no longer depend on costly chemicals and artificial pest control.

In addition, by reviving local or indigenous seed varieties, farmers' dependence on hybrid seeds commercially produced by multinational companies can be reduced or even eliminated. This will give farmers the freedom to plant seeds in accordance with local natural conditions at a reasonable cost. Consequently, agricultural production costs can be minimized and agricultural commodities sold at a premium price as organic products, which in turn would improve farmers' incomes. Also, agricultural commodities that are free from chemicals and genetically modified organisms are safer and healthier for human consumption.

In short, eco-agriculture tries to combine conservation with development. Farmers and rural communities are key actors in conserving biodiversity and ecosystems.

Indian farmers have increased production 40 percent by using organic fertilizers in paddy farming systems similar to conventional rice farming.

Making eco-agriculture work requires a favorable institutional environment, suitable financing and good dissemination of information.

To boost Agriculture development, we need to create biodiversity reserves that:

- benefit local farming communities,
- Develop habitat networks in non-farmed areas,
- Reduce land conversion to agriculture by increasing farm productivity,
- Minimize agricultural pollution,
- Modify management of soil,
- Water and vegetation resources,
- Modify farm systems to mimic natural ecosystems.

These steps can be started through initiatives at the grassroots level, with the coordinated and collaborated efforts of various stakeholders, but should include government support in promoting eco-agriculture practices and creating a sustainable agricultural system in India.

Climate change is also having a growing impact on agriculture and requires new practices and approaches to guarantee the sustainability of farming, which still is the main source of livelihood for most Indonesians.

Agriculture is an activity directly related to the use of natural resources. We now often see and hear of crop failures due to climatic influences. This is compounded by farming practices that pay little heed to the rules of ecosystem balance and environmental conservation, which will in turn have an impact on agriculture itself.

Eco-friendly Agricultural practices: are as:

- ✓ Agronomy: Cropping pattern, sowing time
- ✓ Water management: Exp. (SRI Technology, DSR,) collection of rain water in pond
- ✓ Soil conservation and reclamation
- ✓ Entomological practices: Exp. (IPM Technology) Control termite, American bollworm, sucking pests, other insects, spray related practices)
- ✓ Storage : pulses stored mud containers, Neem leaves (*Azadirachta indica*)
- ✓ Zoology: Rat control by cat n pet dogs

Classification of Eco-friendly Agricultural Practices:

The following classification of eco-friendly practices are:

- ❖ Crop production
- ❖ Soil management
- ❖ Water management
- ❖ Weed control
- ❖ Insect-pest control
- ❖ Weather forecast
- ❖ Agricultural engineering
- ❖ Home management
- ❖ Clothing and textile
- ❖ Animal husbandry

Sustainable Agriculture:

Sustainable agriculture is a complex issue associated with producing food while maintaining our biophysical resources including soil, water and biota with no adverse impacts on the wider environment. It should:

- ✚ Maintain or improve the production of clean food
- ✚ Maintain or improve the quality of landscapes, which includes soils, water, biota and aesthetics
- ✚ Have minimal impact on the wide environment
- ✚ Be acceptable to society

Concerns of Eco-friendly sustainable agriculture:

The concept of sustainability has many dimensions. It can be used to mean economic sustainability, social sustainability, institutional sustainability as well as environmental sustainability. The environmental sustainability agenda in agriculture, which is the topic of this paper, covers the protection of the resource base, the reduction of negative externalities and the promotion of positive externalities. Principal issues include water quality and quantity, air quality, soil erosion, biodiversity, and landscape protection as well as food safety and animal welfare. The agenda includes:

- 1. Water quality and quantity concerns:** Issues here include leaching of nutrients and pesticides, water extraction and drainage and flooding. Contamination of both ground and surface waters caused by high levels of production and use of manure and chemical fertilisers is a serious problem, particularly in areas of intensive livestock or specialised crop production.
- 2. Air quality concerns:** The issues here are emissions of ammonia and greenhouse gases. At EU level, agriculture is responsible for about 8% of total greenhouse gas emissions but due to the pastoral nature of Irish farming, the proportion here rises to 30%.
- 3. Biodiversity concerns:** Issues include genetic, species and ecosystem diversity. The intensification of agriculture has led to widespread reduction of species and habitats.
- 4. Landscape concerns:** The marginalisation of agricultural land can lead to its abandonment if farming ceases to be viable. Alternatively, intensification of agriculture can lead to the loss of important landscape features such as hedges and ponds, the enlargement of fields and the replacement of traditional farm buildings with industrial structures. Rights of access may be restricted in interests of more efficient farming.

5. **Soil erosion concerns:** Overgrazing particularly in mountain areas has led to the erosion of vegetation cover with the consequent loss of soil, the silting of rivers, etc.
6. **Food safety and animal welfare concern:** The issue here is the effect of agricultural practices on human health and animal well-being rather than the physical environment. There is concern about the consequences for the quality and safety of the food supply of the increasing use of pesticides and drugs, as well as the consequences of introducing genetically-modified organisms.

Eco-friendly approaches for farming system:

The following eco-friendly approaches are as:

- A. **Organic farming:** Organic farming is a production system, which avoids or largely excludes the use of synthetically compounded fertilizers, pesticides, growth regulators, and livestock feed additives. To the maximum extent feasible, organic farming system rely upon crop rotations, crop residues, animal manures, lagumes, green manures, off-farm organic wastes, mechanical cultivation, mineral-bearing rocks, and aspects of biological pest control to maintain soil productivity and tilth, to supply plant nutrients, and to control insects, weeds, and other pests.
- B. **Biological farming:** Biological farming allows the use of selected chemical fertilize3rs (avoiding disruptive materials such as anhydrous ammonia and potassium chloroxide) and adopts low-inputs approaches to use of herbicides and insecticides. (diagnostic instruments to monitor plant and soil conditions are frequently used in biological farming. These include refract meters to monitor sugar content (Brix) in plant tissue sap; electrical conductivity meters to monitor ERGS (or energy released per gram of soil); ORPS meters (or oxygen reduction potential of soil); and radionics.)
- C. **Nature farming:** In addition to these methods-based approaches to sustainable farming, regenerative agriculture and permaculture are widely recognized. However, these letter systems, like sustainable agriculture, are more conceptually oriented than methods-based.
- D. **Regenerative Agriculture:** In regenerative agriculture bunds on nature’s own inherent capacity to cope with pests, enhance soil fertility, and increase productivity. It implies a continuing ability to re-create the resources that the system requires. In practice, regenerative agriculture uses low-input and organic farming systems as a frame work to achieve these goals.
- E. **Permaculture:** Permaculture is concerned with designing ecological human habitats and food production systems, and follows specific guidelines and principles in the design of these systems. To the extent that permaculture is not a production system, per se,, but rather a land use planning philosophy, it is not limited to a specific method of production. Thus, practically any site-specific ecological farming system is amenable to permaculture.

Problems and suggestions on the use of eco-friendly practices in crop production in India:

Sl. No.	Problems	Suggestions
1	Farmers became bound to use chemical pesticides in case of severe attract.	1. Increasing opportunity for availability of necessary of raw materials for compost, green manures, bio-fertilizer, bio- pesticide, etc.
2	Lack of sufficient publicity through different media regarding the use of eco-friendly practices.	2. More publicity should be given in different media.
3.	Lack of proper technical knowledge about eco-friendly agricultural practices.	3. Establishment of adult education for increasing eco-friendly agricultural practices.
4.	Lack of awareness of environment pollution.	4. Increasing farmers’ awareness on environmental pollution.
5.	Lake of livestock and poultry for necessary excreta.	5. Increasing motivational program for rearing more livestock and poultry.

6.	Lack of proper training on eco-friendly agricultural practices related organization.	6.	Arranging proper training on eco-friendly agricultural practices specially by GOs and NGOs collaboration.
7	Limited availability of readymade ingredients to prepare compost botanical fertilizer and pesticides.	7.	Increasing opportunities for availability of necessary ingredients and more awareness on environment pollution.
8	No punishment for failure and awarded for the successful adopters of eco-friendly practiced farmers/change agent.	8.	Establishment the punishment for failure and awarded for the successful adopters of eco-friendly practiced farmers/ change agent.
9	Lack of proper sell value due to involvement of middle men.	9.	Government should strictly control the whole sale and retail market both centrally and locally.
10	Un popularity of agro-chemical free products.	10.	Making social movement on increasing popularity of agro-chemical free products.

The methods of ecological agriculture are based on modern ecological science combined with time-tested indigenous knowledge, giving emphasis on the mode of cultivation through Integrated Crop Management (ICM), which providing Integrated Farming System (IFS), Integrated Pest Management (IPM) for crop production. ICM program arranging FFS and provide various types of training courses on eco-friendly agriculture for their club members in order to increase their eco-friendly agricultural knowledge and to make a favorable attitude and adoption of these activities. Sometimes, ICM program provides financial facility to its group members for practicing ecological agriculture and help them for marketing their ecologically produced organic products.

Conclusion:

In a healthy farm system, agriculture works in harmony with the natural environment. This begins with healthy soil that stores water and nutrients and provides a stable base to support plant roots. In a sustainable system, soil is kept in balance. Crops are rotated through the fields to replace nutrients in the soil. Where there is livestock, animals graze the land, then waste from those animals is used to fertilize the soil. The idea is that as farmers take from the land they also give back. Industrial farms disregard that need for balance. Land is used continuously and not given proper rest. Crops are not rotated in a way that replenishes the soil. Manure and chemical fertilizers are used to “feed” the soil, but through over-application these additives become a problem.

Organic, mechanical, physical and cultural practices of agriculture are mainly used in ecological agriculture. Chemical fertilizers and chemical pesticides not only contaminate surface water, they also affect fish population and human health as well. To regain the lost ecological status, it is high time to start the ecological agriculture without further delay. Some NGOs, GOs became very much concerned about the devastating effect of indiscriminate use of chemical fertilizers and pesticides since long, and earnestly felt the need for developing an alternative agricultural strategy that is sustainable, productive and environment-friendly. Since 1985 DAE has been working towards development of this alternative strategy and termed it as “Eco-friendly agriculture”.

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