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Prospects of Organic Farming towards Sustainable Agriculture in India

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Abstract

The prime principle of organic farming results in response to health, environment and sustainability in agriculture towards food security to the growing population despite the climate change issues in India. Organic farming emerged as a potential alternative for meeting food demand, maintaining soil fertility and increasing soil carbon pool. However, Indian organic farming industry is almost entirely export oriented, running as contract farming under financial agreement with contracting firms. Additionally, limitations regarding bulk availability of organic supplements further constrain organic farming in India. Despite these issues, the increasing market demand and institutional support coupled with growing inclination of farmers to go organic have resulted in rapid growth in certified organic area during last 2-3 years. Farmers apprehension towards OF in India is rooted in non-availability of sufficient organic supplements, bio fertilizers and local market for organic produce and poor access to guidelines, certification and input costs.

Introduction

The indiscriminate use of chemical fertilizers and pesticides during green revolution period resulted in several harmful effects on soil, water and air causing their pollution. This has reduced the productivity of the soil by deteriorating soil health in terms of soil fertility and biological activity. The indiscriminate use of pesticides has led to the entry of harmful compounds into food chain, death of natural enemies and development of resurgence/ resistance to pesticides. Out breaks of insect pests have occurred after insecticides were over used. Hence, enhancement and maintenance of system productivity and resource quality is essential for sustainable agriculture. It is believed that organic farming can solve many of these problems as this system is believed to maintain soil productivity and pest control by enhancing natural processes and cycles in harmony with environment. Organic farming is defined as a production system which largely excludes or avoids the use of fertilisers, pesticides, growth regulators, etc. and relies mainly on organic sources to maintain soil health, supply plant nutrients and minimise insects, weeds and other pests.

World Scenario of Organic Farming

Based on the global survey on organic farming carried out in 2009 by the Research Institute of Organic Agriculture (FiBL), the International Federation of Organic Agriculture Movements (IFOAM) and Foundation Ecology & Agriculture (SOEL), the organic agriculture is developing rapidly and is now practiced in more than 141 countries of the world. Its share of agricultural land and farms continues to grow in many countries. According to the latest survey on global organic farming, about 32.2 million hectares of agricultural

land is managed organically as of 2007. Oceania has the largest share of organic agricultural land (37%), followed by Europe (24%) and Latin America (20%). The proportion of organically compared to conventionally managed land, however, is highest in Oceania and in Europe. In the European Union 4% of the land is under organic management. Most producers are in Latin America. The total organic area in Asia is 2.9 mha. This constitutes 9% of the world's organic agricultural land. The leading countries are China (1.6 mha) and India (1 mha). The country with the largest organic area is Australia (12 mha). Global demand for organic products remains robust, with sales increasing by over five billion US Dollars a year. Organic Monitor estimates international sales to have reached 46.1 billion US Dollars in 2007. Consumer demand for organic products is concentrated in North America and Europe; these two regions comprise 97% of global revenues. Asia, Latin America and Australia are important producers' countries of the world. Its share of agricultural land and farms continues to grow in many countries.

Indian Experience of Organic Farming

Organic Agriculture is not a new concept to India and traditionally Indian farmers are organic. But, gradually changed to chemical based cultivation since 1950's and chemicals were increasingly applied during the Green Revolution period. Though the introduction of Green Revolution agricultural technology in the 1960's reached the main production areas of the country, there were still certain areas (especially mountain areas) and communities (especially certain tribes) that did not adopt the use of agro-chemicals. Therefore, some areas can be classified as *organic by default* though their significance and extent has been rather overemphasized. However, an increasing number of farmers have consciously abandoned agro chemicals and now produce organically, as a viable alternative to Green Revolution agriculture. Currently, India ranks 33rd in terms of total land under organic cultivation and 88th position for agriculture land under organic crops to total farming area. In India about 2.8 mha area is under certified organic farming (this includes wild herb collection area of MP and UP) with about 1,95,741 farmers engaged in organic farming. The Indian organic farming industry is estimated at US \$ 100.4 million and is almost entirely export oriented. According to APEDA (2009), a nodal agency involved in promoting Indian organic agriculture, about 9,76,646 MT of organic products worth 498 crores rupees are being exported from India.

Certified Organic Products Produced and Exported from India

India has competitive advantages in the world markets due to low production costs and availability of diverse climates to grow a large number of crops round the year. During

2008-09, India exported 86 items with total volume of 37,533 MT, valued around Rs. 498 crores worth and cotton (43% contribution) leads (16,503 MT) among the products exported followed by Basmati rice (15% contribution). Organic products are mainly exported to EU, US, Australia, Japan, Switzerland and Middle-East.

Organic Rice Cultivation

India has tremendous potential to become a major exporter of organic rice in the International market. Agricultural and Processed Food Products Export Development Authority (APEDA) made efforts to produce and export basmati rice, aromatic rice and other rice varieties by establishing model farms in states like Punjab, Haryana and Uttar Pradesh. During 2008-09, around 5630 MT of organic basmati rice was exported from India through APEDA. Rice is the major crop that receives maximum quantity of fertilizers (40%) and pesticides (17-18 %) and there are two major challenges in organic rice farming. They are: nutrient management and pest management

Table 1: Cost and Returns of Selected Organically Grown Crops (Rs./ha)

Crops	Gross Cost	Gross Returns	Net Returns	Net Returns over Cost (per rupee)
Coconut	14000	140000	126000	9.0
Sapota	16000	87000	72000	4.5
Turmeric	7800	30000	22200	2.9
Grapes	40000	150000	110000	2.8
Groundnut	6000	22000	16000	2.7
Tomato	80000	250000	170000	2.1
Rice	10000	30000	20000	2.0
Tea	90000	NA	NA	NA
Curry leaves	NA	15000	15000	NA

Note: For groundnut and rice costs and returns were worked out for one crop season and for other crops for one year. [Source: Rajendran (1998) and (2002)]

Nutrient Management

Nursery

Preferably, organically grown seed should be selected. From second year onwards, seed from the same organic farm can be used. In seed bed preparation, organic manures such as FYM, compost, vermi-compost can be used @ 5 t/ha. For Seed treatment, azospirillum and phosphorus solubilizing bacteria (PSB) @ 10 g/kg seed can be used. Seedling root dipping can also be done in azospirillum and/or PSB suspension prepared with 600 g of culture for seedlings sufficient to transplant in a hectare of land.

Main field

Only organic manures/ crop residues/ green manures are to be utilized to supply plant nutrients based on soil test recommendations of the location. Nutrient concentrations and moisture content of organic manures, their contribution to plant uptake and crop nutrient requirement are to be considered to estimate the quantity of organic sources. During land preparation and puddling, 10 tons of FYM/ha along with 5 tons/ha of paddy straw and 10 tons/ha of *in situ* grown dhaincha/ sunhemp green manure to be incorporated. In the last puddle, vermi-compost @ 2 t/ha may be applied. Through these organics, approximately 150 kg N, 40-50 kg P₂O₅ and 100-120 kg K₂O will be supplied which takes care of crop NPK needs to a large extent depending on their mineralization and release of nutrients. In addition to NPK, these organics supply micronutrients also in required quantities. Bio-fertilizers such as azospirillum or PSB @ 2-3 kg culture /ha can be mixed with 25 kg FYM or vermi-compost and applied to the soil just before planting. Blue green algae @ 10 kg/ha, 10 days after planting is also recommended. If possible, azolla @ 1 t/ha can be added 7-10 days after transplanting and incorporated after 3 weeks. Azolla can also be used as a green manure @ 6 t/ha and incorporated before transplanting. All these bio-fertilizers may add 30-40 kg N on an average. The combination of different organic sources based on their availability is preferred in rice farming ecosystem in Hyderabad which was reported by Surekha *et al.*, (2010).

Pest Management

Only bio-pesticides and botanicals are recommended. Herbicides should not be used. Only hand weeding or mechanical weeding is to be done. Further, other organic sprays such as panchagavya and amruthajalam, may also be used 2-3 times during active growth period of the crop @ 250 ml/ 10 litres solution as they have insecticidal properties and also supply plant nutrients. In the nursery, seed treatment with biopesticides like *Pseudomonas* and *Trichoderma* is also recommended @ 10 g/kg seed.

The major steps in management of pests are:

1. Cultivation of tolerant varieties,
2. Cultural control,

3. Mechanical control,
4. Biological control,
5. Use of pheromone traps,
6. Use of Biopesticides.

Conclusion

Global demand for organically grown foods is increasing and organic agriculture is growing fast in recent years. As a result, the area under organic farming and the number of countries practicing it are also increasing every year. India is also not an exception with considerable land area under organic farming and most of the north eastern states have been declared as organic by default. The organic system of rice production needs more than two years period to stabilize rice productivity and bring about perceptible improvement in soil quality, sustainability indices and economic returns under intensive, irrigated rice-rice system in tropical climate. Hence, using easily available local natural resources, organic farming can be practiced with a view to safe guard our own natural resources and environment for a fertile soil, healthy crop and quality food and let our future generations enjoy the benefits of non-chemical agriculture. Given the same profitability, organic farming is more advantageous than conventional farming considering its contribution to health, environment, and sustainability in Indian agriculture.

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