

Strengthening the Sustainable Agriculture through Organic Farming: An avenue towards Sustainable Development

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Abstract: In the 21st century the food security is one of the most important factor in agriculture production. Though the agriculture production getting a high range of productivity in less amount of land by using different chemical fertilizers and pesticides. But it rapidly lead towards decreasing the quality production as well as reduce the quality of food product. Soil and land degradation is caused by human miss-management of soils, mostly due to agricultural activities including the use of agrochemicals used in farming. Chemical fertilizers and pesticides and other modern agricultural technologies having affect over the environment sustainability and health hazards into human health as different toxic materials attach those of agricultural food product.

Sustainable agriculture means farming system that are capable of maintaining their productivity & usefulness to society indefinitely. Such systems must be resource-conserving, socially supportive, commercially competitive and environmentally sound. Organic agriculture is generally considered to be under the sustainable agriculture “umbrella”. Organic farming is a kind of farming where natural resources and biological entities are used as inputs, for development of a self-supporting and self-sustainable agro-ecosystem for sustained productivity at a desired level. Organic farming is such a type of farming which satisfy the basic principles of sustainable agriculture. In the rapid changing environment organic farming practice is one of the most significant approach for strengthening the sustainable agriculture.

Keywords: Sustainable agriculture, Organic farming, Sustainable Development

1. INTRODUCTION

The need of food directed towards agriculture practice to all human beings since the ancient times. From the Vedic period agriculture was practiced which was the main source of food and the agricultural products were used as revenue materials had to be provided to the King by the farmers. It was not only a means of revenue materials also used as a commodity for exchange. Some of phase which were used in ancient times “*Uttam krishi, madhyam ban, adham nakri, vikh nidan*” --- Smriti shastra. Even the great Monk Swami Vivekananda also mention the agriculture practice as an honest method of

earning source- “Agriculture is the only profession where one can earn money honestly.” Sage Kasayap also articulated- “Of all wealth agriculture is the highest wealth, there will be no happiness and prosperity on this earth without agriculture”. Indians have been cultivating for more than 10,000 years using locally available resources in an eco-friendly way. Evolution of concept of farming has been best described in Kautilya’s Arthashastra, Varahamihira’s Virat Samhita, Surapala’s Vrikshayurveda, Parasara’s Krishi Parashara and Krishi Sukti of Kashyap. ‘Green Revolution’ in 1966 was a great stride towards self-sufficiency in food of India with the introduction of chemical inputs and high yielding variety of crops.

In the Medieval period there were no such event in the extent of crop production. While in the 21st century the food security is one of the most important factor in agriculture production. Though the agriculture production getting a high range of productivity in less amount of land by using different chemical fertilizers and pesticides. But it rapidly lead towards decreasing the quality production as well as reduce the quality of food product. Soil and land degradation is caused by human miss-management of soils, mostly due to agricultural activities including the use of agrochemicals used in farming. Chemical fertilizers and pesticides and other modern agricultural technologies having affect over the environment sustainability and health hazards into human health as different toxic materials attach those of agricultural food product. Harmful impacts of these external inputs on natural resources is realised later and the need of organic agriculture or farming came out as the one solution to restore the health of natural resources in a cost effective way.

The term ‘Organic Farming’ was coined by Lord Northbourne, in his book ‘Look to the Land’ (written in 1939, published 1940), from his conception of “the farm as organism”, he described a holistic, ecologically balanced approach to farming. Organic farming is a kind of farming where natural

resources and biological entities are used as inputs, for development of a self-supporting and self-sustainable agro-ecosystem for sustained productivity at a desired level. The World Board of International Federation for 'Organic Agriculture Movement' (IFOAM) approved the following definition in March 2008: "*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*". The principles of organic farming includes: principle of health, principle of ecology, principle of fairness, principle of care.

2. CONVENTIONAL FARMING VS. ORGANIC FARMING

Conventional farming deals with that type farming system in where the cultivation system is undertaken on a conventional way. In this farming system different resistant and hybrid variety, crops are cultivated under special management by using fertilizers, pesticides and water resources. It results high level of production even under adverse situation also but affect the environment, kill the beneficial insects of agricultural crop due to high rate of using pesticides and fertilizers etc. The product produced in the conventional farming having high amount of chemicals content which is harmful for human being. Whereas the Organic farming deals with low cost farming in where the locally available resources and biological entities are incorporated keeping in mind the sustainability factor in the agricultural crop production. This type of farming aims at higher production, recycle of renewable energy, restore the soil health and water, and resource conversation.

The organic movement in India has its origin in the work of Howard who formulated and conceptualized most of the views which were later accepted by those people who became active in this movement.

3. DIFFERENT PACKAGE OF PRACTICE IN ORGANIC FARMING

Here we are going discuss some of case study on organic farming. Ramakrishna Mission Vivekananda University has developed a package of technologies for sustainable agriculture with low or no cost technologies using all locally available resources, collecting information from the following sources:

- Vedic agriculture
- Natural farming of Mr Fukuoka
- Organic farming packages of National Centre for organic farming
- Biodynamic agriculture of Dr Steiner
- Resource conserving technologies of modern agriculture

- Innovative traditional techniques
- Zero budget technology of Sri Subhash Pallickar
- Experiments in university farms located at Narendrapur and Ranchi faculty centre.

There are some of technology used in the organic farming which are low cost as well as eco-friendly:

- Land preparation on the basis of raised bed furrow irrigated system
- Selection of suitable crop varieties
- Mulching with Straw
- Use of Cowdung manure,
- Vermicompost, Sanjibani and Panchagavya
- Biofertilizers: Azatobactor, azospirillum, PSB
- Irrigation is undertaken as initially around seedling only, when root system develops irrigation should be given in furrows only
- Use of Green manure
- Weeding
- Bio-pesticides and botanical pesticides: Trichoderma sp
- Home-made fungicides etc.

4. SOME OF EXPERIMENTAL STUDY IN ORGANIC FARMING

Heresome ofcase study in the light of successful organic farming discuss below:

Table 1: Organic Farming on experimental plot of RKMVU campus

Name of the crop and year	Farm	Variety	Yield (Q/ha)	Potential Yield (Q/ha)(Jharkhand Average) ¹
Mustard (Rabi - 2007-08)	University experiment plot- Ranchi)	Pusa Agrani	11.22	08-Oct
Cow-pea (Kharif-07)	„	Pole type	106.6	100-125
Mung (Kharif-07)	„	„	7.4	6-8 in marginal land and 10-12 in medium land
Cabbage (Rabi - 2007-08)	Narendrapur, WB (University experiment plot)	Rare ball	352.5	250-300
Beans(Rabi -2007-08)	„	Dwarf type	53.13	50-55

Addition of organic matter in the soil is a well-known practice to increase crop yields. Sharma and Mitra reported that the application of organic materials increased grain and straw yield of rice. Many researchers reported that in an organically

¹Source: RKMVU (Ramakrishna Mission Vivekananda University record book of experiment)

managed field activity of earth worm is higher than in inorganic agriculture (C. A. Edwards and J. R. Lofly, 1974). In the biodegradation process earthworms and microbes work together and produce vermin-compost, which is the worm faecal matter with worm casts. Vermi-compost provided micro elements such as N, P, K, Ca, and Mg and microelements such as Fe, Mo, Zn, and Cu (K. Amir and I. Fouzia, 2011). The vermin-compost contained 0.74, 0.97, and 0.45 per cent nitrogen, phosphorus, and potassium, respectively (M. Pal, 2002). Mourao et al. (2008) found that organically grown potato. Virgo yielded 66 per cent of the conventional crop, whereas Raja yielded 47 per cent. The nitrogen uptake of organic crop (tubers and foliage) was 37.0 kg/ha for Raja and 50.5 kg/ha for Virgo, respectively, 21 and 28 per cent of nitrogen uptake by same cultivars grown with mineral fertilizer. Although foliage nitrogen content was increased for the conventional crops, difference between N content of organic and conventional tubers were not significant, as well as for K, Ca, and Mg.

Table 2: Comparative study of benefit cost ratio of black gram cultivation (*Vigna mungo*) in one acre of land in Tamilnadu 2004-05 under rain-fed condition

Type of cultivation	Cost of cultivation	Net return	Benefit cost ratio
Organic cultivation(with Sashyagavya in Ranchi University experiment plot)	2409.2	6290.8	3.61
In-organic cultivation	3319.2	4780.8	2.44

Table 3: Comparative study in between conventional farming and organic farming

Author & Institute of Study	Length of Trial	Crops Grown	Findings
Drinkwater et al -1995 Central Valley of California	-----	Tomato	Yields were similar Three times greater nitrogen mineralization potential 28% more organic carbon Crop more resistant to corky root disease Higher microbial abundance and diversity
Leigh R. A., (1997), othamsted Experimental Station, UK	150yrs	Wheat	Organic yields higher than conventional Soil fertility (in terms of soil organic matter and nitrogen levels) increased by 150% as compared to 20% increase in conventional
Clark S., et al (1999), SFAS Project, University of California, Davis	8yrs	Tomato, Safflower, Corn and Bean	Tomato yields were lower in initial three years but exceeds later on Corn yield shown high variability

Welsh R. (1999), South Dakota in the Midwestern United States	6yrs	Soybean, Wheat	Average organic yields of soybeans and wheat were 3.5% & 4.8% higher respectively than conventional
Maeder et al(2002), Institute of Organic Agriculture and Swiss Federal	21 years	Potatoes, Barley, Winter Wheat, Beet, and Grass Clover	Organic yields were less by about 20%, Fertilizer use was less by 34% in organic as compared to conventional, Energy use was less by 53% in organic as compared to conventional, Pesticide use was less by 97% in organic as compared to conventional, Organic soils housed a larger and more diverse community of organisms
Delate K. et al (2004), Iowa State University	4yrs	Corn and Soybean	Initially both (corn & soybean) yields were slightly lower than conventional In fourth year organic yield exceeded conventional

5. CONCLUSION

Strengthening of agriculture through enormous adoption of high yielding cultivation, increased use of synthetic inputs like chemical fertilizers and pesticides, greater exploitation of irrigation potentiality of surface and ground water resources and farm mechanization have fundamentally been responsible for a remarkable achievement in the food grain production that we have achieved over earlier three decades. High yielding cultivation is more fertilizer responsive which often led to aggravation of pest problem as the plants become succulent enough to be fed upon by a variety of crop pests. Therefore the apparent conflict of our necessity for nutritional security on one hand and environmental sustainability on the other makes it predictable to alternative to the organic or eco-farming system as it appears to be a possible option to meet both these objectives. The later implies a farming system that primarily aims at cultivating land and raising crops under ecologically favourable condition. It emphasizes restricting the use of chemical inputs whether it is inorganic fertilizers or pesticides and instead, relies more on an integrated approach of crop management practices making use of cultural, biological and natural inputs. Addition of organic manures such as FYM, recycling of organic wastes through composting, green manures and biological inputs like vermi-composts and bio-fertilizers etc. constitute important components for plant nutrient management in organic farming. Similarly it also takes utmost advantage of the natural mechanism for pest management with utilization of bio-agents such as predators and parasites available in nature in plenty and the botanical pesticides which are effective in controlling crop pests posing no risk to the environment. Agronomic practices such as crop rotation with judicious selection of crops, inter cropping and

companion cropping, stubble mulching and use of resistant varieties are among the important factors contributing to organic farming. Aher Satish B, Swami Bhaveshananda and Sengupta B (2012), reported that organic agriculture plays a role towards sustainable utilization of resources in food production as well as development with less pollution and contribution to the green-house gases; ultimately climate change.

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