

Organic Agriculture: A Novel Pathway for Sustainable Livelihoods

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ABSTRACT

India inhabits 17 per cent of World's population of which around 60 per cent are engaged in agriculture as a means of their livelihood & thus sustainability of livelihoods is a core agenda of Agricultural Research in the country. The green revolution witnessed by the country in 1960's came with a cost of deterioration of soil health, water tables, creating saline & alkaline conditions, resistance of pests & diseases and increased environmental pollution although it gave tremendous boost to food production in the nation. The natural resources of the most productive states (Haryana & Punjab) of the country is under immense pressure. The water table has depleted to more than 10m in 97 per cent of its cultivated area endangering sustained production of major staple crops. Another important challenge in declining soil health & decreasing factor productivity due to imbalanced use of nutrients & depleting soil organic carbon.

Organic Agriculture offers a solution that will ensure efficiency, effectiveness & sustainable agricultural production. It will also be instrumental for improving crop productivity & soil fertility as well as it solely depends on the use of natural wastes, (crop residues, animal manures, off farm organic wastes), green manure, legumes in sequence, biofertilizers & biocontrol agents.

Organic agriculture is also emerging as mainstream agriculture in 21st century due to growing desire for safe and healthy food, necessity for restoration of soil health and fertility, protection of soil and environment, conservation of resources, reduce, dependence on chemical and ensuring increased profitability. Experiments conducted at Organic Instructional Farm has demonstrated that organic agriculture is a viable option if the crops are selected as per local needs. The potato equivalent yield was significantly higher in Rice-Moong-Potato rotation than the conventional Rice-Wheat Rotation. The package of practices for organic crop production management needs to be standardized. Small holding diversified farming situations need greater on-farm participation to get sustained gain in production and their livelihoods.

1. INTRODUCTION

The green revolution witnessed by the country gave a tremendous boost to food grain production in the country in mid sixties, but it came with a cost. The cost of deterioration of soil health, water

tables, creating saline & alkaline conditions, resistance of pests & diseases and increased environmental pollution. While agricultural output increased as a result of the Green Revolution, the energy input to produce a crop has increased faster (Church, 2005) so that the ratio of crops produced to energy input has decreased over time. Its effect is manifest in many ways. India has witnessed the lowest levels of growth in agricultural production in decades - it is the first time that the population growth rate has outstripped the agricultural production growth rate. India inhabits 17 per cent of World's population of which around 60 per cent are engaged in agriculture as a means of their livelihood & thus sustainability of livelihoods is a core agenda of Agricultural Research in the country.

2. ENVIRONMENTAL CONCERNS ABOUT GREEN REVOLUTION

Green Revolution techniques also heavily rely on chemical fertilizers, pesticides and herbicides and rely on machines, making agriculture increasingly rely on energy intensive non renewable resources. The natural resource of the most productive states (Haryana & Punjab) of the country is under immense pressure. The water table has depleted to more than 10m in 97 per cent of its cultivated area endangering sustained production of major staple crops. Another important challenge in declining soil health & decreasing factor productivity due to imbalanced use of nutrients & depleting soil organic carbon. Natural resources viz. arable land, water, soil, biodiversity (plant, animal and microbial genetic resources) are rapidly shrinking due to demographic and socio-economic pressures, monsoon disturbances, increasing frequencies of floods and droughts.

Overuse of marginal lands, imbalanced fertigation, deteriorating soil health, diversion of agricultural land to nonagricultural uses, depleting aquifers & irrigation sources, salinization of fertile lands and water-logging are pressing challenges requiring urgent attention.

3. ORGANIC AGRICULTURE: A NOVEL PATHWAY

Organic Agriculture offers a solution that will ensure efficiency, effectiveness & sustainable agricultural production. It will also be instrumental for improving crop productivity & soil fertility as well as it solely depends on the use of natural wastes, (crop residues, animal manures, off farm organic wastes), green manure, legumes in sequence, biofertilizers & biocontrol agents. About four decades after the Green Revolution that widely helped the world to be able to produce food in sufficient levels, a small percentage of farmers in India have chosen to employ organic farming methods in response to side effects from their adoption of modern agriculture techniques. Organic agriculture, also known as ecological or biological agriculture, is a holistic farm management system which aims to optimise the health and productivity of interdependent communities of soil, life, plants, animals and people (GOI, 2011). Organic agriculture is a systematic strategy, which may reduce GHG emission and enhance the sequestration of carbon, encourage and enhance the

biological cycles with the farming system, maintain and increase long-term soil fertility, use as far as possible renewable resources in locally organized production systems and minimize all forms of pollution.

Organic agricultural practices increase the soil organic matter (SOM) which helps in increasing biodiversity providing vital ecological services including crop protection. With the intensification of agriculture the SOM was completely excluded from the modern practices of soil fertility management. However, evidences of declining soil fertility, scientific advances in agro-ecology and holistic understanding organic farming practices has reinstated the belief of the use of organic matter as an important

4. CHALLENGES AND ORGANIC MANAGEMENT STRATEGIES

The underlying Table outlines the major challenges that need to be addressed to attain sustainability in Agriculture Production Systems.

It also outlines the organic management strategies that will help to address the problem.

CHALLENGES	PARAMETERS	CAUSES	ORGANIC MANAGEMENT PRACTICES
Soil Health	Physical Properties	Compaction, Excessive erosion, water logging	Crop Rotation, Inclusion of legumes, Green manuring
	Chemical properties	Imbalanced use of fertilizers, Emerging micronutrient deficiencies, acidification, soil salinity and soil alkalinity	Composting, vermicomposting, FYM incorporations (All Approaches to increase soil organic carbon status)
	Biological properties	Organic matter depletion and loss of soil fauna and flora due to monocropping practices	Addition of organic matter and use of biofertilizers (<i>Azotobacter</i> , <i>Azospirillum</i> , PSB)
	Soil Pollution	Excessive use of Pesticides and heavy metal contamination	No pesticide usage. Relying on natural predators and biocontrol agents.
Water Use efficiency	Depleting Ground water	Excessive use of ground water, nitrate contamination,	Soil and water conservation practices eg. Mulching, crop

		climate change	residue incorporation, Organic matter to increase water holding capacities
Plant immunity	Stress Management	Stress Management against biotic (pest and diseases) and abiotic factors (drought)	Intelligent selection of crops and crop sequences, Use of Biocontrol agents, Neem oil, Oilseed cakes, sea weed extracts
Rising cost of inputs	On-Farm Resource Management	High cost of pesticides, fertilizers and seed	Farm Yard Manure, Composting, Vermi composting, Organic Waste recycling, Encouraging farmers to save own seeds and use of resistant seeds

5. TOWARDS SUSTAINABLE LIVELIHOODS:

Organic agriculture is also emerging as mainstream agriculture in 21st century due to growing desire for safe and healthy food, conservation of resources and reduce the dependence on chemical and ensuring increased profitability. Organic Agriculture envisage the inclusion of Supplementary livelihood support activities like animal husbandry, agro-forestry, small-scale agro-processing units, agri-tourism to support income of farmer in event of crop failure.

It ensures farmer of securing an income without much investments in agri-inputs which are becoming costlier. It makes the most efficient use of non renewable resources and on-farm resources thus sustaining the economic viability of farm operations. Diversified cropping systems also ensues resilience to changing climate, pest outbreaks and market variability.

There are numerous evidences to also show that organic systems has less long term yield variability. Under drought conditions, crops in organic systems produced significantly higher yields than conventional agriculture crops and often out yields conventional crops by 7-90 per cent (Hanchinal and Babalad, 2012). Experiments conducted at Organic Instructional Farm has demonstrated that organic agriculture is a viable option if the crops are selected as per local needs. The potato equivalent yield was significantly higher in Rice-Moong-Potato rotation than the conventional Rice-Wheat Rotation. The package of practices for organic crop production management needs to be standardized. Small holding diversified farming situations need greater on-farm participation to get sustained gain in production and their livelihoods.

Efforts are also required from all the stakeholders and the policy makers, researchers to make this practice viable. Economic opportunities invite new players into the marketplace who may have little interest in sustainability or the positive social benefits many have come to associate with organics.

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