



**INSTITUTION OF AGRICULTURAL TECHNOLOGISTS,
BENGALURU**



**EVALUATION OF RKVY PROJECTS
OF
UNIVERSITY OF AGRICULTURAL SCIENCES,
RAICHUR**

**“ESTABLISHMENT
OF
RESEARCH INSTITUTE ON ORGANIC FARMING
IN
HYDERABAD KARNATAKA REGION”**

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ESTABLISHMENT OF RESEARCH INSTITUTE ON ORGANIC FARMING IN HYDERABAD KARNATAKA REGION

EXECUTIVE SUMMARY

Agriculture plays a vital role in India's economy. 54.6% of the population is engaged in agriculture and allied sectors. The total geographical area of the country is 328.7 million ha, of which reported net sown area is 140.1 million ha and the gross cropped area is 198.4 million ha with a cropping intensity of 142 percent. Total food grain production during 2016-17 in the country is estimated at 275.68 million tonnes (Annual Report 2017-18, Department of Agriculture, Cooperation and Farmers welfare, Government of India).

The inability of Indian agriculture to meet the demand for food in the country during the two and half decades immediately after independence had been a matter of concern at those times. India has moved from an era of chronic food shortage during the 1960s to food self-sufficiency and even food exports from the 1990s. The green revolution fulfilled our aspirations by changing India from a food importing to a food exporting nation (Narayanan, 2005).

Although India has achieved self-sufficiency in food production and is also exporting foods, the achievement has been at the expense of ecology and environment and to the detriment of the well-being of the people.

The adverse environmental and social impacts of modern agriculture are universal. Pretty (1995) summarized them as follows:

- contamination of water by pesticides, nitrates, soil and livestock wastes, causing harm to wildlife, disruption of ecosystems and possible health problems in drinking water;
- contamination of food and fodder by residues of pesticides, nitrates and antibiotics;
- damage to farm and natural resources by pesticides, causing harm to farm workers and public, disruption of ecosystems and harm to wildlife;
- contamination of the atmosphere by ammonia, nitrous oxide, methane and the products of burning, which play a role in ozone depletion, global warming and atmospheric pollution;
- overuse of natural resources, causing depletion of groundwater and loss of wild foods and habitats and their capacity to absorb wastes causing water-logging and increased salinity;

- the tendency in agriculture to standardise and specialise by focusing on modern varieties, causing the displacement of traditional varieties and breeds;
- new health hazards for workers in the agrochemical and food -processing industries.

The necessity of having an alternative agriculture method which can function in a friendly eco-system while sustaining and increasing the crop productivity is realized now. Organic farming is recognized as the best-known alternative to the conventional agriculture.

With rising concern of health issues and food safety, many consumers have turned their site to organic products. The increased consumers' interest in organic food has been attributed among others to the growing demand for food free from pesticides and chemical residues. The excess/indiscriminate use of pesticides and fertilizers has led to the entry of harmful compounds into food chain, death of natural enemies and deterioration of surrounding ecology (Chitale et al., 2012). Organic foods promote balance among humans, other living organisms and the nature. It also promotes no artificial preservatives and best maintains the originality of food. This prevents excess use of harmful ingredients and thereby ensures health (Raahinipriya P and Rani R Jansi, 2018).

Organic farming system emphasizes on the use of organic matter for enhancing soil properties, minimizing food chain associated health hazards and attaining closed nutrient cycles, the key factors for sustainable agriculture. Organic agriculture is a production system which includes agriculture with biodiversity, ecosystem and biological cycle and excludes all chemical and synthetic inputs. It avoids chemical fertilizers, hormones, feed additives and pesticides and promotes natural techniques like crop rotation, animal manure, off-farm waste, crop residues, plant protection and nutrient mobilization (Negi Priyanka and Negi MS, 2018).

The basic concepts behind organic farming are:

1. It concentrates on building up the biological fertility of the soil so that the crops take the nutrients they need from steady turnover within the soil nutrients produced in this way and are released in harmony with the need of the plants.
2. Control of pests and diseases and weeds is achieved by the development of an ecological balance within the system and by the use of bio-pesticides and various cultural techniques such as crop rotation, mixed cropping and cultivation.
3. Organic farmers recycle all wastes and manures within a farm, but the export of the products from the farm results in a steady drain of nutrients.
4. Enhancement of the environment in such a way that wild life flourishes.

Keeping the above in view, the project, “**ESTABLISHMENT OF RESEARCH INSTITUTE ON ORGANIC FARMING IN HYDERABAD KARNATAKA REGION**” was taken up by University of Agricultural Sciences, Raichur with Rashtriya Krishi Vikas Yojana funding. The project was implemented from 2013-14 to 2016-17. The details of the project are as under:

1.	Title of Project	:	“ESTABLISHMENT OF RESEARCH INSTITUTE ON ORGANIC FARMING IN HYDERABAD KARNATAKA REGION”
2.	Nodal officer and Principal Investigator	:	Dr. Satyanarayana Rao, Professor of Agronomy, Main Agricultural Research Station, University of Agricultural Sciences, Raichur
3.	Implementing Institution (S) and other collaborating Institution (s)	:	Main Agricultural Research station, Raichur College of Agriculture, Bheemaranagudi Agricultural Research Station, Kalaburgi Agricultural Research Station, Bidar Agricultural Research Station, Hagari
4.	Date of commencement of Project	:	October 2013
5.	Approved date of completion	:	2016-17
6.	Actual date of completion	:	August 2016
7.	Project cost	:	Rs. 150 lakhs

The objectives of the project are as follows:

1. Survey, documentation and Scientific validation of potential ITK's.
2. To develop location specific organic production technologies (Package of Practice for different crops and cropping systems with assessing the long-term effect on productivity, soil health and quality produce.
3. To develop research facilities to address the various problems of organic farming.
4. To develop and demonstrate the Integrated Organic Farming Systems (diversified organic farming practices and land use systems) in different agro-climatic regions to sustain natural resources, enhance the productivity and farm income.
5. To develop novel microbial strains and to establish mass production units for organic inputs (organic manures, bio-agents, bio-fertilizers, bio-pesticides etc.,) for their multiplication, demonstration and supply of quality inputs.
6. To develop cost effective new techniques for rapid composting of farm wastes for resource recycling.

7. To create scientific awareness among the farmers and the concerned regarding organic agriculture practices through capacity building (training programmes, exposure visits and participatory research etc.,).
8. To provide value addition and market linkages for organic products

The context of the evaluation arises from the following facts:

1. Organic farming evolved thousands of years ago. Ancient farmers started crop cultivation along the river belts by using natural resources. There have been several indigenous technologies developed by farmers themselves and practiced in farming. These technologies have been modified to suit local conditions in different parts of the country and there is need to document these practices, examine their utility in sustained crop production practices and validate the technologies scientifically.
2. Although it is common to equate organic farming with sustainable agriculture, the two are not synonymous. Sustainability in agriculture is a broad concept, with considerations on many levels, such as environmental health, economic profitability etc. Organic farming methods strikes balance between what is taken out of the soil with what is returned to it, without relying on outside inputs. There is need to develop location specific organic production technologies (Package of Practice for different crops and cropping systems with assessing the long-term effect on productivity, soil health and quality produce.
3. Farmers adopting conventional organic farming face huge losses i.e. up to 71%, in the initial years (Savage, 2016). Also, the time required to achieve crop sustainability under present organic cultivation system is still unknown and thereby resulting in high cultivation cost and economic unviability. According to an USDA Survey, the organic yields were lower in 84% areas. The organic yield gap is predominant for row crops, fruit crops and vegetables. Following the conventional approach of pest management utilizing weaker organic pesticides cannot resolve the pest/disease issues in organic agriculture. And this forms the major reason for crop failure under organic. Conventional farming practices, increased mechanization and decreasing per capita land holding has led to scarcity of bio-resource for compost production that forms a major bottleneck towards large scale organic conversion. Hybrid seeds are designed to respond to fertilizers and chemicals. Presently Genetic and fertilizer sensitive seed and planting materials rules the market with negligence on indigenous varieties, which are more suited for organic farming. There is a large vacuum in the availability of quality organic seeds and forms a major constraint for the farmers willing to adopt organic farming. There is need to take up research on the above common problems associated with organic farming.
4. There is lack of adequate research and development backup as well as training related to Organic Farming in India. Most of the farmers in the country have only vague ideas about organic farming and its advantages as against the conventional

- farming methods. There is need to develop and demonstrate the Integrated Organic Farming Systems (diversified organic farming practices and land use systems) in different agro-climatic regions to sustain natural resources, enhance the productivity and farm income.
5. Following the conventional approach of pest management utilizing weaker organic pesticides cannot resolve the pest/disease issues in organic agriculture. Use of bio-fertilizers and bio pesticides requires awareness and willingness on the part of the farming community. Knowledge about the availability and usefulness of supplementary nutrients to enrich the soil is also vital to increase productivity.
 6. Farmers lack knowledge of compost making using the modern techniques and also its application. The maximum they do is making a pit and fill it with small quantities of wastes. Often the pit is flooded with rainwater and result is the top of the compost remains under composted the bottom becomes like a hard cake. Proper training to the farmers will be necessary to make vermi-compost on the modern lines.
 9. There is lack of adequate research and development backup as well as training related to Organic Farming in India. Most of the farmers in the country have only vague ideas about organic farming and its advantages as against the conventional farming methods. There is need for capacity building to create scientific awareness among the farmers and the concerned regarding organic agriculture practices through training programmes, exposure visits and participatory research etc.
 7. Local demand for organic food is growing. India is poised for faster growth with growing domestic market. Success of organic movement in India depends upon the growth of its own domestic markets. Farmers need to be organized in a group/ association for crop cultivation such as, Organic Farming Association of India, Institute of Natural Organic Agriculture to provide value addition and market linkages for organic products.

The focus of Evaluation is:

- i. To examine whether the indigenous technology knowledge with organic farming practices followed by farmers can be examined, evaluated and validated by standardizing the practices.
- ii. To evaluate the location specific organic production technologies (Package of Practice for different crops) and cropping systems developed and assessing the long-term effect on productivity, soil health and quality produce.
- iii. To evaluate the Integrated Organic Farming Systems (diversified organic farming practices and land use systems) developed in different agro-climatic regions to sustain natural resources, enhance the productivity and farm income.

- iv. To evaluate the steps taken to develop and establish mass production units for organic inputs (organic manures, bio-agents, bio-fertilizers, bio-pesticides etc.) for their multiplication, demonstration and supply of quality inputs.
- v. To study the cost-effective new techniques for rapid composting of farm wastes for resource recycling.
- vi. To study the efforts made to create scientific awareness among the farmers and the concerned regarding organic agriculture practices through capacity building (training programmes, exposure visits and participatory research etc.).
- vii. To evaluate the steps taken to provide value addition and market linkages for organic products in Hyderabad Karnataka region.

REFLECTIONS AND CONCLUSIONS

1. The project has been comprehensively designed and implemented at different stations by proper monitoring. Significant findings have been arrived at by different experiments and have been successfully transferred into farmers' fields through participatory demonstrations, training programmes and publication of extension bulletins.
2. For identification of Indigenous Technology Knowledge, 93 innovative organic farmers in various districts were identified and ITKs followed were documented and studies for their validation were taken up. However, it was observed that standardization of the ITKs has not been taken up. The microbial compositions of various liquid organic manures were evaluated. While the beneficial effects of the microbes are known, no studies to evaluate the effect of ITKs on plant growth have been done. This could have given sufficient information for validation of the ITKs. The recommendations on use of ITKs have been done without any research studies and needs to be scientifically examined before any recommendations.
3. Many other ITKs identified are proposed to be taken up for standardization and validation.
4. Long range evaluation of location specific production technologies has been done at various locations. The research results have revealed that adoption of organic production methods will result in reduction of crop yield in the early years and become comparable in the later years. This clearly shows that without any intervention in price determination based on quality of produce, organic method of cultivation may not be viable for rainfed farmers. While package of practices for various location specific organic production technologies have been developed, unless there is some policy intervention at insuring the farmers against yield reduction seen under organic farming is taken, the technologies will not be adopted by the farmers.

5. In this context, the studies have missed the aspect of evaluation of quality of produce under organic production method vis a vis other method studied.
6. The demonstrative impact of Integrated Organic Farming Systems developed needs to be propagated among the farming community by conduct of training programmes and taking up participatory demonstration at farmer/ field level.
7. While efforts have been made to popularize the bio-agents, bio-fertilizers and bio-pesticides by mass production and sale, there is need to educate the farmers on use of these organic products. These items may be included in the package of practices as recommendations. There is need to include use of biopesticides in integrated pest management and in e-pest surveillance recommendations.
8. While capacity building exercise through conduct of training programmes, exposure visits and demonstrations has been exemplary, there is need to design the training programmes and exposure visits with specific objective orientation.
9. Quantifying the resources and enhancing their use efficiency through developing suitable organic production systems by identifying suitable crop varieties and other production practices including innovative bio-inputs for long term sustainability has to be done.
10. Studies on nutrient management including micro nutrients with various organic nutrient sources and their nutrient releasing pattern over a period of time needs to be taken up.
11. Long term impact of organic / natural farming practices on soil fertility status, biodiversity and environmental changes in comparison with conventional and integrated production systems has to be done.
12. Crop residues management in major crops of TBP and UKP command areas. (Paddy straw, Cotton stalks, Red gram stalks etc).
13. Organic farming research in horticultural crops including protected structures and terrace gardening.
14. The study has not evaluated various composting methods and standardized composting technology for the region. This has to be taken up.

ACTION POINTS

1. Indigenous Technology Knowledge (ITKs) has been the basic fabric of organic farming practices in crop production in the country. There are innumerable ITKs which are being practiced by farmers in the region. There is need to identify, document and validate these ITKs. Efforts should be made to standardize the ITKs and conduct research on the impact of ITKs on various aspects of plant growth, yield and quality of products.
2. Unless there are policy interventions for quality-based price determination of organic products, cultivation of crops organically will not be viable for farmers as organic methods of cultivation have proven to result in reduction in crop yields. Policy guidelines for maintenance of soil fertility/ health through organic production methods could also be attempted.
3. Integrated Organic Farming systems have been tested and evaluated in different parts of the country and many models have been developed. While some attempts have been made to popularize the IOFS among farmers, there is need to attempt and try participatory demonstration approach to educate the farmers on the beneficial effects of the system in improving their income, improving soil fertility/ health and environment.
4. There is need to encourage use of organic manures, bio-fertilizers and bio-pesticides by farmers. The quality of these available at present in the market and items being made available to the farmers on discount by government departments leaves much to be desired. Although there are guidelines to test each batch of these products produced by private companies, it is never practiced or insisted. As a result, the quality of produce has been very low. There is need for the Universities to take up mass production of these products and supply to farmers under government sponsored programmes. A policy issue that is yet to be solved is the need for certification by Central Insecticides Board, Government of India for bio-pesticides manufactured by Universities.
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9. Crop residues management in major crops of TBP and UKP command areas. (Paddy straw, Cotton stalks, Red gram stalks etc).
10. Organic farming research in horticultural crops including protected structures and terrace gardening. The study has not evaluated various composting methods and standardized composting technology for the region. This has to be taken up.
11. Promotion and production of On-farm production of inputs, viz., Compost, vermicompost, any other bio-nutrients and bio-control agents by the unemployed rural youth thereby reducing the burden on purchasing external inputs at cluster/ Gram Panchayat levels with the guidance and services of the Institute of the organic farming and its centres in the region can be focused.
12. Organic Farming Research Institute should be accredited and used as Nodal centre for organic certification process in the Region.
13. In view of reduced animal population, there is need to focus on green leaf manuring and use of non-edible oil cake for crop production.
14. Documentation of quality of food grains produced in organic farming with scientific reasoning has to be done.
15. Long term organic manuring experimental plots may be initiated by integrating different sources of organic manures, i.e., Farm Yard Manure, vermicompost, green leaf manure and non-edible oil cakes.
16. There is need for convergence of line departments of the University and government departments on organic farming and quality assessment.

RESEARCHABLE ISSUES

1. Relevance of non cash inputs in organic farming and its cost effectiveness needs to be assessed.
2. Branding of organic products needs to be standardized.
3. Nutrient use efficiency and water use efficiency with reference to organic farming needs to be assessed.
4. Need for integrated system-oriented impact assessment and a realistic consideration of the adoption constraints in small holding systems.
5. Soil fertility dynamics vis a vis sustainability of the system.
6. Developing organic farming systems and different agricultural and horticultural crops suitable for different agro climatic and farming systems.
7. Prioritize area of research leading to development of package of practices and validation of innovations and indigenous technology knowledges (ITKs).
8. Bio-composting of microorganism consortia for management of city and urban wastes.