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*Fig 1. A typical picture of an organic farming system in a medium rainfall area. The precipitation is 500-1000 mm per year. Long-term research is needed on how to improve soil and human health, economic viability vs. sustainability, and lively-hood support to the farm family. Photo: S.Subhash.*

## Innovative organic farming in India

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India is the seventh largest country in the world, and in terms of agricultural land, diversity in climate and terrain, and long tradition of farming systems, it has a very high potential for organic farming. Further, 68 % of the agricultural land is rainfed, and in these areas inputs of intensive agriculture have so far not been too much applied. Increasing export demands of organic produce such as cotton, oilseed, processed food and spices compelled policy makers to promote organic farming in India. Consequently, the Indian Agricultural and Processed Food Products Export Development Authority (APEDA) launched a National Program on Organic Production in 2002. Since then APEDA is working as apex body for regulation of certification and export of organic produce, and produce statistics of organic production in India.

*Statistics of organic farming in India 2010-11 (Source: APEDA)*

- Total organic production : 3.88 million MT
- Quantity export: 69837 MT
- Export Value: 157.22 million US$
- Share of export to total production: 4 %
- Certified area (including wild harvest): 4.43 million ha
- Certified area under cultivation: 0.24 million ha
- Increase export (form 2010 to 2011): 33 %

In 2004, the National Centre of Organic Farming was established near New Delhi to promote organic farming by capacity building and control the quality of organic inputs.

**Research on Organic farming**

Although research related to organic farming started in 1950's, a majority of researchers hesitate to brand themselves as organic researchers and instead use terms such as research in eco-friendly farming technologies or conservation of natural resources. At most of the research institutions, work is done on integrated use of eco-technologies with chemicals. In 2004, the Indian Council of Agricultural Research, ICAR, started a network project on organic farming at 13 centers all over the country. Almost all the agricultural universities offer some education in organic farming, and some offer a full course. Recently, Himachal Pradesh Agricultural University in north India and University of Agricultural Sciences in south India opened departments of Organic Agriculture.

The current research relevant for organic farming in India can be structured into three major groups: Revalidation of traditional technologies, Development of ecofriendly inputs and Organic system research.

**1. Revalidation and standardization of traditional technologies**

Here, traditional knowledge and technologies developed during millenniums are studied and documented by various research organizations. Tamil Nadu Agricultural University and University of Agricultural Sciences are the leading institutes in this. One example is the utilization of Panchgavya and Amrit Pani as a soil amendments. These products belong to the Ayurvedic medical tradition, where (indigenous) cow products (dung, urine, milk, ghee (cleared butter) and curd) are central ingredients, in addition to medical herbs. The products may be used to treat human sickness, but also as an elixir or promoter of soil health and plant growth. Several other preparation form botanicals as plant growth promoter or as biopesticides have also been revalidated and standardized. The beauty of these traditional technologies is the cost effectiveness, local availability and that they are socially acceptable.

*Fig 2.Honey bee (on sesame crop) is a great indicator of developed organic systems. We need more research on how organic systems may help to protect and support the bees, and vice versa.*

**2.Development of ecofriendly organic inputs**

In this field, research is popular because it does not require a conversion period for a system development, it is linked to basic science and possibly biotechnology, there are easy funding availabilities and the products may be commercialized. Several such products have been developed by universities as well as private entrepreneurs. Some of the examples are enriched compost (with natural minerals and microbes), neem or other botanically based biopesticides, and isolation of local effective fauna for biofertilisers or biopesticides.

**3.Organic system research**

This field is the most difficult and time consuming, and hence this type of research is conducted only at a few locations. One interesting work is a recent survey of productivity, soil health and economics of selected organic farms conducted by Ramesh et.al. (2010). One organic system has been developed for the low rainfall areas at Central Arid Zone Research Institute in Jodhpur, and aims at developing an organic production protocol for high value –low water requiring crops (Sharma, 2011). Crop based organic protocols have already been developed for basmati rice, cotton, tea and spices at various universities or at ICAR's institutes. In comparison to the rapid growth of organic production in India, research has grown slowly. Possible reasons are that organic system research requires a conversion period of 5-6 years, which limits the interest from researchers, students and funding bodies. Further, significant climatic variations induced high variations, especially in rainfed areas in the response to the organic inputs from year to year. This challenges a logic interpretation of the results. Variation in the quality of organic inputs further aggravates this problem.

*Fig 3.The population of beneficial insects and predators like lady bird beetle, here on a cumin crop, should be maintained the year round in organic farming systems where crops are grown continuously. To achieve this, multidisciplinary research is required.*

As discussed by Ramesh et al. (2010), organic farming may be economically superior in spite of somewhat lower yield levels provided that premium prices are paid. Without premium prices, organic farming is less economically viable. However, benefits such as positive environmental and health effects of organic production are difficult to assess economically, and subsidies for conventional fertilizers and pesticides may be ignored. Many times the question is raised why organic systems do not compare too well with chemically based systems. Lower and less stable yield levels, especially during the 2-5 year conversion period, are often criticized. Replying such queries requires good knowledge and experience, which is becoming rare since too little long-term research is carried out.

Organic researchers often have to face several questions while presenting results which diverts the discussion towards a debate on organic vs. chemicals. Some common arguments are that plants cannot differentiate between different sources of nutrients; that organic inputs are not available in sufficient quality or quantity; that organic farming is labor intensive; that 100 % organic food is impossible anyway given the present pollution status in air and water etc. Often the debate takes over so that the presentation of research results is set at side, and very few researchers dare to indulge in such

discussions. Instead, they divert their work towards integrated use of organic and chemicals, because this approach is regarded as safer and more readily accepted.

Still research is conducted on various aspects as mentioned above by dedicated workers, who have reason to believe that organic systems have a lot to contribute to the current challenges in agriculture such as climate change, high cost of chemical inputs, deterioration of soil health etc. Fortunately at national level, an increasing awareness about soil health may further support organic farming research in one or the other way.

## Referred papers

Ramesh, P., Panwar, N. R., Singh, A. B., Ramana, S., Yadav, S. K., Shrivastava, R., Subba Rao, A., (2010): Status of organic farming in India. Curr. Sci. 98, pp. 1090–1194.

Sharma, A.K. 2011. Organic System in low rainfall areas for climate resilience and returns. Organic Farming Newsletter 7(4), p 3-9. NCOF, India. Available at http://www.orgprints.org/20805/

## Further reading

http://ncof.dacnet.nic.in/Newsletters/Organic_Farming_Newsletter/Volume_2/OFNL%20Vol%202(2)%20June%2006.pdf

http://www.rainfedfarming.org/documents/seminar_brochure/27th_Sept/OPRupela.pdf

*Fig 4. A typical picture of an organic farming system in a low rainfall area. The precipitation is less than 500 mm per year. A current research need is to quantify the benefit of agrodiversity for climate resilience.*