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Organic Input Production and Marketing in India

Efficiency, Issues, and Policies

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India had developed a vast and rich traditional agricultural knowledge since ancient times and presently finding solutions to problems created by over use of agrochemicals. Today's modern farming is not sustainable in consonance with economics, ecology, equity, energy, and socio-cultural dimensions. Indiscriminate use of chemical fertilizers, weedicides, and pesticides has resulted in various environmental and health hazards along with socio-economic problems. Though agricultural production has continued to increase, but productivity rate per unit area has started to decline. The entire agricultural community is trying to find out an alternative sustainable farming system, which is ecologically sound, economically and socially acceptable. Sustainable agriculture is unifying concept, which considers ecological, environmental, philosophical, ethical, and social impacts, balanced with cost effectiveness. The answer to the problem probably lies in returning to our own roots. Traditional agricultural practices, which are, based on natural and organic methods of farming offer several effective, feasible, and cost effective solutions to most of the basic problems being faced in conventional farming system. Many long-term studies have reported that soil under organic farming conditions had lower bulk density, higher water holding capacity, higher microbial biomass carbon and nitrogen, and higher soil respiration activities compared to the conventional farms. This indicates that sufficiently higher amounts of nutrients are made available to the crops due to enhanced microbial activity under organic farming.

India is bestowed with lot of potential to produce all varieties of organic products due to its agro-climatic regions. In several parts of the country, the inherited tradition of organic farming is an added advantage. This holds promise for the organic producers to tap the market which is growing steadily in the domestic market related to the export market. 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. The cultivated land under certification is around 2.8 million ha (2007–08, 1.9 per cent of GCA). This includes one million ha under cultivation and the rest is under forest area (wild collection) (Agricultural and Processed Food Products Export Development Authority [APEDA] 2010). India exported 86 items during 2007–08 with the total volume of 37,533 MT. The export realization was around 100.4 million USD registering a 30 per cent growth over the previous year (APEDA 2010).

With having such a due importance of organic farming in India, the important event in the history of the modern nascent organic farming was the unveiling of the National Programme for Organic Production (NPOP) in 2000. The subsequent accreditation and certification program was started in 2001. The implementation of NPOP is ensured by the formulation of the National Accredited Policy and Programme (NAPP). Later, the Department of Agriculture and Cooperation, Ministry of Agriculture has also launched a central sectoral scheme entitled 'National Project on Organic Farming (NPOF)' during 10th five-year plan. The main objectives of the programme are: capacity building through service providers; financial support to different production units engaged in production of bio-fertilizers, fruit and vegetable waste compost and vermi-hatchery compost; human resource development through training on certification and inspection, production technology, and so on.

Setting up of organic input units with capital investment subsidy is one of major component under NPOF for encouraging the organic inputs production since 2004. Availability of quality organic inputs is critical for success of organic farming in India. To promote organic farming in the country and to increase the agricultural productivity while maintaining the soil health and environmental safety; organic input units are being financed as credit-linked and back-ended subsidy through National Bank for Agriculture and Rural Development (NABARD) and NCDC. These units will not only reduce the dependency on chemical fertilizers but also efficiently convert the organic waste in to plant nutrient resources. Three types of organic input production units namely; Fruit/vegetable waste units, bio-fertilizer unit, and vermi-hatchery units are being supported at 25 per cent of their total project costs respectively. Around 455 vermi-hatchery units, 31 bio-fertilizer units, and 10 fruit and vegetable waste units were sanctioned across different states by NABARD till May 2009. But, NCDC has so far sanctioned only two bio-fertilizer units in Maharashtra state.

OBJECTIVES

At this juncture, it is very interesting to know what is the present status of these units, what is the production and capacity utilization of each unit, and suggestions for enhancing capacity utilization, and so on. It is also very important to get the feedback from promoters for further improving in the implementation of the scheme. However, very little effort has been made so far to find out the performance of organic input units in terms of its capacity utilization, cost of production and efficiency. Very few attempts were also made till now to assess the economics and efficiency of organic farming in India. Such analysis can provide valuable insights for undertaking appropriate measures for faster expansion organic farming in the country.

DATA AND METHODOLOGY

The selection of sample organic input units for the study was purposively chosen from four states, namely Punjab, Uttar Pradesh, Gujarat, and Maharashtra. One of the reasons for choosing these four states was to see the comparison in efficiency of organic input units between the northern states (where irrigation and fertilization application is default in states like Punjab and Uttar Pradesh) and western states (where irrigation and fertilizer application is optional in states like Maharashtra and Gujarat) of India. A total sample of 40 vermi-hatchery units were chosen in clusters under four states for the study. The criterion used for selection of sample units from each state was on their respective weights in the population. Due to their extremely scattered nature in each state, vermi-hatchery sample units were chosen in two to three groups/clusters in order to minimize the travel costs and time. Similarly, four bio-fertilizer units (three NABARD and one NCDC sanctioned) and two fruit and vegetable units were also covered in the study. A well-structured and pre-tested questionnaire was administered to extract some common quantitative parameters of each type of unit; with utmost emphasis was placed on qualitative case analysis through interaction with the organic input units. The study also covered a sample of 60 (15 each from one state) organic farmers to canvass a structured questionnaire to extract constraints in procuring and usage of organic inputs, and so on. Another random sample of 60 (15 each from one state) conventional farmers was also selected to compare the crop economics and productivity of crops with organic cultivation in the respective study areas.

This study used a model based non-parametric DEA approach for efficiency analysis of organic input units. Multiple regression models are also used to estimate the drivers for efficiency in input units. The same DEA approach is also used for estimating the efficiency between organic and conventional farming systems. Similarly, the determinants for efficiency in organic farming are also identified.

RESULTS AND DISCUSSION

Capacity Utilization of Sample Units

The details of capacity utilization of sample units are presented in Table 64.1. Capacity utilization is a concept that refers to the extent to which an enterprise actually uses its

Table 64.1 Capacity Utilization of Sample Units (TPA)

Item	Gujarat	Maharashtra	Punjab	Uttar Pradesh	Over all
Average installed capacity	150	150	150	150	150
Current capacity utilization	24.2	187	33	105	76.2
Capacity utilization rate (%)	16.1	124.6	22.0	70.0	50.8
Average recovery rate (%)†	48.0	52.5	33.3	39.7	42.7
Gestation period per cycle (days)†	46.5	35	60	50	48.8
Avg no. of cycles per year (range)†	5–7	10–15	3–5	6–8	7–9

Note:† reviewed based on farmers' past experiences.

installed productive capacity. The results presented in the table were referring to the capacity utilization of organic input units in the last one year.

The average installed capacity of the sample units was 150 tonnes per annum (TPA). Overall, the average capacity utilization was around 76.2 TPA. The average capacity utilization rate was 50.8 per cent which indicates nearly half of its full potential. Across different states, the average capacity utilization was the highest in Maharashtra followed by Uttar Pradesh, Punjab, and Gujarat. The actual production in Maharashtra units was more than its installed capacity. The lowest capacity utilization was observed in Gujarat at the rate of 24.2 TPA. This capacity utilization rate was one sixth of the actual potential (16.1 per cent). The reasons for low capacity utilization are lack of demand, poor production skills, and insufficient infrastructure. Even though the units in Punjab were well equipped, their productivity levels were also low. This is because of absence of market demand for vermi-compost. In case of Uttar Pradesh, the average capacity utilization rate was 70.0 per cent. The demand is slowly picking up due to its nearness to different export channels exist in and around New Delhi.

The average recovery rate per unit was 42.7 per cent. Across different states, the highest recovery rate was noticed in case of Maharashtra (52.5 per cent) followed by Gujarat, Uttar Pradesh, and Punjab. The high recovery rate in Maharashtra may be one of the reasons for its high productivity. Even though, the rate of recovery was high in Gujarat, the productivity was low because of lack of production skills and influence of climatic parameters (high temperatures, heavy rains, and so on). The average gestation period per cycle for the entire sample was 48.8 days. It is dependent on various parameters like number of worms per cubic meter, age of the worms, raw material type, and production season, and so on. The time period was the lowest in Maharashtra due to their higher efficiency levels while it was the highest in Punjab. Overall, the average number of cycles per annum produced by the organic inputs was seven to nine. This number was very low in case of Punjab because of high gestation period.

India has enough potential for production of sufficient quantities of organic inputs. Substantial capacities have been generated for production of different organic manures through diverse state and central financial assistance schemes. As per National Centre of Organic Farming (NCOF) (2007–08), the total compost/vermi-compost production (includes rural, urban, FYM, and other sources) at all India was 3830.9 lakh tonnes and area covered by these units was 1694.8 lakh ha. Similarly, the total green manure production in the country was 133.5 lakh tonnes with 13.0 lakh ha area coverage. The total installed capacity created for production of different bio-fertilizers in the country was 67,162 tonnes. But, their actual production of different bio-fertilizers was 38932.6 tonnes. This data clearly indicates that only 58 per cent of their capacity was utilized. However, the growth in production of bio-fertilizers was quite significant when compared to 2004–05. The results also showed that the total production of bio-fertilizers was the highest in case of Tamil Nadu followed by Karanataka, Andhra Pradesh, and Kerala. It also concludes that the awareness and usage of bio-fertilizers was higher in south zone than other zones in India. Among different types of bio-fertilizers, the share of Phosphorous Solubilizing Bacteria (PSB) production was higher. The status of biopesticides production in India is still in infant stage. The production is slowly gaining momentum with the increased awareness of the farmers.

Economics of Vermi-Compost Production

The summary of economics of vermi-compost production across different states is presented in Table 64.2. The results clearly reveal that the production of vermi-compost was a profitable venture in India. The weighted average cost of production per quintal was Rs 286 and price realization for the same was Rs 506. The net margin per quintal of vermi-compost production was Rs 220. This is a quite significant margin in agri-business sector. Among different states, the

Table 64.2 Summary of Economics of Vermi-Compost Production in India (Rs)

Item	Gujarat	Maharashtra	Punjab	Uttar Pradesh	Weighted Average
Cost of production per quintal (Rs)	453	218	433	324	286
Price realization per quintal (Rs)*	233	447	488	678	506
Net margin per quintal (Rs)	−220	229	55	354	220

*Note:** Including the sale of worms.

Table 64.3 Frequency Distribution of Efficiency of Organic Input Units (n = 40)

Efficiency (%)	CRS			VRS		
	TE	AE	EE	TE	AE	EE
1–50	47.5	47.5	85.0	12.5	40.0	57.5
51–60	5.0	17.5	2.5	2.5	7.5	10.0
61–70	5.0	10.0	0.0	5.0	20.0	10.0
71–80	12.5	7.5	5.0	10.0	2.5	2.5
81–90	10.0	10.0	2.5	25.0	20.0	10.0
91–100	20.0	7.5	5.0	45.0	10.0	10.0
Max (%)	100	100	100	100	100	100
Min (%)	25.4	12.8	8.8	44.6	16.3	13.4
Mean (%)	63.7	50.95	32.95	83.39	59.42	50.24
Standard deviation (%)	24.0	25.7	24.1	18.8	25.2	26.4

cost of production was the highest in Gujarat followed by Punjab, Uttar Pradesh, and Maharashtra. Good production skills, higher market demand, and economies of scale of production are, may be, the reasons for higher productivity and low cost of production in Maharashtra. Per quintal price realization was the highest in Uttar Pradesh followed by Punjab, Maharashtra, and Gujarat. Proximity to Delhi metropolitan and presence of vermi-compost export channels have helped Uttar Pradesh state to realize more price per quintal. Even though, the productivity and market demand were relatively lower in Punjab, existence of green houses and nurseries in Chandigarh facilitating to reap reasonable price for vermi-compost. The average net margin per quintal was the highest in Uttar Pradesh while it was the lowest and in negative value in Gujarat state. By administering proper training to promoters and providing technical know-how in vermi-compost production would yield good results in Gujarat state as well.

Efficiency of Organic Inputs

The frequency distribution of technical, allocative, and economic efficiencies of sample organic input units both under CRS and VRS models of DEA approach is presented in Table 64.3. The estimated mean technical, allocative, and economic efficiencies under DEA-CRS model were 63.7, 50.95, and 32.95 per cent, respectively. Similarly, these values under DEA-VRS model were 83.39, 59.42, and 50.24 per cent, respectively. In terms of technical efficiency, about 45 per cent of the sample units have more than 90 per cent efficiency under the VRS model. Under the CRS model, only 20 per cent of the sample units have more than 90 per cent efficiency. In case of allocative efficiency, majority of sample units (40 per cent) fell under less than 50 per cent category under VRS model while 47.5 per cent of the same belonged to less than 50 per cent category under CRS assumption. 85 per cent of sample units exhibited less than 50 per cent of economic efficiency under CRS assumption. Correspondingly under VRS model, the large share of sample (57.5 per cent) was also belonging to the same class.

It is concluded from the table that majority of the sample organic units (47.5 per cent) showed less than 50 per cent technical efficiency under CRS assumption, indicating that most of the organic production units were inefficient. In other words, the inputs under CRS model (VRS) can be reduced by 36 per cent (16 per cent) to attain the same level of output. To supplement the above statement, the most frequent interval of allocative and economic efficiency was 1 to 50 per cent under both CRS and VRS assumptions. Further, it reveals that the organic production units were suffering from both technical inefficiency in using resources as well as unable to allocate inputs in the cost minimizing way. The scale efficiency index among sample varied from 32.7 per cent to 100 per cent, with a mean value of 77.7 per cent.

Due to very little accessible information on economics and efficiency of organic farming in India, an attempt is made to assess it in different crops and states. The results showed mixed response. Overall, crop economics results concluded that the unit cost of production is lower in organic farming in case of cotton (both in Gujarat and Punjab) and sugarcane (both in Uttar Pradesh and Maharashtra) crops whereas the same is lower in conventional farming for Paddy and Wheat (both in Punjab and Uttar Pradesh) crops. The DEA efficiency analysis conducted on different crops indicated that the efficiency levels are lower in organic farming when compared to conventional farming, relative to their production frontiers.

These results conclude that there is ample scope for increasing the efficiency under organic farms. The determinants of the efficiency in organic farming are education of the farmer and formal participation in training programmes.

The broad suggestions for promotion of organic input units are also collected from the sample respondents. The major issues are: prompt and timely conduct of JMC visits; quick and timely disbursement of subsidies to promoters; inclusion of buffaloes in the scheme, inclusion of training on vermi-compost production, and insurance components in the going scheme; assist farmer producers in obtaining licensing and certification of compost; supply of quality seed stock at cheaper rates; intervention of NABARD/state government/SAUs in marketing of compost; encouragement of organic inputs usage by subsidies; creation of market demand by promoting more awareness programmes; and finally further increase in subsidy upper limit in the establishment of input units.

Finally, the nagging key policy decisions are hindering the growth of organic farming in the country. In India, APEDA is the highest controlling body for organic certification for export. Till date there are no domestic standards for organic produce within India. Although there is no system for monitoring and labelling of organic produce sold within India, which particularly affects the retail market. An innovative cost effective certification method uniform in standards across various countries need be developed to connect numerous small and marginal farmers in the country.

CONCLUSIONS AND POLICY IMPLICATIONS

The study brought out the following conclusions and policy implications after thorough understanding about organic farming in India as well as analysis of primary data:

1. Out of 40 vermi-hatchery units covered in the study, only 22 units are functioning on the day of visit. The main reasons for not functioning are: lack of demand for vermi-compost, neither JMC visit nor no subsidy release from NABARD, death of worms in high temperatures, heavy rains, and floods. The number of non-functioning units were maximum (100 per cent) in case of Gujarat.
2. NABARD has finished the conduct of JMC visits only in case of 70 per cent units. The remaining 30 per cent units are still waiting for JMC visits and final subsidy. This indicates a huge delay in the process of subsidy release. Out of the 28 units (70 per cent) which completed JMC visits, only 19 units have received the final subsidy amount. Almost 32 per cent of units are waiting for release of final subsidy. This was another bottleneck in the scheme where lot of time was consuming for processing.
3. On an average, the total financial out lay per unit was Rs 5.9 lakh. The outlay was the highest in case of Maharashtra whereas it was the lowest in Punjab. The results conclude that there is a huge gap between subsidy released till now (0.93 lakh) and eligible subsidy (1.5 lakh) per unit. This gap is the highest in case of Gujarat (1.23 lakh) followed by Uttar Pradesh (0.27 lakh) and Punjab (0.25 lakh).
4. The socio-economic characters of promoters were regressed against efficiency values to determine the drivers for efficiency in vermi-hatchery units. The results concluded that the size of the unit, contribution of family labour have shown positive relation with technical as well as scale-efficiencies. Participation in the training programmes is also enhancing technical efficiency of the corresponding units. The age of the unit and subsidies discouraged the scale-efficiency.
5. Majority of the sample promoters did not face any problem in establishment of vermi-hatchery units. Very few expressed some difficulties while establishing them. The major problems are: non-availability of quality worms in the vicinity, lack of sufficient raw materials, wild boar attacks on compost units, no proper guidance from NABARD, heavy rains, and delay in release of bank loan amounts, and so on.
6. Almost all vermi-hatchery units are following direct sales method rather than depending upon any other intermediary. The quantity of total sales is very high in direct sales. Nearly half of the sample promoters expressed that they are facing severe marketing problems in marketing of their compost.

Policy Implications

The Ministry of Agriculture should introduce favourable governmental policies and strategies for the promotion of organic farming in India. These should include:

1. A single authority at national level with a well-defined role should be responsible for the organic sector in the country. This includes the responsibility for regulating and supervising the organic sector at both domestic and outside the country. With regard to export, the national authority should act as counterpart to the authorities of the importing countries and could, thus, strengthen the organic sector's export potential.

2. Current market demand is considerably higher than the supply, a situation which creates potential opportunities for countries in the short and medium term. So, India should use this opportunity timely to tap the national and international markets by framing a well-defined strategy on organic farming sector at the national level. The development of international markets will also stimulate domestic as well as regional market opportunities.
3. The quality organic input production (compost, bio-fertilizers, and biopesticides) in the country should be further encouraged with latest technologies and improved way of financial assistance so as to reduce the high dependency on inorganic fertilizers in a phase manner and to save our domestic subsidies. It not only protects our soil health but also sustains the environmental and natural resources.
4. The organic input units established under various schemes in the country should be linked up with suitable market channels to improve their capacity utilization or to make use of entire installed capacities. NABARD/state agriculture department/ IFFCO should intervene in providing necessary support for their marketing of organic inputs. Establishment of organic input marketing channels is the need of the hour for expansion of organic farming in the country.
5. The technical efficiency of organic input production should also be enhanced by imparting more production skills to the promoters. The economic and scale efficiency of the units should also be improved by providing more technical guidance, quality seed stock, and training programmes.
6. A comprehensive programme/scheme should be developed to assist the farmers that who want to convert their lands from conventional to organic farming. It includes some conversion or input subsidies, providing technical guidance, and finally certification of farm. It will dramatically expand the organic farming in the country and ultimately sustains our food production.
7. Finally, the most important task would be to ensure consistency of government policies on organic sector. Through focusing of policies and activities, the organic sector can be developed more quickly and more effectively. Institutional barriers to the development of the organic sector are considered greater than the technical and trade barriers. So, most relevant institutions and partners should be prepared to competently involve in the promotion of the organic sector in the country.

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