P-ISSN: 2618-0723
E-ISSN: 2618-0731

NAAS Rating (2025): 5.04
www.extensionjournal.com

International Journal of Agriculture Extension and Social Development

Volume 8; Issue 11; November 2025; Page No. 519-524

Received: 15-08-2025
Accepted: 19-09-2025

Indexed Journal
Peer Reviewed Journal

Prospects in organic paddy farming: A socio-economic study from Western Maharashtra

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DOI: https://www.doi.org/10.33545/26180723.2025.v8.i11g.2690

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Abstract

The present study explores the socio-economic profile of organic paddy farmers in Western Maharashtra, compare with inorganic paddy farmers. For this purpose, data was collected for the agricultural year 2022-23 using a sample size of 72 respondent and data was analysed with help of simple tabular analysis. Result of tabular analysis revealed that, the average family size of organic paddy growers was 6.28 while in inorganic paddy growers was 4.47, organic paddy growers generally had a higher level of primary level of education 47.81 per cent while inorganic paddy growers had higher level of secondary education 52.18 per cent, 4.78 per cent of organic farmer's families were illiterate, whereas only 6.21 per cent of inorganic farmer's families fell into this category, the per farm average land holding was 3.10 hectares in organic paddy growers and 1.46 hectares land holding of inorganic paddy growers, organic paddy growers owned 28.32 per cent cows, while inorganic farmers owned 11.37 per cent cows, organic paddy growers had 28.67 per cent buffalos and inorganic paddy growers 6.75 per cent buffalos, organic paddy growers invest significantly more and had higher asset ownership (252993.33 rupees) as compare to inorganic paddy growers (145677.40 rupees), organic paddy grower had a cropping intensity of 156.55 per cent, higher than the 151.11 per cent of inorganic paddy growers farmers.

Keywords: Inorganic, organic, tabular analysis, socio-economic, sustainable, paddy

Introduction

Conventional farming practices, which rely heavily on chemical fertilizers and pesticides, have led to soil degradation, reduced biodiversity, and environmental concerns. In response, organic farming has emerged as a sustainable alternative that promotes natural farming methods and reduces dependency on synthetic inputs.

Organic farming is a production system which avoids or largely excludes the use of synthetically compounded fertilizers, pesticides, growth regulators, and livestock feed additives. To the maximum extent feasible, organic farming systems rely upon crop rotations, crop residues, animal manures, legumes, green manures, mechanical cultivation, mineral-bearing rocks, and aspects of biological pest control to maintain soil productivity and tilth, to supply plant nutrients, and to control insects, weeds, and other pests. "The term "conventional farming" will be used here to refer to a production system which employs a full range of pre- and post- plant tillage practices, synthetic fertilizers, and pesticides. Conventional farming is characterized by a high degree of crop specialization. Organic farming is characterized by a diversity of crops. This study aims to examine the socio-economic profile of organic paddy farmers in Western Maharashtra, compare it with inorganic paddy farmers, and identify the major challenges faced by organic paddy farmers. Despite its advantages, organic farming is not widely adopted due to various socio-economic constraints.

Paddy is India's staple food crop, and with people nowadays becoming increasingly conscious about their health and the quality of their food, it has become important to study the socio-economic characters and constraints of organic farming in paddy cultivation. Such a study can help assess the current situation of organic paddy farmers and provide recommendations to overcome the challenges encounter.

In 2022, nearly 96.4 million hectares of agricultural land were organic (including in-conversion areas). The regions with the largest organic agricultural land areas were Oceania (53.2 million hectares - comprising more than half of the world's organic agricultural land, at 55 percent) and Europe (18.5 million hectares, accounting for 19 percent). Latin America followed with 9.5 million hectares (10 percent), succeeded by Asia with 8.8 million hectares (9.2 percent), Northern America with 3.6 million hectares (3.8 percent), and Africa with 2.7 million hectares (2.8 percent). (FiBL (Forschungsinstitut für biologischen Landbau, which translates to Research Institute of Organic Agriculture) & IFOAM (International Federation of Organic Agriculture

Movements) - Organics International (2024): The World of Organic Agriculture. Frick and Bonn). According to National Centre for Organic and Natural Farming, Ministry of Agriculture & Farmers Welfare, during 2020-21, area under organic farming in India was increased up to 2.66 M ha. Lowest area under organic farming during 2020-21 was in Delhi which is only 5.17 ha. Andaman and Nicobar having no area under organic farming. Uttar Pradesh had been ranked ninth in area (0.067M ha) but it ranked fifth in production (0.18 MT) and Maharashtra was second ranked in area and production. Production of organic farming in India during 2020-21 was 3.47 million tonnes. Madhya Pradesh having highest production under organic farming during 2020-21. Most organically produced commodities in India were oilseeds, fibers, sugar and cereals during 2020-21. Maharashtra is divided into four divisions namely Konkan, Western Maharashtra, Marathwada and Vidarbha. According to, Department of Commissionerate of Agriculture, Maharashtra state, Pune, total area under organic farming is 537224 ha. Out of which certified area is 371798 ha. Area under Western Maharashtra in the year 2020 was 55084 ha which is purposively selected for present study due to second highest area under organic farming is observed. Hence, it offers viable socio-economic comparison between organic and conventional farming. Therefore, this research will aid policymakers and researchers in realising the factors that restrain sustainable agriculture. It will also encourage evidence-based promotion of organic farming.

Methodology

The study was conducted in the Pune and Nashik districts of Maharashtra. A multistage sampling technique was employed to select the study area and respondents. The data was collected for the agricultural year 2022-23. The multistage sampling approach enabled the selection of representative districts, tehsils, villages, and farmers. Two tahsils that is Igatpuri and Peth from Nashik & Bhor & Velhe from Pune (sub-districts) were selected from each district, and three villages were chosen randomly from each tahsil that is Khed Bhairav, Mogre & Mukni from Igatpuri tahsils & Gavandhpadha, Peth & Nirgude karanjali from Peth tahsils. Villages that were, Sangavi BK, Pargaon & Deulgaon from Bhor tahsils & villages that were Velhe BK, Asani manjai & Vinzar from Velhe tahsils. Farmers cultivating paddy were included in the study. A total of 72 farmers, consisting of 36 organic paddy farmers and 36 inorganic paddy farmers. The organic farmers selected those who had registered under the Participatory Guarantee System (PGS) India organic certification. Data collection was done through structured interview, and the analysis focused on socio-economic factors, landholding patterns, cropping intensity, and constraints faced by organic farmers. Tabular analysis was employed to compute means, percentages, and frequency distributions to present the socio-economic profile of organic and inorganic paddy farmers. This method was used to identify key trends and differences between organic and conventional farmers, facilitating comparisons across different variables.

Results and Discussion

Composition of Organic and Inorganic Sample Farm Families

The information about the size and composition of a family gives an idea about the available labour force and also indirectly indicates the consumption needs of the family. The details about the size and composition of the selected farm families growing organic and inorganic paddy farmers are presented in Table 1.

Table 1: Family Size and its Composition of Organic and Inorganic Farmers (No./farm)

Sr. No.	Particulars	Organic Paddy Farming (N=36)	Inorganic Paddy Farming (N=36)
1	Male	2.42 (38.50)	2.22 (49.69)
1	Female	2.53 (40.26)	1.97 (44.10)
2	Children	1.33 (21.24)	0.28 (6.21)
3	Total	6.28 (100.00)	4.47 (100.00)

(Figures in parentheses indicate per cent to total)

The information from the table No. 1 indicates that the average family size of paddy. The average family size of organic paddy farmers was 6.28 while in inorganic paddy farmers was 4.47.

The average family size of the organic paddy was found to be 6.28 persons, consisting of 38.50 per cent males, 40.26 per cent females and 21.24 per cent children. The average family size of the inorganic paddy was found to be 4.47 persons, consisting of 49.69 per cent males, 44.10 per cent females and 6.21 per cent children.

This comparison shows variations in family sizes across farming practices. Organic paddy farmers had the largest families as compare to inorganic paddy farmers. The larger family sizes in organic paddy farming highlight the interplay of labor demands, economic considerations and cultural norms. These insights can guide targeted interventions for resource allocation, labor management and education programs tailored to different farming communities.

Table 2: Educational Status of Organic and Inorganic Sample Farms (No./farm)

Sr. No.	Particulars	Organic Paddy Farming (N=36)	Inorganic Paddy Farming (N=36)
1	Primary	3.00 (47.81)	0.61 (13.66)
2	Secondary	1.98 (31.47)	2.33 (52.18)
3	Graduation	1.00 (15.94)	1.25 (27.95)
4	Illiterate	0.30 (4.78)	0.28 (6.21)
	Total	6.28 (100.00)	4.47 (100.00)

(Figures in parentheses indicate per cent to total)

Education is another important factor influencing managerial ability and technical knowledge of the farmers. The information about the educational status of selected organic and inorganic

paddy growing farmers are presented in Table 2. It was noticed from the table that, the maximum organic paddy farmers' practices, 47.81 per cent of family members had education up to primary education, 31.47 per cent had

education up to secondary education, 15.94 per cent had education up to graduation level and 4.78 per cent were illiterate. Inorganic farmers' practices 13.66 per cent of family members were educated up to primary level, 52.18 per cent were educated up to secondary level, 27.95 per cent were educated up to graduation level and 6.21 per cent were illiterate. Literacy is notably lower in inorganic farming families as compared to organic farming families due to awareness of education. The observed patterns reflect the varying knowledge demands of different farming practices.

Table 3: Per Farm Land Holding of Paddy Farmers (ha)

Sr. No.	Particulars	Organic Paddy Farming (N=36)	Inorganic Paddy Farming (N=36)
1	Cultivated land	2.91 (93.54)	1.35 (92.66)
a.	Irrigated	2.49 (80.32)	0.97 (66.34)
i.	Organic	1.21 (39.03)	-
ii.	Inorganic	1.28 (41.29)	0.97 (66.34)
b.	Unirrigated	0.41 (13.22)	0.38 (26.32)
2	Fallow land	0.13 (4.20)	0.11 (7.34)
a.	Current fallow	0.06 (1.94)	0.08 (5.17)
b.	Permanent fallow	0.07 (2.26)	0.03 (2.17)
3	Unsuitable for cultivation	0.07 (2.26)	-
	Total	3.10 (100.00)	1.46 (100.00)

(Figures in parentheses indicate per cent to total)

The per farm land holding is one of the important capital assets for the farmers. The information about the land possessed by the paddy growers and its utilization pattern are presented in Table 3.

It is observed from the table, the distribution of landholding across organic and inorganic paddy farmers reveals significant differences in land use and distribution. The per farm average land holding was 3.10 hectares in organic paddy growers and 1.46 hectares land holding of inorganic paddy growers. The per farm net cultivated area of an averages was 2.91 hectares in organic paddy growers and 1.35 hectares land holding in inorganic paddy growers during the study period. The highest average landholding was observed between organic paddy growers as compared to inorganic paddy farmers. This may be due to the predominance of paddy cultivation in regions with larger farm sizes and better cropping patterns.

The maximum irrigated area was found among organic paddy growers (80.32%) while inorganic paddy (66.34%). This is because *kharif* paddy, which depends mainly on rainfall and therefore requires less irrigation.

The data suggests that organic farming practices are associated with more diverse land utilization patterns, including greater reliance on temporary fallow and un-irrigated areas. This analysis highlights a key distinction: organic farmers generally manage more intensively irrigated land, whereas inorganic farmers often adopt broader but more varied land-use strategies.

Table 4: Livestock Ownership Pattern of Paddy Farmers (No.)

Sr. No.	Particulars	Organic Paddy Farming (N=36)	Inorganic Paddy Farming (N=36)
1	Bullock	0.32 (3.79)	0.44 (7.25)
2	Cow	2.39 (28.32)	0.69 (11.37)
3	Cow Calf	0.72 (8.53)	0.07 (1.15)
4	Buffalo	2.42 (28.67)	0.41 (6.75)
5	Buffalo Heifer	0.55 (6.52)	0.42 (6.92)
6	Goat/Sheep	0.84 (9.95)	1.68 (27.68)
7	Poultry	1.20 (14.22)	2.36 (38.88)
	Total	8.44 (100.00)	6.07 (100.00)

(Figures in parentheses indicate per cent animals to total animals)

Livestock size significantly influenced farmers' cash earnings through the sale of milk, draught power and eggs. Livestock is an indispensable component of the organic and inorganic farming, contributing to the overall sustainability and profitability of farm households. It enhances the farm economy by providing additional employment opportunities for family members, Income generation through the sale of milk, animals and hiring out bullock pairs and the supply of valuable manure, which improves soil fertility and supports sustainable crop production. Thus, integrating livestock with crop production not only diversifies income sources but also strengthens the resilience and productivity of farming, particularly in organic agriculture. The details for livestock position in organic and inorganic farms were owned by the sample farmers as shown in Table 4.

The bullock provides draught power to the various farming operations and milch animal is very good source of regular cash flow from daily sale of milk and manures. The average number of livestock possessed per household was 8.44 in organic paddy farming. In contrast, the corresponding figure for inorganic farming was, 6.07. In organic farming, farmers possessed a higher number of livestock compared to inorganic farming. This is primarily because organic farming relies on livestock to supply organic materials such as dung and urine, which are used as manure and inputs for crop production, thereby helping to minimize input costs.

In table 4 revealed that, among the organic and inorganic farming, inorganic farms possess a higher average number of bullocks compared to organic farms. This may indicate a greater dependence on animal draught power in inorganic farming, possibly due to mechanization constraints, cropping intensity, or other factors that vary by farming practice.

In organic farming of paddy crop, the average number of livestock possessed was 8.44, constituting 28.67 per cent buffaloes, 28.32 per cent cow, 14.22 per cent poultry, 9.95 per cent goat/sheep, 8.53 per cent cow calf, 6.52 per cent buffalo heifer and 3.79 per cent bullocks. While in inorganic paddy farmers owned an average number of livestock

possessed 6.07 constituting 38.88 per cent poultry birds, 27.68 per cent goat/sheep, 11.37 per cent cow, 7.25 per cent bullocks, 6.92 per cent buffalo heifer, 6.75 per cent buffaloes and 1.15 cow calves, respectively.

Among two categories organic farmers consistently showed higher total livestock value compared to their inorganic counterparts. This reflects the critical role of livestock, especially cattle, in organic farming for composting, nutrient recycling and maintaining soil fertility. In contrast, inorganic farmers emphasized animals like bullocks and buffaloes more for draught and milk purposes. The patterns suggest that livestock management is a vital component of organic agriculture, influencing both ecological balance and farm economics. Among two categories, organic farmers consistently owned more livestock in value, particularly cows and buffaloes, which are crucial for organic farming due to their role in nutrient recycling and farm sustainability. In contrast, inorganic farmers relied more on bullocks and had lower overall livestock investment.

Table 5: Per Farm Capital Assets Owned under Paddy Sample Farm

Sr. No.	Particulars	Organic Paddy Farming (N=36)	Inorganic Paddy Farming (N=36)
1	Land (ha)	2475555.56	1964785.19
2	Cattle sheds	44472.22 (17.58)	12685.65 (8.71)
3	Wells	19962.96 (7.89)	9874.56 (6.78)
4	Tube well	12259.26 (4.85)	3444.44 (2.36)
5	Farm pond	5729.63 (2.26)	1666.67 (1.14)
6	Spray pumps	863.89 (0.34)	1258.33 (0.86)
7	Machinery	17631.48 (6.96)	7351.21 (5.05)
8	Irrigation structure	52155.56 (20.62)	36134.72 (24.80)
9	Tractors and implements	98655.56 (39.00)	72567.36 (49.81)
10	Other implements	1262.78 (0.50)	694.44 (0.49)
	Total (excluding land value)	252993.33 (100.00)	145677.40 (100.00)

(Figures in parentheses indicate per cent to total excluding value of land)

Farm assets position indicates the economic soundness of the farmers and net worth of the farm business. It also helps to face the risk and uncertainties in farming. Farm assets include land, well, farm buildings, irrigation structure, farm implements and machinery and livestock. The current value of the assets was estimated and taken into account during the assessment. The value of assets depends on their age and condition of operability. Generally, the value of other assets, excluding land, decreases over time due to depreciation. The value of land can vary depending on factors such as soil fertility, access to water sources, topography and market demand. The current values of assets of organic and inorganic farming are presented in Table 5.

It is seen from the table No. 5, the value of total capital assets was ₹252993 paddy organic farm, while the main item of capital assets was tractor and implements, which had contributed 39 per cent share to the total capital assets for excluding land value, followed by irrigation structure 20.62 per cent, cattle shed 17.58 per cent, well 7.89 per cent, machineries 6.96 per cent, tube well 4.85 per cent, farm pond 2.26 per cent, and spray pumps 0.34 per cent respectively.

The value of total capital assets was ₹ 1,45,678 paddy inorganic farm while the main item of capital assets was as tractor and implements, which had contributed 49.81 per cent share to the total capital assets for excluding land value, followed by irrigation structure 24.80 per cent, cattle shed 8.71 per cent, well 6.78 per cent, machineries 5.05 per cent, tube well 2.36 per cent, farm pond 1.14 per cent, spray pumps 0.86 per cent, respectively. The value of land of organic and inorganic farms was major item of the total value of fixed assets owned by the sample farmers, it would therefore, be more appropriate if we consider the value of capital assets excluding land for the purpose of comparing relative capital endowments of the sample farms.

Organic farming requiring more initial investment in terms of infrastructure and equipment of tractors, wells, tube wells and irrigation systems, offers a higher value of assets overall compared to inorganic farming. This reflects a more sustainable investment in long-term farm productivity, which could yield better returns or more resilient farming in the future.

Table 6: Cropping Pattern of Organic and Inorganic of Paddy Farmers

Sr. No.	Particulars	Organic farming			Inorganic farming	
		Organic / Inorganic	Area (ha)	Per cent	Area (ha)	Per cent
a.	***Kharif***					
1	Paddy	(O+I)	1.51	33.19	0.85	41.67
2	Maize	(O+I)	0.17	3.74	0.15	7.35
3	Soybean	(O+I)	0.57	12.52	0.04	1.96
4	Vegetables	(O+I)	0.32	7.03	0.18	8.82
	Subtotal	(O+I)	2.57	56.48	1.22	59.80
b.	***Rabi***					
1	Wheat	(O+I)	0.45	9.89	0.23	11.27
2	Sorghum	I	0.04	0.88	-	-
3	Gram	-	-	-	0.12	5.88
4	Vegetables	(O+I)	0.65	14.28	0.11	5.39
	Subtotal	(O+I)	1.14	25.05	0.46	22.54
c.	***Summer***					
1	Groundnut	(O+I)	0.50	10.99	0.13	6.37
2	Maize	-	-	-	0.10	4.91
	Subtotal	(O+I)	0.50	10.99	0.23	11.28
d.	**Annual**					
1	Sugarcane	I	0.21	4.62	-	-
	Subtotal		0.21	4.62	-	-
e.	**Perennial**					
1	Grapes	I	0.13	2.86	0.13	6.38
	Gross cultivated area	(O+I)	4.55	100.00	2.04	100.00
	Net cultivated area	(O+I)	2.91		1.35	
	Cropping intensity	(O+I)	156.36		151.11	

(O= Area under organic crop, I = Area under inorganic crop)

The table no. 6 shows the cropping patterns of paddy farmers who engage in both organic and inorganic farming, emphasizing the hectares of land under cultivation and the percentage share that corresponds to it.

For organic paddy the total *kharif, rabi*, summer, annual and perennial crops occupied 56.48, 25.05, 10.99, 4.62 and 2.86 per cent share in cropping pattern organic farming growers, respectively. The cereal crops were cultivated on large scale followed by oilseeds crops. The proportion of area under cereal crops for organic paddy growers was 33.19 per cent. Share of soybean and groundnut crops occupied 12.52 and 10.99 per cent area of gross cropped area of organic growers, respectively.

The cropping pattern of inorganic sample farms was dominated by *kharif* crops (59.80%) followed by *rabi* crops (22.54%), summer (11.28%) and perennial (6.38%). In total cropping pattern, paddy was dominant crop, which shared 41.67 per cent followed by wheat (11.27%) and maize (7.35%). In organic and inorganic paddy farming, the gross cultivated area was 4.55 hectares and 2.04 hectares, respectively, while the net cultivated area was 2.91 hectares and 1.35 hectares. Cropping intensities for organic farming (156.36%) was more as compared to inorganic farming (151.11%), respectively. Both organic and inorganic farming the total cereal crops occupied major share in gross cropped area.

The gross cropped area, net cultivated area and cropping intensity were higher in organic farming than in inorganic farming because organic farmers cultivated a larger area under crops.

Conclusion

Organic farming has the potential to be a sustainable and profitable agricultural practice, but several socio-economic constraints limit its expansion. To support organic farmers, policymakers should focus on developing separate organic markets**,** which will help farmers secure better prices. Consumer awareness campaigns should be implemented to increase demand for organic products. Financial assistance and subsidies should be extended to farmers transitioning to organic farming to help them cope with initial yield reductions. The certification process needs to be simplified and made more accessible to rural farmers. Training programs should be conducted to educate farmers on efficient organic input preparation and sustainable farming techniques. The formation of organic farmer cooperatives can help farmers strengthen their market position, reduce dependency on middlemen, and negotiate better prices. With adequate support, organic farming can be a viable and sustainable agricultural approach, benefiting farmers, consumers, and the environment.

Disclaimer (Artificial intelligence)

Author(s) hereby declares that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

Competing Interests

Authors have declared that no competing interests exist.

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