**~~Towards Sustainable Wheat Farming: Socio-economic Insights and Constraints in Western Maharashtra’s Organic Sector~~**

**Abstract**

**Agriculture is a ~~crucial~~ sector in the Indian economy, ~~providing livelihoods~~ to millions of people. However, 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. This study aims to examine the socio-economic profile of organic wheat farmers in Western Maharashtra, compare ~~it~~ with inorganic wheat farmers, and identify the major challenges faced by organic wheat 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 and garret ranking technique. Result of tabular analysis revealed that, organic farmers had an average family size of 5.72, while inorganic farmers had 7.26, inorganic farmers generally had a higher level of secondary education (40.64 per cent) and organic farmers had higher level of primary level of education (36.93 per cent), 9.62 per cent of organic farmer’s families were illiterate, whereas only 2.62 per cent of inorganic farmer’s families fell into this category, organic farmers had a slightly smaller landholding of 3.19 hectares, compared to 3.43 hectares for inorganic farmers, organic farmers owned 49.34 per cent cows, while inorganic farmers had a higher percentage of buffaloes, while inorganic farmers hold 27.04 per cent cows, organic wheat farmers invest significantly more and had higher asset ownership (325238.53 rupees) as compare to inorganic wheat farmers (259314.62 rupees), organic wheat farmers had a cropping intensity of 167.55%, higher than the 151.19% of inorganic wheat farmers. The findings of garret ranking analysis revealed that, no separate organic consumer was the main constraints in general constraint then low productivity in initial stage was the main constraint in technical constraint, organic markets are not well established was the main marketing constraints, certifying agency is not operated in area was the main administrative constraints, high cost of bio materials was the main financial constraint. Result concluded that, with adequate support, organic farming can be a viable and sustainable agricultural approach, benefiting farmers, consumers, and the environment.**

**Key words: Constraints, Garret Ranking, Organic, Tabular analysis, Socio-economic, Sustainable, Wheat**

#### ****Introduction****

~~Agriculture is a crucial sector in the Indian economy, providing livelihoods to millions of people.~~ However, 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. ~~By contrast,~~ organic farming is characterized by a diversity of crops. This study aims to examine the socio-economic profile of organic wheat farmers in Western Maharashtra, compare it with inorganic wheat farmers, and identify the major challenges faced by organic wheat farmers. Despite its advantages, organic farming is not widely adopted due to various socio-economic constraints.

Wheat 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 wheat cultivation. Such a study can help assess the current situation of organic wheat farmers and provide recommendations to overcome the challenges ~~they~~ 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.

#### ****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 Niphad and Peth from Nashik & Baramati & Daund from Pune (sub-districts) were selected from each district, and three villages were chosen randomly from each tahsil that is Niphad, Devgaon & Khede from Niphad tahsils & Gavandhpadha, Peth & Nirgude karanjali from Peth tahsils. Villages that are, Sangavi, Malegoan BK, Karhati from Baramati tahsils & villages that is Deulgoan gada, Pargoan & Patas from Daund tahsils. Farmers cultivating wheat were included in the study. A total of 72 farmers ~~participated,~~ consisting of 36 organic wheat farmers and 36 inorganic wheat farmers. The organic farmers selected ~~were~~ those who had registered under the Participatory Guarantee System (PGS) India organic certification. Data collection was done through structured interview~~s~~ , 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 farmers. This method was used to identify key trends and differences between organic and conventional farmers, facilitating comparisons across different variables. Henry Garrett’s ranking technique was used to determine the constraints faced by farmers in organic wheat farming. As per this method, farmers were asked to assign the rank for all factors and outcomes of such ranking were converted into score value with help of following formula.

Per cent position = 100(R\_ij-0⋅5)/N\_j

Were,

R\_ij = Rank given for the i^th variables by j^th farmer

N\_j = Number of variables ranked by j^th farmer

**Result and Discussion**

#### ****Family Size and Composition****

Family size plays a vital role in farm operations, as larger families often have more labor available for agricultural activities. The table 1. revealed that, variations in family size among organic and inorganic farmers across different crops. Among wheat farmers, organic farmers had an average family size of **5.72**, while inorganic farmers had a larger family size of **7.26.** Findings suggest that organic wheat farmers have smaller families, which may impact labor availability, while paddy farmers engaged in organic farming tend to have larger families, possibly contributing to labor-intensive organic practices.

**Table 1. General information of organic and inorganic wheat farmers**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sr. No.** | **Particulars** | **Organic Farming (N=36)** | **Inorganic Farming (N=36)** |
| 1 | **Size of family** |  |  |
|  | a. Male | 2.36  (35.56) | 2.56  (35.25) |
|  | b. Female | 2.28  (34.31) | 2.64  (36.40) |
|  | c. Children | 1.08  (30.13) | 2.06  (28.35) |
|  | **Total** | 5.72  (100.00) | 7.26  (100.00) |
| 2 | **Education of family** |  |  |
|  | a. Illiterate | 0.55  (9.62) | 0.20  (2.62) |
|  | b. Primary | 2.11  (36.93) | 2.19  (30.29) |
|  | c. Secondary | 1.5  (26.24) | 2.94  (40.64) |
|  | d. Graduation | 1.56  (27.21) | 1.93  (26.45) |
|  | **Total** | 5.72  (100.00) | 7.26  (100.00) |

(Figures in parentheses indicate percentage to total)

#### ****Education Levels****

Education plays a significant role in farm decision-making, adoption of new technologies and market access. Education level classified into four different categories which are Illiterate, Primary, Secondary, Graduation and higher. The table no. 1 revealed that, inorganic farmers generally had a higher level of secondary education compared to organic farmers. Among wheat farmers, **9.62 per cent of organic farmer’s families were illiterate,** whereas only **2.62 per cent of inorganic farmer’s families** fell into this category. Secondary education was more common among inorganic wheat farmer’s families **(40.64%)** than organic wheat farmer’s families **(26.24%).** These findings indicate that inorganic farmer’s families may have better access to agricultural knowledge, technology, and government schemes due to their higher education levels, while farmer’s families may need additional support through training and awareness programs. Education level and knowledge and adoption of the organic farming not have significant relationship. Rather than that, experience of organic farming is significant factor.

**Table 2. Per farm land holding of wheat Farmer (ha)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sr. No.** | **Particulars** | **Organic Farming (N=36)** | **Inorganic Farming (N=36)** |
| 1 | **Cultivated land** | | |
|  | a) Irrigated | | |
|  | i) Organic | 1.34  (42.00) | - |
|  | ii) Inorganic | 1.28  (40.00) | 2.91  (84.84) |
|  | b) Un-irrigated | 0.30  (9.48) | 0.40  (11.68) |
| 2 | **Fallow land** | | |
|  | a) Current fallow | 0.18  (5.57) | 0.03  (0.81) |
|  | b) Permanent fallow | 0.05  (1.65) | 0.07  (2.03) |
| 3 | **Unsuitable for cultivation** | 0.04  (1.30) | 0.02  (0.64) |
|  | **Total** | 3.19  (100.00) | 3.43  (100.00) |

(Figures in parentheses indicate percentage to total)

### ****Landholding****

Land size and cropping intensity determine a farmer's ability to sustain agricultural practices. The study found differences in landholding sizes between organic and inorganic wheat farmers. In table no. 2 land holding is divided into three categories, mainly cultivated land, fallow land and unsuitable for cultivation. Cultivated land is further divided into irrigated and un-irrigated land Irrigated land again classified as organic and inorganic land. Fallow land subdivided into current fallow and permanent fallow. For wheat farming, organic farmers had a slightly smaller landholding of **3.19 hectares**, compared to 3.43 **hectares** for inorganic farmers. Out of total landholding, organic wheat farmers have **42 per cent** of organic land, whereas 40 per cent land is under inorganic farming. Inorganic wheat farmers, on the other hand, have **84.84 per cent** land under inorganic irrigation indicate that inorganic wheat farmers have slightly more area under irrigation than organic wheat farmers. In terms of **un-irrigated land**, organic wheat farmers have **0.30 hectares (9.48%)**, while inorganic wheat farmers have **0.40 hectares (11.68%).** This shows that inorganic wheat farmers maintain a slightly higher proportion of land dependent on rainfall, but both groups face similar challenges in dryland farming.

**Table 3. Livestock ownership pattern of wheat farmers**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Sr. no.** | **Particulars** | **Organic Farming (N=36)** | | **Inorganic Farming (N=36)** | | |
| **Number** | **Value (₹)** | **Number** | **Value (₹)** |
| **1** | **Bullock** | 0.34 | 25750.00 |  | 14999.98 |
| (6.23) | 0.53 | (14.59) |
| **2** | **Cow** | 3.30 | 203765.90 | 0.92 | 27797.22 |
| (49.34) |  | (27.04) |
| **3** | **Cow calf** | 1.19 | 46527.78 | 0.48 | 5111.11 |
| (11.27) |  | (4.97) |
| **4** | **Buffalo** | 1.94 | 83593.19 | 0.42 | 24237.87 |
| (20.24) |  | (23.58) |
| **5** | **Buffalo Heifer** | 0.44 | 14444.44 | 0.32 | 5555.56 |
| (3.50) |  | (5.40) |
| **6** | **Goat/ Sheep** | 2.07 | 21240.14 | 0.94 | 12469.70 |
| (5.14) | (12.13) |
| 7 | **Poultry** | 35.28 | 17678.54 | 24.26 | 12614.67 |
| (4.28) | (12.29) |
|  | **Total** | - | 412999.99 | - | 102786.11 |
| (100.00) | (100.00) |

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

### ****Livestock Ownership****

Livestock plays an essential role in organic farming, especially for manure production, which is used as an organic fertilizer. The table no.3 revealed that cows were the dominant livestock among organic wheat farmers, whereas inorganic wheat farmers relied more on buffaloes and bullocks. Among wheat farmers, organic farmers owned **49.34 per cent cows,** while inorganic farmers had a higher percentage of buffaloes. While inorganic farmers hold 27.04 per cent cows. This trend indicates that organic farmers depend more on cows for manure production, which is a crucial component of organic farming. In contrast, inorganic farmers prioritize animals used for ploughing and milk production.

**Table 4. Assets owned by wheat farmers**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sr. No.** | **Particulars** | **Organic Farming (N=36)** | | **Inorganic Farming (N=36)** | |
| **Number** | **Value (**₹**)** | **Number** | **Value (**₹**)** |
| 1 | Land (ha) | 2.62 | 2475000.00 | 3.34 | 2979127.72 |
| 2 | Cattle sheds | 0.81 | 59972.22  (18.44) | 0.64 | 10066.67  (3.88) |
| 3 | Wells | 0.69 | 33333.33  (10.25) | 0.44 | 19250.00  (7.42) |
| 4 | Tube well | 0.39 | 15036.98  (4.62) | 0.39 | 11777.78  (4.54) |
| 5 | Farm pond | 0.19 | 6521.90  (2.01) | - | - |
| 6 | Spray pumps | 1.94 | 1372.22  (0.42) | 1.23 | 1601.03  (0.62) |
| 7 | Machinery | 0.14 | 13275.00  (4.08) | 0.11 | 8518.52  (3.29) |
| 8 | Irrigation structure | - | 62384.72  (19.18) | - | 44191.41  (17.04) |
| 9 | Tractors and implements | 2.00 | 132407.14  (40.71) | 2.13 | 161186.99  (62.16) |
| 10 | Other implements | 17.00 | 935.00  (0.29) | 15.21 | 2722.22  (1.05) |
|  | **Total (excluding land value)** |  | 325238.53  (100.00) |  | 259314.62  (100.00) |

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

#### ****Asset Ownership and Investments****

In table no. 4 revealed that, organic wheat farmers invest significantly more in **cattle sheds,** which aligns with their reliance on livestock for manure and organic fertilizers. They also allocate more resources to **irrigation structures**, mechanization, and farm infrastructure to sustain organic practices. Across all three crops, organic farmers have a higher total asset value (excluding land), indicating greater investment in sustainable farming resources. Organic farmers invest more in infrastructure and long-term sustainability; they require greater institutional and policy support to compete effectively with conventional farming methods.

**Table 5. Cropping pattern of wheat farmers**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Particulars** | **Organic farming** | | | **Inorganic farming** | |
|
| Organic / Inorganic | Area (ha) | Percent | Area (ha) | Percent |
|
| **Kharif** |  | | | | |
| Paddy | O | 0.04 | 0.90 | 0.05 | 1.12 |
| Maize | O | 0.25 | 5.63 | 0.45 | 10.10 |
| Soyabean | O | 0.62 | 13.96 | 0.32 | 7.18 |
| Beans | I | 0.15 | 3.38 | 0.25 | 5.61 |
| Tomato | I | 0.13 | 2.93 | 0.42 | 9.43 |
| Red gram | O | 0.13 | 2.93 | 0.30 | 6.74 |
| Chilli | I | 0.15 | 3.38 | 0.23 | 5.16 |
| Other vegetables | O | 0.20 | 4.50 | - | - |
| **Subtotal** | (O+I) | 1.67 | 37.61 | 2.02 | 45.34 |
| **Rabi** |  | | | | |
| Wheat | O | 0.38 | 8.56 | 0.42 | 9.43 |
| Sorghum | O | 0.11 | 2.48 | 0.09 | 1.91 |
| Onion | (O+I) | 0.46 | 10.36 | 0.34 | 7.63 |
| Gram | O | 0.16 | 3.60 | 0.04 | 0.90 |
| Maize | I | 0.17 | 3.83 | 0.07 | 1.57 |
| Other vegetables | O | 0.10 | 2.25 | 0.25 | 5.61 |
| **Subtotal** | (O+I) | 1.38 | 31.08 | 1.21 | 27.05 |
| **Summer** |  | | | | |
| Groundnut | O | 0.17 | 3.83 | 0.15 | 3.37 |
| Maize | O | 0.05 | 1.12 | 0.10 | 2.24 |
| Other vegetables | (O+I) | 0.19 | 4.28 | 0.05 | 1.12 |
| Subtotal | (O+I) | 0.41 | 9.23 | 0.30 | 6.73 |
| **Annual** |  | | | | |
| Sugercane | I | 0.38 | 8.56 | 0.43 | 9.65 |
| **Perenuial** |  | | | | |
| Grapes | I | 0.42 | 9.46 | 0.38 | 8.54 |
| Guava | (O+I) | 0.18 | 4.05 | 0.12 | 2.69 |
| Gross cultivated area | (O+I) | 4.44 | 100.00 | 4.46 | 100.00 |
| Net cultivated area | (O+I) | 2.65 | | 2.95 | |
| Cropping intensity | (O+I) | 167.55 | | 151.19 | |

(Figures in parentheses indicate percentage to total) (O- Organic I- Inorganic)

#### ****Cropping pattern****

Cropping intensity, which measures the frequency of crop cultivation on available land, was examined. The study revealed (table no.5) that, organic wheat farmers had a cropping intensity of **167.55%,** higher than the **151.19%** of inorganic wheat farmers. These findings suggest that organic farmers tend to cultivate their land more intensively to compensate for potentially lower yields, especially in wheat and okra farming. However, inorganic paddy farmers had a higher cropping intensity, possibly due to low net cultivated area holding easy to handle.

**Table 6. ~~Constraints in organic wheat farming~~**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sr. No** | **Constraints** | **Rank** | **GMS** |
| A. | **General constraints** | | |
| 1 | No separate organic consumer | I | 79.17 |
| 2 | Consumers are not health conscious | II | 58.87 |
| 3 | Availability of cattle dung is decreasing | III | 16.68 |
| 4 | Limited availability of organic material | IV | 11.87 |
| B. | **Technical constraints** | | |
| 1 | Low productivity in initial stage | I | 71.17 |
| 2 | Complexity in preparation and use of inputs | II | 62.17 |
| 3 | Difficulty in obtaining recommended levels of nutrients | III | 55.20 |
| 4 | Inadequate knowledge to prepare and apply bio materials | V | 0.00 |
| 5 | Lack of knowledge to utilize organic waste | IV | 8.32 |
| C. | **Marketing constraints** | | |
| 1 | Organic markets are not well established | I | 76.23 |
| 2 | Weak marketing channels | II | 51.43 |
| 3 | No MSP mechanism for organic produce | III | 39.57 |
| D. | **Administrative constraints** | | |
| 1 | Certifying agency is not operated in area | I | 69.17 |
| 2 | No freedom for price fixation | II | 59.78 |
| 3 | Lengthy process of inspection | III | 43.93 |
| 4 | Complicated and expensive process of obtaining certificate | IV | 42.73 |
| E. | **Economic constraints** | | |
| 1 | High cost of bio materials | I | 24.43 |
| 2 | High rates of bio materials | II | 21.30 |

(GMS- Garret Mean Score)

### ****~~Constraints~~ Faced by Organic Wheat Farmers****

Despite the benefits of organic farming, farmers face several ~~obstacles~~ that hinder its widespread adoption. Constraints were categorized into five category that were, general constraints, technical constraints, marketing constraints, administrative constraint and economic constraints. In general constraints. One of the most significant challenges was the **lack of separate organic consumer** rank first (79.17 GMS), ~~then~~ consumers are not health-conscious rank second (58.87 GMS), availability of cattle dung is decreasing rank third (16.68 GMS) and limited availability of organic material rank fourth (11.87 GMS). In technical constraints, low productivity in initial stage rank first (71.17 GMS), complexity in preparation and use of inputs rank second (62.17 GMS), difficulty in obtaining recommended levels of nutrients rank third (55.20 GMS), lack of knowledge to utilize organic waste rank fourth (8.32 GMS) and Inadequate knowledge to prepare and apply bio materials rank fifth (0.00 GMS). In marketing constraints, Organic markets are not well-established rank first (76.23 GMS), ~~then~~ weak marketing channels rank second (51.43 GMS) and lack of MSP mechanism for organic produce rank third (39.57 GMS). In administrative constraints, certifying agency is not operated in area was the foremost constraints (69.17 GMS), no freedom for price fixation ranks second (59.78 GMS), lengthy process of inspection rank third (43.93 GMS), complicated and expensive process of obtaining certificate rank fourth (42.73 GMS). In economic constraints, high cost of bio materials ranks first (24.43 GMS) high rates of bio materials rank second (21.30 GMS).

### ****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. ~~Additionally,~~ **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. ~~Lastly,~~ 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.

**Compliance with ethical standards**

**Conflict of interest**: The authors declare that they have no conflict of interest.

**Ethical approval**: This article does not contain any studies against human ethical approach, performed by any of the authors.

**Informed consent**: Informed consent was obtained from all authors.

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