SWITCH ON FOUNDATION

ECONOMIC ANALYSIS

OF ORGANIC AND INORGANIC CULTIVATION OF TURMERIC

IN AKOLA DISTRICT,

MAHARASHTRA

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ABSTRACT

The present study endeavors to conduct a comparative economic analysis of organic and inorganic turmeric cultivation in Akola district, Maharashtra. This analysis is crucial for shedding light on the economic aspects of both cultivation methods. Required primary data was collected for the Kharif season of 2022. The study employed a multistage sampling design to select the district, tehsil, villages, and cultivators. The sample size consisted of 30 organic turmeric growers and 30 inorganic turmeric growers, totalling 60 turmeric growers in the Akola district of Maharashtra. The research relies on cost concepts to assess the economics of selected organic and inorganic farmers. Among all the inputs the most substantial and significant difference was observed in the application of chemical fertilizers in inorganic black cumin cultivation. The benefit cost ratio was found to be high for organic (1:2.37) as compared to inorganic turmeric cultivation (1:1.57).

1. INTRODUCTION

Turmeric (*Curcuma longa* L.), the ancient and sacred spice of India known as "Indian saffron", is an important commercial spice crop grown in India. It is known as the "golden spice" as well as the "spice of life" (Sahoo). India is a major supplier of turmeric to the world with more than 60 percent share in turmeric trade (Angles S). Turmeric was probably cultivated at first as a dye, and then became valued as condiments as well as for cosmetic purposes. The Arab traders took turmeric to Europe in the thirteenth century during his travels in China in 1280 (Babu N.). Use of turmeric dates back nearly 4000 years to the Vedic culture in India. It is extensively used in Ayurveda, Unani and Siddha medicine as home remedy for various diseases (Preeti Rathaur).

Indian turmeric cultivation and production trend has increased gradually over the past decades and also the area of cultivation shows an increasing trend. India accounts for about 80 percent of world turmeric production (Deepa KM). In India, Turmeric is cultivated in the States of Andhra Pradesh, Telangana, Maharashtra, Orissa, Tamil Nadu, Karnataka and Kerala. Maximum area under turmeric cultivation and production is in Telangana state followed by Karnataka, Andhra Pradesh, Maharashtra and Tamil Nadu. Maharashtra state in India ranks sixth in area under turmeric cultivation. (National Horticulture Board). The area under crop was 11000 hectares with production of 45000 tonnes and productivity of 4.09 tonnes/ha. Sangli district is the major turmeric production center in Maharashtra both in area and production. Maharashtra is also one of the important states in turmeric production.

In Maharashtra about 113.60 thousand hectares of cultivation area under turmeric crop and produce 96.60 thousand tons of turmeric. The people from Akola district change their attitude towards the production of turmeric. The total area under turmeric is 720 ha in Akola district. Akola district is well known for growing turmeric traditionally, but during the last few years area under this crop has been increased tremendously with commercial organic turmeric production. Therefore, a present study has been undertaken to compare the economic viability of organic and inorganic cultivation Turmeric in Akola district of Maharashtra.

2.1. OBJECTIVES OF THIS STUDY

1. To study socio-economic status of organic and turmeric growers

2. To study input utilization pattern in organic and inorganic turmeric cultivation

3. To study cost and return structure of organic and inorganic turmeric cultivation

2.2. SCOPE OF RESEARCH

This study primarily focuses on gaining insights into the perspectives of farmers regarding their choice of organic or inorganic cultivation of turmeric in the Akola district of Maharashtra. The central objective of this research is to compare the cost and return structures of turmeric cultivation while also delving into the reasons why organic and inorganic farmers opt for their respective farming methods without compromising their income goals. The study area exhibits diverse farming philosophies, with pure organic farmers placing significant importance on their health and the condition of their soil. Their preference for organic farming is driven by their genuine concern for personal well-being rather than external pressures. In contrast, inorganic farming practitioners rely on chemical pesticides to achieve higher crop yields and, consequently, greater income. The perspectives of inorganic farmers are distinctly income-oriented, with financial gain being their primary motive in farming.

Research in this specific domain is limited, making this study unique as it delves into the actual expenditure and returns structures of both organic and inorganic turmeric cultivation. Furthermore, it seeks to comprehend the underlying motivations that drive farmers towards their chosen methods. While differences between these two farming approaches are apparent, the primary objective of this research is to gain a deep understanding of the farmers' decision-making processes and what drives them to opt for a particular farming method.

3. REVIEW OF LITERATURE

Khambalkar *et al.* (2016) carried out research work at three different villages viz, Sonkhas, Gorwha and Tamashi. This work was done to determine the total energy required in turmeric cultivation. On the basis of results obtained, it has been observed that the average cost of operation is more in intercultural operation. The total energy required to the turmeric cultivation at three different villages Sonkhas, Gorwha and Tamashi were comes to be 4042.72, 4562.55, 4310.05 MJ/ha respectively. This energy includes human labour as well as animal power. Average energy required for different operations like sowing, intercultural, irrigation, harvesting were observed to be 453.84, 1695.78, 285.09, 1870.4 MJ/ha respectively. It has shown that the average energy required is more in harvesting operations. The cost required to turmeric crop cultivation at Sonkhas, Gorwha and Tamshi was observed to be 53361.12, 39000, 39219.69 Rs/ha respectively. From the result we concluded that harvesting requires a large amount of energy.

Sahoo *et al*. (2017) concluded that Kandhamal is the major turmeric growing district of the state. It is the main cash crop for their economic development. Kandhamal Turmeric is an important product and now has become popular in the organic food market of Europe and North America. It has gained a good market share in the International and Local market. The local variety grown from time immemorial is having 2-3 per cent, curcumin 12-15 percent of oleoresin and 5.3 percent of volatile oil. The current study was carried out in three blocks of the district to analyze the profitability in organic Turmeric cultivation and to document various constraints faced by the turmeric growers in the study area. The data pertained to the agricultural year 2016-17. The yield per ha of fresh Turmeric was 100 quintals whereas dry was 20 q. The average price received by the sample farmers per quintal of dry Turmeric was Rs 4800. The total cost of cultivation was Rs.52,200, whereas for dry turmeric production it was Rs. 55,800. The net returns per hectare of Turmeric cultivation was found to be Rs 40,200 leading to a benefit to cost ratio of 1.72. The sample respondents ranked high cost of labour as the greatest constraint in organic turmeric cultivation with a Garrett score of 76.40. The problems ranked as second, third and fourth, fifth, sixth and seventh place were personal obligation with traders, financial weakness, lack of technical knowledge, lack of storage facilities, low productivity and non-availability of quality seed respectively. Efforts should be made to introduce labour saving techniques in the study area. To address this problem, mechanization of various operations such as ploughing, sowing, harvesting and drying should be done.

Katole et al. (2018) conducted study at Patur and Murtizapur tehsils of Akola district of Vidarbha region of Maharashtra with the objective to ascertain to study the profile of turmeric growers, to study the marketing behaviour of turmeric growers, to study the relationship between profile of turmeric growers and their marketing behaviour, to enlist the problems faced by turmeric growers for seeking information about market. Exploratory research design of social research was used for this study. From two tehsils, 120 turmeric growers were selected as respondents for the study and data was collected by personal interview method.

The findings of the study revealed that the majority of the respondents (86.67percent) sold their produce because of their financial urgency. Majority of the respondents (93.33percent) sold their produce through wholesalers. Majority of the respondents (83.33percent) sold their produce because of lack of time to engage themselves to sell directly to the consumers. Most of the respondents (91.67percent) sold their produce in the distant market. Most of the respondents (100.00percent) sell his produce at a particular place because of immediate payment and better market facilities available.

The results revealed that education, land holding, annual income, area under turmeric cultivation, source of information, risk preference, market orientation, extension contact and innovativeness were found to be positively and significantly correlated with the marketing behavior at 0.01 percent level of probability. The variables age and family size were found to be non-significantly correlated with the marketing behavior of turmeric growers.

Kadte *et al*. (2018) conducted a study to assess the socio-economic characteristics of turmeric growers and cost and returns of turmeric production in Sangali district of Maharashtra. Multistage sampling design was used. From Sangali district, six villages from Miraj and Palus tehsil were selected randomly. The information pertaining to the objective was collected from 60 samples of turmeric growers from selected villages. Average size of holding of turmeric growers was 2.62 ha of which net sown area was 2.41 ha. The average double cropped area was 1.07 ha. The cropping intensity was found at 144.40 percent. The average area under turmeric was 1.30 ha. The results showed that per hectare cost-A with regard to turmeric cultivation was Rs. 167905.68 while cost-B was Rs. 291440.55 and cost-C was Rs. 309138.55. It was found that, gross return was Rs. 739170.00. It was clear that farm business income, family labour income and net profit were Rs.571264.32, Rs.447729.45 and Rs.430031.45 respectively in turmeric production. Output input ratio was found to be 2.39.

Kambale and Gadakh (2023) studied the cost structure, returns and resource use efficiency during the year 2018-2019 based on primary data. The study was conducted in Akola, Patur and Akot tehsil based on purposive sampling. A sample of 90 turmeric growers was selected based on random sampling. It was observed that, Per hectare total cost of cultivation of Turmeric was highest in the large group i.e. Rs. (320584.94) per hectare followed by Medium group (Rs. 311907.23) and small group (Rs. 299825.93). The total cost of cultivation of turmeric for overall farmers was Rs. 311663.48/-. The average yield and gross returns per hectare increased with the increase in size of farms The benefit cost ratio of Turmeric at cost 'C3' was 1.65 in small group, 1.69 in medium group and 1.72 in large group. This indicates that, Cultivation of turmeric crop was economically profitable. The average main production was 74.12 q/ha.

4. RESEARCH METHODOLOGY

The current study was carried out in the Akola district of Maharashtra. To gather the necessary primary data, a personal interview approach was utilized with the aid of pre-tested questionnaires. A multistage sampling technique was employed for data collection. In the initial stage, a specific Akola district was chosen for the study. In the subsequent stage, Murtijapur and Patur Tehsils or blocks within the district were selected based on the highest area under organic and inorganic turmeric cultivation during the Kharif season. In the third stage, Matoda, Anbhora, Navsal and Asola villages from Murtijapur and Patur Tehsils were chosen according to the extent of land under turmeric cultivation. In the fourth stage, a list of organic and inorganic turmeric growers was compiled from each of the selected villages.

5.0. METHODOLOGY

5.1.Methods of data collection

The essential primary data was then collected through personal interviews conducted with the selected organic and inorganic turmeric growers using a pre-tested questionnaire that was specifically designed for this research. To achieve the objectives of the study, the selected Turmeric growers were categorized into two groups: organic and inorganic growers. The sample size consisted of 30 organic turmeric growers and 30 inorganic turmeric growers, totalling 60 turmeric growers in the Akola district of Maharashtra. The study was conducted for the Kharif season of 2022 for both organic and inorganic turmeric cultivation, serving as the reference period.

The data collected encompassed various aspects of farm operations, including:

1. Socio-economic profiles of both organic and inorganic turmeric farmers.
2. Season-wise records of crop cultivation in both organic and inorganic turmeric farmers.
3. Records of inputs and outputs for both organic and inorganic turmeric farmers.
4. Records of the cost of cultivation and cost of production for different crops cultivated by both groups of farmers.
5. Records of input usage in both organic and inorganic turmeric farmers.

These aspects were thoroughly examined to conduct a comparative analysis of the selected Turmeric growers, shedding light on various dimensions of their farming practices and economic activities.

Fig. 1.

DATA COLLECTION PHOTOS

5.2. DATA ANALYSIS

The comparative economic analysis of selected farmers incorporates various cost concepts, which are as follows:

Cost 'A': This category encompasses expenditures related to hired human labour, bullock labour, machinery charges, the value of manures, fertilizer costs, seed expenses, irrigation charges, plant protection costs, land revenue, depreciation, repairs, and interest on working capital, among others.

Cost 'B': In this concept, imputed costs such as rental value of land and interest on fixed capital are factored into Cost 'A'. The formula for Cost 'B' is as follows:

Cost 'B' = Cost 'A' + Rental value of land + Interest on fixed capital

Cost 'C': This represents the total cost of production, encompassing all cost items, both actual and imputed. The value of family labour is imputed and included in Cost 'B' to derive Cost 'C'. The formula for Cost 'C' is as follows:

Cost 'C' = Cost 'B' + Imputed value of family labour

6.0. RESEARCH FINDINGS

6.1. SOCIO-ECONOMIC CHARACTERISTICS OF SELECTED SAMPLE ORGANIC AND INORGANIC TURMERIC GROWERS

The socio-economic attributes of the sampled organic and inorganic farmers are instrumental in offering background insights into the resource endowments and contextual information of farmers within the chosen study area, situated in the Akola district of Maharashtra. These characteristics encompass facets such as family composition, landholding sizes, cropping patterns, educational qualifications, livestock count, and more, all of which have a discernible impact on agricultural endeavors. These factors hold significant relevance in steering favorable transformations within the agricultural economy. Therefore, to gain a comprehensive understanding, the socio-economic characteristics of the selected sample of organic and inorganic Turmeric growers in the Akola district of Maharashtra state are presented in Table 1.

6.1.1. FAMILY BACKGROUND

Table 1 provides valuable insights into the comparison of landholding sizes, family sizes, and family structures between organic and inorganic Turmeric growers within the study area, situated in the Akola district of Maharashtra. The data indicates that, on average, organic Turmeric growers possess land holdings of approximately 6.55 acres per farm, while inorganic Turmeric growers have an average landholding of approximately 6.28 acres per farm. The overall average landholding size across all farms is approximately 6.42 acres per farm.

Regarding family size, the average family size among organic farmers is approximately 6.13 persons, while inorganic farmers have an average family size of approximately 4.97 persons per family. The overall average family size for the entire study area is approximately 5.55 persons. This data reveals that the average family size of organic farm households is somewhat higher compared to inorganic farm households within the study area. Family structures vary between joint families and nuclear families. In the overall study area, joint families constitute 63.33 percent of the total, while nuclear families account for 36.67 percent. Specifically, in organic farms, 73.33 percent of families are joint, with only 26.67 percent being nuclear. This highlights the presence of family labour within joint families, which is particularly relevant for agricultural activities. Conversely, in inorganic turmeric farms, the distribution of family types is more evenly balanced, with 53.33 percent being joint families and 46.67 percent being nuclear families. This suggests a relatively similar distribution of family structures within this group.

6.1.2. AGE AND EDUCATIONAL PROFILE

The age and educational profiles of the sampled organic and inorganic turmeric growers, as observed during the survey conducted in the Akola district of Maharashtra, reveal some intriguing trends. Table 1 provides a clear view of the demographics in this study. From the data, it is apparent that the largest segment of farmers (41.67 percent) falls within the age group of 40-50 years, followed by the age group of 30-40 years, which constitutes 30 percent of the total. Approximately 23.33 percent of the farmers are aged above 50, while only 5 percent belong to the 20-30 age group.

When we compare the age distribution of turmeric growers under organic and inorganic farming, it becomes evident that, in the case of organic farming, the majority (43.33 percent) falls within the 40-50 age group, which is 3.33 percent higher than inorganic turmeric farmers. The age group above 50 makes up 30 percent in the organic sector, while in the inorganic sector, the age group of 30-40 has the second-highest number of farmers. Within the organic category, the remaining 23.33 percent of farmers belong to the 30-40 age group, and only 3 percent are in the 20-30 age group. In the inorganic category, the age group above 50 accounts for 16.67 percent of the farmers, with only 6.67 percent in the 20-30 age group.

Table 1. Socio-economic characteristics of the sample organic and inorganic turmeric growers

SL. No.	Particulars	Organic	Inorganic	Overall
1.	**Land Holding (Acre)**	6.55	6.28	6.42
2.	**Total family member**	6.13	4.97	5.55
3.	**Family Type**			
	Nucleus	8 (26.67)	14 (46.67)	22 (36.67)
	Joint	22 (73.33)	16 (53.33)	38 (63.33)
	Total	30 (100)	30 (100)	60 (100)
4.	**Age in Years**			
	20 - 30	1(3.33)	2 (6.67)	3 (5.00)
	30 - 40	7 (23.33)	11 (36.67)	18 (30.00)
	40 - 50	13 (43.33)	12 (40.00)	25 (41.67)
	Above 50	9 (30.00)	5 (16.67)	14 (23.33)
	Total	30 (100)	30 (100)	60 (100)

5.	**Education Level**			
	Illiterate	2 (6.67)	3 (10.00)	5 (8.33)
	High School	11 (36.67)	8 (26.67)	19 (31.67)
	Higher Secondary School	10 (33.33)	15 (50.00)	25 (41.67)
	College	7 (23.33)	4 (13.33)	11 (18.33)
	Total	30 (100)	30 (100)	60 (100)
6.	**Livestock in Numbers**			
	Draft Animals	1.07 (33.44)	0.83 (46.89)	0.95 (38.31)
	Cow	1.33 (41.56)	0.67 (37.85)	1.00 (40.32)
	Buffaloes	0.33 (10.31)	0.27 (15.25)	0.30 (12.10)
	Others	0.47 (14.69)	0.00 (0.00)	0.23 (9.27)
	Total	3.20 (100.00)	1.77 (100.00)	2.48 (100.00)

NOTE: VALUES IN BRACKETS SHOW PERCENTAGES

6.1.4. LIVESTOCK STATUS

The diversification of livelihood options is crucial for ensuring the long-term sustainability of any livelihood. From the perspective of the study area, livestock rearing emerges as a prominent and viable alternative source of income, contributing to the sustainability and security of livelihoods. This is highlighted in Table 1. This provides valuable insights, illustrating that a significant number of farmers in the area are engaged in livestock rearing, encompassing draft animals, cows, buffalos, and other animals such as goats, sheep, and poultry birds. Notably, cow rearing stands out as the dominant practice, largely because it serves as an additional income source for farmers. Organic farmers, in particular, place a strong emphasis on livestock rearing as they have on an average 3.20 number of livestock per farm, recognizing its significance in producing various types of manure. This not only complements their agricultural activities but also contributes to cost savings in production.

In the local village context, animal husbandry is not merely a means of livelihood but is deeply ingrained as an alternative occupation for the community. It plays a vital role in enhancing the economic resilience of the villagers, promoting sustainability, and ensuring a secure and diversified flow of income.

6.2. LAND UTILIZATION PATTERN OF SELECTED SAMPLE ORGANIC AND INORGANIC TURMERIC GROWERS

Land utilization pattern refers to the way land is used or allocated for various purposes. It is an important aspect of land management and land-use planning. The land utilization pattern in a particular region or area provides insights into how land resources are allocated and utilized for different activities. Land utilization pattern of selected sample organic and inorganic Turmeric growers has been presented in Table 2.

Data from Table 2 reveals that, on average, the landholding of turmeric growers in the study area is approximately 5.90 acres per farmer, with the majority of these farms benefitting from irrigation facilities. When we delve into a comparison between organic and inorganic farming, we find that the average landholding size for organic farming stands at approximately 5.52 acres per farmer, while for inorganic farming, it is slightly higher, at approximately 6.28 acres per farmer.

Notably, there is a negligible amount of permanent fallow land in both organic and inorganic farms, indicating the efficient utilization of available land resources. Additionally, it's pertinent to mention that most farmers in the study area own the land they cultivate, with no instances of land being leased out. This underscores the self-reliant nature of the farming community in the study area, where all farmers are actively involved in cultivating their own land.

Table 2. Land Utilization Pattern of the sample Organic and Inorganic Turmeric Growers (acre/farm)

SL. No.	Particulars	Organic	Inorganic	Overall
1.	Total (acre)	5.52	6.28	5.90
2.	Dry (acre)	0.45	5.17	2.81
3.	Irrigated (acre)	4.62	1.60	3.11
4.	Permanent Fallow (acre)	0.10	0.13	0.12
5.	Own land (acre)	5.52	6.28	5.90
6.	Leased/shared in land	0.00	0.00	0.00
7.	Leased/shared out land	0.00	0.00	0.00
8.	Operated land (own land leased/shared in- leased/shared out land)	5.52	6.28	5.90

6.3. CROPPING PATTERN OF SELECTED SAMPLE ORGANIC AND INORGANIC TURMERIC GROWERS

The cropping pattern adopted by farmers in a particular area is a pivotal factor that significantly influences the economic status of these farmers. In the context of the current study, an examination of the cropping pattern of turmeric growers has been conducted, and the findings are presented in Table 3.

Table 3. Cropping pattern of the sample Organic and Inorganic Turmeric Growers

SL. No.	Particulars	Organic (acre/farm)	Inorganic (acre/farm)	Overall (acre/farm)
	KHARIF			
1	Turmeric	1.57 (28.97)	1.36 (22.11)	1.47 (25.32)
2	Soybean	0.62 (11.44)	1.05 (17.07)	0.84 (14.43)
3	Cotton	0.55 (10.15)	0.83 (13.50)	0.69 (11.93)
4	Pigeon pea	0.75 (13.84)	0.95 (15.45)	0.85 (14.69)
	Total	3.49 (64.39)	4.19 (68.13)	3.84 (66.38)
	RABI			
5	Gram	1.32 (24.35)	1.20 (19.51)	1.26 (21.78)
6	Wheat	0.34 (6.27)	0.25 (4.07)	0.30 (5.10)
7	Safflower	0.05 (0.92)	0.07 (1.14)	0.06 (1.04)
	Total	1.71 (31.55)	1.52 (24.72)	1.62 (27.92)
	SUMMER			
8	Vegetables	0.00 (0.00)	0.09 (1.46)	0.05 (0.78)
9	Groundnut	0.12 (2.21)	0.20 (3.25)	0.16 (2.77)
10	Fodder crop	0.10 (1.85)	0.15 (2.44)	0.13 (2.16)
	Total	0.22 (4.06)	0.44 (7.15)	0.33 (5.70)
11	**Gross Cropped Area**	5.42 (100.00)	6.15 (100.00)	5.79 (100.00)
12	Net Sown Area	3.76 (69.37)	4.44 (72.20)	4.10 (70.87)
13	Double cropped area	1.66 (30.63)	1.71 (27.80)	1.69 (29.13)
	Cropping intensity (percent)	144.15	138.51	141.10

NOTE: VALUES IN BRACKETS SHOW PERCENTAGES

The gross cropped area, as observed, amounts to 5.79 acres across all turmeric farms. Interestingly, it's evident that the gross cropped area is larger in inorganic farms, totaling 6.15 acres, compared to organic turmeric farms, which have a gross cropped area of 5.42 acres. This difference is attributed to the fact that in the Kharif season, inorganic turmeric growers tend to cultivate a more diverse range of crops inorganically, including soybean, cotton, and pigeon pea. The findings reveal that during the kharif season, organic turmeric cultivation covers an area of 28.97 percent. This surpasses the land allocated to inorganic turmeric, which stands at 22.11 percent. This data suggests that turmeric is a prominent crop during the kharif season in both organic and inorganic farms within the study area.

Furthermore, it is worth noting that inorganic farms allocate a larger portion of their land to crops such as soybean, followed by cotton and pigeon pea. As a result, inorganic farms occupy a greater share of the total cropped area during the kharif season, amounting to 68.13 percent of the gross cropped area.

During the rabi season,farmers cultivate crops like gram, wheat, and safflower, among others. Additionally, it is observed that farmers in the study area engage in the cultivation of crops such as groundnut, certain vegetables, and flowers during the summer season, provided there is adequate water available for crop production. However, this summer season cultivation is relatively limited, accounting for only 5.70 percent of the total. It is also apparent that farmers place significant emphasis on cultivating turmeric, alongside gram and soybean, as part of their cropping pattern in both organic and inorganic farms. The combined total area dedicated to kharif and rabi crops amounts to 66.38 percent and 27.92 percent, respectively. The net sown area constitutes a substantial 70.87 percent of the total farm area, while approximately 30 percent of the land is double cropped.

In terms of cropping intensity, the data indicates that organic turmeric growers exhibit a cropping intensity of 144.15 percent, surpassing the cropping intensity of inorganic farming, which stands at 138.51 percent. This signifies a higher level of agricultural productivity within organic turmeric cultivation in terms of multiple cropping cycles.

6.4. PHYSICAL INPUT UTILIZATION PATTERN OF THE SAMPLE ORGANIC AND INORGANIC TURMERIC GROWERS

Per hectare utilization of physical input in cultivation of turmeric were worked out and presented in Table 4. The utilization of physical inputs per hectare, such as hired human labour, family human labour, bullock labour, machine labour, seed treatment materials, rhizomes, nitrogen, phosphorus, potassium, complex fertilizers, micronutrients, and plant protection chemicals, was found to be similar across the farms.

Table 4. Physical input utilization pattern of the sample Organic and Inorganic Turmeric method

Particulars	Organic		Inorganic	
	Units / Name of Material	**Qty**	**Units / Name of Material**	**Qty**
Human Labour	Man Days	194.74	Man Days	203.59
Bullock Labour	Pair days	3.30	Pair days	2.62
Machine Labour	Hours	11.41	Hours	13.11
Seed Treatment Chemicals / Organic material	Trichoderma viridi. (kg)	1.02	Bavistin Powder (kg)	0.51
-	Phosphate solubilizing bacteria PSB (kg)	1.00	-	-
-	S9 Culture (kg)	0.71	-	-
Planting Material (Rhizomes)	Qtls	10.76	Qtls	10.47
Fertilizers	-	-	-	-
Nitrogen (N)	-	-	Urea (Kg)	84.89
Phosphorus (P)	-	-	DAP (kg)	70.39
Potassium (K)	-	-	MOP (kg)	47.61
Complex	-	-	10:26:26 (kg)	47.69
Micronutrients	Jivamrut (Lit)	439.51	Tuber (Lit)	0.50
Compost/ Manures	FYM (Qtls)	19.32	FYM (Qtls)	12.23

Plant Protection	Dashparni Ark (Lit)	298.44	-	-
	Neemped (kg)	38.4	Neemped (kg)	30.50

6.4.1. HUMAN LABOUR:

In the context of turmeric cultivation, the average human labour requirement for organic farming stands at 194.74 man-days per acre, while for inorganic cultivation, this figure rises to 203.59 man-days per acre. Consequently, there exists a difference of 8.85 man-days of human labour between organic and inorganic turmeric cultivation. This difference suggests that inorganic turmeric cultivation demands a greater allocation of human labour compared to its organic counterpart. The higher demand for human labour in inorganic cultivation primarily arises from the need to apply chemical fertilizers in split doses at regular intervals, as prescribed by recommended agricultural practices. Consequently, this results in higher labour costs associated with inorganic turmeric cultivation.

6.4.2. BULLOCK LABOUR:

In contrast to the use of human labour, bullock labour per acre is higher in organic turmeric cultivation, where it amounts to 3.30 pairs per acre. This indicates that organic farmers employ additional bullock pairs for intercultural operations when compared to their counterparts practicing inorganic turmeric cultivation.

6.4.3. MACHINE LABOUR:

When it comes to machine labour, which is assessed on an hourly basis, the data reveals that inorganic turmeric cultivation demands a significantly greater amount of machine labour in comparison to organic cultivation. This increased reliance on machine labour in inorganic farming translates to higher expenses associated with machine labour for inorganic turmeric growers in the study area.

6.4.4. SEED TREATMENT CHEMICALS / ORGANIC MATERIAL:

In terms of seed treatment materials, organic turmeric cultivation involves the use of *Trichoderma viride*, Phosphate solubilizing bacteria (PSB), and S9 culture, while inorganic turmeric cultivation relies on Bavistin powder. The average quantity required for seed treatment per acre was approximately 1 kg for *Trichoderma viride*, PSB, and S9 culture in organic turmeric cultivation. Conversely, under inorganic cultivation, the average quantity of Bavistin required for seed treatment was only 0.51 kg per acre.

6.4.5. PLANTING MATERIAL (RHIZOMES):

Turmeric propagation is achieved through the use of rhizomes. The average quantity of rhizomes used per acre was approximately 10.76 quintals in inorganic turmeric cultivation and 10.47 quintals in organic turmeric cultivation. The input quantity used as planting material showed a similar range under both organic and inorganic turmeric cultivation practices in the study area.

6.4.6. FERTILIZERS:

Inorganic turmeric farmers employ a variety of chemical fertilizers, which include nitrogenous (N), phosphorous (P), potassic (K), complex fertilizers, and micronutrients. In the study area, inorganic turmeric growers apply specific chemical fertilizers, with urea used at a rate of 84.89 kg per acre as the nitrogenous fertilizer, DAP at 70.39 kg per acre as the phosphorus source, and MOP at 47.61 kg per acre as the potassic fertilizer. Additionally, they use a complex fertilizer with the composition 10:26:26. These applications significantly contribute to an increased expenditure on fertilizers for inorganic turmeric cultivation.

In contrast, organic turmeric farmers do not utilize any chemical fertilizers. However, they employ organic micronutrient sources, applying 439.51 liters per acre of Jivamrut, which is a higher quantity than the chemical micronutrient source Tuber, for which only 0.50 liters per acre are used in inorganic turmeric cultivation in the study area.

6.4.7. COMPOST/ MANURES:

Regarding compost and manures, organic turmeric cultivators applied 19.32 quintals of FYM, while their counterparts practicing inorganic turmeric cultivation used a lesser quantity of 12.23 quintals of FYM. This demonstrates a significant difference in the utilization of manures and chemical fertilizers between organic and inorganic turmeric cultivation.

6.4.8. PLANT PROTECTION:

For the protection of turmeric crops against insect pests and diseases, organic turmeric growers in the study area sprayed an average of 298.44 liters per acre of Dashparni Ark. Additionally, some organic turmeric farmers applied Neemped at a rate of 38.4 kg per acre. In contrast, inorganic turmeric growers employed Neemped at a lower rate of 30.50 kg per acre for plant protection.

The observed difference in the utilization of per hectare physical inputs is of paramount significance. Within this context, the most pronounced and substantial differences are observed when examining the application of inputs related to seed treatment, whether they are chemical or organic materials, as well as chemical fertilizers. These differences in the use of inputs are indicative of the varying agricultural practices and approaches adopted by organic and inorganic turmeric growers within the study area. It is particularly striking that the differences are most notable in the categories of seed treatment and chemical fertilization, reflecting the distinctive methods and priorities embraced by these two groups of farmers. This divergence in input usage underscores the uniqueness of the cultivation methods employed by organic and inorganic turmeric growers.

6.5. COMPARATIVE PER ACRE COST OF CULTIVATION OF ORGANIC AND INORGANIC TURMERIC PRODUCTION

The cost of cultivation encompasses the expenses incurred by a farmer in order to achieve the final agricultural output. Generally, a farmer's expenditures fall into two categories: variable or operational costs and fixed costs. Variable costs pertain to the expenses associated with factors of production such as seeds, human labour, fertilizers, pesticides, bullock labour, livestock feed, tractor fuel, and similar items. On the other hand, fixed costs include expenses related to land rent, taxes, depreciation of machinery and implements, interest, insurance premiums, and other similar overheads.

For the purpose of this study, various cost components were taken into consideration, including expenses for hired human labour, family labour, machine labour, seed costs, plant protection materials, fertilizers, interest on working capital, land revenue, rental value of owned land, depreciation, and interest on fixed capital. The costs were calculated using standard cost concepts, namely Cost A, Cost B, and Cost C, each of which serves specific analytical purposes. This study aims to estimate and compare the cost of cultivating organic and inorganic turmeric within the study area, as presented in Table 5.

Table 5. Per acre cost of cultivation of Organic and Inorganic Turmeric production (Rs/acre)

SL. No.	Cost Components	Organic	Inorganic
1	Hired Human labour	30522.50 (31.38)	30016.63 (28.99)
2	Bullock labour	2310.78 (2.38)	1830.89 (1.77)
3	Machine labour	2562.89 (2.64)	5245.78 (5.07)
4	Rhizome	23049.04 (23.70)	23182.21 (22.39)
5	Fertilizers	230.04 (0.24)	12809.78 (12.37)
6	Manures	7193.33 (7.40)	4553.54 (4.40)
7	Plant protection	2004.44 (2.06)	628.57 (0.61)
8	Irrigation	980.00 (1.01)	1005.60 (0.97)
9	Land revenue	0.00 (0.00)	0.00 (0.00)
10	Depreciation on capital assets	309.25 (0.32)	498.35 (0.48)
11	Miscellaneous charges	260.00 (0.27)	395.00 (0.38)
12	Interest on working capital 6 %	4369.34 (4.49)	4629.98 (4.47)
13	Cost A (Σ item 1 to 12)	73791.61 (75.87)	84796.32 (81.91)
14	Rental value of land	13859.00 (14.25)	9767.54 (9.43)
15	Interest on fixed capital 12 %	1314.16 (1.35)	1172.11 (1.13)
16	Cost-B (Σ item 13 to 14)	88964.77 (91.47)	95735.97 (92.47)
17	Family labour	8294.00 (8.53)	7792.13 (7.53)
18	Cost-C (Σ item 16 to 17)	97258.77 (100.00)	103528.10 (100.00)

Values in brackets show percentages

6.5.1. TOTAL VARIABLE COST PER ACRE (COST A):

In Table 5, it is evident that the total variable cost, known as Cost A, is higher for inorganic turmeric cultivation, amounting to Rs. 84,796.32, in comparison to organic turmeric, which incurs Rs. 73,791.61. Cost A contributes to 81.91 percent of the total expenditure in the case of inorganic turmeric cultivation, which is approximately 6.04 percent higher than the percentage allocated to organic turmeric cultivation.

6.5.2. FERTILIZERS AND MANURE COST:

When comparing organic and inorganic turmeric cultivation, it becomes apparent that the use of chemical fertilizers in inorganic farming leads to an increase in expenses by approximately 12.37 percent, equivalent to Rs. 12,809.78 per acre. This signifies that by adopting organic agricultural practices, turmeric cultivators have the potential to save on the average cost of chemical fertilizers per acre. Following the inputs that account for the largest share of costs, the expenses related to chemical fertilizers were substantial, constituting 12.37 percent of the total cost for inorganic turmeric cultivation. In contrast, for organic turmeric cultivation, the cost associated with manure was notable, making up 7.40 percent of the total expenditure. It's noteworthy that the expenditure required for the purchase of chemical fertilizers in inorganic cultivation was observed to be nearly double that of organic manures in organic turmeric cultivation. This difference underscores the distinct approaches to soil enrichment and nutrient management adopted by these two cultivation methods.

6.5.3. LABOUR COST:

Upon closer examination of individual input costs, it becomes evident that labour costs, including hired human labour, account for 31.38 percent under organic turmeric cultivation and 28.99 percent under inorganic turmeric cultivation. Family labour constitutes 8.53 percent of the cost under organic cultivation and 7.53 percent under inorganic cultivation. Interestingly, bullock labour is more predominantly utilized by organic farmers. Regarding machine labour costs, it is observed that inorganic turmeric growers allocate 5.07 percent of their expenditure to machine labour, which is higher than the proportion spent by organic turmeric growers. According to feedback from turmeric growers in the study area, organic farmers require more labour for intercultural operations such as weeding and plant protection activities. Detailed examination of the expenditure breakdown reveals that human labour costs represent a substantial share of the total cost, constituting 31.38 percent for organic turmeric cultivation and 28.99 percent for inorganic turmeric cultivation.

6.5.4. COST OF RHIZOMES:

Another significant observation pertains to the quantity of rhizomes used. Organic turmeric cultivators in Akola district, Maharashtra, employ a greater quantity of rhizomes. The cost of rhizomes constitutes 23.70 percent of the total cost for organic growers, which is notably higher than for inorganic turmeric growers.

6.5.5. COST OF PLANTING MATERIAL:

In the cost of planting material, specifically rhizomes, accounts for a significant portion, making up 23.70 percent of the total cost for organic turmeric and 22.39 percent for inorganic turmeric.

6.5.6. RENTAL VALUE OF LAND:

Additionally, the rental value of land is another noteworthy component, covering 14.25 percent of the total cost under organic turmeric cultivation and 9.43 percent for inorganic turmeric cultivation. These cost allocations highlight the differing priorities and resource utilization patterns in organic and inorganic turmeric farming, underlining the substantial impact of human labour and planting material expenses on the overall expenditure.

6.5.7. PLANT PROTECTION COST:

In the domain of plant protection practices, organic turmeric cultivation incurs additional costs. Specifically, there is a 2.06 percent expenditure associated with the purchase of organic plant protection materials like Trichoderma viridi, dashparni ark and neemped etc. In contrast, under inorganic turmeric cultivation, this expense constitutes only 0.61 percent of the total cost.
This distinction highlights the investment difference between organic and inorganic turmeric cultivation when it comes to the procurement of materials aimed at safeguarding the crops from pests and diseases. Organic cultivation, while environmentally friendly, demands a slightly higher financial allocation in this aspect due to the utilization of specialized organic plant protection materials.

6.6. PER ACRE PROFITABILITY OF ORGANIC AND INORGANIC TURMERIC PRODUCTION.

The assessment of profitability in both organic and inorganic turmeric production encompasses several key factors, including the output level, which is represented by the average yield per acre, as well as gross income in Indian Rupees. Further, it considers various cost components such as Variable cost (Cost A), Cost B, and the total cost of cultivation (Cost C). Additionally, it takes into account farm business income at Cost A and Cost B, net profit at Cost C, the per quintal cost of production, and the B:C ratio. These critical aspects are summarized and presented in Table 6 for a comprehensive evaluation of the profitability of organic and inorganic turmeric cultivation.

Table 6. Per acre profitability of turmeric production (Rs/acre)

SL. No.	Cost Components	Organic	Inorganic
1	Average yield per acre (Qtls)	24.83	21.43
2	Gross Returns (Rs.)	230983.33	162792.39
3	Cost-A	73791.61	84796.32
4	Cost-B	88964.77	95735.97
5	Cost-C	97258.77	103528.10
6	Farm business income at Cost-A	153791.73	80996.07

7	Family labour income at Cost-B	141526.19	70056.42
8	Net profit at Cost-C	133724.56	59264.29
9	Benefit - Cost ratio	1:2.37	1: 1.57
10	Per quintal cost of production	3916.99	4821.99

In the case of organic turmeric cultivation, a robust yield of 24.83 quintals per acre was achieved, resulting in a substantial gross revenue of Rs. 230,983.33. These organic turmeric growers have been diligently following organic farming practices for the past decade, which has enabled them to attain superior yield levels compared to their inorganic counterparts in the study area. The total cost incurred in organic cultivation amounted to Rs.97,258.77, ultimately leading to a net income of Rs.133,724.56 per acre at cost C. Conversely, inorganic turmeric cultivation yielded 21.43 quintals per acre, generating comparatively lower revenue of only Rs.162,792.39. As a result, the net income at cost C for inorganic turmeric stood at Rs.59,264.29 per acre. Notably, the per quintal cost of production was higher in inorganic turmeric cultivation, amounting to Rs. 4,821.99 per quintal. This indicates a higher cost of production for inorganic turmeric growers in comparison to their organic counterparts.

The benefit-cost ratio (BCR) serves as a key indicator of profitability for both organic and inorganic turmeric cultivation. In the case of organic turmeric, the BCR was notably high at 2.37. This implies that for every 1 rupee invested in organic turmeric production, farmers can expect a return of Rs. 2.37 in organic turmeric cultivation. Under inorganic turmeric, the BCR was found to be 1.57. Therefore, the BCR in turmeric cultivation within the study area reflects the returns obtained for each rupee invested. In summary, As organically produced turmeric gets better price in the market because of its quality as compared to inorganically produced. Organic turmeric outperforms its inorganic counterpart in terms of both total yield and profit earned per acre in the study area, as indicated by the higher BCR, emphasizing its economic viability and profitability.

7. CONCLUSION

The recent study conducted in Akola district of Maharashtra has drawn a crucial conclusion regarding turmeric cultivation which are as follows

- The findings reveal that inorganic turmeric cultivation may not be as economically profitable as its organic counterpart.
- The cost structure analysis highlights that organic turmeric cultivation in Akola involves higher labour costs, primarily due to the greater number of labourers employed in these practices.
- To enhance the economic viability of organic turmeric cultivation, strategies aimed at reducing labour requirements and costs should be explored and implemented.
- Organic turmeric cultivation in Akola, despite the elevated labour costs, emerges as economically viable, boasting an encouraging benefit-cost ratio of 2.37.
- The study revealed that turmeric growers who practiced organic methods over a period of years got better yield compared to the conventional turmeric growers.
- This ratio indicates that for every rupee invested in organic turmeric production, a return of Rs. 2.37 can be expected.
- This highlights the potential for organic farming to significantly improve the financial well-being of farmers in the region.
- The study also brings to light the fact that both organic and inorganic turmeric cultivators employ a relatively higher number of labourers and face increased labour costs in the region.
- To make turmeric cultivation economically viable for all farmers, it is crucial to find ways to reduce labour requirements and costs through the implementation of selective mechanisms.
- To support the farmers in achieving this objective, the government should actively formulate and promote advanced agricultural techniques that are more labour-efficient.
- Technological interventions, such as rhizome treatment, the application of biofertilizers like Dashparni Ark and Neemped, and improved plant protection measures, have shown promise in enhancing organic turmeric yield.
- These eco-friendly production methods offer a solution to the productivity challenge and should be disseminated extensively among the farming community.
- Furthermore, combining traditional indigenous knowledge with modern cultivation techniques is essential to ensure a sustainable and prosperous future for turmeric farming in Akola district.

7.1. RECOMMENDATIONS

Improving organic turmeric production in Akola district of Maharashtra requires a multi-faceted approach aimed at enhancing yield and profitability. Some of the major ponits to be considered for recommending are,

- **Rhizome selection and Production:** To further boost organic turmeric production, a critical step is the selection of improved planting material sourced from local cultivars with high curcumin content. This strategy can lead to increased yields and higher-quality turmeric.
- **Irrigation Management:** Identifying appropriate irrigation quantities and timings is essential to optimize water usage for turmeric cultivation. Providing training and guidance to farmers on efficient irrigation practices can help conserve resources and improve crop yields.
- **Training in Organic Inputs:** Training initiatives should focus on educating organic turmeric farmers about the application of organic inputs. This includes organic fertilizers, biopesticides, and other natural farming practices that can enhance crop health and productivity.
- **Processing Promotion:** Encouraging organic turmeric farmers to undertake processing is a valuable step. This can be achieved by offering subsidies or facilitating access to loans for establishing small-scale processing units. Processed dry turmeric fetches higher market prices compared to raw turmeric, providing an economic incentive for farmers.
- **Market Support:** To ensure farmers receive a fair share of the consumer price, supporting them in establishing mini-processing plants is critical. These processing units can add value to their turmeric products, leading to increased profitability.
- **Government Initiatives:** The government plays a pivotal role in supporting farmers. It should formulate comprehensive packages that incorporate advanced agricultural techniques to meet labour requirements. labour-efficient methods can significantly reduce labour costs and make turmeric cultivation economically viable.
- **Market Infrastructure:** Strengthening regulated market committees and enhancing market infrastructure for organic turmeric is essential. These committees can ensure that farmers receive remunerative prices for their produce, improving their financial well-being.
- **Enhancing organic turmeric cultivation:** Organic cultivation and the economic well-being of local farmers in Akola district requires a collaborative effort involving government initiatives and the active participation of various stakeholders.

By implementing these measures, it is possible to achieve sustainable and profitable organic turmeric production in the region.

8. BIBLIOGRAPHY

Aglawe DD. Technological gap in Turmeric production technology M.Sc (Agri) Thesis (Unpub.), Dr. PDKV. Akola, 2012.

Angles S, Sundar A, Chinnadurai M. (2011) Impact of globalization on production and export of turmeric in India – An economic analysis. Agricultural Economics Research Review. 24:301-308.

Angles S. Production and export of turmeric in South India- An economic analysis. Unpublished M.Sc.(Agri.) thesis submitted to University of Agricultural Sciences, Dharwad (Karnataka); c2001.

Azam M. S., Shaheen M. (2019) Decisional factors driving farmers to adopt organic farming in India: a cross-sectional study. International Journal of Social Economics, 46(4):562–580.

Babu N, Shukla AK, Tripathy PC, Prusty M. (2015) Traditional cultivation practices of turmeric in tribal belt of Odisha. Journal of Engineering Computers & Applied Sciences. 4(2):52-57.

Bhise RN. Training needs of the onion growers. M.Sc.(Agri.) Thesis (Unpub.) Dr. PDKV, Akola, 2011.

Chahal SS, Singla R, Kataria P. (2004) Marketing efficiency and price behavior of green peas in Punjab. Indian Journal of Agricultural Economics. 18(1):115-128.

Deepa KM. Turmeric: The golden spice, Facts for You. Sept. 19-20; 2010. 2. Sahoo PP. Value Chain Analysis of Organic Turmeric In Kandhamal District of Odisha. M.Sc (Agri) Thesis, Orissa University of Agriculture and Technology (India); 2017.

Dodke L.B., S.S. Kalamkar, N. V. Shende and B.L. Deoghare (2002) Economics of production and marketing of turmeric. Indian Journal of Agricultural Marketing, 16 (2): 69-72.

Ganeshprasad TS, Manjunatha BN, Nataraju MS. (2010) Economics of production and marketing channels used by turmeric growers. Mysore Journal of Agricultural Sciences. 44(1):144-147.

GOI. A project Proposal On Integrated Turmeric cultivation in Kandhamal under RKVY 2013-14, Deputy Director of Horticulture 2014.

Hema M, Ranjit Kumar. Production and trade performance of major spices grown in Western Ghat region in India. Indian J. Agril. Mktg. 2007;21(1):83-95.

Inbasekar K. (2011) Economics of production marketing and price forecasting of turmeric in Warangal district of Andhra Pradesh. Unpublished M.Sc. (Agri) thesis submitted to Acharya N. G. Ranga Agricultural University.

Jayasubramanian P, Sasikumar (2015) Problems And Prospects For Turmeric Products Perceived By Small Farmers In Erode District. International Journal of Applied Research. 1(13):306-311.

Kadam ST. A study of the technological gap in ginger cultivation. M.Sc. (Agri.) Thesis MPKV, Rahuri, 2008.

Kadte A. J., Perke D. S.and Kale P. S. (2018) Economics of Turmeric Production in Sangli District of Maharashtra, India. International Journal of Current Microbiology and Applied Sciences,6: 2279-2284

Kafle B. (2011). Factors affecting adoption of organic vegetable farming in Chitwan district, Nepal. World Journal of Agricultural Sciences, 7(5), 604–606.

Kamble P. L. (2003) Economics of production and marketing of turmeric in Sangali district of Maharashtra. Unpublished M. Sc (Agri) thesis Submitted to Mahatma Phule Krishi Vidyapeeth, Rahuri.

Kanagaraju P, Venkatesan N. A Study on Production and Marketing of Turmeric in Perambalur District. IJEMR. 2016 July, 6(07).

Karvy Comtrade Limited. Turmeric Seasonal report, Karvy Ltd.; 2008.
Katole RT, More GB, Priti Todasam and Darange AS (2018) Marketing behavior of turmeric growers in Akola district of Maharashtra state. International Journal of Chemical Studies, 6(5): 09-12
Khambalkar V. P., Thakare S. H. and Pandagale V. P. (2016). Energy Management Studies Of Turmeric Crop Cultivation. The Bioscan, 11(2): 857-861
Lokesh G. B. and M. G. Chandrakant (2004) Economics of Production, Marketing of Turmeric in Karnataka. Indian Journal of Agricultural Marketing, 18 (2): 32-44.
Maghade AV, Khalache PG, Gaikwad JH. A Study of marketing behaviour and constraints faced by onion growers in Ahmednagar district M.Sc. (Agri.) Thesis (Unpub.) MPKV, Rahuri, 2008.
Mane U. S., R.B. Changule, P.L. Kolekar and S.H. Gharge (2011). An economic analysis of turmeric arrivals and price behavior in Sangali district of Maharashtra. International Journal of Commerce and Business Management, 4 (2): 224-227.
Ovhar ND. Technological gap in Turmeric production technology. M.Sc. (Agri.) Thesis (Unpub.) Dr. PDKV, Akola, 2012.
Pawar AS. Production and Marketing Behaviour of organic vegetable Growers in western vidarbha. M.Sc. (Agri.) Thesis (Unpub), Dr. PDKV, Akola, 2014.
Prangya Paramita Sahoo, Khitish K. Sarangi, Upasana Mohapatra, Shruti Mohapatra and M. Sangeetha (2017). Economics of Organic Turmeric (Curcuma longa) Cultivation in Kandhamal District of Odisha. Asian Journal of Agricultural Extension, Economics & Sociology, 21(4): 1-8
Radha Y, Chowdhry KR. (2005) Comparative economics of seed production vis-à-vis commercial production of cotton in Andhra Pradesh. Indian Journal of Agricultural Economics. 60(1): 94-102.
Sachin D Kambale and AS Gadakh (2023). Economics of production of turmeric in Akola district. The Pharma Innovation Journal, 12(5): 3881-3886
Santosh. Cost and returns structure of pigeon pea crop in Maruti variety and Local variety. Karnataka J. Agric. Sci. 2006; 20(1):72-75.
Singh S.P., Priya and Sajwan K. (2023) Factors influencing the adoption of organic farming: a case of Middle Ganga River basin, India. Organic Agriculture, 13, 193–203.
Singh SP, Verma HN. (2001) Scope of farm mechanization in Shivalik hills of India. AMA, Agricultural Mechanization in Asia, Africa and Latin America. 32(1):5964.
Umagowri M, Chandrasekaran M. (2011) An economic analysis of the value chain of banana in Western Tamil Nadu. IUP Journal of Supply Chain Management.7(3):66-80.
Upasana M. Economics of mechanical harvesting of tur in north Karnataka. M.Sc (Agri) Thesis, Univ. Agric. Sci., Dharwad, Karnataka; 2015.
Waghamare G S. Existing cultivation practices followed by the turmeric growers in Sindhudurg district. M. Sc. (Agri.) Thesis (Unpub.) Dr. BSKKV, Dapoli, 2014
Wankhade R N, Dhanwate S P, Bhende A M. Value addition of Tur in Akola district of Maharashtra. Agricultural Economics Research Review. 2010;23(Conference Number):545.

9. APPENDIX

QUESTIONNAIRE

TOPIC: ECONOMIC ANALYSIS OF ORGANIC AND INORGANIC TURMERIC IN AKOLA DISTRICT OF MAHARASHTRA

NAME OF RESEARCHER:

NAME OF FARMER: **MOBILE NO.**

1. SOCIO-ECONOMIC STATUS

1.	Date of interview	
2.	Name of the main crop referred for the survey	Turmeric
3.	Country	India
4.	State	Maharashtra
5.	District	
6.	Taluka/Block	
7.	Village	
8.	Farm size (Small less than 1 ha, Medium 1-2 ha & Large more than 2ha)	
9.	Land holding	
10.	Total family member	
11.	Family type (Joint/Nucleolus)	

2. GENERAL FAMILY INFORMATION

SL. No.	Name	Gender	Age	Education	Occupation	Annual Income	Remark
1.							
2.							
3.							
4.							
5.							
6.							
7.							

3. LAND INVENTORY

Particulars	Dry (acres)	Irrigated (acres)	Permanent fallow (acres)	Total (acres)
Own land				
Leased/shared in land				

Leased/shared out land				
Operated land (own land+ leased/shared in- leased/shared out land)				

4. CROPPING PATTERN

Total area (ha)	Kharif			Rabi			Summer			Annual	
	Name of crop	Dry (ha)	Irrigated (ha)	Name of crop	Dry (ha)	Irrigated (ha)	Name of crop	Dry (ha)	Irrigated (ha)	crop	Irri. (ha)

5. LIVESTOCK

Type	Quantity (No)	Present total value (Rs.)
1. Draft animals		
2. Cows		
3. Buffaloes		
4. Goat		
5. Sheep		
6. Poultry		
7. Others		

6. FARM IMPLEMENTS

Particulars	Quantity (No)	Present total value (Rs.)
1. Tractor		
2. Harvesters		
3. threshers		
4. shellers		
5.Sprinkler sets		
6. drip irrigation		
7. Bullock Cart		
8. Electric Pump set		
9. Diesel Pump set		
10. Manual sprayers		
11. Power sprayers		

12. Others			

7. FARM BUILDING/RESIDENTIAL STRUCTURE

Particulars	Quantity (No)	Size (Sq.feet)	Present total value (Rs.)
1. Residential house			
2. Farm house			
3. Cattle shed			
4. Poultry shed			
5. Engine pump house			
6. Others (Specify)			

8. LABOUR USE PATTERN IN TURMERIC

NAME OF CROP: **IRRIGATION METHOD:** **DATE OF:**

AREA UNDER: **VARIETY:**

CROP: **SOWING METHOD:** **SPACING:** **SOIL TYPE:**

SL.No	Operations	Human Labour required days				Bullock required (pair days)		Machinery (hrs.)	
		Owned		Hired					
		M	F	M	F	Owned	Hired	Owned	hired
A)	Preparatorytillage								
1)	Rotavator								
2)	Harrowing								
3)	Bed preparation								

4)	Others a. Cultivator b. Tillering c. d.								
B)	Seed treatment								
C)	Farm management								
1)	Sowing								
2)	Irrigation-								

D)	Intercultural operations								
1)	Weeding								
2)	Hoeing								
3)	Earthing up								
E)	Fertilizer Application								

F)	Plant protection chemical / Organic material Application/ Practices								
G)	Supervision								
H)	Harvesting								
I)	Threshing								
J)	Transport								

J)	Transport								
1)	Farm to store								
k)	Land Revenue								
l)	Others								

9. INPUT USE PATTERNIN TURMERIC

Sr. No.	Particular	Qty	Rate	Amount	Brand Name/ Company	Form	Source of Information	Place of purchase
1	**Seed Treatment Chemicals / Organic material**							
	a)							

	b)							
	c)							
	d)							
	e)							
	f)							
	g)							
2	**Seed**							

3	**Fertilizers**							
	a) Nitrogen	Urea						
		DAP						

		Complex							
		Others i.							
		ii.							
		iii.							
	b) Phosphorus	SSP							
		DSP							
		Others i.							
		ii.							
		iii.							

	c)Potassium	MOP							
		Others i.							
		ii.							
		iii.							
	d) Compost / Manures	FYM							
		Vermicompost							

		Green Manuring							
	e) Micronutrients	i.							
		ii.							
		iii.							
		iv.							
4	**Plant Protection Chemicals / Organic material**								
	Herbicides	i.							
		ii.							
		iii.							

	Insecticides/ Pesticides	i.							
		ii.							
		iii.							
	Fungicides	i.							
		ii.							
		iii.							
5	**Others i.**								
	ii.								
	iii.								

10. PRODUCTION

A	**Main produce**		
	Quantity (Kg/qtls)	Rate (Rs/qtls)	Total value (Rs.)
B	**By produce**		
	Quantity (Kg/qtls)	Rate (Rs/qtls)	Total value (Rs.)
C	**Grand total (Rs) (A+B)**		

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