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13. Prospects and Problems of Vegetable Cultivation in Murshidabad District, West Bengal, India

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Abstract:

The district of Murshidabad in West Bengal holds immense promise for future vegetable cultivation. With its fertile soil, favourable climatic conditions and a rich tradition of agriculture, the prospects for vegetable cultivation in this region are promising.

Cultivation of vegetables provides a primary economic opportunity for reducing poverty of the small and marginal farmers by providing higher returns. Less land requirement, short span duration, day-to-day returns are some reasons for growing popularity of vegetable cultivation. The study was conducted during the years 2018 – 2019 and 2019 – 2020 covering all the agricultural seasons. 480 respondents from 16 blocks of Murshidabad district, West Bengal were surveyed. The required data for the concerned study were collected through field visits and using a standard pre-tested questionnaire. In this present study, only the present scenario of vegetable cultivation is considered in order to analyze the input costs and subsequent returns. The existing conditions pertaining to the state of organic farming in the district have also been reported. To find out the most significant constraint that influences the farmers, Garrett's technique is used. The results from the analysis bring out the fact that the 'Elevated labour cost' occupies the highest rank with the highest Garret score.

Keywords:

vegetables, input cost, organic farming, Murshidabad District, Garret score, Garret Table

13.1 Introduction:

Murshidabad is one of the main agricultural districts of the West Bengal state with more than 70% of the population of the district directly depends on agriculture (NABARD, 2024 and BAES, 2005). The district consists of five sub-divisions (BAES, 2005), viz. Berhampore, Kandi, Lalbagh, Jangipur and Domkal with community development blocks. In total, there are 26 numbers of community development blocks in the district (BAES, 2005). The river Bhagirathi passes through the district from north to south; thereby dividing the district into two distinct regions (NABARD, 2024 and NRIO, 2024). The eastern part is called as Bagri region which is blessed with fertile alluvial soil. The western part consists of stiff clay soil, reddish in colour, and undulated topography called the Rarh region (Figure 13.1). Most of the framers in this district are involved in traditional farming mainly paddy

(*Oryza sativa* L.), jute (*Corchorus* spp.) and the other agricultural crops such as oil seeds, vegetables and pulses (NABARD, 2024). Vegetables occupy a chief position in the daily food cart. They are the source of important vitamins, minerals, Phyto-chemicals, fibre, anti-oxidant and *good* carbohydrates. The present trend of consuming lesser calories through healthy diets for weight management makes vegetables more popular. This increasing demand of vegetables imposes a positive economic effect on the vegetable growing farmers who generally belong to small or marginal group (Agarwal & Banerjee, 2019; Kundu & Mandal, 2020). It is worth to mention that India holds the second highest vegetable producing country, contributing about 14% of the world's total production (Sahni & Kumari, 2017; IBEF, 2024). Among the states of India, West Bengal is one of the leading vegetable growing states with about 15% contribution (Sahni & Kumari, 2017).

The Murshidabad district is the sixth largest district in West Bengal covering the geographical area of 5324 km^2 with the total cropping area of about 3959 km^2 [4], and considered as the *crop museum* of West Bengal (NABARD, 2024). Due to its fertile soil and diverse weather conditions, different types of fruits, vegetables, flowers, medicinal and plantation crops are grown on commercial scale throughout the year. As per the published report of the Bureau of Applied Economics & Statistics, Department of Planning, Statistics & Programme Monitoring, Government of West Bengal (BAES,2024), the cultivated area (*vegetable production*) in Murshidabad District for the past six years from 2011 to 2015 are 86.70 thousand hectares (*1447.59 thousand tons*) in 2011-12, 87.28 thousand hectares (*1458.68 thousand tons*) in 2012-13, 87.84 thousand hectares (*1499.37 thousand tons*) in 2013-14, and 88.48 thousand hectares (*1515.47 thousand tons*) in 2014-15, respectively. This indicates the cultivated areas and productions of vegetable crops are increasing in the district over the past few years and impacted the socio-economic conditions of the local farmers at large [Agarwal & Banerjee, 2019; Ghosh *et al*., 2019). Examining the economic aspect of increasing vegetable production is essential for fostering sustainability, profitability and resilience of agriculture.

Ultimately a comprehensive understanding of the economic perspective surrounding vegetable cultivation is crucial for securing food supplies, promoting economic growth and enhancing the well-being of both producers and consumers. Extensive study on vegetable cultivationin Murshidabad District is lacking. Agarwal and Banerjee (2019) conducted research on tomato cultivation in the Kandi Block of Murshidabad district. The study focuses on the financial aspects of growing tomatoes, underscoring seeds and labour as the key factors driving variable costs. A study by Ghosh, *et al*., (2019) examined the agricultural performance of farmers cultivating various crops within Murshidabad District and concluded that rice crop was given the first priority followed by jute, mustard, lentil and vegetable crops. The increasing demand of vegetables is seen as beneficial for small-scale farmers, who are predominant in India's agricultural landscape. The current study focuses on examining the input costs associated with cultivating various vegetable crops and the resulting returns from these crops. This study specially covers ten commonly grown vegetable crops in the study area, which are widely cultivated by local farmers. Additionally, this study assesses the challenges encounter by the producers in the process of cultivating vegetables.

13.2 Materials and Methods:

The present study was carried out in sixteen blocks (Berhampore, Beldanga-I, Beldanga-II, Hariharpara, Kandi, Khragram, Bharatpur-II, Domkal, Raninagar-I, Raninagar-II, Murshidabad-Jiaganj, Bhagawangola-I, Bhagawangola-II, Lalgola, Nabagram and Raghunathganj-I) of Murshidabad district and the primary data were collected from the field.

The survey was conducted during the year 2018–2019 and 2019–2020 covering all the agricultural seasons. The detailed information was collected from 480 respondents in 16 blocks as stated through personal interview and regular field visits.

A detailed questionnaire (both in English and Bengali) was standardized including the general socio-economic information of the respondents and detail information of various expenses related to seeds, fertilizers, organic manures, insecticides, pesticides.

The information in connection with the cultivating procedures such as land preparation, transportation, irrigation, inter-cultivating operations, harvesting, details on the difficulties during the process of cultivations were also gathered during the survey.

The considered respondents are small (possessing up to 2.5 acres of cultivated land) and marginal farmers (possessing below 1.0 acre of cultivated land). The following parameters were considered for the analysis of total input cost of cultivation.

1. Hired human labour: (a) Male labour (b) Female labour

2. Total bullock labour: (a) Owned (b) Hired

3. Total machine labour: (a) Owned (b) Hired

4. Seeds:

5. Manures: (a) Compost (b) FYM

6. Fertilizers: (a) Nitrogen (N) (b) Phosphorus (P) (c) Potassium (K)

7. Irrigation charges

8. Insecticides and pesticides

Further, the conventional Garrett's ranking technique has been implemented for unveiling the most significant constraint encountered by the concerned farmers during the vegetable cultivation.

In this context, the required percent position has been calculated using the following relation:

$$\text{Percentage position} = [100\times(R_{ij} - 0.5)] / N_j$$

Here, R_{ij} is the rar _

N_{ij} is the number of items ranked by the j^{th} individual.

The ranks were converted into scores using the Garrett table (see Table 13.1).

For each constraint, we added up the scores of individual respondents and then divided that sum by the total number of respondents whose scores were added.

This allowed us to rank the average score for each constraint by arranging them in descending order.

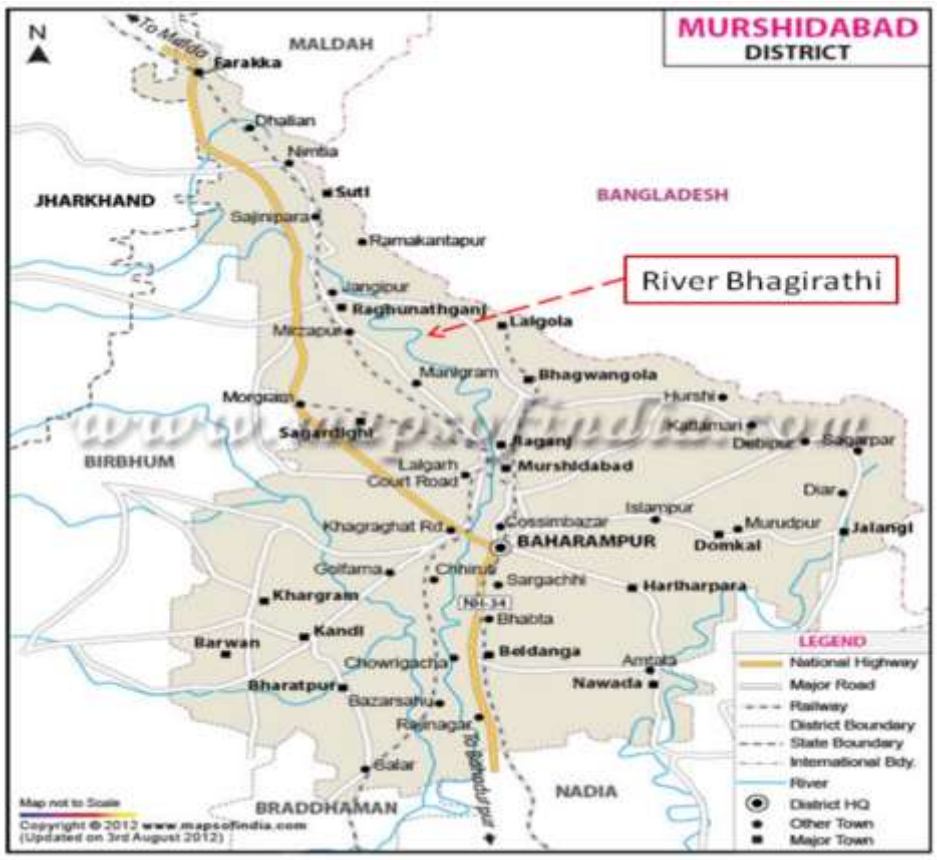

Figure 13.1: The geographical map of Murshidabad District highlighting the flow of River Bhagirathi from North to South.

Source: *https://www.mapsofindia.com/maps/westbengal/districts/murshidabad.htm*

Table 13.1: Garrett Ranking Conversion Table highlighting the conversion of orders of merits into the units of number of "scores" (Agarwal & Banerjee, 2019, Dhanavandan, 2016; Ao & Jamir. 2020).

Percent	Score	Percent	Score	Percent	Score
0.09	99	22.32	65	83.31	31
0.20	98	23.88	64	84.56	30
0.32	97	25.48	63	85.75	29
0.45	96	27.15	62	86.89	28
0.61	95	28.86	61	87.96	27
0.78	94	30.61	60	88.97	26
0.97	93	32.42	59	89.94	25
1.18	92	34.25	58	90.83	24
1.42	91	36.15	57	91.67	23
1.68	90	38.06	56	92.45	22
1.96	89	40.01	55	93.19	21
2.28	88	41.97	54	93.86	20
2.69	87	43.97	53	94.49	19
3.01	86	45.97	52	95.08	18
3.43	85	47.98	51	95.62	17
3.89	84	50.00	50	96.11	16
4.38	83	52.02	49	96.57	15
4.92	82	54.03	48	96.99	14
5.51	81	56.03	47	97.37	13
6.14	80	58.03	46	97.72	12
6.81	79	59.99	45	98.04	11
7.55	78	61.94	44	98.32	10
8.33	77	63.85	43	98.58	9
9.17	76	65.75	42	98.82	8
10.06	75	67.48	41	99.03	7
11.03	74	69.39	40	99.22	6
12.04	73	71.14	39	99.39	5
13.11	72	72.85	38	99.55	4

Percent	Score	Percent	Score	Percent	Score
14.25	71	74.52	37	99.68	3
15.44	70	76.12	36	99.80	2
16.69	69	77.68	35	99.91	1
18.01	68	79.17	34	100.00	0
19.39	67	80.61	33		
20.93	66	81.99	32		

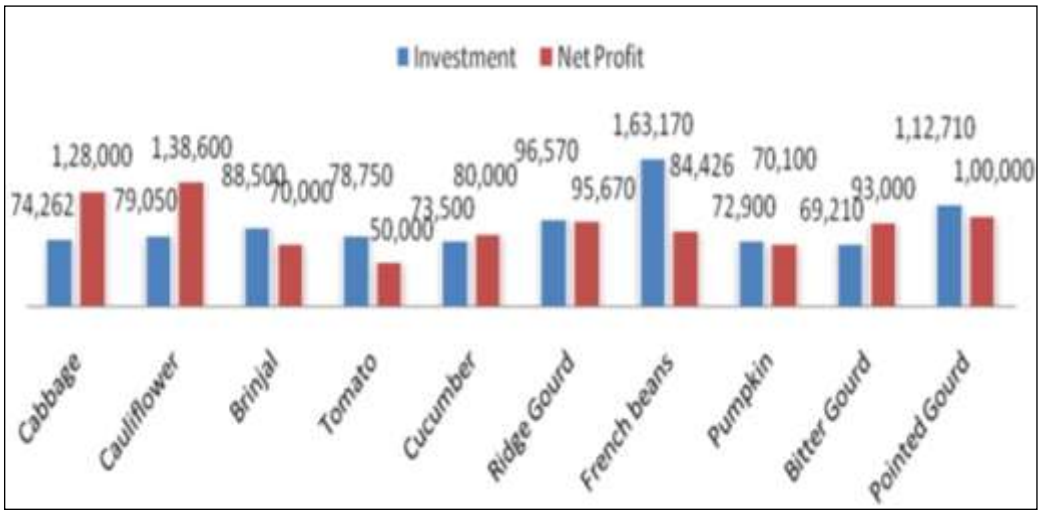

Figure 13.2: The input cost and net profit profile of the ten different vegetables cultivated in the study area

13.3 Results and Observation:

Table 13.2: Brief taxonomical description of the ten vegetables.

Sr. No.	Scientific name	Family	Common name	Local name	Description of the plant
1	*Brassica oleracea* L. *var. capitata*	Brassicaceae	Cabbage	Bandhakofi	Very short but stout stem with a mass of closely packed thick fleshy overlapping leaves; the older leaves surround the younger, smaller, tenderer ones and the miniature stem

Sr. No.	Scientific name	Family	Common name	Local name	Description of the plant
2	*B. oleracea* L. *var. botrytis* Linn.	Brassicaceae	Cauliflower	Phoolkofi	Short stem bearing a large condensed, compact, swollen hemispherical head at the top surrounded by large leaves
3	*Cucumis sativas*L.	Cucurbitaceae	Cucumber	Sosa	Creeping vine plant that roots in the ground and grows up trellises or other supporting frames, wrapping around supports with thin spiraling tendrils; the vine bears large leaves that forms a canopy over the cylindrical to spherical fruits
4	*Luffa acutangula (*L.*) Roxb.*	Cucurbitaceae	Ridge Gourd	Zhingey	Vigorous climbing plant producing long stems that scramble over the ground or climb into nearby vegetation; supporting themselves by means of tendrils
5	*Cucurbita pepo* L.	Cucurbitaceae	Pumpkin	Mistikumro	Creeping plant; shallow root system and hollow angled stems with large, alternate simple long-petioled and palmately leaves; round, oblate or oval shaped fruit (technically known as *pepo*) with round or flat ends
6	*Momordica charantia*L.	Cucurbitaceae	Bitter Gourd	Ucheche	Herbaceous, tendril bearing vine with simple alternate leaves across, with three to seven deeply separated lobes; oblong shaped fruit with distinct warty exterior

Sr. No.	Scientific name	Family	Common name	Local name	Description of the plant
7	*Trichosanthes dioica* Roxb.	Cucurbitaceae	Pointed Gourd	Potol	Perennial plant propagated vegetatively and grows with training on a support system as creeper; dark green cordate simple leaves; remain dormant during the winter season; green coloured prolate shaped fruits with white or no stripes
8	*Solanum melongena* L.	Solanaceae	Brinjal	Begun	Much branched, often spiny perennial plant; calyx persistence; large smooth glossy firm flashed pendent berry fruits usually with ovoid/ oblong/ obovoid shapes with the colours ranging from white or green to deep purple or black.
9	*S. lycopersicum*L.	Solanaceae	Tomato	Tomato	Weak-stemmed trailing, much branched short-lived plant with edible berry with fleshy pulp and seeds; vines with typical pubescent
10	*Phaseolus vulgaris* L.	Leguminosae (Fabaceau)	French beans	Beans	Herbaceous plant (bush type); pinnately compound leaves (sometimes with 3 leaflets); pod shape ranges from flat to round, smooth to irregular, and straight to sharply curved

Table 13.3: Input production costs of 10 vegetables under different heads and the corresponding estimates for the net profit based on the field survey and personal interview.

Sr. No.	Crop (common name)	Input costs under different heads (in Rs.) per acre (1 acre = 3 bigha)							Producton (in quintal per acre)	Selling price range (in Rs.) (per kg)	Net Profit (in Rs.)
		Field preparation	Nursery, Sowing/planting/Seed treatment etc.	Fertilizers (Organic& Inorganic)	Pesticides &Insecticides	Labour (including weeding, harvesting, spraying)	Irrigation	Total			
1	Cabbage	7,500	4,500	21,000	10,500	26,100	4,662	74,262	250	5–25 per piece	1,28,000
2	Cauliflower	6,000	6,000	15,000	6,000	38,400	7,650	79,050	180	10–40 per piece	1,38,600
3	Cucumber	5,100	4,500	7,500	21,000	24,000	11,400	73,500	150	20–70	80,000
4	Ridge Gourd	10,410	16,500	11,700	19,560	32,400	6,000	96,570	70	8–60	95,670
5	Pumpkin	6,210	2,400	15,000	13,500	27,000	8,790	72,900	124	10–25	70,100
6	Bitter Gourd	7,500	2,700	5,400	8,610	33,000	12,000	69,210	45	20 –90	93,000
7	Pointed Gourd	12,000	36,000	7,710	12,000	30,300	14,700	1,12,710	180	10–150	1,00,000
8	Brinjal	3,000	2,100	21,750	33,900	22,500	5,250	88,500	130	30–80	70,000
9	Tomato	5,460	9,000	13,200	18,750	24,600	7,740	78,750	320	10–80	50,000
10	French Beans	13,500	56,250	21,000	14,400	43,500	14,520	1,63,170	25	60–150	84,426

The farmers were asked to prioritize six of the following constrains that they face during the vegetable cultivation activities. All of these constraints were systematically assessed; filtered and assigned rankings using the Garrett's method (Agarwal & Banerjee, 2019; Dhanavandan, 2016; Ao & Jamir, 2020).

The subsequent results are presented Table 13.4. The table shows the preference and rankings of the problems faced by the farmers of the study area during the survey and interview. The elevated labour cost ranked as first by 196 respondent farmers, second rank by 158 farmers and none of them ranked it as last preference. The financial hardship ranked as first by 167 farmers and ranked last by 8 farmers.

Table 13.4: Preference of ranking of constraints of vegetable cultivation by the farmers.

Sr. No.	Constraints	Rank given by the respondents					
		1st	2nd	3rd	4th	5th	6th
1	Elevated Labor Cost	196	158	57	51	18	0
2	Financial hardship	167	77	181	35	12	8
3	Inadequate water supply	158	198	67	29	17	9
4	Pricy high-quality seeds	57	59	62	175	84	43
5	Ignorant of diseases of pests	61	201	92	16	82	21
6	Deficit in technical guidance	151	218	75	109	21	13

Table 13.5: Percent Position and Garrett Value

Srl. No.	$100\times(R_{ij} - 0.5)/N_j$	Calculated value	Garrett value
1	100×(1 – 0.5)/6	8.33	77
2	100×(2 – 0.5)/6	25.00	63
3	100×(3 – 0.5)/6	41.67	54
4	100×(4 – 0.5)/6	58.33	46
5	100×(5 – 0.5)/6	75.00	37
6	100×(6 – 0.5)/6	91.67	23

Table 13.6: Calculations of Garrett's values and ranking.

Constraints	Ranks given by the Respondents						Total	Average Total No. of Respondents	Rank
	1st	2nd	3rd	4th	5th	6th			
Elevated Labor Cost	15,092	9,954	3,078	2,346	666	0	31,136	64.86	I
Financial hardship	12,859	4,851	9,774	1,610	444	184	29,722	61.92	III
Inadequate water supply	12,166	12,474	3,618	1,334	629	207	30,428	63.45	II
Pricy high-quality seeds	4,389	3,717	3,348	8,050	3,108	989	23,601	49.17	V
Ignorant of diseases of pests	4,690	12,663	4,968	736	3,034	483	26,574	55.36	IV
Deficit in technical guidance	3,927	13,734	4,050	5,014	777	299	22,787	47.47	VI

13.4 Discussion:

The ten popular vegetables grown by the farmers of Murshidabad district belongs to four families and nine genera. The present study reveals that the inclusive maximum total input cost of cultivation (Rs. 1,63,170/acre) amongst the ten vegetables was found in French Beans with a return of Rs. 84,426/acre and minimum input costs (Rs. 69,210/acre) in Bitter Gourd with a net profit of Rs. 93,000/acre. Also, the French beans occupy the maximum costs of field preparation (Rs. 13,500/acre) and nursery preparation (Rs. 56,250/acre) and the minimum costs recorded in Brinjal both in field (Rs. 3,000/acre) and nursery (Rs. 2,100/acre) preparation (Table 14.3). The reduced cost of field and nursery preparation in Brinjal is due to its perennial growth and maintained by the local farmers in the field, however, it consumed maximum fertilizers (Rs. 21,750/acre) and pesticides (Rs. 33,900/acre) amongst the ten crops under the present study indicating the excessive use of fertilizers, insecticides and pesticides in Brinjal cultivation which the farmers spend Rs. 650/bigha daily on insecticides and pesticides alone.

The cost of irrigation is the maximum in the case of Pointed Gourd (Rs. 14,700/acre) followed by French Beans (Rs. 14,520/acre) and Bitter Gourd (Rs. 12,000/acre), respectively. The cultivation of Cabbage is associated with the minimum cost of irrigation (Rs. 4,662/acre) (Table 14.3). Among the parameters considered for the present study, the labour costs expenditure was found to be maximum in majority of the crops except Brinjal. In case of French Beans, the labour cost per acre is as high as 27% of the total input cost. Out of the total input cost of Rs. 1,63,170/acre, the total labour cost is Rs. 43,500/acre for French Beans (Table 14.3).

The data analysis indicates that tomato production is the highest (320 quintal/acre) followed by Cabbage (250 quintal/acre), Cauliflower (180 quintal/acre), Pointed Gourd (180 quintal/acre) and Cucumber (150 quintal/acre), respectively.

The market price of different vegetables varies over a wide range with Green Beans as the highest (Rs. 66–150/kg) followed by Pointed Gourd (Rs. 10–150/kg) and Bitter Gourd (Rs. 20–90/kg), respectively.

The Cabbage and Cauliflower are sold piece wise in the local market (Table 14.3). Likewise, the price of Cabbage varies from Rs. 5–25/piece and that for Cauliflower from Rs. 5–40/piece in the market, respectively (Table 2). The fluctuating price of the vegetables in the market is primarily due to the seasonal based cropping and natural condition which influence the supply and demand ratio in the market. As far as the net profit is concerned, the farmers get the maximum return from Cauliflower cultivation (Rs. 1,38,600/acre) followed by the cultivation of Cabbage (Rs. 1,28,000/acre), Pointed Gourd (Rs. 1,00,000/acre) and Ridge Gourd (Rs. 95,670/acre), respectively (Table 14.3).

The results from the present analysis indicates that majority of the farmers (95%) (454 out of the total 480 number of interviewed farmers) utilize the method of inorganic framing for growing their crops.

On the other hand, the organic crops (Kundu & Mandal, 2020; Singh, 2023) are cultivated by only 5% farmers (26 out of the total 480 number of interviewed farmers). Though organic farming is the healthy way of farming to improve the soil fertility and the product is healthier for consumption, however, the farmers are hesitating in organic farming due to high input cost, law yields and the lack of proper knowledge and adequate information.

By using the Garrett's table (Agarwal & Banerjee, 2019, Dhanavandan, 2016; Ao & Jamir. 2020), the percent position is converted into Garrett's values (see Table 14.5). Following the Garrett's ranking technique, Table 14.6 has been constructed. The results presented in the table reveal that 'Elevated labour cost' is in the highest rank with the highest Garret score and an average value of 31,136,64.86 followed by 'Inadequate water supply' (with the average value of 30,428;63.45), 'Financial hardship'(with the average value of 29,772;61.92), 'Ignorant of diseases and pests'(with the average value of 26,574;55.36), and 'Pricy high quality seeds' (with the average value of 23,601;49.17).'Deficit in technical guidance' is ranked at the last position by the farmers (with the average value of 22,787; 47.47).

13.5 Conclusion:

Vegetable farming in the Murshidabad district of West Bengal holds a considerable importance within the local agricultural context. The investigation into input costs and returns for ten widely cultivated vegetable crops underscores the significance of this sector for the farmers of this region. Imparting proper training and dissemination of scientific knowledge is essential for the farmers to facilitate them to shift from inorganic to organic farming for management of soil and healthy products for the safety of the consumers. Vegetable farming in this district encounters various constrains including elevated labour cost, inadequate water supply, financial hardship, ignorant of diseases and pests, pricy high-quality seeds and deficit in technical guidance etc. Focused interventions play a critical role in enhancing and maintaining the sustainability of vegetable farming within the study area. Further research and support for sustainable practices could potentially enhance the productivity and profitability of vegetable faming in Murshidabad district.

13.6 Acknowledgements:

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