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Economic analysis of green pea production in Ahilyanagar district of Maharashtra

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Abstract

The present study entitled “Economics of Production and Marketing of Green Pea (*Pisum sativum* L.) in Ahilyanagar District of Maharashtra” was undertaken to examine the cost and returns of green pea cultivation in Ahilyanagar district of Maharashtra. Green pea is an important vegetable crop providing substantial income to farmers due to its short duration, high market demand and favourable returns. The study was conducted in Parner and Sangamner tehsils of Ahilyanagar district. Primary data were collected from 90 selected green pea growers for the agricultural year 2024-25 through personal interviews using a pre-tested schedule. The collected data were analysed using standard cost concepts to estimate the cost of cultivation, gross income, net returns and B:C ratio.

The results revealed that the overall Cost ‘C’ of green pea cultivation was ₹1,70,113.78 per hectare. The average productivity was 48.74 quintals per hectare, while the gross income was estimated at ₹2,62,811.18 per hectare. The B:C ratio at Cost ‘C’ was 1.54, indicating the economic viability and profitability of green pea cultivation in the study area. The analysis further showed variation in the cost and returns across different farm-size groups. The Cost ‘C’ was estimated at ₹1,74,301.53 per hectare for small farms, ₹1,68,919.57 per hectare for medium farms and ₹1,67,120.26 per hectare for large farms. The corresponding gross incomes were ₹2,70,240.38, ₹2,65,066.37 and ₹2,53,126.79 per hectare, respectively. The B:C ratios at Cost ‘C’ were 1.55 for small farms, 1.57 for medium farms and 1.51 for large farms. The results indicate that green pea cultivation was economically profitable across all farm-size groups, with medium farms recording the highest B:C ratio. Overall, the study confirms that green pea cultivation has good potential as a remunerative and economically viable crop enterprise in Ahilyanagar district of Maharashtra.

Keywords: Green pea, cost of cultivation, cost and returns, gross income, net returns, b:c ratio

Introduction

Green pea (*Pisum sativum* L.) belongs to the family Leguminosae (Fabaceae) and has a chromosome number of $2n = 14$. It is believed to have originated in the Mediterranean region and is an important leguminous crop cultivated worldwide for its nutritional and economic value. Pea is also renowned for its genetic significance due to the pioneering work of Gregor Mendel, which laid the foundation of modern genetics. The crop has been cultivated for centuries in temperate regions and has adapted well to diverse climatic conditions. In India, pea is grown as a winter crop in the plains of North India and as a summer crop in the hilly regions, with Uttar Pradesh and Bihar being the leading producers. Its short duration and suitability for multiple cropping systems make it an important crop for crop diversification. Field pea is an important nutritional and economically valuable crop, particularly for low-income populations. It is popularly regarded as “poor man’s meat” because of its affordable source of protein, vitamins, minerals, and prebiotic carbohydrates. (Amarakoon *et al*, 2012). Green pea seeds are rich in bioactive compounds such as flavonoids, phenolic acids, and saponins, which contribute to their therapeutic potential. These compounds possess antioxidant, anti-inflammatory, and anticancer properties, making green pea an important functional food. Pea consumption is also associated with improved digestive health and a reduced risk of cardiovascular diseases. Regular consumption of peas may contribute to the prevention of chronic diseases and improvement of overall health

(Rungruangmaitree and Jiraungkoorskul, 2017) ^[6]. Furthermore, pea pods obtained from mature fresh green peas are rich sources of dietary fibre, protein, and calcium and possess higher nutritional value than broad bean and okra pods. The incorporation of 20% pea pod powder into biscuits has also been reported to produce highly acceptable products in terms of consumer preference (Garg, 2015) ^[4]. Pea plants possess a strong and well-developed taproot system, while the majority of their finer roots remain concentrated in the upper layers of the soil (Dhillon *et al.*, 2022) ^[3]. These roots establish a symbiotic association with beneficial soil bacteria, particularly *Rhizobium leguminosarum*, resulting in the formation of root nodules. These nodules facilitate biological nitrogen fixation by converting atmospheric nitrogen into forms that can be utilized by the plant, thereby supporting plant growth and contributing to improved soil fertility. To ensure effective nodulation and nitrogen fixation, pea seeds are generally treated with *Rhizobium leguminosarum* before sowing, or the inoculant is applied directly to the soil. Root nodules generally begin to develop within two weeks after plant establishment. Effective nodulation is important for maintaining healthy plant growth, whereas inadequate nodulation may result in symptoms such as pale green or yellow leaves and stunted growth (Sharma *et al.*, 2025). India's pea production increased from 5,848.00 thousand MT in 2020 to 6,670.60 thousand MT in 2024, while its contribution to global pea production increased from 28.71 to 30.69 per cent (APEDA, 2024). The increasing production and market importance of the crop highlight its potential as a remunerative agricultural enterprise. However, the profitability of green pea cultivation depends largely on efficient utilization of production resources and effective management of cultivation costs. Therefore, farm-level economic analysis is essential to assess the cost

structure, returns and profitability of green pea cultivation. In this context, the present study was undertaken in Ahilyanagar district of Maharashtra to analyse the cost of cultivation, returns, profitability and input-use pattern of green pea across different farm-size groups.

Methodology

The study was undertaken to assess the production of green pea in Ahilyanagar district using both primary and secondary sources of information. Primary data for the Kharif season 2025-26 were collected from selected green pea growers through personal interviews using a structured questionnaire. The information covered farmers' general characteristics, input utilization, cost of cultivation, and major constraints related to production. Ahilyanagar district was purposively selected considering its significant contribution to green pea cultivation and production in Maharashtra. Among the tehsils, Parner and Sangamner were selected purposively owing to their larger area under green pea cultivation.

Village-wise information on the area under green pea cultivation was obtained from the concerned Tehsil Agriculture Officers, and three villages from each selected tehsil were selected based on the cultivated area. Accordingly, Parner, Kanhur Pathar and Karandi from Parner tehsil, and Malegaon Pathar, Sarole Pathar and Nandur Khandarmal from Sangamner tehsil were selected. Farmers were randomly selected and classified according to the area under green pea cultivation into small (below 0.20 ha), medium (0.21-0.40 ha), and large (above 0.41 ha) farm-size groups. Five farmers

from each farm-size group were selected from each village, resulting in 15 farmers per village and a total sample of 90 farmers.

Table 1: Distribution of Sample Green Pea farmers by Farm Size Group

Tehsil	Villages	Size group			
		Small (below 0.20ha)	Medium (0.21 to 0.40ha)	Large (above 0.41ha)	Total
Parner	Parner	5	5	5	15
	Kanhur Pathar	5	5	5	15
	Karandi	5	5	5	15
Sangamner	Malegoan Pathar	5	5	5	15
	Sarole Pathar	5	5	5	15
	Nandur Khandarmal	5	5	5	15
Total		30	30	30	90

The data collected from the sample farmers were analysed to estimate the cost of cultivation and production of green pea. The standard cost concepts, namely Cost A, Cost B and Cost C, were used along with simple statistical measures such as averages and percentages.

Cost A: Includes expenses on human labour and machinery labour, seed, manures and fertilizers, plant protection,

irrigation, depreciation, land revenue, interest on working capital, and other incidental charges.

Cost B: Includes Cost A plus the imputed rental value of owned land and interest on fixed capital.

Cost C: Includes Cost B plus the imputed value of family labour and represents the total cost of cultivation.

Results and discussion

Table 2: Cost of Cultivation of Green Pea (₹/ha)

Sr.No.	Items of Cost	Small			Medium			Large			Overall		
		Qty	Value	Percent	Qty	Value	Percent	Qty	Value	Percent	Qty	Value	Percent
1	Hired Human Labour (Man days)												
	a) Male	20.00	8000.00	4.59	18.76	7716.81	4.57	19.10	7639.26	4.56	19.29	7785.36	4.57
	b) Female	50.58	15173.08	8.71	48.58	14681.42	8.69	48.33	14498.67	8.66	49.16	14784.39	8.69
2	Bullock Power (Pair-days)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	Machine Power (Hours)	20.05	19638.17	11.27	18.60	18265.28	10.81	17.90	17890.12	10.69	18.85	18597.86	10.93
4	Seed (Kg)	56.54	16961.54	9.73	55.84	16752.21	9.92	55.81	16742.71	10.00	56.06	16818.82	9.88
5	Manures (Qtls.)	58.85	11769.23	6.75	60.09	12017.70	7.11	59.26	11851.46	7.08	59.40	11879.46	6.98
6	Fertilizers (Kg)												
	N	40.40	2397.53	1.38	44.24	2625.58	1.55	46.30	2747.65	1.64	43.64	2590.25	1.52
	P	77.75	5051.19	2.90	85.55	5558.33	3.29	83.62	5433.01	3.25	82.31	5347.51	3.14
	K	61.12	3151.82	1.81	73.13	3771.46	2.23	74.75	3855.00	2.30	69.67	3592.76	2.11
7	Irrigation Charges (₹)		1365.47	0.78		1376.05	0.81		1585.97	0.95		1442.49	0.85
8	Plant Protection Charges (₹)		5282.69	3.03		5375.49	3.18		5686.47	3.40		5448.22	3.20
9	Incidental Charges (₹)		1348.08	0.77		1389.56	0.82		1495.01	0.89		1410.88	0.83
10	Repairs (₹)		898.08	0.52		913.63	0.54		992.10	0.59		934.60	0.55
11	Working Capital (₹)		91036.87	52.23		90124.93	53.35		90417.42	54.03		90526.41	53.19
12	Interest on Working Capital @ 6% (₹)		5462.21	3.13		5407.50	3.20		5425.05	3.24		5431.58	3.19
13	Depreciation (₹)		1185.82	0.68		1491.47	0.88		1207.99	0.72		1295.09	0.76
14	Land Revenue and Taxes (₹)		135.00	0.08		135.12	0.08		135.00	0.08		135.04	0.08
	Cost 'A'		97819.90	56.12		97159.02	57.52		97185.46	58.07		97388.13	57.22
15	Rental Value of Land (₹)		44905.06	25.76		44042.61	26.07		42052.80	25.13		43666.82	25.66
16	Interest on Fixed Capital @ 10% (₹)		7576.56	4.35		5089.62	3.01		4996.06	2.99		5887.41	3.46
	Cost 'B'		150301.53	86.23		146291.25	86.60		144234.32	86.18		146942.36	86.34
17	Family Labour (Man-days)												
	a) Male	31.15	12461.54	7.15	29.56	11823.01	7.00	30.24	12095.49	7.23	30.32	12126.68	7.13
	b) Female	38.46	11538.46	6.62	36.02	10805.31	6.40	35.97	10790.45	6.45	36.82	11044.74	6.49
	Cost 'C'		174301.53	100.00		168919.57	100.00		167120.26	100.00		170113.78	100.00
18	Output (Qtls.) & Income (₹)	47.00	270240.38		48.80	265066.37		50.41	253126.79		48.74	262811.18	
19	Per Quintal Cost (₹)		3708.54			3461.47			3315.22			3495.08	

The cost of cultivation of green pea across different farm-size groups is presented in Table 2. At the overall level, the total cost of cultivation (Cost 'C') was ₹1,70,113.78 per hectare, while Cost 'A' and Cost 'B' were ₹97,388.13 (57.22%) and ₹1,46,942.36 (86.34%), respectively. Machine power constituted the highest operational expenditure at ₹18,597.86 (10.93%), followed by seed ₹16,818.82 (9.88%), hired female labour ₹14,784.39 (8.69%), farmyard manure ₹11,879.46 (6.98%) and hired male labour ₹7,785.36 (4.57%). Under Cost 'B', rental value of land was the major fixed cost component at ₹43,666.82 (25.66%), followed by interest on fixed capital at ₹5,887.41 (3.46%). The imputed value of family male and female labour was ₹12,126.68 (7.13%) and ₹11,044.74 (6.49%), respectively. The average yield was 48.74 q/ha, with gross returns of ₹2,62,811.18 per hectare and cost of production of ₹3,495.08 per quintal.

Farm-size-wise analysis showed that Cost 'C' was highest on small farms at ₹1,74,301.53 per hectare, followed by medium farms at ₹1,68,919.57 and large farms at ₹1,67,120.26. Cost 'A' was ₹97,819.90, ₹97,159.02 and ₹97,185.46, while Cost 'B' was ₹1,50,301.53, ₹1,46,291.25 and ₹1,44,234.32 for small, medium and large farms,

respectively. Machine power, seed, hired female labour and farmyard manure were the major operational cost components across all farm-size groups. Rental value of land and interest on fixed capital were the principal fixed cost components. The declining cost of cultivation with increasing farm size indicates economies of scale, as larger farms could utilize production resources more efficiently and spread fixed costs over a larger operational area.

The cost structure was also influenced by the input-use pattern of the sample farmers. Seed and farmyard manure were used below the recommended levels, whereas chemical fertilizers, particularly nitrogen, were applied in excess of recommended doses. Higher expenditure on chemical fertilizers, machine power, hired labour and plant protection inputs contributed to the overall cost of cultivation. The relatively lower use of farmyard manure may be attributed to its bulky nature, limited availability and higher transportation and handling costs. Overall, the findings suggest that improving input-use efficiency and adopting balanced input application could help reduce the cost of production and improve the economic efficiency of green pea cultivation.

Table 3: Resource Utilization Pattern in Green Pea Cultivation (Per hectare)

Sr. No.	Particulars	Unit	Small	Medium	Large	Overall
1	Human Labour	Days				
a	Male		51.15	48.32	49.34	49.60
b	Female		89.04	84.60	84.30	85.98
2	Machine	Hours	20.05	18.60	17.90	18.85
3	Seed	kg	56.54	55.84	55.81	56.06
4	Manures	Qtls.	58.85	60.09	59.26	59.40
5	Fertilizers	kg				
a	N		40.40	44.24	46.30	43.64
b	P		77.75	85.55	83.62	82.31
c	K		61.12	73.13	74.75	69.67
6	Irrigation Charges	₹	1365.47	1376.05	1585.97	1442.49
7	Plant Protection Charges	₹	5282.69	5375.49	5686.47	5448.22

The details regarding resource utilization in green pea cultivation are presented in Table 3. Overall, the crop required 135.58 man-days of human labour per hectare, including 49.60 male and 85.98 female labour days. Machine power use was 18.85 hours/ha, while seed and FYM use were 56.06 kg and 59.40 q/ha, respectively. The average application of N, P and K was 43.64, 82.31 and 69.67 kg/ha, with irrigation and plant protection expenditure of ₹1,442.49 and ₹5,448.22 per hectare, respectively.

Farm-size-wise, human labour and machine power use were highest on small farms at 140.19 man-days and 20.05 hours per hectare, respectively. Seed and FYM use remained fairly uniform across farm-size groups. Large farms recorded the

highest use of N (46.30 kg/ha), K (74.75 kg/ha), irrigation (₹1,585.97/ha) and plant protection (₹5,686.47/ha), while P use was highest on medium farms (85.55 kg/ha).

As per Krushidarshni (MPKV, Rahuri, 2024), the recommended seed rate, FYM and NPK doses are 70-80 kg, 15-20 tonnes and 25:60:60 kg per hectare, respectively. Compared with the minimum recommended levels, seed and FYM use were lower by 19.91 and 60.40 per cent, respectively, whereas N, P and K application exceeded the recommended levels by 74.56, 37.18 and 16.12 per cent. This indicates underuse of seed and FYM and relatively higher dependence on chemical fertilizers among the sample farmers.

Table 4: Costs and Returns from Green Pea Cultivation (₹/ha)

Sr. No.	Particulars	Unit	Small	Medium	Large	Overall
1	Total Cost					
	i) Cost 'A'	₹	97,819.90	97,159.02	97,185.46	97,388.13
	ii) Cost 'B'	₹	150,301.53	146,291.25	144,234.32	146,942.36
	iii) Cost 'C'	₹	174,301.53	168,919.57	167,120.26	170,113.78
2	Profit at					
	i) Cost 'A'	₹	172,420.48	167,907.35	155,941.33	165,423.05
	ii) Cost 'B'	₹	119,938.85	118,775.12	108,892.47	115,868.82
	iii) Cost 'C'	₹	95,938.85	96,146.80	86,006.53	92,697.40
3	Production	Qtls	47.00	48.80	50.41	48.74
4	Gross Income	₹	270,240.38	265,066.37	253,126.79	262,811.18
5	Benefit-Cost Ratio					
	i) Cost 'A'		2.76	2.73	2.60	2.70
	ii) Cost 'B'		1.80	1.81	1.75	1.79
	iii) Cost 'C'		1.55	1.57	1.51	1.54

The costs and returns from green pea cultivation are presented in Table 4. At the overall level, Cost 'A', Cost 'B' and Cost 'C' were ₹97,388.13, ₹1,46,942.36 and ₹1,70,113.78 per hectare, respectively. Gross income was ₹2,62,811.18 per hectare, with returns over Cost 'A', Cost 'B' and Cost 'C' of ₹1,65,423.05, ₹1,15,868.82 and ₹92,697.40, respectively. The average production was 48.74 q/ha, indicating that green pea cultivation was a profitable enterprise in the study area.

Among the farm-size groups, small farms recorded the highest gross income (₹2,70,240.38/ha) and returns over Cost 'A' (₹1,72,420.48) and Cost 'B' (₹1,19,938.85).

However, medium farms recorded the highest return over Cost 'C' (₹96,146.80/ha), followed by small farms (₹95,938.85) and large farms (₹86,006.53). The B:C ratio over Cost 'C' was 1.55, 1.57 and 1.51 for small, medium and large farms, respectively, with an overall ratio of 1.54. Thus, medium farms showed relatively better profitability after accounting for total cultivation costs.

Overall, the B:C ratio of 1.54 indicated that every ₹1.00 invested in green pea cultivation generated ₹1.54 in gross returns. The positive net return of ₹92,697.40 per hectare further confirmed the economic viability of the crop. The findings were broadly in agreement with Pandey (2018)^[5], Singh *et al.* (2020)^[7], and Tripathi *et al.* (2015)^[8], who also reported the profitability of green pea cultivation and the importance of efficient resource use and improved production practices in enhancing farm returns.

conclusion

The present study on the economics of production and marketing of green pea in Ahilyanagar district revealed that green pea cultivation was economically viable under the prevailing production conditions. The overall Cost 'C' was ₹1,70,113.78 per hectare against a gross income of ₹2,62,811.18, with an average productivity of 48.74 q/ha and a B ratio of 1.54. The cost of cultivation declined from ₹1,74,301.53 per hectare on small farms to ₹1,67,120.26 on

large farms, indicating economies of scale. Medium farms recorded the highest return over Cost 'C' (₹96,146.80/ha) and B ratio (1.57). Resource-use analysis showed that green pea cultivation was labour-intensive, while seed and FYM were used below recommended levels and some fertilizers were applied in excess. The study suggests that efficient resource use, balanced fertilizer application and optimum use of seed and FYM can reduce production costs and improve profitability. Timely input availability and adoption of improved production practices can further enhance the economic performance of green pea cultivation. Overall, green pea has good income potential and can be promoted as a remunerative crop in Ahilyanagar district.

Policy suggestions

1. **Balanced Use of Production Inputs**

Efficient and balanced use of production inputs should be encouraged among green pea growers, particularly through optimum use of seed, FYM and chemical fertilizers. Balanced nutrient management and timely application of inputs can help reduce the cost of cultivation and improve productivity and farm profitability.

2. **Labour and mechanization management**

Mechanization and labour management should be improved to address the high cost and seasonal shortage of labour. Timely availability of labour and machinery, along with improved production practices and better irrigation management, can enhance resource-use efficiency and strengthen the economic viability of green pea cultivation.

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