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Adiba F Khan
PG Scholar, Agricultural
Economics and Statistics
Section, College of Agriculture,
Nagpur, Maharashtra, India

Sunita N Suryawanshi
Assistant Professor,
Agricultural Economics and
Statistics Section, College of
Agriculture, Nagpur,
Maharashtra, India

MS More
Assistant Professor,
Agricultural Economics and
Statistics Section, College of
Agriculture, Nagpur,
Maharashtra, India

Harsha S Mendhe
Assistant Professor,
Agricultural Extension
Education section, College of
Agriculture, Nagpur,
Maharashtra, India

Shalini A Badge
Associate Professor,
Horticulture Section, College of
Agriculture, Nagpur,
Maharashtra, India

Sejal C Somkuwar
PG Scholar, Agricultural
Economics and Statistics
Section, College of Agriculture,
Nagpur, Maharashtra, India

Pratiksha R Rothe
PG Scholar, Agricultural
Economics and Statistics
Section, College of Agriculture,
Nagpur, Maharashtra, India

Corresponding Author:
Adiba F Khan
PG Scholar, Agricultural
Economics and Statistics
Section, College of Agriculture,
Nagpur, Maharashtra, India

Economics of selected summer leafy vegetables in Nagpur district of Maharashtra state

Adiba F Khan, Sunita N Suryawanshi, MS More, Harsha S Mendhe, Shalini A Badge, Sejal C Somkuwar and Pratiksha R Rothe

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Abstract

The present study was undertaken to work out the economics of selected summer leafy in Nagpur district of Maharashtra state. The study was based on primary data collected from 120 farmers during the summer season of 2025-26 through personal interview method using pre-tested schedules. The study focused on three major summer leafy vegetables i.e. fenugreek, spinach and amaranthus. Cost and returns of fenugreek, spinach and amaranthus were estimated using standard cost concepts. It is observed from the study was that the per hectare cost of cultivation at cost C₃ was Rs. 55,157.38, Rs. 53,417.87 and Rs. 68,298.72 for fenugreek, spinach and amaranthus respectively. The per hectare net returns at Cost C₃ were Rs. 63,429.87, Rs. 48,007.93 and Rs. 1,04,131.28 per hectare, with B:C ratios of 2.14, 1.90 and 2.52 in fenugreek, spinach and amaranthus, respectively. The study further revealed that non-availability of labour on time was the major production constraint for fenugreek (82.33 per cent), spinach (85.00 per cent) and amaranthus (85.00 per cent) had rank I. In the marketing of selected summer leafy vegetables high transportation cost was the major constraint for fenugreek (85.00 per cent) and spinach (82.50 per cent), whereas not getting a remunerative market was the major marketing constraint for amaranthus (87.50 per cent). The results indicate that all three crops were economically profitable, while amaranthus recorded the highest net returns and B:C ratio at cost C₃.

Keywords: Summer leafy vegetables, fenugreek, spinach, amaranthus, cost and returns, constraints

Introduction

Vegetables are an essential component of a balanced diet and play an important role in food and nutritional security. Leafy vegetables are particularly valued because they are rich sources of vitamins, minerals, dietary fibre and other beneficial nutrients. Summer leafy vegetables such as spinach, fenugreek and amaranthus are important because of their short duration, quick growth, regular market demand and capacity to generate cash income within a comparatively short period. Their cultivation also provides employment opportunities, particularly through repeated harvesting, sorting, bundling and marketing operations. Maharashtra is one of the important vegetable-producing states of India. In 2024-25 the area under leafy vegetables was about 1,245.94 thousand hectares, with production of about 17,227.04 million tonnes and productivity of 13.826 MT/ha (2nd Advance Estimates, Ministry of Agriculture and Farmers Welfare, Govt. Of India, 2024-25). Nagpur district has favourable climatic and soil conditions and market access that support summer vegetable cultivation. During 2024-25, the total area under summer cultivation in Nagpur district was 4,794.10 hectares, out of which 2,569.00 hectares were under summer vegetables and 134.00 hectares (SAO Office, Nagpur) were under summer leafy vegetables. Summer leafy vegetable cultivation is important to the agricultural economy of Nagpur district because it provides farmers with a quick and regular source of income. With the following objectives, to work out the cost and returns of selected leafy vegetables and to identify the constraints faced by the farmers in production and marketing of leafy vegetables

Material and Methods

The present study was undertaken in Nagpur district of Vidarbha region considering the concentration of summer leafy vegetable cultivation. The study focused on three major summer leafy vegetables i.e. fenugreek, spinach and amaranthus. Nagpur district was

purposely selected and data pertaining to the summer season of 2025-26 were considered. Three tehsils i.e. Hingna, Saoner and Kalmeshwar, were selected from each tehsil four villages and each village ten farmers were selected. Thus, the total 120 farmers were selected. Primary data were collected from the selected farmers through personal interview method using a pre-tested schedules. Information on input utilization, cost and returns and constraints were collected for the summer season of 2025-26.

Analytical Tools and Techniques

For cost and returns, standard cost concepts Cost A₁, A₂, B₁, B₂, C₁, C₂ and C₃ were used. Gross returns were obtained from output and prevailing rate. Net returns were estimated by deducting the respective cost from gross returns. Benefit-cost ratio was calculated as gross returns divided by the corresponding cost.

Net returns

Net returns was computed at different costs i.e. cost A₁, cost A₂, cost B₁, cost B₂, cost C₁, cost C₂ and cost C₃ by deducting respective costs from the gross returns.

Net returns at A₁ = Gross returns - Cost 'A₁'
 Net returns at A₂ = Gross returns - Cost 'A₂'
 Net returns at B₁ = Gross returns - Cost 'B₁'
 Net returns at B₂ = Gross returns - Cost 'B₂'
 Net returns at C₁ = Gross returns - Cost 'C₁'
 Net returns at C₂ = Gross returns - Cost 'C₂'
 Net returns at C₃ = Gross returns - Cost 'C₃'

Benefit-cost ratio

It is a ratio between the value of gross returns and the cost of cultivation at different cost concepts. It was worked out by dividing gross returns by the total cost. It was calculated at cost A₁, cost A₂, cost B₁, cost B₂, cost C₁, cost C₂ and cost C₃.

$$\text{Benefit-cost ratio} = \frac{\text{Gross returns}}{\text{Respective cost}}$$

The constraints faced by the summer leafy vegetables farmers in production and marketing were achieved by percentage analysis.

Results and Discussion

Table 1: Per hectare cost of cultivation of fenugreek (Rs./ha)

Sr. No.	Particulars		Unit	Input/Ha	Rate / unit of inputs (Rs.)	Total cost per hectare (Rs.)	Per cent to total Cost "C3"
1	2		3	4	5	6	7
1	Hired human labour	a) Male	Days	7.12	403.12	2870.21	5.20
		b) Female	Days	14.70	312.06	4587.28	8.32
	Sub-total		Days	21.82		7457.50	13.52
2	Machine charges (Hired)		Hours	4.00	930.12	3720.48	6.75
3	Seed		Kg.	39.24	127.22	4992.11	9.05
4	FYM		Qtl	8.60	250.00	2150.00	3.90
5	Fertilizer:Urea (N)		Kg	43.78	6.18	270.56	0.49
6	Irrigation charges		Rs.			639.00	1.16
7	Plant protection (weedicide)		Rs.			625.45	1.13
8	Incidental charges		Rs.			186.98	0.34
9	Repairing charges		Rs.			176.55	0.32
10	Working capital (1 to 09)		Rs.			20218.63	36.66
11	Interest on working capital @ 6 per cent / annum		Rs.			202.18	0.37
12	Depreciation charges		Rs.			372.12	0.67
13	Land revenue		Rs.			43.97	0.08
14	Cost "A1" (10 to 13)					20836.90	37.78
15	Rental value of leased land					0.00	0.00
16	Cost "A2" (14 +15)					20836.90	37.78
17	Interest on fixed capital @ 10 per cent					2475.32	4.49
18	Cost "B1" (16 +17)					23312.22	42.26
19	Rental value of owned land (Rs.)					19820.57	35.93
20	Cost "B2" (18+19)					43132.79	78.20
21	Imputed value of family labours	a) Male	Days	8.72	403.12	3515.21	6.37
		b) Female	Days	11.20	312.06	3495.07	6.34
	Sub-total		Days	19.92		7010.28	12.17
22	Cost "C1" (18 + 21)		Rs.			30322.50	54.97
23	Cost "C2" (20 + 21)		Rs.			50143.07	90.91
24	Supervision charges @ 10 per cent of cost C2					5014.31	9.09
25	Cost "C3"					55157.38	100.00
26	Yield per hectare		Qtl.	59.15	2015.00	119187.25	
27	Gross value of produce		Rs.			119187.25	
28	Per quintal cost of production		Rs.		932.50		

Table 1 revealed that per hectare cost of cultivation of fenugreek was Rs. 55157.38 at the total cost i.e. cost C₃. The share of major item i.e. working capital was 36.66 per cent followed by rental value of land 35.93 per cent, hired human labour 13.52 per cent, in the total i.e. cost C₃, respectively.

The per cent share of Cost A₂ and Cost B₂ were 37.38 per cent and 78.20 per cent respectively in total cost. The per hectare yield was obtained 59.15 quintal and gross returns was Rs. 119187.25. The per quintal cost of production was Rs. 932.50. The results obtained are closely related to the

findings of Wankhede *et al* (2024), they observed that the tomato respectively. BC ratio was 1.66, 1.70, 1.53 in fenugreek, spinach and

Table 2: Per hectare cost of cultivation of spinach (Rs./ha)

Sr. No.	Particulars		Unit	Input/Ha	Rate / unit of inputs (Rs.)	Total cost per hectare (Rs.)	Per cent to total Cost „C3”
1	2		3	4	5	6	7
1	Hired human labour	a) Male	Days	11.34	407.13	4616.58	8.64
		b) Female	Days	18.22	300.13	5468.37	10.24
	Sub-total		Days	29.56		10085.22	18.88
2	Machine charges (Hired)		Hours	4.25	952.13	4046.55	7.58
3	Seed		Kg.	38.26	133.12	5093.17	9.53
4	FYM		Qtl.	8.22	250.00	2055.00	3.85
5	Fertilizer:Urea (N)		Kg	38.78	6.12	237.33	0.44
6	Irrigation charges		Rs.			732.00	1.37
7	Plant protection (weedicide)		Rs.			790.00	1.48
8	Incidental charges		Rs.			135.73	0.25
9	Repairing charges		Rs.			230.80	0.43
10	Working capital (1 to 09)		Rs.			23405.81	43.82
11	Interest on working capital @ 6 per cent /annum		Rs.			234.06	0.44
12	Depreciation charges		Rs.			430.00	0.80
13	Land revenue		Rs.			42.00	0.08
14	Cost “A ₁ ” (10 to 13)		Rs.			24111.87	45.14
15	Rental value of leased land					0.00	0.00
16	Cost “A ₂ ” (14 +15)					24111.87	45.14
17	Interest on fixed capital @ 10 per cent					1177.30	2.20
18	Cost “B ₁ ” (16 +17)					25289.17	47.34
19	Rental value of owned land (Rs.)					16862.30	31.57
20	Cost “B ₂ ” (18+19)					42151.47	78.91
21	Imputed value of family labour	a) Male	Days	9.70	407.13	3949.16	7.39
		b) Female	Days	8.20	300.13	2461.07	4.61
	Sub-total		Days	17.90		6410.23	10.00
22	Cost “C ₁ ” (18 + 21)		Rs.			31699.40	59.34
23	Cost “C ₂ ” (20 + 21)		Rs.			48561.70	90.91
24	Supervision charges @ 10 per cent of cost C ₂					4856.17	9.09
25	Cost C ₃					53417.87	100.00
26	Yield per hectare		Qtl	82.46	1230.00	101425.80	
27	Gross value of produce		Rs.			101425.80	
28	Per quintal cost of production		Rs.		647.80		

Table 2 revealed that per hectare cost of cultivation of spinach was Rs. 53417.87 at the total cost i.e. cost C₃. The major item contributed to cost C₃ was rental value of owned land i.e. 31.57 per cent, hired human labour 18.88 per cent share to cost C₃, respectively. The per cent share of Cost A₂ and Cost B₂ were 45.14 per cent and 78.91 per cent

respectively in total cost. The per hectare yield was 82.46 quintal and gross return obtained was Rs. 101425.80. The per quintal cost of production was Rs. 647.80. Similar results are closely related to the findings of Garde *et al.* (2019), they observed that the BC ratio was 2.15, 1.69, 2.00 in fenugreek, amaranthus and coriander respectively.

Table 3: Per hectare cost of cultivation of amaranthus (Rs /ha)

Sr. No.	Particulars		Unit	Input/Ha	Rate / unit of inputs (Rs.)	Total cost per hectare (Rs.)	Per cent to total Cost “C3”
1	2		3	4	5	6	7
1	Hired human labour	a) Male	Days	12.23	410.23	5017.11	7.35
		b) Female	Days	14.83	322.19	4778.08	7.00
	Sub-total		Days	27.06		9795.19	14.34
2	Machine charges (Hired)		Hours	4.00	970.00	3880.00	5.68
3	Seed		Kg.	30.12	135.23	4073.13	5.96
4	FYM		Qtl	13.22	250.00	3305.00	4.84
5	Fertilizer:Urea (N)		Kg	45.16	6.85	309.35	0.45
6	Irrigation charges		Rs.			922.13	1.35
7	Plant protection (weedicide)		Rs.			968.22	1.42
8	Incidental charges		Rs.			272.89	0.40
9	Repairing charges		Rs.			322.12	0.47
10	Working capital (1 to 09)		Rs.			23848.02	34.92
11	Interest on working capital @ 6 per cent /annum					238.48	0.35

12	Depreciation charges	Rs.			480.18	0.70
13	Land revenue	Rs.			49.35	0.07
14	Cost "A ₁ " (10 to 13)				24616.03	36.04
15	Rental value of leased land				0.00	0.00
16	Cost "A ₂ " (14 +15)				24616.03	36.04
17	Interest on fixed capital @ 10 per cent				2573.88	3.77
18	Cost "B ₁ " (16 +17)				27189.91	39.81
19	Rental value of owned land (Rs.)				28688.98	42.01
20	Cost "B ₂ " (18+19)				55878.90	81.82
21	Family human labour	a) Male	Days	6.32	410.23	3.80
		b) Female	Days	11.23	322.19	5.30
	Sub-total	Days		17.55		9.10
22	Cost "C ₁ " (18 + 21) Rs.				33400.76	48.90
23	Cost "C ₂ " (20 + 21) Rs.				62089.74	90.91
24	Supervision charges @ 10 per cent of cost C ₂				6208.97	9.09
25	Cost "C ₃ "				68298.72	100.00
26	Yield per hectare	Qtl.	80.20	2150.00	172430.00	
27	Gross value of produce	Rs.			172430.00	
28	Per quintal cost of production	Rs.		851.60		

It is observed from the Table 3 the per hectare cost of cultivation of amaranthus crop was Rs. 68298.72 at cost C₃. The major item was Rental value of own land i.e. 42.01 per cent contributed in the total cost followed by working capital 34.92 per cent, hired human labour 14.34 per cent and family human labour 9.10 per cent, seed 5.96 per cent and hired machine charges 5.68 per cent shares to the cost C₃, respectively. The per cent share of Cost A₂ and Cost B₂

were 36.04 per cent and 81.82 per cent respectively in total cost. The per hectare yield was 80.20 quintal and gross returns obtained was Rs. 172430.00. The per quintal cost of production was 851.60. The results obtained are closely related to the findings of Jahan *et al* (2024), they observed that the BC ratio of brinjal is 1.82, tomato 1.96, bottle guard 1.98 respectively.

Table 4: Economics of the selected summer leafy vegetables

Sr. No	Particulars	Fenugreek	Spinach	Amaranthus
1	Yield (Qtls.)	59.15	82.46	80.20
2	Rate per quintal (Rs.)	2015.00	1230.00	2150.00
3	Gross value of produce (Rs.)	119187.25	101425.80	172430.00
4	Cost of cultivation at (Rs.)			
	a) Cost "A ₁ "	20836.90	24111.87	24616.03
	b) Cost "A ₂ "	20836.90	24111.87	24616.03
	c) Cost "B ₁ "	23312.22	25289.17	27189.91
	d) Cost "B ₂ "	43132.79	42151.47	55878.90
	e) Cost "C ₁ "	30322.50	31699.40	33400.76
	f) Cost "C ₂ "	50143.07	48561.70	62089.74
	g) Cost "C ₃ "	55157.38	53417.87	68298.72
5	Net returns at (Rs.)			
	a) Cost "A ₁ "	98350.35	77313.93	147813.97
	b) Cost "A ₂ "	98350.35	77313.93	147813.97
	c) Cost "B ₁ "	95875.03	76136.63	145240.09
	d) Cost "B ₂ "	76054.46	59274.33	116551.10
	e) Cost "C ₁ "	88864.75	69726.40	139029.24
	f) Cost "C ₂ "	69044.18	52864.10	110340.26
	g) Cost "C ₃ "	63429.87	48007.93	104131.28
6	Benefit Cost ratio at			
	a) Cost "A ₁ "	5.72	4.21	7.00
	b) Cost "A ₂ "	5.72	4.21	7.00
	c) Cost "B ₁ "	5.11	3.06	6.34
	d) Cost "B ₂ "	2.76	2.41	3.09
	e) Cost "C ₁ "	3.93	3.20	5.16
	f) Cost "C ₂ "	2.38	2.09	2.78
	g) Cost "C ₃ "	2.14	1.90	2.52

It was observed from Table 4. that fenugreek recorded a yield of 59.15 quintals per hectare with a gross value of Rs. 1,19,187.25 per hectare. The Cost C₃ was Rs. 55,157.38 per hectare, while net returns over Cost C₃ were Rs. 63,429.87 and the B:C ratio at Cost C₃ was 2.14. Spinach recorded the

highest physical yield of 82.46 quintals per hectare among the three crops. Its gross value was Rs. 1,01,425.80 per hectare, Cost C₃ was Rs. 53,417.87 and net returns over Cost C₃ were Rs. 48,007.93. The B:C ratio at Cost C₃ was 1.90, indicating that spinach cultivation was also

economically profitable. Amaranthus recorded the highest gross value of produce at Rs. 1,72,430.00 per hectare and the highest net returns over Cost C₃ at Rs. 1,04,131.28. Its Cost C₃ was Rs. 68,298.72 and B:C ratio at Cost C₃ was 2.52. Thus, among the selected crops amaranthus showed

the highest profitable. The results obtained are closely related to the findings of Paudel *et al* (2021), they observed that BC ratio of cauliflower was 4.64, brinjal 3.42 and chilli 4.48 respectively.

Table 5: Constraints faced by farmers in production of selected leafy vegetables

Sr. No	Constraints	Selected summer leafy vegetables					
		Fenugreek (N = 40)	Rank	Spinach (N = 40)	Rank	Amaranthus (N = 40)	Rank
1	High cost of seeds	26 (65.00)	III	31 (77.50)	II	25 (62.50)	III
2	Non availability of labours on time	33 (82.33)	I	35 (85.00)	I	34 (85.00)	I
3	Irregular electricity supply for irrigation	29 (72.50)	II	25 (62.50)	IV	27 (67.50)	II
4	High cost of plant protection (weedicide)	23 (57.50)	IV	27 (67.50)	III	23 (57.50)	IV

The Table 5 revealed that non-availability of labour on time was the major production constraint in all three crops. It was reported by 82.33 per cent of fenugreek, 85.00 per cent of spinach and 85.00 per cent of amaranthus farmers and ranked first. High cost of seeds ranked third in fenugreek 65.00 per cent and amaranthus 62.50 per cent, while it

ranked second in spinach 77.50 per cent. Irregular electricity supply for irrigation ranked second in fenugreek 72.50 per cent and amaranthus 67.50 per cent, but fourth in spinach 62.50 per cent. High cost of plant protection ranked fourth in fenugreek 57.50 per cent and amaranthus 57.50 per cent, while it ranked third in spinach 67.50 per cent.

Table 6: Constraints faced by farmers in marketing of selected leafy vegetables

Sr. No	Constraints	Selected summer leafy vegetables					
		Fenugreek (N = 40)	Rank	Spinach (N = 40)	Rank	Amaranthus (N = 40)	Rank
1	High transportation cost	34 (85.00)	I	33 (82.50)	I	31 (77.50)	II
2	Poor storage facilities	28 (70.00)	II	19 (47.50)	IV	17 (42.50)	IV
3	Price fluctuations	21 (52.50)	III	27 (67.50)	III	27 (67.50)	III
4	Not getting the remunerative market.	15 (37.50)	IV	29 (72.50)	II	35 (87.50)	I

The Table 6 revealed that high transportation cost was the major marketing constraint for fenugreek and spinach, reported by 85.00 per cent and 82.50 per cent of farmers, respectively and ranked first. In amaranthus, it was reported by 77.50 per cent farmers and ranked second. Poor storage facilities ranked second in fenugreek 70.00 per cent, while it ranked fourth in spinach 47.50 per cent and amaranthus 42.50 per cent. Price fluctuations ranked third in all three crops, reported by 52.50 per cent of fenugreek and 67.50 per cent each of spinach and amaranthus farmers. Not getting a remunerative market ranked fourth in fenugreek 37.50 per cent, second in spinach 72.50 per cent and first in amaranthus 87.50 per cent. The results obtained are closely related to the findings of Kumar *et al* (2021), who studied constraints faced by the farmers in production and marketing of vegetables in Haryana.

Conclusion

The study revealed that summer leafy vegetable cultivation in Nagpur district was economically profitable. The Cost C₃ was Rs. 55,157.38 per hectare for fenugreek, Rs. 53,417.87 for spinach and Rs. 68,298.72 for amaranthus. The corresponding benefit-cost ratio at Cost C₃ was 2.14 for fenugreek, 1.90 for spinach and 2.52 for amaranthus, respectively. Amaranthus recorded the highest gross value of produce and net return at Cost C₃, while all three crops

had benefit-cost ratios greater than one. The major production constraints across all crops was non-availability of labour on time. High transportation cost was the leading marketing constraint for fenugreek and spinach, while lack of a remunerative market was the leading constraint for amaranthus.

The findings suggest that improving timely labour availability, ensuring reliable irrigation and electricity, reducing transportation costs, strengthening storage and encouraging direct marketing or farmer-group marketing can improve the economic performance of summer leafy vegetable farmers.

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