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Mitalee Sunil Bhalerao
Master Students Dr. Sharadchandra Pawar College of Agriculture Baramati, Maharashtra, India

Arati A Jambhale
Assistant Professor, Department of Agricultural Economics, Dr. Sharadchandra Pawar College of Agriculture Baramati, Maharashtra, India

Dr. Pallavi S Deokate
Assistant Professor, Department of Agricultural Economics, Dr. Sharadchandra Pawar College of Agriculture Baramati, Maharashtra, India

YL Jagdale
Professor, Subject Matter Specialist, Department of Horticulture, Dr. Sharadchandra Pawar College of Agriculture, Baramati, Maharashtra, India

Akshada S Kharat
Master Students Dr. Sharadchandra Pawar College of Agriculture Baramati, Maharashtra, India

Prasad R Akolkar
Master Students Dr. Sharadchandra Pawar College of Agriculture Baramati, Maharashtra, India

Corresponding Author:
Mitalee Sunil Bhalerao
Master Students Dr. Sharadchandra Pawar College of Agriculture Baramati, Maharashtra, India

An economic analysis of grafted and non-grafted brinjal production: A comparative study in Pune, Maharashtra

Mitalee Sunil Bhalerao, Arati A Jambhale, Pallavi S Deokate, YL Jagdale, Akshada S Kharat and Prasad R Akolkar

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Abstract
The present study aimed to compare the economic viability of grafted and non-grafted brinjal (*Solanum melongena L.*) cultivation in Pune district of Maharashtra. The study was based on primary data collected through a survey method for the agricultural year 2023-24. A total of 90 farmers (45 grafted and 45 non-grafted brinjal growers) were surveyed across nine villages in three tehsils Baramati, Daund, and Purandar. The cost of cultivation was estimated using standard cost concepts: Cost A, Cost B, and Cost C. The analysis revealed that although grafted brinjal cultivation involved a slightly lower total cost (₹7,86,794.21/ha) compared to non-grafted brinjal (₹7,96,732.23/ha), it produced a significantly higher yield of 1817.17 quintals/ha versus 1169.76 quintals/ha. This resulted in quite higher gross income for grafted brinjal (₹19, 15,271.15/ha) and net profit. The Benefit-Cost (B: C) ratio for grafted brinjal at Cost C was 2.43, notably higher than 1.54 for non-grafted brinjal, indicating superior profitability and return on investment. Grafted brinjal cultivation also showed better pest and disease resistance, reduced plant protection cost, and improved cost-efficiency per quintal. The findings support the adoption of grafted brinjal as a more productive, sustainable, and economically beneficial practice for farmers.

Keywords: Cost of cultivation, returns, profitability, cost A, cost B, cost C, Economic viability, Grafted brinjal, Non-grafted brinjal

Introduction
Brinjal is native of India. Brinjal or eggplant (*Solanum melongena* L.) is an important solanaceous crop of sub-tropics and tropics. The name brinjal is popular in Indian subcontinent and is derived from Arabic and Sanskrit whereas the name eggplant has been derived from the shape of the fruit of some varieties, which are white and resemble in shape to chicken eggs. It is also called aubergine (French word) in Europe. The brinjal is of much importance in the warm areas of far east, being grown extensively in India, Bangladesh, Pakistan, China and the Philippines. It is also popular in Egypt, France, Italy and United States. In India, it is one of the most common, popular and principal vegetable crop grown throughout the country except in higher altitudes. It is a versatile crop adapted indifferent agro-climatic regions and can be grown throughout the year. It is a perennial but grown commercially as an annual crop. A number of cultivars are grown in India, consumer preference being dependent upon fruit colour, size and shape.
Brinjal fruit (unripe) is primarily consumed as cooked vegetable in various ways and dried shoots are used as fuel in rural areas. It is low in calories and fats, contains mostly water, some protein, fiber and carbohydrates. It is a good source of minerals and vitamins and is rich in total water-soluble sugars, free reducing sugars, amide proteins among other nutrients. India is the world's second-largest producer of fruits and vegetables after China. The area under cultivation of vegetables and fruits is estimated at 10.86 million hectares and 9.6 million hectares respectively (APEDA, 2023). In India during 2022-23, Brinjal acreage was increased by 0.29 per cent to 6.77 lakh hectares (16.72 lakh acres) with 127.79 lakh tones production as compared to 127.65 lakh tones production from 6.75 lakh hectares (16.68 lakh acres) during the last year. (FAOSTAT,2022-23).

Materials and Methods:

The sample for the study necessary involved the selection of area i.e. district, tehsils, villages and growers. Pune district was purposively selected for the present study. There are fourteen tehsils in Pune district. Out of these three tehsils was selected i.e. 1) Baramati 2) Daund 3) Purandar for the present study on the basis of maximum area under grafted and non-grafted Brinjal. From each of the three selected tehsil three villages was selected where the maximum grafted and non-grafted brinjal growing area was concentrated. Totally nine villages was selected for study. Total 90 samples (45 sample of grafted brinjal grower and 45 sample of non-grafted brinjal grower) were selected for study.

Tools of Analysis

Estimation of Production Costs and Returns

The production costs and returns of grafted and non-grafted brinjal production were estimated on the basis of per hectare The standard cost concept were used and *viz.* cost 'A', cost 'B' and cost 'C' were worked out. The sample statistical tools *viz*. percentages and averages were used.

Cost A

Cost A is the real cost paid out by the cultivators in cash or kind. It approximates the actual expenses experienced by farmers. It includes the expenditure on seedlings, manures and fertilizers, hired human labour, machine labour, irrigation charges, land revenue, plant protection charges, micronutrient charges and interest on working capital and depreciation.

Cost B

It includes cost 'A' in addition with interest on fixed capital and rental value of land.

Cost C: It includes cost 'B' in addition with imputed value of family labour.

Result and Discussion

Cost of cultivation of grafted and non-grafted brinjal:

The cost of cultivation helps farmers decide whether to grow grafted or non-grafted brinjal. Every farmer wants to earn a good profit, so they can compare both methods and choose the one that gives better income.

Table 1: Per hectare cost of cultivation of grafted and non-grafted brinjal production: (₹/ha)

Sr. No	Cost item	Grafted brinjal farmers			Non-grafted brinjal farmers		
		Qty	Value	%	Qty	Value	%
1.	**Hired Human Labour (days)**						
	a) Male	73.44	36722.22	4.67	96.5	48250	7.03
	b)Female	250.46	75138.89	9.55	173.72	52116.67	7.59
	Total human labour	323.9	111861.11	14.22	270.22	100366.67	14.62
2	Machine (hrs.)	19.4	15527.4	1.97	19.5	15530.5	2.26
3	Manures(qtls)	95.55	40222.22	5.11	100	40000	5.82
4	Seedling cost	3850	26953.24	3.43	4427.37	6641.06	0.97
5	Fertilizers(Kgs)		7094.12	0.90		6628.12	0.97
	N	175	0	0.00	187.3	0	0.00
	P	87.5	0	0.00	90.5	0	0.00
	K	93.65	0	0.00	95.5	0	0.00
6	Micronutrients		50640.74	6.44		65039.59	9.47
7	Irrigation charges (₹)		8384.38	1.07		7719.38	1.12
8	Plant Protection Charges(₹)		21592.59	2.47		31788.88	4.63
9	Incidental charges (₹)		5763.88	0.73		6022.03	0.88
10	Repairs(₹)		2025.92	0.26		2040.18	0.30
11	Working Capital		346927.59	44.09		342177.38	49.83
12	Int. on working capital @ 6% (₹)		175703.09	22.33		20527.04	2.99
13	Depre. On farm implements		29404.29	3.47		38282.21	5.57
14	Land revenue and taxes		135	0.02		135	0.02
	Cost 'A'		325744.18	70.18		335169.42	58.41
15	Rental value of land		388457.28	20.77		270485.37	29.09
16	Interest on fixed capital @10% (₹)		31687.12	4.03		31659.72	4.61
	Cost 'B'		621284.96	94.98		632547.05	92.11
17	**Family Labour(days)**						
	a) Male	46.12	23064.81	2.93	50.7	25351.85	3.69
	b)Female	54.81	16444.44	2.09	96.11	28833.33	4.20
	Cost 'C'		786794.21	100		796732.23	100
18	**Output (qtls)**						
a.	Main produce	1817.17	1915271.15		1169.76	1224194.44	
19	Cost 'C' net of by produce		786794.21			796732.23	
20	Per qtls cost		3054.18			4340.56	

In Table 1, it was observed that the total human labour cost for grafted brinjal farmers was ₹111,861.11, accounting for (14.22%) of the total cost, whereas non-grafted brinjal farmers incurred ₹100,366.67, representing a slightly higher share of (14.62%). Among grafted farmers, female labour contributed more significantly than male labour, while non-grafted farmers showed the opposite trend. The cost of machine use was nearly equal in both groups, amounting to ₹15,527.40 (1.97%) for grafted and ₹15,530.50 (2.26%) for non-grafted farmers. seedling cost showed a considerable difference. Grafted farmers spent ₹26,953.24, which made up (3.43%) of their total cost, whereas non-grafted farmers incurred only ₹6,641.06 (0.97%). Fertilizer costs were relatively low for both groups, contributing (0.90%) and (0.97%) of the total cost, respectively. However, micronutrient application was costlier for non-grafted farmers at ₹65,039.59 (9.47%) compared to ₹50,640.74 (6.44%) for grafted farmers, indicating a possible greater nutritional requirement in non-grafted brinjal crops.

Plant protection charges were also higher for non-grafted farmers, at ₹31,788.88 (4.63%), while grafted farmers spent ₹21,592.59 (2.47%). This implies that grafted brinjal may have better pest and disease resistance. Irrigation and incidental charges were comparable between both groups, contributing just above 1% and below 1%, respectively. Working capital was marginally higher in grafted cultivation ₹346,927.59 (44.09%) compared to non-grafted ₹342,177.38 (49.83%). A notable difference was observed in the interest on working capital, where grafted farmers incurred ₹175,703.09 (22.33%) much higher than the ₹20,527.04 (2.99%) reported for non-grafted farmers, possibly due to differences in financing conditions or credit availability. Depreciation on farm implements was slightly higher for non-grafted farmers at ₹38,282.21 (5.57%) compared to ₹29,404.29 (3.47%) for grafted farmers.

Cost 'A', which includes operational expenses and land taxes, was slightly lower for grafted farmers at ₹325,744.18 (70.18%) versus ₹335,169.42 (58.41%) for non-grafted farmers. However, grafted brinjal farmers incurred a higher rental value of land (₹388,457.28, 20.77%) compared to non-grafted farmers (₹270,485.37, 29.09%). Interest on fixed capital was nearly the same in both cases, around 4%. Total cost of cultivation (Cost 'C') stood at ₹786,794.21 for grafted brinjal and ₹796,732.23 for non-grafted brinjal. Despite having nearly equal total costs, grafted farmers achieved a significantly higher output of 1817.17 quintals (₹1,915,271.15) compared to 1169.76 quintals (₹1,224,194.44) for non-grafted farmers. Consequently, the cost of production per quintal was much lower for grafted brinjal at ₹3,054.18, while it was ₹4,340.56 for non-grafted brinjal, highlighting the superior cost-efficiency and productivity of grafted brinjal cultivation.

Table 2: Cost, return and gross income for grafted and non-grafted brinjal: (Per ha)

Sr. no	Particulars	Unit	Grafted brinjal	Non-grafted brinjal
1	**Total cost (₹)**			
	Cost "A"	₹.	325744.18	335169.42
	Cost "B"	₹.	621284.96	632547.05
	Cost "C"	₹.	786794.21	796732.23
2	**Profit a t (₹)**			
	Cost "A"	₹.	1589526.97	889025.03
	Cost "B"	₹.	1293986.19	591647.40
	Cost "C"	₹.	1128476.94	427462.21
3	Production (q)	qtls	1817.17	1169.76
4	Gross income (₹)	₹.	1915271.15	1224194.44
5	**B:C ratio**			
	Cost A		5.88	3.65
	Cost B		3.08	1.94
	Cost C		2.43	1.54

In Table 2, a comparison of the economic performance between grafted and non-grafted brinjal cultivation revealed a clear advantage for grafted brinjal in terms of profitability, productivity, and cost-efficiency. The total cost of cultivation under Cost 'C' was ₹786,794.21 for grafted brinjal and ₹796,732.23 for non-grafted brinjal. The production output supported this conclusion, as grafted brinjal yielded 1817.17 quintals per hectare, considerably more than the 1169.76 quintals achieved by non-grafted cultivation. As a result, the gross income from grafted brinjal was ₹1,915,271.15, substantially higher than the ₹1,224,194.44 earned from non-grafted brinjal.

Grafted brinjal production gives higher returns with higher B: C ratio compared to non-grafted brinjal production. The B: C ratio at cost "C" was 2.43 in case of grafted brinjal production as compared to 1.54 non-grafted brinjal production. These figures clearly demonstrated that every rupee invested in grafted brinjal cultivation yielded significantly higher returns than non-grafted cultivation. A similar kind of response was also observed in brinjal, as reported by Kumar *et al.* (2019) [7] and Johnson *et al*. (2013) [13].

Overall, the analysis confirmed that grafted brinjal cultivation not only enhanced yield but also resulted in higher profitability and better return on investment, making it a more economically sustainable option for brinjal farmers.

The findings coincided with Kumar *et al*. (2019) [7], Holkar *et al*., (2024) [6] the hypothesis stated that there significant difference in cost and return grafted and non-grafted brinjal is proven.

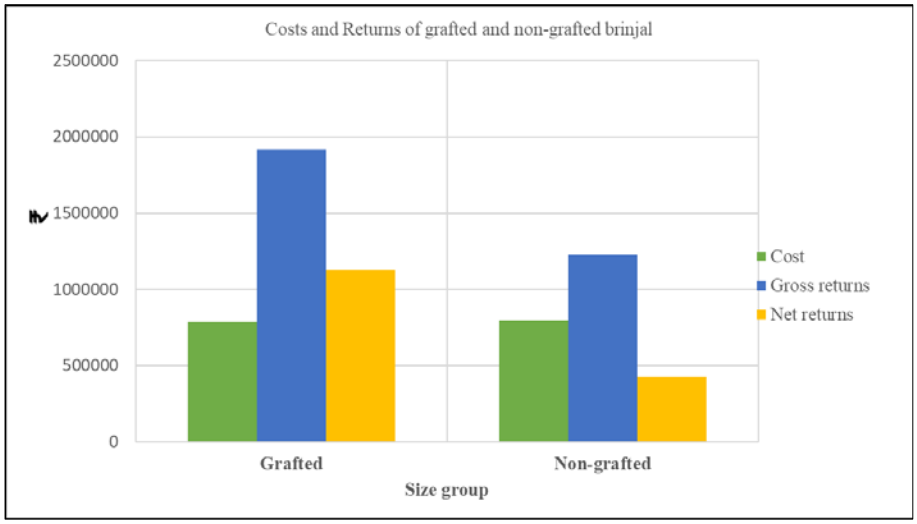

Fig 1: Cost and returns of grafted and non-grafted brinjal

Conclusion

The study concludes that grafted brinjal cultivation is more profitable and efficient than non-grafted cultivation. Grafted brinjal gave higher yield (1817.17 quintals/ha), more gross income (₹1,915,271.15), and a lower cost of production per quintal. The Benefit-Cost ratio was also higher at 2.43 compared to 1.54 in non-grafted brinjal, indicating better returns for every rupee invested. Overall, grafted brinjal offers higher productivity, better pest resistance, and greater economic sustainability, making it a better choice for farmers.

References

1. Anamika, Ghalawat S, Goyal M, Malik JS, Kumar N. Cost and return analysis of tomato cultivation in Haryana. Indian J Ext Educ. 2023;59(4):19–22.
2. Anonymous. APEDA. 2023. Available from: https://apeda.gov.in/
3. Anonymous. FAOSTAT. 2023. Available from: https://www.fao.org/faostat/
4. Athawale S, Suryawanshi S, Gawande S. Cost benefit analysis of brinjal cultivation in Amravati district of Maharashtra. Pharma Innov J. 2023;12(12):2249–2254.
5. Berkile MS, More SS, Dhok AA. Costs, returns and profitability of brinjal in Latur district of Maharashtra. Int J Stat Appl Math. 2020;8(2):30–33.
6. Holkar SR, Agale MG, Khapte PS, Tayade SA, Sadakal OU, Kokani NK. Evaluating the comparative performance of grafted and non-grafted sweet pepper (*Capsicum annuum* L.) for morphometric and yield traits under protected condition. Int J Adv Biochem Res. 2024;8(11):119–126.
7. Kumar S, Patel N, Saravaiya S. Studies on Solanum torvum Swartz rootstock on cultivated eggplant under excess moisture stress. Bangladesh J Bot. 2019;48(2):297–306.
8. Mondal M, Ali H, Bera BK. An economic analysis of brinjal (*Solanum melongena* L.) cultivation in Nadia district of West Bengal, India. Int J Curr Microbiol Appl Sci. 2019;8(11):210–216.
9. Sahu R, Raghuwanshi N, Patel G. Cost and returns from brinjal in the study area. Int J Curr Microbiol Appl Sci. 2020;9(11):3445–3452.
10. Shedge R, Jagtap S, Perne S. Cost and returns of brinjal. Pharma Innov J. 2021;10(12):1877–1878.
11. Tambe PC, Hile RB, Patare SD. Cost and returns of summer tomato production in Ahmednagar district of Maharashtra. J Pharmacogn Phytochem. 2018;7(4):1525–1527.
12. Thorat TD, Naik VG, Tasbi RA. Cost, return and profitability in brinjal in Ratnagiri district. Int J Chem Stud. 2019;7(5):4400–4402.
13. Johnson S, Inglis D, Miles C. Grafting effects on eggplant growth, yield, and Verticillium wilt incidence. Int J Veg Sci. 2013;20(1):3–20.