



International Journal of Research in Agronomy

E-ISSN: 2618-0618
P-ISSN: 2618-060X
© Agronomy
NAAS Rating (2025): 5.20
www.agronomyjournals.com
2025; SP-8(11): 215-217
Received: 06-09-2025
Accepted: 14-10-2025

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Evaluation of drumstick varieties for yield and economy through On Farm Trails (OFT's) in Vidarbha Region of Maharashtra

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DOI: <https://www.doi.org/10.33545/2618060X.2025.v8.i11Sc.4243>

Abstract

The On Farm Trials on evaluation of Drumstick varieties for growth and Yield in Buldhana district was carried out at Krishi Vigyan Kendra, Buldhana II of Maharashtra State (India) during 2018-19 to 2020-21. To evaluate Drumstick cultivar recommended by TANU, Coimbatore and UHS, Bagalkote in Buldhana of Vidarbha Region of Maharashtra State, was the main objective of this study. Total area 15.6 ha (5.2 ha area in each year) used for cultivation of PKM-1 and Bhagya (KDM-1) during three years. Randomized Block Design (RBD) with two treatments, thirteen replications was selected to laid out the experiment. The observation were recorded and analysed statistically on yield and economics parameters. The results from comparing the observation revealed that, the Drumstick variety PKM-1 was shown better results with an average increase of 11.67% in drumstick yield (43.17 t/ ha) over the Bhagya (38.41 t/ ha). The average extension gap (t/ ha), technology gap (t/ ha) and technology index (%) were 4.76 t/ha, 6.82 t/ha, and 15.45% respectively. The Drumstick variety PKM-1 gave highest average gross return (Rs. 114818/ha), net return (Rs. 81171/ha) and benefit cost ratio 3.45. Bhagya (KDM-1) obtained average gross return (Rs. 100842/ha), net return (Rs. 67595/ha) and B:C ratio 3.03. It can be revealed from conclusion that production of Drumstick can be enhanced by motivating farmers through adoption of new varieties with improved technologies and providing need based inputs in due time which were followed in evaluation.

Keywords: Drumstick, growth, varieties for and yield

Introduction

Drumstick is the most well-known crop with a wide range of uses, which belongs to the Moringaceae family. There are more than 13 species in the genus *Moringa* two of which *M. oleifera* and *M. concanensis* are grown as vegetables in India (Malathi *et al.*, 2021) ^[4].

The Drumstick tree has been grown throughout the plains, especially in backyards. The tree can reach heights of 5 to 10 meters. It grows best in tropical climates with little drought. Drumstick plant is native of the western and sub Himalayan tracts, India, Pakistan, Asia Minor, Arabia and Africa. *Moringa oleifera* popularly known as, Miracle tree, West Indian ben, Mother's best friend, Spinach Tree, Drumstick tree, Horse radish tree, Murungai. *Moringa oleifera* also possess number of remedial traits and all the plant parts- leaf, Roots, pods, bark, gum, seeds, flowers and seed oil have been utilized for several diseases in the traditional medicine of South Asia for the curing of inflammation and infectious diseases like cardiovascular, gastrointestinal, haematological and hepatorenal disorders.

In Maharashtra state of India, Drumstick farming is a profitable and drought-resistant crop suitable for arid regions of Maharashtra, especially Solapur, due to its low water needs and ability to provide round-the-year income. The crop is suitable for dryland farming, has a high yield potential, and can generate significant income compared to traditional crops like sugarcane.

Drumstick (*Moringa*) farming in Vidarbha is considered economically viable and is being explored as a profitable crop, especially with the adoption of integrated farming systems and specific agricultural techniques like drip irrigation. Key aspects include a lower initial investment compared to some other crops, potential for good returns, and a long harvesting period of about 10 months a year with certain varieties. Challenges to overcome include dealing

with local climate extremes, such as Vidarbha's severe summers and heavy monsoons, which can impact sapling survival and overall yield.

Farmers have lack of knowledge regarding recent package of practices as well as recommended varieties to get better production and income from drumstick crop. With aim, the present On Farm Trials were carried out to evaluate the performance of Drumstick varieties suitable for Buldhana district of Vidarbha region of Maharashtra.

Materials and Methods

The On Farm Trials were conducted by Krishi Vigyan Kendra, Buldhana II in Buldhana district from 2018-19 to 2020-21. The on farm testing conducted at 13 farmers field namely Ajisapur and Nandrakoli villages of Buldhana block and Walti village of Chikhli block in Buldhana District. Two Drumstick varieties viz. PKM-1 and Bhagya (KDM-1) were assessment and cultivated in an area of 15.6 ha. during 2018-19 to 2020-21. The seeds were sown in the month of June to grow seedlings and were transplanted in the month of July on selected farmers field. The field trials was laid out in a Randomized Block Design (RBD) with three treatments with ten replications as per the method was suggested by Panse and Sukhatme (1967) [6].

The data on the outcome of yield and economics were directly collected from the farmers who were selected for the On Farm Trials. The gathered data were processed, tabulated, classified and analysed in terms of mean% score and ranks in the light of objectives of the study. More than 10% difference between beneficiary and non-beneficiary farmers' was considered as significant difference. The extension gap, technology gap and technology index were calculated using the formula as suggested by Samui *et al.*, (2000) [8].

Extension gap (qha^{-1}) = Demonstration yield- Farmer's yield

Technology gap (qha^{-1}) = Potential yield - Demonstration yield

Technology index (%) = [Potential yield - Demo yield / Potential yield] x 100

Results and Discussion

Table 1 shown comparison yield parameters between Drumstick varieties PKM-1 and Bhagya (KDM-1) were used for this trial. It is clearly observed from results that under the assessment plot, performance of Drumstick variety PKM-1 (yield) was sustainable higher than that in the Bhagya (KDM-1) in all the years of the study (2018-19 to 2020-21). Yield in variety PKM-1 ranged from (41.00 to 46.48 t/ha) during the period under trials and enhanced yield to a tune of 11.17% during 2018-19, 10.38% during 2019-20 and 13.47% during 2020-21 respectively, over the Bhagya (KDM-1). Similar enhancement in yield in Drumstick was documented by Karunakar *et al.*, 2018; Rajamanickam *et al.*, 2019 [3, 7].

Yield of Drumstick varieties PKM-1 and Bhagya (KDM-1) and potential yield of the Drumstick varieties PKM-1 and Bhagya (KDM-1) was compared for extension parameters. These parameters were further categorized as technology and extension gaps. Technology gap indicates a gap in demonstration yield over the potential yield, and this was 9.00 t/ha (2018-19), 7.95 t/ha (2019-20) and 3.52 t/ha (2020-21) respectively (Table 2). Extension gap ranged 4.12 t/ha during 2018-19, 3.93 t/ha during 2019-20 and 6.23 t/ha during 2020-21 respectively, (Table 2). A wide extension gap means farmers were need to educate regarding production technology of drumstick by different farmers training programme as well as different extension activities.

Table 1: Yield and Percent yield increase in technology demonstrated over farmers practice under OFT's on Performance of Drumstick Varieties PKM-1 and KDM- 1 (Bhagya) at Buldhana District during 2018-19 to 2020-21.

Duration	No. of OFT	Area covered (ha)	Yield (t/ha)		Additional yield over Bhagya (KDM-1) (t/ha)	Per cent increase yield over Bhagya (KDM-1)
			PKM-1	Bhagya (KDM-1)		
2018-19	5.2	13	41.00	36.88	4.12	10.11%
2019-20	5.2	13	42.05	38.12	3.93	16.12%
2020-21	5.2	13	46.48	40.25	6.23	17.10%
Total	15.6	39				

Table 2: Yield gap and technology index under OFT's Performance of Drumstick Varieties PKM-1 and KDM- 1 (Bhagya) at Buldhana District of Vidarbha Region of Maharashtra during 2018-19 to 2020-21.

Duration	No. of trials (OFT)	Technology gap (t/ha)	Extension Gap (t/ha)	Technology Index (%)
2018-19	50	9.00	4.12	18.00
2019-20	50	7.95	3.93	15.90
2020-21	50	3.52	6.23	12.46
Mean		6.82	4.76	15.45

Table 3: Detail of Economics under OFT's Performance of Drumstick Varieties PKM-1 and KDM- 1 (Bhagya) at Buldhana District of Vidarbha Region of Maharashtra during 2018-19 to 2020-21.

Duration	Cost of Cultivation (Rs/ha)		Gross Return (Rs/ha)		Net Return (Rs/ha)		B:C Ratio	
	PKM-1	Bhagya (KDM-1)	PKM-1	Bhagya (KDM-1)	PKM-1	Bhagya (KDM-1)	PKM-1	Bhagya (KDM-1)
2018-19	31950	31950	96350	82980	64000	51030	3.02	2.60
2019-20	31233	31230	115637	104830	84407	73600	3.70	3.35
2020-21	36563	36563	132468	114717	95105	78154	3.62	3.13
Mean	33249	33248	114818	100842	81171	67595	3.45	3.03

Proper use of recommended package of practices was help to mitigate this extension gap between Drumstick varieties PKM-1 and Bhagya (KDM-1). Improved varieties and recommended practices eventually lead farmers into discontinuing obsolete varieties. Technology index refer to the feasibility of variety at

farmers field. A lower the value of technology index (mean 15.45%) more is the feasibility (Table 2). This finding corroborates results of Muthuramu *et al.*, 2015 and Selvakumari *et al.*, 2017 [5, 11].

The economics of trials Drumstick varieties PKM-1 and Bhagya

(KDM-1) under this On Farm Trials was calculated and results are presented in Table 3. Economic analysis of yield performance revealed that besides higher production, participating farmers in evaluation realized a higher price of Drumstick variety PKM-1 than produce compared to that in Bhagya (KDM-1) during the period under this on farm trials. PKM-1 recorded higher mean gross return (Rs. 114818 /ha) and mean net returns (Rs. 81171/ha) with average benefit: cost ratio (3.45) compared to the Bhagya (KDM-1) in our trials. The similar results are also observed by Sekhar *et al.*, 2018 and Sakdeo *et al.*, 2019^[10, 9].

On the basis of observations recorded in present on farm trials, it is concluded that PKM-1 recorded the highest yield, net profit and with the benefit cost ratio and per cent increased yield over the Bhagya during the all years of study. It was found that farmers were very much convinced with the performance of Drumstick var. PKM-1, fetches higher income, higher yield and recorded the low incidence of fruit fly when compared with Bhagya. This also improved linkages between farmers and scientists, and built confidence for adoption of the new variety of Drumstick. Productivity enhancement under new varieties over local variety of Drumstick cultivation created a greater awareness, and motivated other farmers not growing Drumstick improved cultivation technologies.

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