

# VEGETATIVE PERFORMANCE OF POLYEMBRYONIC MANGO (*MANGIFERA INDICA* L.) ROOTSTOCKS UNDER EASTERN DRY ZONE OF KARNATAKA

G. NAYAN DEEPAK<sup>1\*</sup>, U. JEEVAN<sup>2</sup>, H. L. PRIYANKA<sup>3</sup>, H. P. BHAGYA<sup>4</sup> AND S. JAGANATH<sup>3</sup>

<sup>1</sup>Division of Fruits and Horticultural Technology, ICAR-Indian Agricultural Research Institute, New Delhi, 110 012

<sup>2</sup>Division of Floriculture and Landscaping, College of Horticulture- Rajendranagar, Hyderabad, 500 030

<sup>3</sup>Division of Fruit crops, College of Horticulture, Bengaluru, UHS Campus, Karnataka – 560 065

<sup>4</sup>ICAR-Indian Institute of Oil Palm Research, Pedavagi, Andhra Pradesh, 534 450

e-mail: nayan.iari@gmail.com

## KEYWORDS

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**\*Corresponding author**

## ABSTRACT

The vegetative performance of three polyembryonic mango rootstocks *viz.*, Olour, Vellaikolumban and Nekkare were evaluated at RHREC, University of Horticultural Sciences, Bengaluru, Karnataka. The maximum seedling height (31.17 cm), stem girth (2.65 cm), internodal length (14.21 cm), chlorophyll contents 'a' (0.806 mg/g), 'b' (0.621 mg/g) and total (1.421 mg/g) and the minimum days to attain graftable size (186.02) was observed in the rootstock, Nekkare; while the rootstock Olour, recorded the highest number of leaves (22.56), leaf length (22.8 cm), leaf width (5.78 cm) and leaf area (90.33 cm<sup>2</sup>) at 265 DAS. Whereas the minimum number of leaves (15.04), leaf length (20.39 cm), leaf width (5.46 cm), leaf area (79.59 cm<sup>2</sup>), seedling height (23.72 cm), stem girth (2.13 cm), internodal length (8.42 cm), chlorophyll contents 'a' (0.564 mg/g), 'b' (0.471 mg/g) and total chlorophyll (1.031 mg/g) at 265 DAS and the maximum days to attain graftable size (248.27) was noticed in the rootstock, Vellaikolumban. The present investigation reveals that the rootstock Nekkare could be vigorous in growth, Olour was semi vigorous and Vellaikolumban was less vigorous in nature. The above results will help nursery man to choose these rootstocks for propagation based on the requirement of farmers for different density planting.

## INTRODUCTION

The mango (*Mangifera indica* L.) belongs to the family Anacardiaceae, originated from South East Asia and Indo-Burma region (Mukherjee, 1951). Mango is the major fruit crop growing in India with production of 184.31 lakh tonnes from an area of 25.16 lakh hectare (Anon., 2014). Major mango producing states are Uttar Pradesh followed by Andhra Pradesh, Karnataka, Telangana and Bihar. India's share is about 15 per cent in the world mango market and scope is there for increasing the area and productivity of mango. Recently the high density orchard system became a new trend in fruit production because of urbanization, conversion of agri-fields to other purpose, labour problem, increase in population growth and to meet market demand (Hegde, 2007). For high-density planting, vigour management is important and can be achieved by rootstocks (Reddy *et al.*, 2003). Several seedlings were produced from seeds of polyembryonic varieties (Rao *et al.*, 2008), which in turn produce true-to-type traits. Nucellar embryo provides uniform seedlings, has tap root system and higher probability of survival under varied conditions (Kundan, 2015). Since long, random rootstocks of unknown origin were used for propagation which influences the various desirable characters, this clear the importance of specific known rootstocks (Venkat and Reddy, 2005). Uniformity in mango trees can be achieved by using vegetatively developed seedlings from desired plants as

rootstock instead of rootstocks from sexually developed seeds, which are highly heterozygous. To achieve uniform growth and dwarfing rootstock for high density planting, standardization of rootstock for mango cultivation in different agro climatic regions is essential. Morphological characterization is a key aspect for documentation of the performance of varieties, which also helps to introduce, select and improve the existing ones. There are limited reports on the vegetative characterization of rootstocks for specific area or agro climatic regions. The present study on these polyembryonic rootstocks will help to select the suitable ones. With this context, the research was conducted to know the growth behavior of three polyembryonic mango rootstocks under Eastern dry zone of Karnataka.

## MATERIALS AND METHODS

A field experiment was conducted at Regional Horticultural Research and Extension Centre, University of Horticultural Sciences, Bagalkot, GVKK (West), Bengaluru, Karnataka. The field is located at an altitude of 930 meters above mean sea level, 12° 58' North latitude and 77° 35' East longitude. Three polyembryonic rootstocks, *viz.*, Olour, Vellaikolumban and Nekkare were used for conducting experiment. After germination, seedlings were transplanted to poly bags (25 cm x 9 cm) containing regular potting media. Seedlings with uniform growth at fifty five days after sowing were selected for

study. Experiment carried out using complete randomized design with nine replications. Observations on vegetative growth *viz.*, number of leaves per seedling, seedling height and stem girth at 30 days interval were recorded from 55 to 265 days after sowing, while leaf length, leaf width, leaf area, chlorophyll contents (a, b and total) were noticed at 265 days after sowing. Vegetative parameters were measured as per mango descriptor (IPGRI, 2006). Leaf area was measured by using leaf area meter; the number of days taken for the stem to attain graftable thickness (2.04 cm) was calculated. Chlorophyll (a, b and total) contents were analyzed (Barnase *et al.*, 1992). The data recorded on growth characters were subjected to Fishers method of analysis of variance and interpretation of data as given by Panse and Sukhatme (1954).

### RESULTS AND DISCUSSION

The number of leaves per seedling, seedling height and stem girth were progressively increased in successive months. The number of leaves was significantly higher with the rootstock Olour over other rootstocks (Fig. 1). The maximum number of leaves per seedling was noticed in the rootstock Olour (6.24, 9.07, 11.6, 13.91, 15.44, 17.91, 20.76 and 22.56), followed by Nekkare (5.82, 8.29, 9.96, 11.91, 13.33, 15.00, 17.27 and 19.36) and the least number of leaves per seedling was noticed in the rootstock Vellaikolumban (3.44, 5.22, 6.69, 7.69, 8.84, 10.09, 12.69 and 15.04) at 55, 85, 115, 145, 175, 205, 235 and 265 days after sowing respectively. The rootstock Nekkare recorded the maximum plant height (16.89, 19.49, 21.52, 23.98, 25.31, 27.00, 29.31 and 31.17 cm) and stem girth (1.17, 1.37, 1.56, 1.75, 1.97, 2.21, 2.42 and 2.65 cm), whereas the minimum plant height (12.68, 14.54, 16.24, 18.02, 19.73, 21.12, 22.36 and 23.72 cm) and stem girth (0.99, 1.12, 1.27, 1.43, 1.62, 1.78, 1.95 and 2.13 cm) was recorded in the rootstock Vellaikolumban at 55, 85, 115, 145, 175, 205, 235 and 265 days after sowing respectively (Fig. 2 and 3). The maximum leaf length (22.8 cm), leaf width (5.78 cm), leaf area was observed in the rootstock Olour (90.29 cm<sup>2</sup>), whereas the maximum internodal length (14.21 cm), chlorophyll 'a' (0.806 mg/g), chlorophyll 'b' (0.621 mg/g) and total chlorophyll (1.421 mg/g) was recorded in the rootstock Nekkare. Vellaikolumban recorded the lowest leaf length (20.39 cm), leaf width (5.46 cm), leaf area (79.59 cm<sup>2</sup>), internodal length (8.42 cm), chlorophyll 'a' (0.564 mg/g), chlorophyll 'b' (0.471 mg/g) and total chlorophyll (1.031 mg/g) at 265 days after sowing (Table 1). The minimum days taken to attain graftable thickness (Table 1) was observed in the rootstock Nekkare (186.02 days), followed by Olour (200.91 days) and the maximum days taken was recorded in

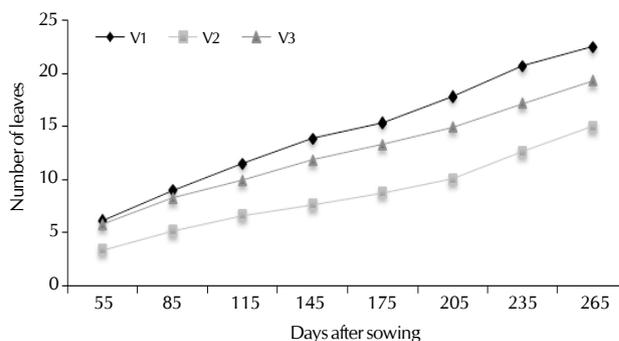


Figure 1: Number of leaves of different polyembryonic varieties of mango

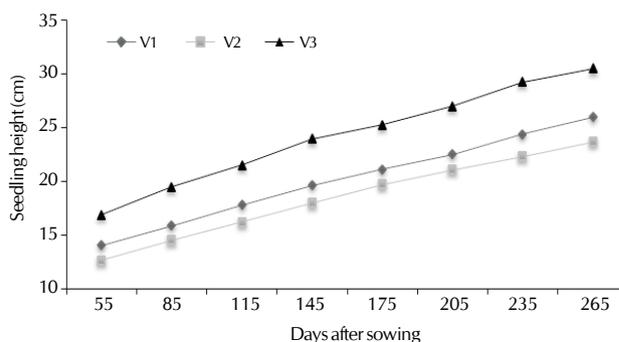


Figure 2: Seedling height of different polyembryonic varieties of mango

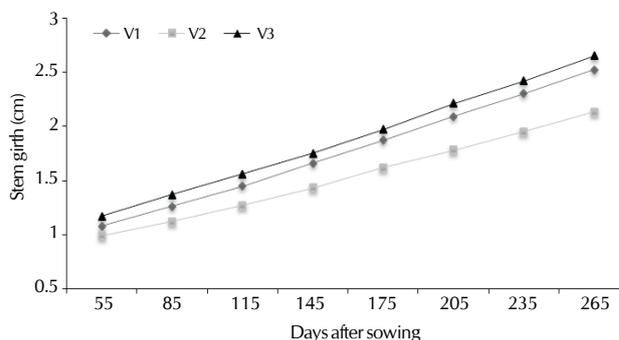


Figure 3: Stem girth of different polyembryonic varieties of mango

the rootstock Vellaikolumban (248.27 days). The variation in vegetative behavior may be due to genetic makeup, vigorous growth, leaf producing capability which in turn facilitates better harvest of sunshine by the plants to produce more number of

Table 1: Leaf length (cm), Leaf width (cm), Leaf area (cm<sup>2</sup>), Internodal length (cm), chlorophyll content (mg/g) at 265 days after sowing and days taken to attain graftable thickness in polyembryonic mango rootstocks

Rootstocks	Leaf length(cm)	Leaf width(cm)	Leaf area (cm <sup>2</sup> )	Internodal length (cm)	Chlorophyll content (mg/g)			Days taken to attain graftable thickness (DAS)
					Chl 'a'	Chl 'b'	Total chlorophyll	
Olour	22.80 <sup>a</sup>	5.78 <sup>a</sup>	90.33 <sup>a</sup>	12.81 <sup>b</sup>	0.629 <sup>b</sup>	0.477 <sup>b</sup>	1.107 <sup>b</sup>	200.91 <sup>b</sup>
Vellaikolumban	20.39 <sup>c</sup>	5.46 <sup>b</sup>	79.59 <sup>c</sup>	8.42 <sup>c</sup>	0.564 <sup>c</sup>	0.471 <sup>c</sup>	1.031 <sup>c</sup>	248.27 <sup>c</sup>
Nekkare	21.82 <sup>b</sup>	5.60 <sup>ab</sup>	84.82 <sup>b</sup>	14.21 <sup>a</sup>	0.806 <sup>a</sup>	0.621 <sup>a</sup>	1.421 <sup>a</sup>	186.02 <sup>a</sup>

leaves was noticed in the rootstock Olour. The number of leaves was least in the rootstock Vellaikolumban may be due to slow growth vigour. Similarly, variation in mango leaf characteristics was reported by Parasana *et al.*, 2013, Kobra *et al.*, 2012, Kundu *et al.*, 2009 and Majumder *et al.*, 2011. The variation in growth potential of different rootstocks may be basically due to the stone characters as well as faster and quicker germination. The stone weight of Olour and Nekkare was more than Vellaikolumban which leads to vigorous seedlings. The results are in agreement with Venkat and Reddy (2005), Manish *et al.* (2009) and Rajesh *et al.*, 2014 reported in mango. The variation in number of days taken to attain graftable size may be due to the vigour difference among the rootstocks. Sanjay and Bhargava (2011) and Pal *et al.* (1980) also reported that higher chlorophyll content was associated with vigorous varieties.

Based on the vegetative performances of rootstocks in the present study, results indicate that rootstock Nekkare could be vigorous in growth, Olour was semi vigorous and Vellaikolumban was less vigorous or slow growth in nature. Further these varieties can be utilized as rootstocks for different planting density.

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