



## Research Paper

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# Effect of mixture of growing media on germination and seedlings growth of different mango (*Mangifera indica* L.) cultivars under net house conditions

■ J.S. PARASANA, N.R. RAY<sup>1</sup>, B.N. SATODIYA<sup>1</sup>, K.A. PATEL<sup>1</sup> AND G.P. PANCHAL<sup>1</sup>

### Members of the Research Forum

#### Associated Authors:

<sup>1</sup>Department of Horticulture, B.A. College of Agriculture, Anand Agricultural University, ANAND (GUJARAT) INDIA

#### Author for correspondence :

##### J.S. PARASANA

Department of Horticulture, B.A. College of Agriculture, Anand Agricultural University, ANAND (GUJARAT) INDIA  
Email : jigar.parasana@gmail.com; kiran12raj@yahoo.co.in

**ABSTRACT :** An experiment on effect of mixture of growing media on germination and seedlings growth of different mango (*Mangifera indica* L.) cultivars under net house conditions was carried out at Horticultural research farm, Department of Horticulture, B. A. College of Agriculture, Anand during the year 2011-12. The experiment was laid out in Completely Randomized Block Design (Factorial) with twelve treatment combinations and replicated thrice. The treatments comprised of four growing media (M<sub>1</sub>-Soil + sand + farm yard manure (1:1:1), M<sub>2</sub>- Soil + sand + vermicompost (1:1:1), M<sub>3</sub>- Soil + sand + farm yard manure (2:1:1) and M<sub>4</sub>- Soil + sand + vermicompost (2:1:1)) and three cultivars (V<sub>1</sub>- Amrutang, V<sub>2</sub>- Kesar and V<sub>3</sub>- LSM-12 Master royal). At 60 DAS, significantly minimum days (27.11) were taken to germinate as well as maximum germination percentage of mango stone (77.33 %) were noted in M<sub>3</sub> media *i.e.* soil + sand + farm yard manure (2 : 1 : 1). The height of seedling (51.13 cm), number of leaves per plant (15.22), length of shoot (51.13 cm), length of root (36.17 cm), root : shoot ratio (0.70), stem girth (4.07 cm), fresh weight of seedling (28.79 g), dry weight of seedling (18.90 g) and maximum survival (79.67 %) were recorded by M<sub>3</sub> medium *i.e.* soil + sand + farm yard manure (2 : 1 : 1) at 180 DAS. Among different cultivars significantly minimum days (30.83) were taken to germinate as well as maximum germination percentage of mango stone (70.75) was obtained in cultivar V<sub>3</sub> (LSM-12-Master royal) at 60 DAS. Significantly maximum height of seedling (46.95 cm), number of leaves per plant (13.17), length of shoot (46.95 cm), length of root (31.05 cm), stem girth (3.18 cm), fresh weight of seedling (24.63 g) and dry weight of seedling (14.63 g) and maximum survival (72.17 %) were recorded in cultivar V<sub>3</sub> (LSM-12-Master royal) at 180 DAS. Interaction of M<sub>3</sub>V<sub>3</sub> (Soil + sand + farm yard manure (2 : 1 : 1) + LSM-12-Master royal) recorded significantly minimum days (24.33) as well as maximum germination percentage of mango stone (81.00 %) at 60 DAS. Significantly maximum number of leaves per plant (17.67), length of shoot (52.30 cm), stem girth (4.53), fresh weight of seedling (33.23 g), dry weight of seedling (23.23 g) and maximum survival (82.67 %) were noted in combination of M<sub>3</sub>V<sub>3</sub> (Soil + sand + Farm yard manure (2 : 1 : 1) + LSM-12 Master-royal) at 180 DAS.

**KEY WORDS :** Growing media, Mango cultivars, Net house conditions, Growth of seedlings

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**M**ango (*Mangifera indica* L.) is grown almost in 63 countries around the world and occupies a unique place among the fruits in India. It belongs to genus *Mangifera* and family Anacardiaceae, originated in South-east Asia at early date. Mukherjee (1953) reported that this genus had its origin in the continental region of Burma,

Thailand, Indo-China and Malaysia peninsula. Mangoes possessing the pride position in tropical and subtropical regional, between 23° North and South latitude.

It is considered as best fruits of the world by virtue of its flavour, delicious taste, delicate fragrance, attractive colour, so it is also known as “king of fruit”. There are 41 valid species

of *Mangifera*, which are distributed throughout the world. The total area under mango crop was estimated to be 2312 thousand ha. with a production of 15027 thousand metric tonnes per annum in 2009-2010 (Anonymous, 2010). As per FAO estimates, India produced about 10 million metric tonnes of mango. The major fruit growing states are Uttar Pradesh, Karnataka, Bihar, Andhra Pradesh, Tamilnadu, Kerala, Maharashtra, Orissa, West Bengal and Gujarat. Area in Gujarat was 121.5 thousand hectares under mango cultivation which produced 856.7 thousand metric tonnes of mango fruits (Anonymous, 2010).

Most of the mango trees are grown in a commercial orchard or in private garden usually grafted trees, each tree is made up of two parts; the rootstock, providing root system and the scion forming the tree head. Both of these parts play an equally vital role in the life of a tree. The rootstock has great influence on the vigour, longevity and productivity of the scion variety. Even the quality and composition of fruits also have been affected by it. A stock is called "seedling root stock" if it is grown from seed and "clonal roots stock" if it is grown from vegetative propagation. Potting medium is most important input for better seedling production. It is responsible for healthy and uniform seedling production. Apart from the selection of proper ingredients, it is also necessary to maintain the porosity of the potting mixture so that proper development of roots takes place (Srivastava *et al.*, 1998). Therefore, the present study was undertaken to evaluate effect of various growing media on mango cultivars in regard with their growth parameters.

## RESEARCH METHODS

The present investigation on effect of mixture of growing media on germination and seedlings growth of different mango (*Mangifera indica* L.) cultivars under net house conditions was carried out at Horticultural research farm, Department of Horticulture, B. A. College of Agriculture Anand during the year 2011-12. The experiment was laid out in Completely Randomized Block Design (Factorial) with twelve treatment combinations. All treatments were replicated thrice. The treatment comprised of four growing medias (M<sub>1</sub>-Soil + sand + farm yard manure (1:1:1), M<sub>2</sub>- Soil + sand + vermicompost (1:1:1), M<sub>3</sub>- Soil + sand + farm yard manure (2:1:1) and M<sub>4</sub>- Soil + sand + vermicompost (2:1:1)) and three cultivars (V<sub>1</sub>- Amrutang, V<sub>2</sub>- Kesar and V<sub>3</sub>- LSM-12 Master royal).

The data on days to germination, germination percentage, height of seedling, number of leaves per plant, length of shoot and root, root: shoot ratio, stem girth, fresh and dry weight of seedling and survival percentage were recorded and statistically analyzed (Snedecor and Cochran, 1980).

## RESEARCH FINDINGS AND DISCUSSION

Among different growing medias significantly the

minimum days (27.11) were taken to germinate as well as maximum germination percentage of mango stone (77.33 %) were noted in M<sub>3</sub> medium *i.e.* Soil + sand + farm yard manure (2 : 1 : 1) while in case of cultivars, minimum days (30.83) required to germinate and maximum germination percentage of mango stone (70.75 %) were obtained with V<sub>3</sub> (LMS-12-Master royal) at 60 days after sowing (Table 1). It might be because of media containing organic manures possess organic acid within them. Therefore, more available moisture and some acids may have helped in minimum days to germination and better germination percentage (Bisla *et al.*, 1984).

The highest height of seedling *i.e.* 51.13 cm was recorded in Soil + sand + farm yard manure (2:1:1) medium and among different cultivars, LMS-12-Master royal recorded significantly the maximum plant height *i.e.* 46.95 cm at 180 DAS. This may be attributed to general improvement in the physical and chemical properties of the rooting medium. (Deelip *et al.*, 1994).

Similarly, at 180 days also Soil + sand + farm yard manure (2 : 1 : 1) medium produced significantly maximum number of leaves per plant *i.e.* 15.22 while among various cultivars, LMS-12-Master royal recorded significantly the maximum number of leaves per plant *i.e.* 13.17. It may be due to better nutrient availability leading to higher production of photo synthetically functional leaves due to growing media (Borah *et al.*, 2008).

Significantly the maximum length of shoot and root *i.e.* 51.13 and 36.17 cm were recorded in medium Soil + sand + farm yard manure (2 : 1 : 1) while among different cultivars, LMS-12-Master royal produced significantly the maximum length of shoot and root *i.e.* 46.95 and 31.05 cm, respectively at 180 DAS. This may be attributed to general improvement in the physical and chemical properties of the rooting medium. (Deelip *et al.*, 1994).

Similarly, at 180 days Soil + sand + farm yard manure (2 : 1 : 1) medium produced significantly the maximum root : shoot ratio *i.e.* 0.70, while it was found non-significant with different cultivars.

Soil + sand + farm yard manure (2 : 1 : 1) medium produced significantly maximum stem girth (4.07 cm) and among various cultivars, LMS-12-Master royal produced significantly the maximum stem girth *i.e.* 3.18 cm at 180 DAS. It may be due to better nutrient availability leading to higher production of photo-synthetically functional leaves in these treatments finally resulting in better girth of seedling. (Borah *et al.*, 2008).

Significantly the maximum fresh and dry weight of seedling *i.e.* 28.79 and 18.90 g was recorded with Soil + sand + farm yard manure (2 : 1 : 1) medium while cultivar LMS-12-Master royal produced significantly the maximum fresh and dry weight of seedling *i.e.* 24.63 and 14.63 g, respectively at 180 DAS. This may be attributed to general improvement in the physical and chemical properties of the rooting medium which improved the fresh weight and dry weight also (Deelip *et al.*, 1994).

**Table 1: Influence of different of growing medias on germination and seedlings growth of different mango (*Mangifera indica* L.) cultivars under net house conditions**

Factor	Days required to germinate	Germination percentage of mango stone	Height of seedling (cm)	Number of leaves per plant	Length of shoot (cm)	Length of root (cm)	Root : shoot ratio	Stem girth (cm)	Fresh weight of seedling (g)	Dry weight of seedling (g)	Survival percentage
	60 DAS	60 DAS	180 DAS	180 DAS	180 DAS	180 DAS	180 DAS	180 DAS	180 DAS	180 DAS	180 DAS
<b>Growing medias</b>											
M <sub>1</sub>	34.00	65.33	44.43	11.00	44.43	26.28	0.59	2.43	20.97	10.96	67.33
M <sub>2</sub>	35.67	61.67	36.37	10.44	39.70	22.41	0.57	2.00	18.57	8.56	60.33
M <sub>3</sub>	27.11	77.33	51.13	15.22	51.13	36.17	0.70	4.07	28.79	18.90	79.67
M <sub>4</sub>	31.33	71.33	48.43	12.11	48.43	32.28	0.66	3.37	24.70	14.70	72.33
S.E. ±	0.338	0.333	0.524	0.289	0.524	0.400	0.014	0.051	0.530	0.517	0.462
C.D. (P=0.05)	0.984	0.971	1.526	0.841	1.526	1.166	0.042	0.148	1.545	1.507	1.345
<b>Cultivars</b>											
V <sub>1</sub>	33.00	67.75	43.13	11.25	43.13	27.46	0.63	2.83	22.37	12.34	67.17
V <sub>2</sub>	32.25	68.25	45.20	12.17	47.70	29.34	0.61	2.88	22.80	12.88	70.42
V <sub>3</sub>	30.83	70.75	46.95	13.17	46.95	31.05	0.66	3.18	24.63	14.63	72.17
S.E. ±	0.293	0.289	0.454	0.500	0.454	0.346	0.012	0.088	0.459	0.448	0.400
C.D. (P=0.05)	0.853	0.841	1.322	1.457	1.322	1.009	NS	0.257	1.338	1.305	1.164
C.V. %	3.17	1.45	3.49	7.10	3.42	4.10	6.79	5.15	6.84	5.68	1.98
<b>Interaction</b>											
M x V	S	S	NS	S	S	NS	NS	S	S	S	S

NS=Non-significant S=Significant

The maximum survival *i.e.* 79.19 per cent was recorded in Soil + sand + farm yard manure (2:1:1) medium and among different cultivars, LMS-12-Master royal recorded significantly the maximum survival *i.e.* 67.17 per cent at 180 DAS. This may be due to favourable medium for better growth of the seedling, particularly for good development of a root system. These results are in close agreement with Shamet *et al.* (1994).

Interaction of growing media and cultivars produced significantly minimum days (24.33) were required to germinate as well as maximum germination percentage of mango stone (81.00 %) in combination of M<sub>3</sub>V<sub>3</sub> (Soil + sand + farm yard manure (2:1:1)+ LSM-12-Master royal) at 60 DAS. Significantly maximum number of leaves per plant (17.67), length of shoot (52.30 cm), stem girth (4.53), fresh weight of seedling (33.23 g), dry weight of seedling (23.23 g) and maximum survival (82.67 %) were noted in combination of M<sub>3</sub>V<sub>3</sub> (Soil + sand + farm yard manure (2 : 1 : 1) + LSM-12 Master-royal) at 180 DAS, respectively.

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