

Original Research Article

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## Standardization of Growing Media for Growth of Kokum (*Garcinia indica* Choisy) to Find Out Suitable Growing Media for Growth of Kokum Seedling Grown in Polybag

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### ABSTRACT

#### Keywords

Kokum seeds,  
FYM, Rice husk,  
Coco peat,  
Vermicompost

#### Article Info

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The demand of kokum grafts, as well as, seedlings is more in konkan region. To fulfill the demand, as well as, for healthy grafts, the experiment was laid out at AICRP, Oil Palm, College of Horticulture, Mulde along with seven different media.vizM<sub>1</sub> Soil + FYM (3:1) with 1” Cocopeat at top, M<sub>2</sub> Soil + FYM + Rice husk (2:1:1) with 1” Cocopeat at top, M<sub>3</sub> Soil + FYM + Cocopeat (2:1:1), M<sub>4</sub> Soil + Vermicompost (3:1) with 1” Cocopeat at top, M<sub>5</sub> Soil + Vermicompost + Rice husk (2:1:1) with 1” Cocopeat at top, M<sub>6</sub> Soil + Vermicompost + Cocopeat (2:1:1), M<sub>7</sub>Soil + FYM + Vermi-compost +Cocopeat (1:1:1:1) out of which the superior one recorded M<sub>1</sub> Soil + FYM (3:1) with 1” Cocopeat at top is recorded significantly minimum days to attain the graftable stage i.e. 147 days along with highest germination % and Survival %.

### Introduction

*Garcinia indica* Choisy Kokum is one of the condiment underexploited tree belongs to family *Guttiferae*. It is commonly known as butter tree Kokum in English and vernacular names are kokum, amsolbirand, atamba, mostly found in Konkan

region of Maharashtra, Goa, Karnataka, Kerala and Surat district of Gujarat on the West Coast of India (Haldankar *et al.*, 2012 and Braganza *et al.*, 2012). Due to dioecious nature of the plant, unproductive maleness, large genetic variability, slow growth, extended harvesting in rainy season etc. are some of the constraints for its area expansion (Patil *et al.*,

2012) As Kokum is dioecious tree hence crosspollination is necessary for fruit setting. Tree starts flowering during November-December and fruits are harvested during April-May (Pruthi, 2009) In Maharashtra major area of konkan region occupied by kokum is more than 1000 ha and production of 4500 tones with productivity of 4.5 t/ha. In Goa, it is grown on 1200 ha area and production is 12000 tones with productivity of 8.5 t/ha (Senthikumar *et al.*, 2014) It is observed that the growth of kokum seedling is very slow, hence, there is need to hasten seedling growth for getting vigorous rootstock for grafting at early stage of growth. Potting media is the basic component which affects the growth of container seedling.

Soil + FYM (3:1) is a basic media used for nursery production. However, requirement of soil as potting media in nursery programme is very huge and becoming scare with time. Different growing media other than soil like Cocopeat, Rice husk, FYM, Vermicompost etc. are light in weight and also have good porous structure which can be used as component along with soil. Very little work on use of different media on growth of underexploited fruit trees has been done hence, with this view; present investigation on Standardization of growing media for growth of Kokum (*Garcinia indica* Choisy)

To find out suitable growing media for growth of kokum seedling grown in polybag was carried out for hastening the growth of kokum seedling.

## **Materials and Methods**

The experiment was laid out at AICRP Oil Palm, College of Horticulture, Mulde Kudal, Dist. Sindhudurg Dr. Balasheb Sawant Konkon Krishi Vidyapeeth, Dapoli, during 2020 to 2023 a continuous three year trail conducted along with 7 media treatment with three replication along with seven different media treatments, M<sub>1</sub> Soil + FYM (3:1) with 1” Cocopeat at top, M<sub>2</sub> Soil + FYM + Rice husk (2:1:1) with 1” Cocopeat at top, M<sub>3</sub> Soil + FYM + Cocopeat (2:1:1), M<sub>4</sub> Soil + Vermicompost (3:1) with 1” Cocopeat at top, M<sub>5</sub>

Soil + Vermicompost + Rice husk (2:1:1) with 1” Cocopeat at top, M<sub>6</sub> Soil + Vermicompost + Cocopeat (2:1:1) M<sub>7</sub> Soil + FYM + Vermicompost + Cocopeat (1:1:1:1), randomly selected uniform kokum seedlings of six month old grown in polybags of size 6” x 8” were transferred in Polythene bags of 9” x 11” size and used for the experimental purpose. Potting mixture was prepared separately for each treatment as per the treatments under study.

A group of 100 seedlings was formed a unit. The whole set of treatments was replicated three times in a randomized block design (RBD) as a replications. Statistical analysis of the data was carried out by following the standard method of analysis of variance as given by Panse and Sukhatme (1985). Graphs and plates have been used to project the important results.

## **Results and Discussion**

The pooled data pertaining for three year revealed from table no 1 that germination percentage recorded significantly highest in media/ treatment - 1 M-1 (Soil + FYM (3:1) with 1” Cocopeat at top) along with 79.22% and at par with M-3 (Soil + FYM + Cocopeat (2:1:1)). Regarding the numbers of days required for initiation of germination the minimum number of days recorded in M-1 i.e. 36 days which are at par with all other media except M-7 (Soil + FYM + Vermicompost + Cocopeat (1:1:1:1)).

Days required for 50% germination the minimum days required for 50% germination recorded in M-1 (Soil + FYM (3:1) with 1” Cocopeat at top) i.e.52 days which is at par with M-4 Soil + Vermicompost (3:1) with 1” Cocopeat at top which are significantly minimum days.

The total days required for germination (germination period) the media M-1 (Soil + FYM (3:1) with 1” Cocopeat at top) recorded significantly less number of days i.e. 84 days. The highest germination index recorded 77% in M-1 (Soil + FYM (3:1) with 1”

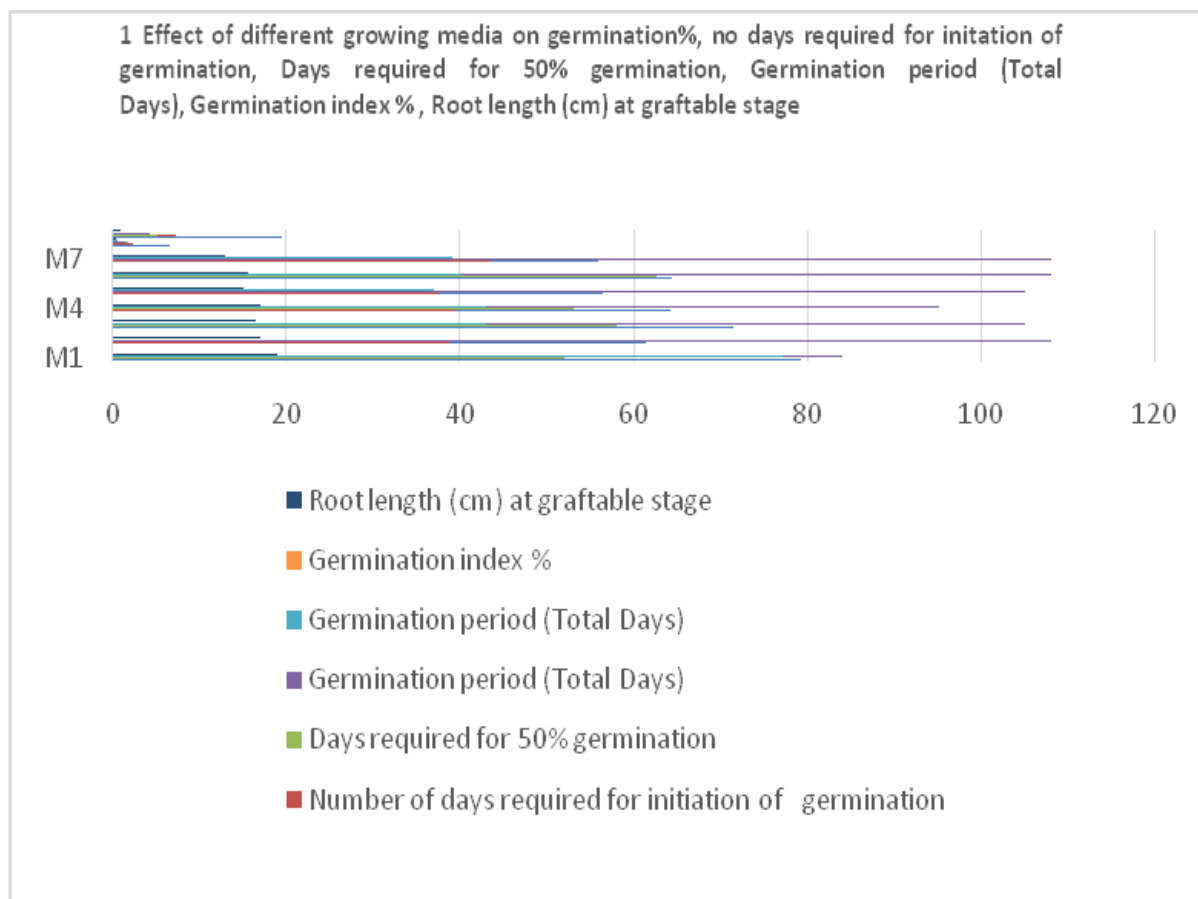
Cocopeat at top). The root length is recorded significantly highest at graftable stage in M-1(Soil + FYM (3:1) with 1” Cocopeat at top) 18.94 cm.

It revealed from table 2 the seedling height at 60 days recorded maximum 12.19 cm in M-1 (Soil + FYM (3:1) with 1” Cocopeat at top) while at graftable stage the Media M-1 recorded highest height of seedling 15.42cm which are at par with M-3 and M-4at graftable stage. The seedling girth at 60 days recorded maximum 239 mm in M-1 (Soil + FYM (3:1) with 1” Cocopeat at top) while at graftable stage the Media M-1 recorded highest girth of seedling 3.77 mm which were at par with M-2 and M-3,M-4,M-5 and M-7 at graftable stage.

The number of leaves at 60 days were recorded maximum 9.22 in M-1 (Soil + FYM (3:1) with 1” Cocopeat at top) while at graftable stage the Media M-1 recorded highest number of leaves recorded 13 which are at par with M-3,M-4,M-6 and M-7 at graftable stage.

The leaf length at 60 days recorded maximum 9.59 cm in M-1 (Soil + FYM (3:1) with 1” Cocopeat at top) while at graftable stage the Media M-1 recorded highest leaf length 12.85 cm recorded which are at par with M-3 and M-5 at graftable stage. The leaf width at 60 days recorded maximum 3.33 cm in M-1 (Soil + FYM (3:1) with 1” Cocopeat at top) while at graftable stage the Media M-1 recorded highest leaf width 3.85 cm at graftable stage.

**Fig.1**



**Table.1** Effect of different growing media on germination %, no days required for initiation of germination, Days required for 50% germination, Germination period (Total Days), Germination index %, Root length (cm) at graftable stage

Treatment		Germination %	Number of days required for initiation of germination	Days required for 50% germination	Germination period (Total Days)	Germination index %	Root length (cm) at graftable stage
M <sub>1</sub>	Soil + FYM (3:1) with 1” Cocopeat at top	79.22 (63.05)*	36.00	52.00	84	77 (62.42)*	18.94
M <sub>2</sub>	Soil + FYM + Rice husk (2:1:1) with 1” Cocopeat at top	61.33 (51.71)*	38.67	62.11	108	47(43.07)*	17.04
M <sub>3</sub>	Soil + FYM + Cocopeat (2:1:1)	71.44 (58.36)*	37.56	57.89	105	43 (41.13)*	16.36
M <sub>4</sub>	Soil + Vermicompost (3:1) with 1” Cocopeat at top	64.20 (53.40)*	39.45	53.00	95	43 (41.33)*	16.88
M <sub>5</sub>	Soil + Vermicompost + Rice husk (2:1:1) with 1” Cocopeat at top	56.45 (48.81)*	37.45	59.78	105	37 (37.32)*	15.06
M <sub>6</sub>	Soil + Vermicompost + Cocopeat (2:1:1)	64.36 (53.89)*	38.00	62.56	108	40 (39.23)*	15.61
M <sub>7</sub>	Soil + FYM + Vermicompost + Cocopeat (1:1:1:1)	55.89 (48.45)*	43.55	57.44	108	39 (38.39)*	12.98
<b>SEm±</b>		6.57	2.38	1.72	1.46	0.5	0.32
<b>CD @ 5%</b>		19.38	7.3	5.07	4.31	0.16	0.93

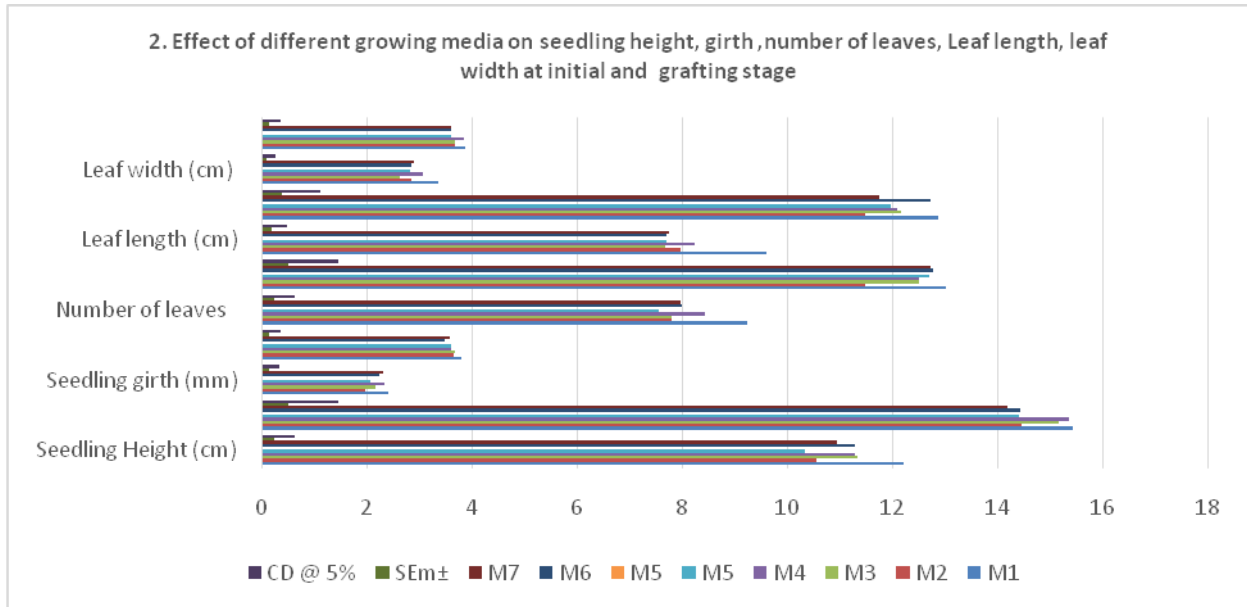
**Table.2** Effect of different growing media on seedling height, girth, number of leaves, Leaf length, leaf width at initial and grafting stage

Treatment		Seedling Height (cm)		Seedling girth (mm)		Number of leaves		Leaf length (cm)		Leaf width (cm)	
		At 60 days	Graftable stage	At 60 days	Graftable stage	At 60 days	Graftable stage	At 60 days	Graftable stage	At 60 days	Graftable stage
<b>M<sub>1</sub></b>	Soil + FYM (3:1) with 1” Cocopeat at top	12.19	15.42	2.39	3.77	9.22	13.00	9.59	12.85	3.33	3.85
<b>M<sub>2</sub></b>	Soil + FYM + Rice husk (2:1:1) with 1” Cocopeat at top	10.53	14.44	1.96	3.64	7.78	11.47	7.94	11.47	2.82	3.65
<b>M<sub>3</sub></b>	Soil + FYM + Cocopeat (2:1:1)	11.32	15.15	2.15	3.65	7.78	12.49	7.65	12.14	2.61	3.65
<b>M<sub>4</sub></b>	Soil + Vermi-compost (3:1) with 1” Cocopeat at top	11.26	15.33	2.31	3.58	8.42	12.49	8.21	12.07	3.05	3.82
<b>M<sub>5</sub></b>	Soil + Vermi-compost + Rice husk (2:1:1) with 1”Cocopeat at top	10.32	14.39	2.05	3.58	7.53	12.69	7.68	11.96	2.80	3.59
<b>M<sub>6</sub></b>	Soil + Vermi-compost + Cocopeat (2:1:1)	11.28	14.42	2.23	3.47	7.98	12.75	7.68	12.70	2.84	3.59
<b>M<sub>7</sub></b>	Soil + FYM + Vermicompost + Cocopeat (1:1:1:1)	10.92	14.17	2.30	3.57	7.96	12.71	7.73	11.72	2.87	3.58
<b>SEM±</b>		0.21	0.48	0.11	0.11	0.21	0.49	0.16	0.37	0.08	0.12
<b>CD @ 5%</b>		0.62	1.43	0.32	0.33	0.60	1.44	0.47	1.10	0.25	0.34

**Table.3** Effect of different growing media on seedling leaf area, Absolute growth rate, Relative growth rate, survival percentage, saleable percentage and number of days required for graftable stage.

Treatment		Leaf area(cm) <sup>2</sup>		Absolute growth rate (cm/day)	Relative growth rate (cm/cm/day)	Survival %		Number of seedling to attended graftable stage	Percent graftable seedlings	Number of days required for graftable stage
		At 60 days	Graftable stage			At 60 days	Graftable stage			
M <sub>1</sub>	Soil + FYM (3:1) with 1” Cocopeat at top	31.52	49.47	0.04	0.005	100 (90)*	99.33 (87.29)*	69	87.89 (70.75)*	147
M <sub>2</sub>	Soil + FYM + Rice husk (2:1:1) with 1” Cocopeat at top	22.33	42.79	0.03	0.017	100 (90)*	99.00 (85.38)*	50	79.86 (64.45)*	169
M <sub>3</sub>	Soil + FYM + Cocopeat (2:1:1)	20.31	44.36	0.04	0.005	100 (90)*	98.33 (83.97)*	58	81.60 (65.14)*	168
M <sub>4</sub>	Soil + Vermi compost (3:1) with 1” Cocopeat at top	24.92	46.26	0.05	0.006	100 (90)*	98.33 (84.24)*	50	78.35 (62.81)*	158
M <sub>5</sub>	Soil + Vermi compost + Rice husk (2:1:1)with 1”Cocopeat at top	21.56	44.15	0.03	0.004	100 (90)*	97.66 (82.98)*	39	67.31 (55.54)*	173
M <sub>6</sub>	Soil + Vermicompost + Cocopeat (2:1:1)	21.85	45.82	0.03	0.003	100 (90)*	97.33 (82.37)*	50	77.29 (62.48)*	173
M <sub>7</sub>	Soil + FYM + Vermicompost + Cocopeat (1:1:1:1)	22.21	42.28	0.03	0.002	100 (90)*	95.00 (79.41)*	41	78.12 (62.51)*	172
<b>SEM±</b>		0.92	2.40							2.49
<b>CD @ 5%</b>		2.70	7.07							7.33

**Fig.2**



**Fig.3**

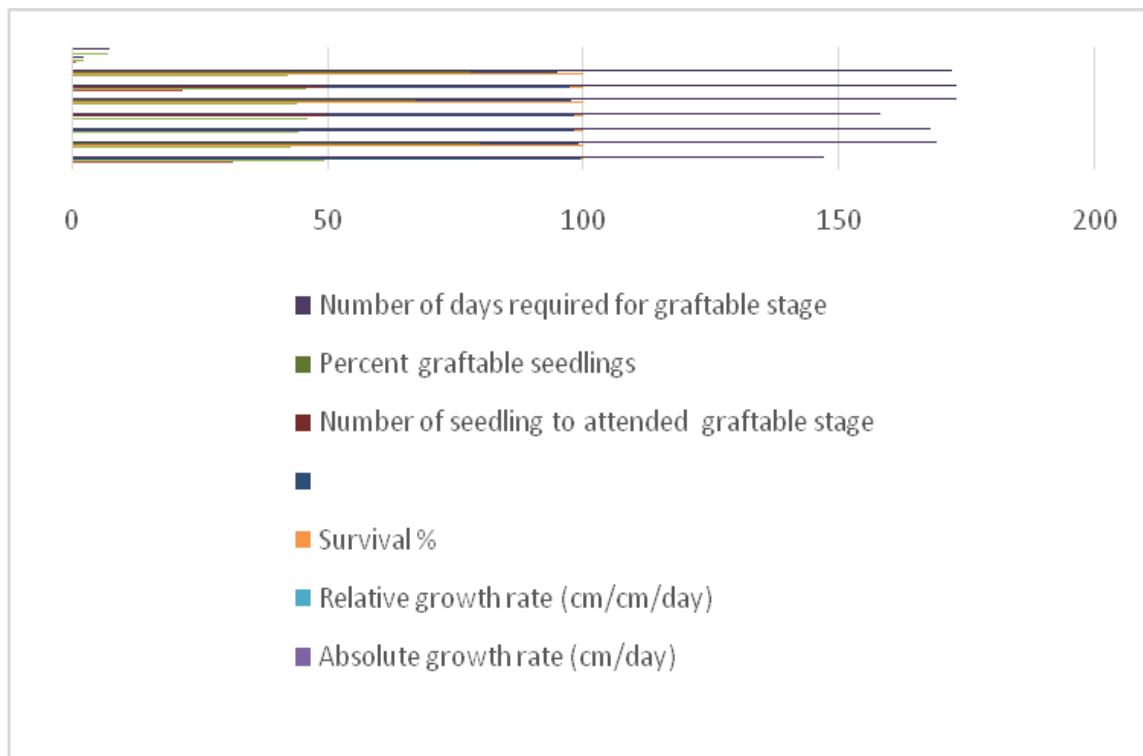


Fig.4



It revealed from table 3 the leaf area at 60 days recorded maximum 31.52 cm<sup>2</sup> in M-1 (Soil + FYM (3:1) with 1” Cocopeat at top) while at graftable stage the Media M-1 recorded highest leaf area 49.47 cm<sup>2</sup> recorded which are at par with M-3, M-4, M-5 and M-6 at graftable stage. The absolute growth rate recorded maximum 0.04 cm/day in M-1 (Soil + FYM (3:1) with 1” Cocopeat at top) while Relative growth rate (cm/cm/day) the Media M-1 recorded 0.005 cm/cm/day.

The survival % at 60 days 100% survival recorded in all media while at graftable stage the Media M-1 recorded highest survival recorded 99.33% at graftable stage. Number of seedling to attain graftable stage recorded maximum in M-1 (Soil + FYM (3:1) with 1” Cocopeat at top) i.e. 69 graftable stage.

The % graftable seedling the maximum 87.89 % graftable seedling recorded in M-1 (Soil + FYM (3:1) with 1” Cocopeat at top). The Number of days required for graftable stage the significantly minimum days required to attain the graftable stage 147 days recorded in M-1 (Soil + FYM (3:1) with 1” Cocopeat at top).

It is concluded that seedling growing media Soil + FYM (3:1) with 1” Cocopeat at top is recorded significantly minimum days to attain the graftable stage i.e. 147 days along with highest germination % and Survival %.

### Authors' Contribution

Conceptualization of Research (PPD, MSG, PCH, PMH); Designing of the experiment (PPD, MSG); contribution of experiments (PCH) Execution of field/lab experiments data collection (PPD, HPN); analysis of data interpretation (PPD, HPN, MSG) Preparation of manuscript (PPD, HPN).

### Declaration

There were no conflict of interest to declare by the authors.

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