Response of clove (*Syzygium aromaticum* (L.) Merr. & Perry) seedlings and black pepper (*Piper nigrum* L.) cuttings to propagating media under nursery conditions[1]

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ABSTRACT

Various propagating media were evaluated for enhancing growth of clove (*Syzygium aromaticum* L.) seedlings in the nursery and the best was soil and vermicompost mixed in 1 : 1 proportion. The transplanting time of clove seedlings could also be shortened to 1 year by adopting this media in the nursery. Vermicompost was also evaluated as a propagating media for black pepper (*Piper nigrum* L.) in comparison with potting mixture comprising of soil, sand and farmyard manure. Black pepper cuttings raised in vermicompost were significantly taller and had more number of leaves than in potting mixture.

Key words : black pepper, clove, nursery, *Piper nigrum*, propagating media, *Syzygium aromaticum*.

Introduction

Clove (*Syzygium aromaticum* (L.) Merr. & Perry) is generally propagated through seeds. The seeds are sown in sand beds and the seedlings raised in the nursery are transplanted to the main field after attaining sufficient growth (height). Verheij & Snijders (1989) stated that seedlings with more than 30 cm height are suitable for planting in the main field. Generally it takes 1 (Prasanna Kumari Amma 1981) to 2 years (Krishnamoorthy 1988) for transplanting to the main field. Application of fertilizer solution at monthly intervals promotes early vigour in the nursery (Bavappa & Reuttiman 1981). If the seedlings attain sufficient growth at an early stage itself they can be transplanted to the main field earlier. This is possible by manipulating nursery practices especially propagating media.

Black pepper (*Piper nigrum* L.) is generally propagated by cuttings. Direct field planting of cuttings collected from terminal or runner shoots leads to poor field establishment. Hence, it is necessary to plant it initially in the nursery for development of sufficient root system. In order to attain good root

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system, various propagating media comprising of different proportions of soil, sand, farmyard manure and compost are in use. Rasing single node cuttings under the rapid multiplication system, Sivaraman (1992) adopted soil, farmyard manure and sand in 3:1:1 proportion. Apart from propagating media, the beneficial effect of growth regulators for enhancing root and shoot growth of black pepper is also known (Kandiannan, Sivaraman & Thankamani 1994). The present study was undertaken to find out the effect of various propagating media including vermicompost on growth of clove seedlings and black pepper cuttings in the nursery.

Materials and methods

The experiment on clove seedlings was conducted at Indian Institute of Spices Research, Calicut during August 1994 to April 1995. Clove seeds collected from Carmalgiri Estate, Nagercoil (Tamil Nadu) were sown on sand beds immediately after harvest. The beds were watered daily and the seedlings on germination were transferred to polythene bags of 20 x 15 cm size filled with different media. A single seedling was planted in each bag and maintained in nursery sheds. The propagating media evaluated were, sand, soil, farmyard manure, forest leaf, coir dust, vermicompost and coir dust compost mixed in different proportions. The earthworm species *Phretima heterochaeta* (Mich.) and *Megascolex trivandranus* (Steph.) collected from Peruvannamuzhi (Calicut District, Kerala) were used for making vermicompost. Coir dust was supplied by M/s Western India Plywood Ltd., Cannanore. There were 24 treatments replicated thrice, in a completely Randomised Block Design. The details of various treatments and nutrient status of propagating media are given in Table 1. Growth parameters like height and number of branches were recorded after 1 year of growth. Three plants per treatment were also destructively sampled for measuring length of tap root and dry weight of root.

In black pepper, 3/4th portion of polythene tubes of 30 x 10 cm size were filled with vermicompost and a single node cutting (*var.* Pournami) was planted. A single node cutting of the same variety planted in potting mixture containing soil, sand and farmyard manure in 3:1:1 proportion was maintained as control. Thirty cuttings were maintained in each group. The experiment was conducted at the Experimental Farm of Indian Institute of Spices Research during December 1994 to April 1995. Growth parameters, such as height and number of leaves of the cuttings were recorded after 3 and 6 months of growth.

Results and discussion

The effect of different propagating media on height of clove seedlings was significant in all the treatments. After 1 year of growth, maximum height (107.3 cm) was observed in seedlings grown in soil and vermicompost in 1:1 proportion, followed by soil and vermicompost in 2 : 1 proportion (104.7 cm). Least height (37 cm) was observed in seedlings grown in soil, sand and farmyard manure (3:1:1 proportion). Maximum number of branches was observed in seedlings grown in soil and vermicompost (1:1proportion) (2.87) and least in soil, farmyard manure and sand (3:1:1 proportion) (0.13). Length of taproot was maximum (34.82 cm) in seedlings raised in soil and vermicompost (1:1 proportion) and minimum (12.58

Table 1. Initial nutrient status of propagating media for clove

Treatment		N (%)	P (%)	K (%)
SO:SA:FM:CD	1:1:1:1	0.10	0.10	0.16
	2:1:1:1	0.10	0.10	0.15
	3:1:1:1	0.10	0.10	0.11
SO:SA:FM:SD	1:1:1:1	0.09	0.05	0.08
	2:1:1:1	0.13	0.10	0.28
	3:1:1:1	0.13	0.50	0.23
SO:SA:FM:FL	1:1:1:1	0.17	0.10	0.28
	2:1:1:1	0.17	0.10	0.29
	3:1:1:1	0.17	0.10	0.29
SO:SA:FM:VC	1:1:1:1	0.28	0.24	0.27
	2:1:1:1	0.10	0.10	0.12
	3:1:1:1	0.29	0.23	0.38
SO:SA:FM:CD	1:1:1:1	0.14	0.10	0.24
	2:1:1:1	0.15	0.10	0.28
	3:1:1:1	0.15	0.10	0.25
SA:VC	1:1	0.80	0.60	0.38
	2:1	0.40	0.40	0.39
SA:CD	1:1	0.13	0.10	0.22
	2:1	0.13	0.10	0.19
SO:VC	1:1	1.20	1.30	0.60
	2:1	1.00	1.10	0.50
SO:CD	1:1	0.20	0.10	0.40
	2:1	0.19	0.10	0.35
SO:SA:FM	3:1:1	0.06	0.03	0.05

SO = Soil; SA = Sand; FM = Farmyard manure; SD = Sawdust; FL = Forest leaf; VC = Vermicompost; CD = Coir dust compost

Table 2. Effect of propagating media on growth characters of clove seedlings

Treatment		Height (cm)	No. of branches	Length of tap root (cm)	Dry weight of root (g)
SO:SA:FM:CD	1:1:1:1	65.27	0.47	22.87	2.72
	2:1:1:1	85.00	1.00	13.13	2.45
	3:1:1:1	81.20	0.87	18.88	2.91
SO:SA:FM:SD	1:1:1:1	56.07	1.27	21.80	2.31
	2:1:1:1	83.20	1.30	17.61	1.73
	3:1:1:1	84.80	0.60	16.85	3.01
SO:SA:FM:FL	1:1:1:1	42.27	2.07	18.51	2.32
	2:1:1:1	46.80	0.93	15.13	2.09
	3:1:1:1	32.67	1.47	20.21	2.35
SO:SA:FM:VC	1:1:1:1	59.53	0.95	14.73	2.18
	2:1:1:1	85.93	1.13	14.95	2.66
	3:1:1:1	89.73	1.87	29.47	2.98
SO:SA:FM:CD	1:1:1:1	60.80	1.70	17.68	2.30
	2:1:1:1	59.47	2.18	20.61	2.12
	3:1:1:1	62.13	1.03	29.78	2.72
SA:VC	1:1	85.80	2.00	29.67	2.36
	2:1	91.93	2.27	33.51	2.48
SA:CD	1:1	66.00	0.93	17.72	2.61
	2:1	79.13	1.40	16.05	3.93
SO:VC	1:1	107.27	2.87	34.82	4.58
	2:1	104.73	2.00	33.27	3.71
SO:CD	1:1	81.67	1.53	22.26	2.93
	2:1	82.93	1.53	16.57	1.35
SO:SA:FM	3:1:1	37.00	0.13	12.58	1.06
CD (P=0.05)		8.24	1.37	3.29	NS

SO = Soil; SA = Sand; FM = Farmyard manure; SD = Sawdust; FL = Forest leaf; VC = Vermicompost; CD = Coir dust compost; NS = Not significant

cm) in soil, farmyard manure and sand. The effect of propagating media on dry weight of root was not significant (Table 2).

A key factor determining the vigour of seedlings is the condition of the propagating media. A good propagating medium must be sufficiently firm and dense to hold the seedling in place during rooting and should also have better water and nutrient holding capacity; it should also be sufficiently porous so that excess water drains away providing adequate aeration (Keshava Reddy, Venkaiah & Praveena 1993). Vermicompost probably has all the qualities mentioned above apart from containing growth regulating substances (Neilson 1964), high nutrient status (Krishnakumar *et al.* 1994) and beneficial microorganisms (Brown 1955). Seedlings grown in sand and vermicompost media (2:1 proportion) also had good growth probably due to its good porosity, capacity to absorb large a quantity of water and its ability to provide substantial nutrients to growing seedlings. The propagating media consisting of soil, sand and farm yard manure (3:1:1 proportion) could not perform well probably because it contained less nutrients and lacked proper aeration compared to vermicompost mixtures. The results obtained with other propagating media, namely, forest leaf and coir dust was also appreciable probably because they contained growth promoting characteristics. The transplanting time of clove seedlings could also be shortened to 1 year by using vermicompost, thus saving on maintenance cost in the nursery.

In black pepper, vermicompost had a positive and significant effect on height and number of leaves after 3 and 6 months of growth. The height of cuttings raised in vermicompost and in potting mixture containing soil, sand and farmyard manure (3:1:1 proportion) was 137.63 and 10.4 cm, respectively, after 6 months of growth. The number of leaves produced (after 3 and 6 months of growth) was higher (6.20 and 20.07) in cuttings raised in vermicompost compared to these raised in potting mixture (3.26 and 8.10) (Table 3). The positive effect of vermicompost on viguor of cardamom seedlings has been reported by Krishnakumar *et al.* (1994). The reasons for the probable beneficial effect of vermicompost as a propagating medium has been discussed earlier in this paper.

Table 3. Effect of propagating media on growth characters of black pepper cuttings

Media	Height (cm)		No. of leaves	
	After 3 months	After 6 months	After 3 months	After 6 months
Vermicompost	36.40	137.63	6.20	20.07
Potting mixture	10.40	51.50	3.26	8.10
t-value	25.00**	47.19**	12.15**	19.18**

** Significant at 1% level

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