



Short communication

Influence of potting media on growth of *Asparagus densiflorus* 'Meyersii'

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ABSTRACT

A study was conducted on the influence of growth media on development of *Asparagus densiflorus* 'Meyersii' at Horticultural Research Station, Yercaud during the years 2011-12. The pot experiment was laid out under open condition, with nine set of treatments comprising various combinations of soil, sand, FYM, vermicompost and microbial consortia (*Azospirillum*, *phosphobacteria* and *Pseudomonas fluorescens*). From among the media combinations used, the treatment involving Soil + Sand + FYM + Vermicompost (T3) @ 2:1:1:0.5 (670g+375g+375g+165g) was found to be the best substrate for vegetative and root characters like plant height, shoot number, leaflet number, leaflet length, leaflet width, root number, root length, bulb number, bulb length, bulb width and vase-life in *Asparagus densiflorus* 'Meyersii'.

Key words: *Asparagus densiflorus* 'Meyersii', growth media, vegetative and root characters, vase-life

Asparagus densiflorus 'Meyersii' is a woody evergreen herbaceous perennial, with upright or trailing branches growing up to 2 feet. Tiny spines are borne in axils along branches. Needle-like branchlets are clustered around nodes. *Asparagus* looks soft and fluffy. It can be easily grown with minimal care, without pest and disease problems. It can be grown as ground cover, indoor plant, hanging basket, landscape border and entry point ornamental. Best potted plants are raised in friable, mild-textured substrates for optimal growth and flowering. Some substrates such as peat, perlite and vermiculite have been successfully used by growers, but their cost and availability are limiting factors. Commonly used growth media containing soil, sand and FYM lead to compaction of this crop having fleshy and sensitive fibrous roots. Therefore, a need was felt to standardize locally available, cheap, good quality growth media for successful pot culture of *Asparagus densiflorus* 'Meyersii'.

The pot experiment was conducted at Horticultural Research Station, Tamil Nadu Agricultural University, Yercaud. The experimental site is geographically situated between 11°04" and 11°05" North latitude and 78°05" and 78°23" East longitude at an altitude of 1500m above Mean Sea Level. Average maximum and minimum temperature range between 31.0°C and 12.4°C, respectively. Mean annual rainfall of Yercaud is 1572 mm and average relative humidity is 75%. Uniform sized young plants of 15cm height

were collected and planted in 30cm diameter earthen pots, with one plant per pot, in the last week of September 2011 in six growth media formulated using soil, sand, FYM, Vermicompost, Cocopeat, microbial consortia, viz., *Azospirillum*, *phosphobacteria* and *Pseudomonas fluorescens*. The experiment was laid out in Completely Randomized Block Design, with nine set of treatments, and replicated three times containing ten plants each. Data was generated on vegetative and root characters at 30 day intervals. Vegetative characters like plant height, number of shoots, number of leaflets, length of leaflet, width of leaflet and root characters like number of roots, root length, number of bulbs, length of bulb, width of bulb and, finally, vase-life were studied. Available nitrogen in the media was estimated by alkaline permanganate as per Subbiah and Asijia (1956). Available phosphorus in the media was estimated by Klett Summerson colorimeter method using red filter (Olsen *et al*, 1954). Available potassium in the media was estimated using neutral, normal ammonium acetate, and values were expressed in kg/ha (Hanway and Heidal, 1952). Micronutrient content, viz., Fe, Zn, Mn and Cu in various media was estimated by the triple acid extract method, using an atomic absorption spectrophotometer, and expressed in g/kg (Jackson, 1973). Nitrogen content in the leaf sample on dry weight basis was estimated by the method of Humphries (1956). Phosphorus and potassium content in leaf samples were also estimated using a flame photometer

(Jackson, 1973). Micronutrients in leaf samples, viz., Fe, Mn, Zn and Cu, were estimated using an atomic absorption spectrophotometer, and were expressed as ppm (Lindsay and Norell, 1978).

Treatment combinations are detailed below:

Treatment combination	Particulars
T 1	Soil + Sand + FYM (2:1:1) (750g + 375g+ 375g)
T2	Soil + Sand + Vermicompost (2:1:1) (750g + 375g + 375g)
T3	Soil + Sand + FYM + Vermicompost (2:1:1:0.5) (670g + 335g + 335g + 165g)
T4	T3 (670g + 335g + 335g + 165g) + Microbial Consortia (<i>Azospirillum</i> 2g/pot, phosphobacteria 2g/pot and <i>Pseudomonas fluorescens</i> 20g/pot added at the time of media preparation)
T5	Cocopeat + Sand + FYM (2:1:1) (750g + 375g + 375g)
T6	Cocopeat + Sand + Vermicompost (2:1:1) (750g + 375g + 375g)
T7	Cocopeat + Sand + FYM + Vermicompost (2:1:1:0.5) (670g + 335g + 335g + 165g)
T8	T7 (670g + 335g + 335g + 165g) + Microbial Consortia (<i>Azospirillum</i> 2g/pot, phosphobacteria 2g/pot and <i>Pseudomonas fluorescens</i> 20g/pot) added at the time of media preparation)
T9	Control

Growth media consisting of Soil + Sand+ FYM+ Vermicompost (T3) induced higher plant height at all the stages. It resulted in the tallest plant (27cm) on 180th day after planting, while, the Control (T9) had dwarf plants (8.57cm) (Table 1). The substrate combination of Soil + Sand + FYM+ Vermicompost (2:1:1:0.5) (T3) produced higher number of stems in *Asparagus densiflorus*

‘Meyersii’. Number of leaflets (238.33) was highest in media with (T3) Soil + Sand + FYM+ Vermicompost (2:1:1:0.5). This corroborates the results of Turski *et al* (1983) on anthurium plant and Khayyat *et al* (2007) on *Epipremnum aureum*. The same treatment (T3) produced longer leaflets (1.03cm) than the Control (0.18cm). These findings are in conformity with those of Fascella *et al* (2003) in *Ruscus hypoglossum*. Leaflet width in our study under different growth media had no significant influence on growth for the entire cropping period.

Table 2 shows significant effect of the media combination Soil + Sand + FYM + Vermicompost (T3) on number of roots (30.67) over the Control (10.47). This study confirms the findings of Fageria *et al* (2007). Root length under different growth media produced significantly longer roots (64cm) under Soil + Sand+ FYM + Vermicompost (T3) compared to Control (12.23cm). The present findings are in conformity with those of Papafotiou *et al* (2005) in *Codiaeum variegatum* L. The same treatment produced more bulbs (39.77) than in the untreated Control (12.20).

Length of bulb was significantly influenced by Soil + Sand + FYM + Vermicompost (T3). The same treatment T3 recorded larger bulbs (3.17cm). This is in accordance with Swaminathan *et al* (1999) and Munikrishnappa *et al* (2004) in tuberose.

Width of the bulb (1.75cm) and weight of the bulb (75g) were significantly higher in Soil + Sand + FYM + Vermicompost (T3) than in Control (1.19cm and 24.83g, respectively). These findings are in agreement with Munikrishnappa *et al* (2004) and Shankar Lal *et al* (2010) in tuberose.

Table 1. Effect of growth media on vegetative characters of *Asparagus densiflorus* ‘Meyersii’

Treatment	Vegetative Characters								
	Plant height (cm)		Shoot number		Leaflet number		Leaflet length (cm)		Leaflet width (cm)
	Initial	Final	Initial	Final	Initial	Final	Initial	Final	
T1	9.69	22.63	7.23	10.43	125.00	190.33	0.47	0.73	0.1
T2	8.05	15.67	5.50	14.03	149.00	181.00	0.51	0.72	0.1
T3	10.20	27.00	9.17	19.00	155.33	238.33	0.61	1.03	0.1
T4	8.11	24.20	7.57	12.87	118.00	207.33	0.36	0.69	0.1
T5	7.79	11.03	5.37	7.77	133.33	175.00	0.26	0.51	0.1
T6	7.84	10.50	7.17	9.53	142.33	212.33	0.17	0.43	0.1
T7	7.16	9.83	5.37	7.57	110.67	169.00	0.30	0.27	0.1
T8	8.74	10.80	5.23	7.50	126.00	178.00	0.18	0.22	0.1
T9	7.29	8.57	4.80	6.97	97.33	154.67	0.10	0.18	0.1
SE(d)	0.95	0.69	1.22	1.20	21.14	32.61	0.12	0.11	NS
CD (<i>P</i> =0.05)	1.99	1.46	2.57	2.53	44.42	68.51	0.25	0.23	NS

Table 2. Effect of growth media on root characters and vase-life of *Asparagus densiflorus* 'meyersii'

Treatment	Root characters											
	Root number		Root length (cm)		Bulb number		Bulb length (cm)		Bulb width (cm)		Bulb weight (g)	Vase-life (days)
	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final		
T1	13.57	23.60	52.27	62.00	20.30	31.00	1.60	2.83	0.87	1.39	60.00	5.97
T2	13.87	23.97	23.70	34.73	28.50	32.37	1.98	2.60	0.71	1.32	46.33	6.20
T3	18.47	30.67	54.00	64.00	30.17	39.77	2.08	3.17	0.89	1.75	75.00	7.47
T4	12.70	21.27	27.07	39.70	19.33	27.83	1.42	2.66	0.76	1.27	48.50	6.67
T5	10.43	15.37	8.38	13.93	10.97	17.60	1.40	2.97	0.85	1.36	30.67	5.20
T6	13.10	20.60	25.00	34.13	15.93	24.57	1.78	2.88	0.80	1.33	51.17	5.43
T7	9.83	17.33	18.03	27.20	9.03	14.53	1.67	2.65	0.79	1.34	29.23	5.27
T8	10.23	18.60	26.63	34.43	15.57	22.83	1.80	2.71	0.69	1.24	31.33	5.70
T9	6.83	10.47	5.67	12.23	8.30	12.20	1.30	2.45	0.60	1.19	24.83	4.33
SE(d)	2.42	2.12	2.83	1.57	1.55	1.10	0.20	0.19	0.12	0.08	1.27	0.32
CD ($P=0.05$)	5.07	4.46	5.94	3.30	3.26	2.31	0.44	0.39	0.24	0.16	2.67	0.68

Table 3. Effect of media on soil nutrient availability in *Asparagus densiflorus* 'Meyersii'

Treatment	Available soil nutrients						
	Macronutrients (Kg ha ⁻¹)			Micronutrients (ppm)			
	N	P	K	Fe	Zn	Mn	Cu
T1	221.00	10.37	91.33	18.17	1.96	19.22	3.82
T2	215.00	11.45	85.67	18.27	1.98	19.68	3.79
T3	191.00	9.65	80.33	16.97	1.89	18.50	3.57
T4	201.00	10.50	108.44	18.44	2.03	19.58	4.14
T5	230.00	10.65	106.00	18.46	1.99	22.11	4.16
T6	242.00	10.90	101.33	19.29	1.95	20.58	3.83
T7	241.00	10.93	119.00	18.40	1.95	22.33	3.93
T8	235.00	11.04	110.00	18.11	1.95	22.00	4.13
T9	252.00	12.17	120.00	19.94	2.20	22.67	4.22
SE(d)	3.74	0.42	3.49	0.25	0.04	0.69	0.08
CD ($P=0.05$)	7.86	0.88	7.34	0.52	0.08	1.46	0.16

Nutrient availability

Plants in the treatment comprising Soil + Sand+ FYM + Vermicompost (T₃) had highest available nitrogen (191.00kg ha⁻¹), phosphorus (9.65kg ha⁻¹) and potassium (80.33kg ha⁻¹) and also recorded higher concentration of micronutrients like iron (16.97ppm), zinc (1.89ppm), manganese (18.50ppm) and copper (3.57ppm) than in the Control (Table 3). Yansong *et al* (2008) reported chicken manure to contain greater amounts of available N than peat moss; Bunt (1988) and Meinken and Schraff (1988) in chrysanthemum; Basker and Saravanan (1977) and Richard *et al* (2010) in *Aglaonema* 'Science Bay'. Ahmad and Qasim (2003) found that Poultry manure + Sand + Silt + Sawdust (2:1:1:1) combination resulted in maximum available phosphorus.

Mineralization and immobilization process of N, and its availability, are influenced by the amount of organic waste added. Phosphorus content of any media had a significant

Table 4. Effect of media on leaf nutrient content in *Asparagus densiflorus* 'Meyersii'

Treatment	Leaf nutrients						
	Macronutrients (Kg ha ⁻¹)			Micronutrients (ppm)			
	N	P	K	Fe	Zn	Mn	Cu
T1	1.96	0.17	4.89	65.00	39.00	67.33	7.33
T2	1.95	0.19	4.55	64.00	35.67	63.33	9.04
T3	2.00	0.22	5.11	80.67	41.00	70.18	10.50
T4	1.95	0.18	4.87	68.00	34.00	65.67	7.33
T5	1.87	0.17	4.30	63.00	36.67	65.00	9.04
T6	1.93	0.18	4.54	66.67	34.00	63.67	6.50
T7	1.97	0.17	4.26	67.33	37.00	62.33	9.04
T8	1.95	0.16	4.67	67.52	32.67	61.78	8.43
T9	1.84	0.14	4.11	60.33	31.33	60.40	5.00
SE(d)	0.03	0.02	0.08	1.33	1.40	1.47	0.31
CD ($P=0.05$)	0.06	0.05	0.16	2.80	2.93	3.09	0.66

influence on root development in the crop. Chen *et al* (1988) experimented with various media, viz., peat, composted cattle-manure and their mixtures, to analyze 'P' content. They observed that cattle manure had the highest P content (125mg 100g⁻¹). This holds true in the present investigation where addition of FYM to the media consortia increased P content in the media. Potassium content in various media was influenced by addition of organic amendments to the media. Yansong *et al* (2008) reported higher levels of N, K, Ca and Mg in a medium consisting of 100% poultry manure. Vermicompost and FYM may have acted as a source of macro- and micronutrients (Zn, Fe, Cu and Mn), enzymes and growth hormones in the early crop-growth phase which, in turn, encouraged early vigorous growth (Table 4).

Foliage from the treatment combination Soil + Sand + FYM + Vermicompost (T₃) had the longest vase-life (7.47 days). Increase in vase-life was probably due to a trigger in metabolic activity, and due to narrowing of C:N ratio by

significant accumulation of carbohydrates. This is in accordance with Khalaj *et al* (2010) in gerbera.

From our study, it can be concluded that media consisting of Soil + Sand + FYM + Vermicompost (T3) (2:1:1:0.5 - 670g + 335g + 335g + 165g) can significantly improve growth, yield and quality parameters, which ultimately result in increased net returns (2.72:1) in *Asparagus densiflorus* 'Meyersii' under pot culture.

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