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Short communication

Effect of various nursery media on onion seedlings development

Devi Singh and Vijay Bahadur
Department of Horticulture
Allahabad Agricultural Institute - Deemed University
Allahabad-211007, India
E-mail: vijay_rajwade@yahoo.com

ABSTRACT

A field experiment was conducted to standardize the nursery raising technique for onion at the Horticulture Research Farm, Department of Horticulture, Allahabad Agricultural Institute - Deemed University, Allahabad, during 2005-2006. The treatments comprised combinations of soil, sand, FYM and vermicompost. Altogether, 14 treatments were applied in a randomized block design with three replications. Hundred percent germination was found with a combination of soil, sand and FYM in proportions of 2:1:2 & 2:2:1, and, 1:1:1 & 2:2:1 Soil:Sand:Vermicompost. Among all the treatments, the combination of soil 2 parts, sand 1 part and FYM 2 parts, significantly influenced growth and health of seedlings and produced the maximum seedling height (11.42 cm), stem diameter (0.33 cm), root length (10.86 cm), shoot fresh weight (6.96 g), root fresh weight (3.22 g), total seedling fresh weight (10.18 g), shoot dry weight (3.95 g), root dry weight (1.53 g) and total seedling dry weight (5.48g). Highest benefit:cost ratio of 3.72 was also seen in this treatment combination.

Key words: Onion, vermicompost, FYM, nursery, seedlings

Onion (*Allium cepa* L.), an important member of the genus *Allium* of the family Alliaceae, is believed to have originated in Uzbekistan. India ranks second in the world in area and production after China, and, third in export after the Netherlands and Spain. It is an important vegetable crop of our country under an area of 4.81 lakh hectares, producing 54.61 lakh tonnes of bulbs both for local consumption and export. India exported 3,33,349 tonnes valued at Rs.20,216 lakh (Singh, 2005). Onion bulbs are rich in phosphorus, calcium, carbohydrates and Vitamin C.

Nursery is a place where seedlings are grown to be transplanted in the field. In India, the traditional method of nursery management under open-field condition is completely dependent on vagaries of nature and about 15-20 % seedlings are damaged. Therefore, it is necessary to standardize the nursery raising technique in a scientific way to obtain healthy and vigorous seedling for the growers. In raising a vegetable nursery, rooting and growth media are the most important factors for growth and development of seedlings and the root. But, under mostly open-field conditions, farmers use only soil and FYM in an inadequate proportion. In place of FYM several other organic manures like vermicompost, poultry manure, NADEP compost etc., are available which could be utilized for production of better and healthy seedlings. These manures are easily available, retain sufficient water and air and allow sufficient drainage, thus, providing a congenial rhizosphere for better root-growth. Moreover, these nursery media improve water holding capacity of the soil under open-field conditions. With this in view sand, soil, FYM and vermicompost were used in this investigation in various proportions to accomplish better growth and seedling production in onion.

The experiment was conducted at the Vegetable Research Farm, Department of Horticulture, Allahabad Agricultural Institute-Deemed University, Allahabad (U.P.), during the rabi season of 2005. Onion variety Pusa Red was used in the experiment. Fourteen treatments comprising soil, sand, FYM (Farm Yard Manure) and VC (Vermicompost) were replicated three times. The treatment combinations were T_1 : Soil + sand + FYM (1:1:1), T_2 : Soil + sand + FYM (1:1:2), T_3 : Soil + sand + FYM (1:2:1), T_4 : Soil + sand + FYM (1:2:2), T_5 : Soil + sand + FYM (2:1:1), T_6 : Soil + sand + FYM (2:1:2), T_7 : Soil + sand + FYM (2:2:1),T_8 : Soil + sand + VC (1:1:1), T_9 : Soil + sand + VC (1:1:2),T_{10} : Soil + sand + VC (1:2:1), T_{11} : Soil + sand + VC (1:2:2), T_{12} : Soil + sand + VC (2:2:1), T_{13} : Soil + sand + VC (2:1:2) and T_{14} : Soil + sand + VC (2:2:1). The treatments were laid out in a randomized block design with a nursery plot size 1m x 1 m. Observations were recorded on ten randomly selected plants from each plot for various characters, viz., percent germination at 8, 9, 10 and 11 days after sowing (DAS), seedling height (at 15, 35 and 45 DAS), stem diameter, seedling fresh and dry weight, root and shoot fresh and dry weights at 45 DAS.

Table 1. Influence of various nursery media on raising onion seedlings

Treatment	% germination at 10 DAS	Seedling height (cm)	Stem diameter (cm)	Root length (cm)	Shoot fresh weight (g)	Root fresh weight (g)	Total seedlings fresh weight (g)	Shoot dry weight (g)	Root dry weight (g)	Total seedlings dry weight (g)
T_1	70.00	7.09	0.15	7.03	2.86	1.85	4.71	0.49	0.71	1.65
T_2	84.67	8.18	0.18	7.83	3.00	1.89	4.89	1.12	0.83	1.95
T_3	84.33	7.91	0.18	7.61	3.00	1.88	4.88	1.06	0.72	1.78
T_4	87.67	8.50	0.20	8.13	3.27	2.16	5.44	1.30	0.93	2.23
T_5	86.00	8.26	0.19	8.03	3.11	2.05	5.16	1.20	0.84	2.04
T_6	100.00	11.42	0.33	10.86	6.96	3.22	10.18	3.95	1.53	5.48
T_7	100.00	11.22	0.31	10.70	6.55	3.05	9.60	3.57	1.50	5.07
T_8	100.00	10.32	0.26	10.39	4.74	2.77	7.51	2.39	1.44	3.83
T_9	99.33	9.35	0.23	10.02	4.44	2.61	7.05	1.97	1.24	3.21
T_{10}	96.00	8.62	0.21	9.81	3.72	2.28	5.99	1.51	1.04	2.55
T_{11}	99.00	9.14	0.22	9.87	3.89	2.38	6.27	1.52	1.22	2.73
T_{12}	99.00	9.16	0.23	9.88	4.27	2.44	6.71	1.90	1.22	3.12
T_{13}	92.67	8.55	0.21	9.36	3.61	2.22	5.82	1.45	0.99	2.44
T_{14}	100.00	9.56	0.24	10.25	4.44	2.66	7.10	2.16	1.35	3.52
F-Test	S	S	S	S	S	S	S	S	S	S
SEd ±	1.95	0.22	0.02	0.15	0.09	0.06	0.09	0.06	0.03	0.07
CD (*P=0.05*)	4.01	0.45	0.03	0.32	0.18	0.12	0.19	0.12	0.07	0.15

Note: Parameters were recorded at 45 days after sowing except germination percentage

All the treatments showed significant differences for traits like germination percentage, seedling height, seedling fresh and dry weight , stem diameter, root length, fresh and dry weights of roots and shoots (Table 1).

Among the various nursery media, the best performance obtained with application of soil 2 part + sand 1 part + FYM 2 part was found to be significantly superior to the other treatments. This could be due to availability of sufficient nutrient content in FYM. FYM, in ideal combination with soil and sand, created healthy rhizosphere adequate in physico-chemical and biological properties. This combination may have resulted in better growth and seedling production in onion. Similar findings were also reported by Booij *et al* (1985), Ponwell *et al* (1991), Baruah (1997), Boff *et al* (2005) and Tathan (1997). The highest net return of Rs.36560 / 500 m^2 and cost: benefit of 1:3:72 was obtained with application of 2 parts soil + 1 part sand + 2 parts FYM, followed by 2 part soil + 2 part sand + 1 part FYM with a net return of Rs. 36460 / 500 m^2 and cost: benefit ratio of 1:3.71(Table 2). This is also in agreement with the work of Awghad *et al* (1994) in onion.

Table 2. Economics of various treatments imposed

Treatment	Cost of cultivation of raising seedlings for 1 ha(Rs)	Gross returns (Rs.)	Net profit (Rs/ha)	Cost: Benefit ratio
T_1	12600	35000	22400	1:2.77
T_2	13160	42250	29090	1:3.21
T_3	13160	42100	28940	1:3.19
T_4	13720	43800	30080	1:3.19
T_5	12880	43000	30120	1:3.30
T_6	13440	50000	36560	1:3.72
T_7	13440	49900	36460	1:3.71
T_8	14280	49850	35570	1:3.49
T_9	16520	49500	32980	1:2.99
T_{10}	14840	48000	33160	1:3.23
T_{11}	17080	49500	32420	1:2.89
T_{12}	14280	49450	35170	1:3.46
T_{13}	16800	46000	29200	1:2.73
T_{14}	15120	49800	34680	1:3.29

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