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Effect of growing media, structures and sowing dates on seed germination and seedling growth of custard apple cv. 'BALANAGAR'

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ABSTRACT : The treatment of soil : vermicompost : paddy husk (1:2:1) had significant influence by recording maximum seed germination at 30 DAS, seedling length, number of leaves per seedling, number of primary roots per seedling, length of tap root per seedling, number of secondary roots per seedling at 30, 60 and 90 days after sowing. It also recorded the maximum fresh and dry weight of seedling at 90 DAS. The condition of net house with 70 per cent mesh size recorded maximum seed germination at 30 DAS, seedling length, number of leaves per seedling at 30 and 90 DAS, number of primary roots per seedling at 30, 60 and 90 DAS, length of tap root per seedling at 30 and 60 DAS, maximum seedling girth at 30 and 60 DAS as well as maximum fresh and dry weight of seedling at 90 DAS. The sowing of seeds on 15th April, 2012 gave maximum germination at 30 DAS and recorded maximum seedling length, number of leaves per seedling, number of primary roots per seedling, length of tap root per seedling, number of secondary roots per seedling and maximum seedlings girth at 30, 60 and 90 DAS. At 90 DAS, maximum fresh and dry weight of seedling was obtained with sowing on 15th April, 2012.

KEY WORDS : Media, Growing structure, Germination, Seedling growth, Dry weight

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Custard apple (*Annona squamosa* L.), a delicious and important minor fruit crop is cultivated in tropical and sub-tropical climate. The ideal media is an important input for healthy and uniform seedling production and growing environment as well as sowing time also favours the proper growth and development of seedlings.

RESEARCH METHODS

The experiment was conducted at Horticultural Research Farm, Department of Horticulture, B.A. College of Agriculture, Anand Agricultural University, Anand during summer season of the year 2012. The treatments comprised of different growing media (M₁ -

Soil + vermicompost + paddy husk (1:1:1) and M₂ - Soil + vermicompost + paddy husk (1:2:1)), growing structures (T₁ - Naturally open nursery condition and T₂ - Net house with 70% mesh size) and different dates of sowing (D₁ : 01-03-2012, D₂ : 15-03-2012, D₃ : 01-04-2012, D₄ : 15-04-2012 and D₅ : 01-05-2012). The experiment was laid out in a Completely Randomized Block Design (Factorial) with twenty treatment combinations and replicated thrice.

RESEARCH FINDINGS AND DISCUSSION

The findings of the present study as well as relevant discussion have been presented under following heads :

Effect of growing media :

The germination percentage at 30 DAS was influenced with different growing media. Soil: vermicompost: paddy husk (1:2:1) recorded significantly maximum seed germination (73.9%) (Table 1). The seedling length influenced significantly with different growing media. Soil: vermicompost: paddy husk (1:2:1) recorded maximum seedling length at 30, 60 and 90 DAS (7.15, 11.45 and 18.34 cm, respectively). The number of leaves per seedling at 30, 60 and 90 DAS also influenced significantly by different proportion of growing media. Soil: vermicompost: paddy husk at 1:2:1 recorded maximum number of leaves (4.10, 10.50 and 13.63, respectively) per seedling (Chopade *et al.*, 1999).

The number of primary roots per seedling at 30, 60 and 90 DAS got influenced with different proportion of growing media. Soil: vermicompost: paddy husk (1:2:1) significantly recorded maximum number of primary roots per seedling (7.15, 8.00 and 12.02, respectively) at 30, 60 and 90 DAS. The length of tap root per seedling at 30, 60 and 90 DAS was influenced with different proportion of growing media. Soil: vermicompost: paddy husk (1:2:1) significantly recorded the maximum length of tap root per seedling (6.52, 12.52 and 17.37 cm, respectively) as compared to rest of the proportion of growing media (Table 2). The number of secondary roots per seedling at 30, 60 and 90 DAS got influenced by different proportion of growing media. Soil: vermicompost: paddy husk (1:2:1) significantly recorded maximum number of secondary roots per seedling (5.71, 8.77 and 12.06, respectively) at 30, 60 and 90 DAS (Table 1). The seedling girth at 30, 60 and 90 DAS got influenced with different proportion of growing media. Soil: vermicompost: paddy husk (1:2:1) significantly recorded the maximum seedling girth (0.28, 0.47 and 0.71 cm, respectively) at 30, 60 and 90 DAS. The fresh and dry weight of seedling at 90 DAS was influenced by different proportion of growing media. Soil: vermicompost: paddy husk (1:2:1) significantly recorded maximum fresh and dry weight of seedling (2.56 and 1.34 g, respectively) (Table 2).

Effect of growing structures :

The seed germination at 30 DAS got influenced significantly by different growing structures. The maximum seed germination (70.1 %) was obtained under net house with 70 per cent mesh size while minimum seed germination (60.8 %) was observed under naturally open nursery condition. The seedling length at 30 and 60

DAS was influenced significantly by different growing structures. The maximum seedling length (6.37 and 10.07 cm, respectively) was obtained net house with 70 per cent mesh size while minimum seedling length (6.10 and 9.80 cm, respectively) was observed under naturally open nursery condition at 30 and 60 DAS. The number of leaves per seedling was influenced significantly by different growing structures at 30 and 90 DAS. The maximum number of leaves per seedling at 30 and 90 DAS (3.65 and 12.76 leavas) was obtained under net house with 70 per cent mesh size while minimum number of leaves per seedling (3.53 and 12.52, respectively) was observed under naturally open nursery condition at 30 and 90 DAS (Joshi, 2003).

The number of primary roots per seedling was significantly influenced under different growing structures at 30, 60 and 90 DAS. The maximum number of primary roots per seedling (6.37, 7.22 and 11.21, respectively) at 30, 60 and 90 DAS was obtained under net house with 70 per cent mesh size while minimum number of primary roots per seedling (6.23, 7.08 and 11.07, respectively) was observed under naturally open nursery condition at 30, 60 and 90 DAS (Table 1). The length of tap root per seedling at 30 and 60 DAS got influenced significantly by different growing structures. The maximum length of tap root per seedling (5.86 and 11.86 cm, respectively) at 30 and 60 DAS was obtained under net house with 70 per cent mesh size while minimum length of tap root per seedling (5.67 and 11.67 cm, respectively) was observed with naturally open nursery condition at 30 and 60 DAS. The seedling girth got significantly influenced by different growing structures at 30 and 60 DAS. The maximum seedling girth at 30 and 60 DAS (0.24 and 0.43 cm, respectively) was obtained under net house with 70 per cent mesh size while minimum seedling girth (0.23 and 0.42 cm, respectively) was observed under naturally open nursery condition at 30 and 60 DAS (Table 2).

The fresh and dry weight of seedling at 90 DAS got influenced significantly by different growing structures. The maximum fresh and dry weight of seedling (2.21 and 1.09 g, respectively) was obtained under net house with 70 per cent mesh size while minimum fresh and dry weight of seedling (2.09 and 1.04 g, respectively) was observed under naturally open nursery condition (Table 2).

Effect of sowing dates :

Different dates of sowing significantly influenced

Table 1 : Effect of growing media, structures and sowing dates on seed germination, no. of leaves, no. of primary and secondary roots per seedling

Treatments	Seed germination (%) 30 DAS	Seedling length (cm)			Number of leaves per seedling			Number of primary roots/seedling			Number of secondary roots/seedling		
		30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS
Media													
1 : 1 : 1 (Soil + Vermicompost + Paddy husk)	57.0	5.03	8.73	14.79	3.08	9.84	11.65	5.45	6.30	10.25	4.83	7.89	11.18
1 : 2 : 1 (Soil + Vermicompost + Paddy husk)	73.9	7.45	11.15	18.34	4.10	10.50	13.63	7.15	8.00	12.02	5.71	8.77	12.06
S.E. _±	0.459	0.018	0.064	0.151	0.027	0.080	0.046	0.038	0.018	0.041	0.029	0.056	0.049
C.D. (P=0.05)	1.31	0.052	0.182	0.431	0.078	0.230	0.131	0.109	0.052	0.116	0.083	0.159	0.141
Growing structures													
Naturally open nursery condition	60.8	6.10	9.80	16.40	3.53	10.11	12.52	6.23	7.08	11.07	5.23	8.29	11.58
Net House with 70% mesh size	70.1	6.37	10.07	16.72	3.65	10.23	12.76	6.37	7.22	11.21	5.31	8.37	11.66
S.E. _±	0.459	0.018	0.064	0.151	0.027	0.080	0.046	0.038	0.018	0.041	0.029	0.056	0.049
C.D. (P=0.05)	1.31	0.052	0.182	NS	0.078	NS	0.131	0.109	0.052	0.116	NS	NS	NS
Sowing dates													
01-03-2012	54.09	5.35	9.05	15.25	3.14	9.73	11.64	5.68	6.53	10.48	4.92	7.98	11.27
15-03-2012	61.14	5.85	9.55	15.99	3.34	9.93	12.12	5.91	6.75	10.71	5.09	8.16	11.45
01-04-2012	63.64	6.15	9.85	16.49	3.62	10.20	12.62	6.23	7.08	11.03	5.24	8.31	11.60
5-04-2012	82.81	7.18	10.88	17.94	4.02	10.60	13.67	7.08	7.93	12.05	5.67	8.73	12.02
01-05-2012	65.54	6.66	10.36	17.15	3.82	10.40	13.14	6.61	7.45	11.41	5.42	8.48	11.77
S.E. _±	0.726	0.029	0.101	0.238	0.043	0.127	0.073	0.060	0.029	0.064	0.046	0.088	0.078
C.D. (P=0.05)	2.076	0.083	0.289	0.681	0.123	0.364	0.207	0.171	0.083	0.184	0.131	0.252	0.223

NS=Non-significant

Table 2 : Effect of growing media, structures and sowing dates on length of tap root, seedling girth, fresh weight and dry weight of seedling

Treatments	Length of tap root (cm)			Girth of seedling (cm)			Fresh weight(g)	Dry weight (g)
	30 DAS	60 DAS	90 DAS	90 DAS	60 DAS	90 DAS	90 DAS	90 DAS
Media								
1 : 1 : 1 (Soil + Vermicompost + Paddy husk)	5.01	11.01	15.91	0.18	0.38	0.61	1.75	0.79
1 : 2 : 1 (Soil + Vermicompost + Paddy husk)	6.52	12.52	17.37	0.28	0.47	0.71	2.56	1.34
S.E. _±	0.021	0.062	0.049	0.003	0.001	0.005	0.008	0.005
C.D. (P=0.05)	0.059	0.176	0.141	0.008	0.004	0.013	0.024	0.013
Growing structures								
Naturally open nursery condition	5.67	11.67	16.60	0.23	0.42	0.65	2.09	1.04
Net House with 70% mesh size	5.86	11.86	16.67	0.24	0.43	0.67	2.21	1.09
S.E. _±	0.021	0.062	0.049	0.003	0.001	0.005	0.008	0.005
C.D. (P=0.05)	0.059	0.176	NS	0.008	0.004	NS	0.024	0.013
Sowing dates								
01-03-2012	5.00	11.00	15.97	0.20	0.39	0.63	1.79	0.77
15-03-2012	5.30	11.30	16.18	0.22	0.41	0.64	1.99	0.94
01-04-2012	5.80	11.80	16.77	0.23	0.42	0.66	2.11	1.09
15-04-2012	6.50	12.50	17.17	0.27	0.47	0.70	2.55	1.33
01-05-2012	6.23	12.23	17.11	0.24	0.44	0.67	2.32	1.21
S.E. _±	0.033	0.097	0.078	0.004	0.002	0.007	0.013	0.007
C.D. (P=0.05)	0.094	0.279	0.223	0.012	0.006	0.021	0.038	0.021

NS=Non-significant

on seed germination at 30 days of sowing. The maximum seed germination (82.81%) was obtained on 15th April, 2012 while minimum seed germination (54.09%) was observed on 1st March, 2012. The seedling length was significantly influenced by the different sowing dates at 30, 60 and 90 DAS. The maximum seedling length at 30, 60 and 90 DAS (7.18, 10.88 and 17.94 cm, respectively) was obtained on 15th April, 2012 while minimum seedling length (5.35, 9.05 and 15.25 cm, respectively) was observed on 1st March, 2012 at 30, 60 and 90 DAS. Different sowing dates significantly influenced the number of leaves per seedling at 30, 60 and 90 DAS (Joshi, 2003 and Vaghamshi and Delvadia, 2006). The maximum number of leaves per seedling (4.02, 10.60 and 13.67, respectively) at 30, 60 and 90 DAS was recorded on 15th April, 2012 while minimum number of leaves per seedling (3.14, 9.73 and 11.64, respectively) was observed on 1st March, 2012 at 30, 60 and 90 DAS.

The different dates of sowing significantly influenced the number of primary roots per seedling. The maximum number of primary roots per seedling at 30, 60 and 90 DAS (7.08, 7.93 and 12.05, respectively) was obtained on 15th April, 2012 while minimum number of primary roots per seedling (5.68, 6.53 and 10.48, respectively) was observed on 1st March, 2012 (Table 1).

At 30, 60 and 90 DAS, the different sowing dates significantly influenced length of tap root per seedling. The maximum length of tap root per seedling (6.50, 12.50 and 17.17 cm, respectively) was recorded on 15th April, 2012 while minimum length of tap root per seedling (5.00, 11.00 and 15.97 cm, respectively) was observed on 1st March, 2012 at 30, 60 and 90 DAS (Table 2). The different sowing dates significantly influenced the number of secondary roots per seedling. The maximum number of secondary roots per seedling (5.67, 8.73 and

12.02, respectively) was obtained on 15th April, 2012 while minimum number of secondary roots per seedling (4.92, 7.98 and 11.27, respectively) was observed on 1st March, 2012 at 30, 60 and 90 DAS (Table 1).

At 30, 60 and 90 DAS seedling girth was significantly influenced by varying sowing dates.

The maximum seedling girth (0.27, 0.47 and 0.70 cm, respectively) was obtained on 15th April, 2012 while minimum seedling girth (0.20, 0.39 and 0.63 cm, respectively) was observed with 1st March, 2012 at 30, 60 and 90 DAS (Table 2).

The fresh and dry weight of seedling at 90 DAS got significantly influenced by different sowing dates. The maximum fresh and dry weight of seedling (2.55 and 1.33 g, respectively) was obtained on 15th April, 2012 while minimum fresh and dry weight of seedling (1.79 and 0.77 g, respectively) was observed with 1st March, 2012 at 90 DAS (Table 2).

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