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Seed Germination and Seedling Growth Performance in *Convolvulus microphyllus* under Different Soil Mixture Ratio and Sowing Depth

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Abstract
It is a source of an important drug in Ayurveda known as Shankhpushpi. The whole herb is used medicinally in the form of decoction. It is also described as one of the Medhya Rasayana drugs in Ayurveda. The Shankhpushpi drug is used as brain tonic and as a laxative. The article presents the data on seed germination, seedling growth, and different agro techniques of Convolvulus microphyllus under nursery conditions. Results revealed that Seed sowing at 0.5 cm depth with1:2:2 soil mixture ratios (sand: clay: FYM) were found to be most favourable for obtaining maximum growth and biomass.

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INTRODUCTION

Leaves and flowers of *C. microphyllus* possess hypotensive and antifungal properties (Kumar *et al.,* 2005). The plant and leaves were found to be intellect promoting and efficacious in nervine affections, epilepsy, insanity, internal haemorrhages and bowel complaints (Khare, 2004). It produced anticancerous activities in various experimental gastric ulcer models (Sairam *et al*., 2001). In Unani medicine, the drug is used as a sedative and also as a blood purifier. Its syrup prepared with *Piper nigrum* is prescribed to vitiated blood, bleeding piles and venereal diseases. The plant is also useful in insomnia, insanity, epilepsy, cough and skin disorders, hyperpyrexia and general debility (Khare, 2004). It is a prostrate perennial herb found all over India and very common throughout the sandy area. In open ground, it is usually prostrate, the leaves are smaller, but when growing in thick associations, the plants become procumbent to suberect. Two types of flower bearing plants, i.e. white and pink were observed which differ in their colour. Seed germination mostly takes place from June to July after one or two showers of rain under natural field conditions.

MATERIAL AND METHODS

Collection of Germplasm

The seeds were collected from three different sites of the Indian desert, viz. Medical College Campus, Jodhpur (4 km away from University Campus in northwest direction; site-I), Nagari village, District Jodhpur (85 km from University Campus in northeast direction; site-II), and J.N.V. University Campus, Jodhpur (site-III) during March–April.

The seeds possess hard seed coat dormancy and for its removal, they were scarified with con. H_2SO_4 for different durations (10-90 min). Seeds were also mechanically treated with sand paper to enhance germination and kept for germination under nursery conditions.

Soil Mixtures

Before sowing, freshly collected seeds of, *Convolvulus microphyllus* were pretreated with Conc. H_2SO_4 pretreatment for 45 min. gave promising results with cent percent germination. After providing above treatments, seeds were sown in polybags in four different soil mixture ratios (sand: clay: FYM) such as R1 (1:1:1), R2 (1:2:1), R3 (2:2:1) and R4 (1:2:2).

Sowing Depths

Seeds were sown in 2:1:1 soil mixture ratios at four sowing depths, viz. D1 (0.5 cm), D2 (1.0 cm), D3 (1.5 cm) and D4 (2.0 cm) after providing different pre-treatments as mentioned.

RESULTS AND DISCUSSION

The data from Table 1 exhibit that among different soil mixtures ratios, cent percent seedlings emergence, plant spread (68.46 cm) and collar diameter (0.281cm) were obtained in R_4 followed by in R_3 and minimum in R_1 ratio after four months of setting the experiments. Among sowing depth experiments, maximum seedlings emergence (100%), plant spread (65.09 cm) and collar diameter (0.256 cm) were observed in D_1 depth followed by D_2 and minimum in D_4. The seedlings emerged after 3 to 5 days of setting the experiments. The data were significant at 5 and 1% probability levels except for seedlings emergence (days), collar diameter after one and two months in sowing depths and soil ratios, respectively which were non-significant.

Table 1: Effect of different soil mixture ratios and sowing depths on emergence of seedlings and growth parameters (cm) in *C. microphyllus* during various months

Treatments	Seedling emergence		Growth parameters (months)							
			Plant spread				Collar diameter			
	Days	Percent	One	Two	Three	Four	One	Two	Three	Four
Soil mixture ratios:										
R_1 (1:1:1)	5	77.76	5.68	32.79	49.44	53.84	0.082	0.150	0.197	0.217
R_2 (1:2:1)	4	86.63	6.74	35.74	53.49	57.78	0.098	0.168	0.203	0.228
R_3 (2:2:1)	3	95.53	8.57	37.53	58.15	62.45	0.115	0.183	0.218	0.247
R_4 (1:2:2)	3	100.00	11.60	40.34	63.54	68.46	0.118	0.208	0.245	0.281
CD	NS	10.647**	0.738**	1.230**	1.247**	2.414**	0.027**	NS	0.031*	0.036**
Sowing depths:										
D_1 (0.5 cm)	3	100.00	8.02	36.04	60.18	65.09	0.146	0.192	0.244	0.256
D_2 (1.0 cm)	4	91.10	6.30	32.11	55.74	57.92	0.131	0.167	0.202	0.231
D_3 (1.5 cm)	5	75.50	5.65	29.94	45.07	50.21	0.117	0.152	0.171	0.214
D_4 (2.0 cm)	5	62.16	4.65	25.17	39.34	44.59	0.110	0.135	0.145	0.204
CD	NS	17.879**	0.965**	2.862**	3.56**	5.218**	NS	0.025**	0.035**	0.027**

NS = Non-significant; and *& ** = Significant at P = 5 &1%, respectively.

Table 2 shows the data pertaining to the effect of different soil mixture ratios and sowing depths on plant biomass. The results reveal that maximum aboveground (8.685 g plant-1 d.wt.) and belowground (0.541 g) biomass were observed in R4 treatment, while these were minimum in R1. In sowing depth experiments, the maximum aboveground (5.883 g) and belowground (0.349 g) biomass were recorded in D1 followed by D2 and minimum in D4 depth. The data were significant at 1 and 5% probability levels.

Table 2: Effect of different soil mixture ratios and sowing depths on above and belowground biomass (g plant-1 d. wt.) in C. *microphyllus* during various months

Treatments	Aboveground (months)				Belowground (months)			
	One	Two	Three	Four	One	Two	Three	Four
Soil mixture ratios:								
R_1	0.035	0.235	4.356	4.631	0.005	0.018	0.106	0.116
R_2	0.064	0.426	5.505	5.787	0.007	0.028	0.171	0.193
R_3	0.073	0.465	5.742	6.247	0.009	0.043	0.248	0.274
R_4	0.105	0.636	7.999	8.685	0.015	0.072	0.514	0.541
CD	0.022**	0.018**	0.065**	0.078**	0.004**	0.014**	0.021**	0.030**
Sowing depths:								
D_1	0.077	0.514	5.529	5.883	0.009	0.051	0.336	0.349
D_2	0.058	0.442	4.135	4.655	0.005	0.036	0.192	0.212
D_3	0.044	0.405	4.011	4.355	0.006	0.029	0.152	0.186
D_4	0.035	0.352	3.364	3.853	0.004	0.017	0.097	0.113
CD	0.026*	0.028**	0.045**	0.052**	0.002**	0.022**	0.041**	0.036**

* &** = Significant at P = 5 & 1% levels, respectively.

Singh et al. (2004) observed increase in biomass production of *C. microphyllus* after providing AM-fungi inoculation. Nautiyal et al. (2001) reported 60% seed germination of *Picrorhiza kurrooa* in sandy loam soil under nursery conditions. Singh et al. (2003b) observed maximum fruit yield and biomass of *Solanum xanthocarpum* in 1:2 ratio of soil: FYM. Vijayaraghavan et al. (2005) observed higher leaf production in Aloe vera with FYM application. Kasera *et al.* (2003) observed that 2:1:2 ratios of sand:clay:FYM were suitable for seedling growth and biomass yield in *Leptadaenia reticulata* under nursery conditions.

CONCLUSION

In the present studies, it was concluded that seeds of *C. microphyllus* when sown at 0.5 cm depth with 1:2:2 soil ratios of sand:clay:FYM, showed maximum seedling emergence, plant growth and biomass productions under nursery conditions.

The present studies also confirm the finding of above observations. It was observed that VAM inoculation with combination of different nutrients such as biovita, compost, fertonic, FYM and NPK effectively increases the plant height, collar diameter and biomass productions of all three selected medicinal plants. Thus, the soil in the polybags under nursery conditions should be inoculated with AM-fungi to get vigorous seedling growth. The increased biomass production through the application of AM-fungi is also accompanied by an efficient nutrient uptake (N & P). P uptake significantly influenced the plant growth and development. The higher amount of clay attributes for increasing nutrients status of the soil and in improving the water holding capacity of the soil

and with increasing the depth, germination percentage decreased significantly.

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