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Effect of direct sowing and transplanting on seed yield of babchi (*Psoralea corylifolia*)

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ABSTRACT

A study was conducted to determine the effects of direct sowing and transplanting on seed yield of Babchi. The experiment was conducted at Medicinal and Aromatic Plants Research Station, Rajendranagar, Hyderabad, India, during 2012-13 to 2013-14. The experiment was laid out in randomized block design with eight treatments (T_1- Direct sowing 7.5 kg/ha, T_2- Direct sowing 12.5 kg/ha, T_3- Direct sowing 17.5 kg/ha, T_4- Transplanting 45 x 30 cm, T_5- Transplanting 50 x 45 cm, T_6- Transplanting 45 x 60 cm, T_7- Transplanting 60 x 30 cm, T_8- Transplanting 60 x 60 cm) and replicated thrice. The results indicated that transplanting of babchi has given higher seed yield than direct sowing. Transplanting of babchi at 45 x 30 cm has recorded maximum plant height (182.86 cm) and highest seed yield (5461.67 kg/ha) over other spacing treatments. Transplanting of babchi at 60 x 60 cm recorded highest number of branches per plant (21.46) and racemes (286.34) per plant. Direct sowing of seed at 7.5 kg/ha recorded lowest seed yield (1227.16 kg/ha).

Keywords *:* MDR cancer cells, seed yield, psoralen, isopsoralen

INTRODUCTION

The World Health Organization estimated that 80% of the population of developing countries rely on traditional medicines, mostly plant drugs, for their primary health care needs. Modern pharmacopoeia still contain at least 25% drugs derived from plants and many others which are synthetic analogues built on prototype compounds isolated from plants. Demand for medicinal plants is increasing in both developing and developed countries, and surprisingly, the bulk of the material traded is still from wild harvested sources on forest lands and only a very small number of species are cultivated. Babchi (*Psoralea corylifolia*) belongs to the family Fabaceae has earned the name *Kusthanasini* as it is one of the best herbs used in the treatment of various skin disorders. It has been recognized since ancient times as panacea for dermatoses in Ayurveda. An essential oil is also found in babchi seeds. Resins, fixed oil and a furocoumarin psoralen and flavonoids bavachinin, bavachalcone, bavachin and isobavachin, corylifolin and corylifolinin were also isolated from the seeds (Prakash Paranjpe, 2005). The seed oil is extremely beneficial externally in various skin ailments like leucoderma and psoriasis. The seed is anthelmintic, antibacterial, astringent and diuretic. Research studies also indicated that *Psoralea corylifolia* significantly inhibits proliferation of sensitive and MDR cancer cells *in vitro*, psoralen and isopsoralen are responsible for the anticancer activity (Yi Wang *et al*., 2011). The seed has good market value and the produce is coming from wild collection. The plant is very hardy and can be cultivated under marginal lands, rainfed as well as irrigated conditions. Adoption of plant geometry is important agronomic factor that contributes to higher yield and the multifaceted seed quality (Alexalbert, 2007). Ponnuswamy and Rangaswamy (1996) opined that for getting higher seed yield and quality, maintenance of adequate plant density is vital as it determines the yield per unit area. Optimum plant density is required for complete use of environmental conditions (water, air, light and soil) by the plants and also to minimize the inter or intra-specific competition (Sadeghi *et al*., 2009). Success in absorption of nutrients from soil depends on the spacing adopted for production. So far package of practices for babchi has not been standardized. Standardization of package of practices for babchi will favour commercial cultivation. The objective of this investigation was to study the effects of direct sowing and transplanting of babchi on seed yield.

Table 1. Effect of direct sowing and transplanting on plant height and No. of branches per plant of *Psoralea corylifolia*

Treatments	Plant Height (cm)			No. of Branches/Plant		
	45 DAS	**90 DAS**	**120 DAS**	**45 DAS**	**90 DAS**	**120 DAS**
T_1 - Direct sowing@ 7.5 kg/ha	13.01	45.40	116.60	2.33	5.64	14.00
T_2- Direct sowing@ 12.5 kg/ha	13.70	46.40	129.93	3.20	5.42	12.46
T_3 - Direct sowing @17.5 kg/ha	17.79	56.93	140.93	3.33	8.13	12.26
T_4 - Transplanting 45 x 30 cm	46.28	105.33	166.33	10.86	8.23	12.33
T_5 - Transplanting 45 x 45 cm	35.61	95.46	158.06	12.86	9.17	15.06
T_6 - Transplanting 45 x 60 cm	38.98	97.13	159.46	12.26	9.22	17.00
T_7 - Transplanting 60 x 30 cm	44.67	95.73	165.46	13.26	11.11	17.46
T_8 - Transplanting 60 x 60 cm	35.48	84.40	151.06	13.80	12.11	20.73
SEM ±	1.90	5.94	6.97	1.18	0.72	1.07
CD at (0.05)	5.77	18.03	21.14	3.58	2.20	3.25

*DAS-Days after sowing

Table 2. Effect of direct sowing and transplanting on growth, flowering and seed yield of *Psoralea corylifolia*

Treatments	Plant Height (cm) (150 DAS)	No .of Branches / plant (150 DAS)	No. of Racemes/ plant (150 DAS)	No. of seeds / cluster	Yield (kg)/ha
T_1 - Direct sowing@ 7.5 kg/ha	136.60	16.10	175.55	31.58	1227.16
T_2- Direct sowing@ 12.5 kg/ha	129.43	15.23	225.81	29.73	1897.78
T_3 - Direct sowing @17.5 kg/ha	141.93	14.16	227.01	26.63	1918.69
T_4 - Transplanting 45 x 30 cm	182.86	16.63	201.47	31.16	5461.67
T_5 - Transplanting 45 x 45 cm	180.23	16.36	256.12	29.20	4261.67
T_6 - Transplanting 45 x 60 cm	170.23	19.20	258.37	33.63	2379.44
T_7 - Transplanting 60 x 30 cm	179.83	18.46	266.66	30.43	4247.95
T_8 - Transplanting 60 x 60 cm	169.06	21.46	286.34	33.63	1946.48
SEM ±	7.85	1.77	14.57	1.68	296.37
CD at (0.05)	22.54	3.60	41.82	NS	850.71

*DAS-Days after sowing

Plot view of Babchi planted at different spacings

MATERIALS AND METHODS

The study was conducted during 2012-2013 and 2013-14 at Medicinal and Aromatic Plants Research Station, Rajendranagar, Hyderabad, India. The experiment was laid out in randomized block design with eight treatments (T_1- Direct sowing 7.5 kg/ha, T_2- Direct sowing 12.5 kg/ha, T_3 - Direct sowing 17.5 kg/ha, T_4 - Transplanting 45 x 30 cm, T_5 - Transplanting 50 x 45 cm, T_6 - Transplanting 45 x 60 cm, T_7 - Transplanting 60 x 30 cm, T_8 - Transplanting 60 x 60 cm) and replicated thrice. Direct sowing was done by broadcasting of seed. Transplanting of seedlings was done by raising nursery and 30 days old seedlings were transplanted as per the spacing. 40 kg N and 20 kg P_2O_5 /ha were applied to the crop. Phosphorous was applied as basal and Nitrogen was applied in two split doses as basal and 30 DAS after planting. Plant protection measures were followed as and when necessary. The crop was irrigated as and when required. Data were recorded on Plant height, number of branches per plant, number of racemes per plant, yield per hectare. Data were pooled and analysed for 'F' test of significance following the methods described by Panse and Sukhatmae (1985). The critical differences (CD) were calculated at 5% probability level.

RESULTS AND DISCUSSION

The results indicated significant differences for plant height (Table 1 & 2). The highest plant height at vegetative and at harvest was obtained in transplanting at 45 x 30 cm (T_4). At all the stages of plant growth this treatment produced the tallest plants. The data shows that increase in plant height and number of branches was observed from 45 DAS or DAP till 150 DAS. At harvest highest plant height was recorded in T_4 (182.86 cm) and minimum plant height (129.43 cm) obtained in direct seeding by broadcast (T_2). At harvest highest number of branches (21.46) was observed in transplanting at 60 x 60 cm (T_8). Minimum number of branches were produced in direct sowing @ 17.5 kg/ha (T_3) (14.16). Since the widest spaced plants had lowest competition for soil nutrients for light, it was most likely that they produce more number of branches. Similar findings were reported by Nanthakumar and Veeraragavathatham (2000), Anburani *et al.* (2003) and Ndereyimana *et al.* (2013).

Plant spacing is an important agronomic attribute since it is believed to have effects on light interception for photosynthesis which is the energy manufacturing medium using green parts of the plant. Also it effects rhizosphere exploitation by

the plants. Significant differences in yield and yield attributing characters were observed (Table 2). Number of racemes per plant were highest in T_8 - 60 x 60 cm spacing (286.34) followed by T_7 (266.66) and T6 (258.37) and were at par. Number of racemes is one of the yield attributing character and influence the yield. The closer spacing (T_4) (45 x 30 cm) recorded the highest seed yield (5461.67 kg). This could be attributed to the highest number of plants per unit area. Similar results were observed by Reddy *et al.,* (1990) in egg plant that the highest yield per hectare was obtained at the closest spacing. Mishirky and Alphonse (1994) reported in bell pepper that the number of fruits per plant were decreased with closer spacing however total yield was increased with closer spacing. Singh and and Saimbhi (1998) opined that the magnitude of yield was influenced by plant population and its distribution pattern, which were important for getting maximum economic yield from a given field area. Lowest seed yield was produced in direct sowing @ 7.5 kg/ha (1227.16 kg/ha) (T_1). Non significant difference in number of seeds per cluster was observed. The range was 26.63 to 33.63 seeds per cluster.

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