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Short Communication

Effect of sowing time and fertilization on productivity and economics of urdbean genotypes

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Urdbean (*Phaseolus mungo* L.) is an important pulse crop grown in different parts of the country. It is rich in protein, amino acids, vitamins and minerals. Urdbean is being grown by the farmers of Southern Rajasthan in recent years in place of traditional pulses like greengram and cowpea because of its higher market value. Suitable urdbean variety, optimum sowing time and fertilizer sources are the key inputs for getting higher yield under this region. An effort was therefore, made in this study to optimize the agronomic management practices for enhancing urdbean productivity under sub-humid southern plain and Arawali hills agroclimatic zone of Rajasthan.

A field experiment was conducted at the Instructional Farm, Rajasthan College of Agriculture, MPUAT, Udaipur during *kharif* 2006. Experiment was laid out in a factorial randomized block design. There were 18 treatment combinations consisting of three urdbean varieties (Barkha, TAU-1 and T-9), two dates of sowing (7th July *i.e.* onset of monsoon and 27th July *i.e.* 20 days after first sowing) and three levels of fertilizer (0 N + 0 P_2O_5 + *Rhizobium* + PSB, 10 kg N + 20 kg P_2O_5/ha + *Rhizobium* + PSB and 20 kg N + 40 kg P_2O_5/ha) with three replications. The soil of experimental site was clay-loam in texture with pH 8.1. The soil was higher in available nitrogen (340.1kg/ha), medium in phosphorus (21.5 kg/ha) and high in potassium (292.8 kg/ha) contents. Seeds were inoculated as per treatments and sown in row spacing of 30 cm. Doses of N and P_2O_5 were applied as basal according to treatments in the form of DAP and urea, respectively. Data were collected viz. plant height (cm), number of pods/plant, number of seeds/pod, 1000-seeds weight, seed yield, haulm yield and nutrient content and uptake (N, P).

Among varieties, Barkha recorded significantly higher seed yield (1103 kg/ha) compared to T-9 and TAU-1. The increase in seed yield of Barkha over T-9 and TAU-1 was to an extent of 9.8 per cent and 23.1 per cent, respectively. This is due to longer maturity period of Barkha (85 days) over other varieties. Variety Barkha obtained significantly higher haulm yield (2254 kg/ha) over T-9 (1818 kg/ha) and TAU-1 (1694 kg/ha). The higher seed yield of Barkha over other genotypes is attributed to better yield components (number of pods/plant, number of seeds/pod and 1000-seed weight) (Table 1).

The nitrogen and phosphorus content in seed (3.25 and 0.6 per cent, respectively) were higher in Barkha over T-9 (3.25 and 0.58 per cent) and TAU-1 (3.17 and 0.53 per cent). The higher nitrogen and phosphorus uptake were also significantly obtained by Barkha (87.8 kg/ha and 13.18 kg/ha, respectively) over T-9 (74.40 kg/ha and 10.83 kg/ha) and TAU-1 (66.70 kg/ha and 8.96 kg/ha). Higher nutrient uptake in Barkha over T-9 and TAU-1 is attributed to long duration and higher seed yield. Singh and Singh (2000) and Yadahalli and Palled (2004) also reported similar results.

Among the agronomic practices of field crops, sowing at optimum time is an important non-monetary input that results in considerable increase in the seed yield under rainfed conditions. This means a favourable soil and climatic condition are made available for the expression of genetic potential. Urdbean varieties sown at onset of monsoon (7th July) recorded maximum seed yield (1185 kg/ha) when compared to crop sown on 27th July (20 days after first sowing). The crop sown on 7th July registered 45 per cent higher yield over crop sown on 27th July. Similarly, urdbean sown on 7th July recorded significantly higher haulm yield (3415 kg/ha) over 27th July (2432 kg/ha). The onset of monsoon sown crop (7th July) got adequate soil moisture particularly during its flowering and pod filling stages in August and September months as a result of rainfall. The higher seed yield in onset of monsoon sown crop can also be attributed to higher values of yield components over the late sown crop. Higher harvest index (34.8 per cent) was also noticed in early sown crop over late sown crop.

There was considerable increase in the values of yield attributing characters (number of pods/plant, number of seeds/pod and 1000-seed weight) in onset of monsoon sown crop compared to crop sown late (27th July). Higher seed yield of urdbean from early sown crop was also reported by Singh and Singh (2000), Panwar and Sharma (2004), Yadahalli and Palled (2004) and Yadahalli *et al.* (2006). Significantly higher N and P content in seed (3.23 and 0.58 per cent, respectively) were obtained by the onset of monsoon sown crop over late sown crop. Similarly, significantly higher N uptake (89.75 kg/ha) and P uptake (13.01 kg/ha) were obtained by the onset of monsoon sown crop over late sown crop. This is mainly attributed to better conditions for nutrient availability in early monsoon period and leading to higher biomass production (seed and haulm yield) by onset of monsoon sown crop over late sown crop. The results agree with the findings of Singh

Table 1. Yield components, yield, nutrient content, uptake and economics of urdbean as influenced by genotypes, dates of sowing and fertilizer sources

Treatments	Pods/ Plant (no)	Seeds/ Pod (no)	1000-seeds weight (g)	Seed Yield (kg /ha)	Haulm yield (kg/ha)	Nutrient content (%)		Nutrient uptake (kg/ha)		COC	Net return	B/C ratio
						N	P	N	P			
Varieties												
Barkha	22.83	5.89	43.50	1103	2254	3.25	0.60	87.81	13.18	7889	28244	3.58
TAU-1	22.22	3.94	38.22	896	1694	3.17	0.53	66.70	8.96	7920	21304	2.69
T-9	21.22	4.11	41.08	1005	1818	3.22	0.58	74.40	10.83	7874	24724	3.14
SEm±	0.18	0.12	0.18	20	41	0.02	0.01	1.59	0.23	-	641	0.09
CD (P=0.05)	0.52	0.34	0.51	57	117	0.05	0.02	4.50	0.66	-	1819	0.25
Sowing time												
7th July	22.26	5.11	41.20	1185	2230	3.23	0.57	89.75	13.01	7890	30691	3.89
20 DAFS*	20.59	4.19	40.67	817	1614	3.20	0.56	62.85	8.97	7909	18824	2.38
SEm±	0.15	0.10	0.15	16	34	0.02	0.004	1.29	0.186	-	523	0.07
CD (P=0.05)	0.37	0.24	0.36	40	83	NS	NS	3.18	0.458	-	1286	0.18
Fertilizer sources												
0 N : 0 P_2O_5 + *Rhizobium* + PSB	19.39	3.44	40.27	885	1710	3.09	0.48	64.74	7.71	7480	21392	2.86
10 kg N + 20 kg P_2O_5/ha + *Rhizobium* + PSB	21.33	4.50	41.14	1032	1938	3.19	0.56	77.20	10.98	7900	25675	3.25
20 kg N + 40 kg P_2O_5/ha	23.56	6.00	41.39	1087	2119	3.35	0.66	86.96	14.28	8244	27205	3.30
SEm±	0.18	0.12	0.18	20	41	0.02	0.01	1.59	0.23	-	641	0.09
CD (P=0.05)	0.52	0.34	0.51	57	117	0.05	0.02	4.50	0.66	-	1819	0.25

*DAFS: Days after first sowing, COC: Cost of cultivation, Selling price, Seed: Rs. 3000/q, Haulm: Rs. 135/q

and Singh (2000), Patel *et al.* (2004) and Yadahalli and Palled (2004).

The seed and haulm yield, yield components, nutrient content and uptake (N and P) of urdbean were obtained significantly higher with 20 kg N + 40 kg P_2O_5/ha over 10 kg N + 20 kg P_2O_5/ha + *Rhizobium* + PSB and 0 N: 0 P_2O_5 + *Rhizobium* + PSB. Similar results were reported by Singh and Singh (2004) and Kumar and Elamathi (2007).

Net return were maximum in Barkha sown on 7th July with 20 kg N + 40 kg P_2O_5 /ha (38672.55 Rs./ha) followed by Barkha sown on 7th July with 10 kg N + 20 kg P_2O_5 /ha + *Rhizobium* + PSB. This can be attributed to higher urdbean yield in these treatment combinations over others. However a lowest net return was realized by the urdbean variety TAU-1 sown on 27th July with 0 N: 0 P_2O_5 + *Rhizobium* + PSB (Table 1). This mainly attributed to lower gross returns and high cost of cultivation in this treatment combination as a result of considerable reduction in urdbean yield due to moisture stress and pest attack.

Higher benefit cost ratio (4.68) was obtained in the urdbean variety Barkha sown on 7th July with 20 kg N + 40 kg P_2O_5/ha. This is mainly due to higher net returns as a result of higher seed yield over other treatment combinations. The minimum benefit cost ratio (1.32) was obtained in urdbean variety TAU-1 sown on 27th July with 0 N: 0 P_2O_5 + *Rhizobium* + PSB which can be attributed to minimum net returns as a result of drastic reduction in urdbean yield and relatively higher cost of cultivation in this treatment combination.

Thus, it can be inferred that urdbean genotype Barkha performed better than other genotypes. However, sowing with onset of monsoon (7th July) and 20 kg N + 40 kg P2O5 found superior than other practices in southern plains and Arawali hills of Rajasthan.

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