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Effect of seed rates and foliar spray of urea on performance of blackgram (*Vigna mungo*) varieties*

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Blackgram (*Vigna mungo* L.) is highly prized in vegetarian diets in India. It can be boiled or eaten whole, and they are ground into flour used to make porridge or baked into bread and biscuits. The green pods are also edible. Dried blackgram contain about 9.7% water, 23.4% protein, 1.0% fat, 57.3% carbohydrate and 3.8% fibre along with 154 mg Calcium, 9.1 mg Iron, 0.37 g riboflavin and 0.42 g Thiamin in each gram of blackgram. In spite of being widely adapted crop in India, its productivity is very low. The major causes of low yield could be nutritional deficiency at flowering stage due to poor fertility status, particularly low N in the soils and improper plant population with particular cultivars. Therefore, additional supply of nitrogen to ensure better crop production on exhausted soils with matching plant population of suitable cultivars is needed. Foliar spray of urea at pre-flowering stage (Elayaraja and Angayarkanni 2005), suitable variety (Singh *et al.* 1999 and Gupta *et al.* 2006), optimum seed rate (Abdul Kabir Khan Achakzai and Syed Allahdad Taran 2011) appears to be the most considerable parameters for realizing the yield potentials and net profit. Hence, the present investigation was undertaken to determine the effect of urea as foliar spray at 40 days after sowing and optimum seed rate of suitable variety on blackgram.

The field experiment was conducted during rainy (*kharif*) season of 2007–08 at the Crop Research Centre, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut. The treatments comprises three varieties (Vallabh Urd 1, Pant Urd 35 and Type 9), two foliar spray of urea solutions (0 and 2%) and three seedrates (15, 20 and 25 kg seed/ha). The experiment was laid out in factorial randomized block design and replicated thrice. The soil was sandy loam in texture, alkaline in reaction (8.2 *p*H), low in organic carbon (0.47%) and available nitrogen (209 kg N/ha), medium in available phosphorus (15 kg P/ha) and available potassium (185 kg K/ha). Nitrogen and phosphorus through di-ammonium phosphate and potassium through muriate of potash were applied as per recommended dose as basal application. Foliar spray of urea was done at 40 days after sowing.

The variety Type 9 recorded significantly higher grain yield, harvest index, net returns and benefit: cost ratio than cv. Pant Urd 35 and Vallabh Urd 1(Table 1). Among the varieties, Type 9 was significantly superior. Significantly more plant height and longer root as observed in this study (Table 1) in case of Type 9 might have contributed to its superiority in terms of grain yield, harvest index, net returns and benefit:cost ratio over Pant Urd 35 and Vallabh Urd 1. These results are in close conformation to those of Gupta *et al.* (2006). Higher grain yield of 1351 kg/ha was observed by Type 9, which was significantly higher than other both varieties.

Grain yield of black grain increased significantly with the foliar spray of 2% urea solution at 40 days after sowing over control (Table 1). The extent of increment in yield varied from 27.9–31.4% in different varieties. Among the different varieties Vallabh Urd 1 responded much more to urea application while least in case of Type 9.

This type of response is mainly due to better yield attribute like number of grains/pods (Table 1). Further, a critical observation with the foliar spray of 2% urea solution at 40 days after sowing over control, plant height, root length and dry matter production for plant increased significantly. Better root length with 2% urea foliar application might have resulted exploitation of large volume of soil for different essential nutrients and their by affecting the yield positively.

Higher growth attributes may be supposed due to more availability of nitrogen due to foliar spray of 2% urea at 40 days after sowing. Similar result was also observed by Reddy

*Short note

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Table 1 Effect of varieties, foliar spray of urea and seed rates on growth, yield and economics of blackgram

Treatment	Plant height (cm)	Root length (cm)	Dry matter production (g)/plant	50 % podding (DAS)	No.of seeds/ plant	Grain yield (kg/ha)	Harvest index	Cost of cultivation (₹/ha)	Net returns (₹/ha)	Benefit: cost ratio
Variety										
Vallabh Urd 1	54.5	20.3	16.6	44.2	4.6	1 020	32.73	6 343	11 473	1.65
Pant Urd 35	59.1	21.5	17.7	52.1	5.5	1 166	36.40	7 043	13 650	1.94
Type 9	61.7	22.5	20.6	48.8	6.1	135	38.87	7 142	16 599	2.32
CD (*P*=0.05)	0.06	0.20	0.38	0.66	0.3	62.6	0.40		1122	0.16
Foliar spray of urea (%)										
0%	57.0	20.6	17.5	46.7	4.9	1 030	34.96	6 930	11 466	1.65
2%	59.9	22.3	19.1	50.0	5.8	1 330	37.11	7 155	16 378	2.29
CD (*P*=0.05)	0.49	0.16	0.31	0.54	0.4	51.1	0.33		916	0.13
Seed rate(kg/ha)										
15	53.5	19.8	16.6	48.3	5.4	949	34.12	6 868	10 148	1.48
20	63.5	21.6	20.4	51.1	6.3	1 455	37.76	7 043	18 634	2.65
25	56.5	22.9	17.9	45.6	4.5	1 133	35.85	7 218	12 937	1.79
CD (*P*=0.05)	0.60	0.20	0.38	0.66	0.3	62.6	0.40		1122	0.16

DAS, Days after sowing

et al. (2005) and Nigamananda and Elamathi (2007).

The crop sown with 20 kg seed/ha recorded significantly higher dry matter production (g)/plant, seeds/pod, grain yield, harvest index, net returns and benefit:cost ratio than 15 and 25 kg seed/ha (Table 1). This might be supposed due to significantly higher dry matter production/plant and seeds/ pod. Higher dry matter production might have resulted in a larger source for photosynthesis and thereby more translocation of photosynthates to sink. These results are in close conformation to Abdul Kabir Khan Achakzai and Syed Allahdad Taran 2011.

The interaction effect of varieties and foliar spray of urea solution on grain yield of blackgram was significant. Variety Type 9 with 2% foliar spray of urea solution at 40 days after sowing gave highest grain yield (1 517 kg/ha) which was significantly higher than all other combinations. This effect may be attributed to significantly higher dry matter production/plant, more root length and more seeds/pod in comparison to other two varieties.

SUMMARY

Among different varieties, cv. Type 9 was found most superior than the other varieties in term of growth, development and yield. An increase of 27.4 to 31.0% in grain yield was recorded due to foliar spray of urea solution (2%) at 40 days after sowing in different varieties, whereas application of 20 kg seed/ha produced the highest grain yield, which was significantly higher than other seed rate.

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