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## Residual effect of biofertilizer consortium and foliar nutrition on plant height of summer blackgram (*Vigna mungo*) under different fertility levels subtropical condition of Jammu

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#### Abstract

Field experiments were conducted during summer season of 2018-19 and 2019-20 at Research Farm, Division of Agronomy, SKUAST- J, Chatha. The soil of the experimental site was sand clay loam in texture, slightly alkaline in reaction, low in organic carbon and available nitrogen but medium in phosphorus and potassium. The experiment was laid out in split-split plot design with three factors replicated thrice. Eighteen treatment combinations comprising of three fertility levels, viz. Control, RDF and 75% of RDF were taken as main plot treatments, two subplot treatment comprising of biofertilizer consortium viz., seed treatment (1.25kg/ha) and soil application (1.25kg/ha) and three foliar application of 2% NPK (19:19:19) viz., at tillering, flowering and tillering+ flowering stage as sub-sub-plot treatments. Wheat crop was sown at spacing of 20 cm with seed rate of 100 kg/ha. Half dose of nitrogen as per the treatment combination and uniform basal application of 50 kg P<sub>2</sub>O<sub>5</sub> and 25 kg K<sub>2</sub>O per hectare was applied to all the treatments through urea, DAP and MOP and the remaining nitrogen was top dressed in two equal splits at CRI and before booting stages. However, blackgram was sown after wheat to study the residual effect of treatment applied to wheat crop at spacing 30 cm with seed rate of 20 kg/ha.

Residual effect on blackgram among the fertility levels, RDF observed higher plant height as compared to 75% of RDF. However, control recorded lowest values of plant height of blackgram crop. Whereas, soil application of biofertilizer consortium recorded higher plant height of blackgram in comparison to seed treatment with biofertilizer consortium applied in wheat as main crop. Among the foliar application 2% of NPK (19:19:19) higher values of plant height of blackgram were recorded in foliar application of 2% NPK (19:19:19) at flowering stage as compared to tillering and tillering +flowering stages of wheat crop during both the years.

**Keywords:** Residual effect, biofertilizer consortium, fertility levels, Blackgram, foliar nutrition

#### Introduction

Pulses occupy a unique position in cropping system as a main, catch, cover, green manure, fodder and as intercrop. Pulses play an important role in the Indian diet, constituting one of the most effective sources in India. As per recommendation of world Health organization (WHO), minimum requirement of pulses is 80 g/capita/day (Anonymous), 2016 [1] but the availability of pulses is very low. Blackgram (*Vigna mungo* L.) 2n= 24 is a self-pollinated crop which grows up to 35 to 50 cm in height having yellow flowers with an auxiliary inflorescence, belongs to the family Leguminosae. It is distributed from different parts of Asia and it contains three times high percentage of quality protein than cereals, also rich in carbohydrate, fat, amino acids, vitamins and minerals. It is broadly used in various cuisine preparation. It is a soil nourishing crop. Which fixes nitrogen from the atmosphere through symbiotic nitrogen fixation (Beniwal and Tomer) [2]. Blackgram is an oldest and well known principal pulse crop of Asia (Kokani *et al.*, 2014) [5]. It is a considered as a staple food for about 900 million consumers and about one third of all underfeed children. After green revolution cereal grain production increased, which resulted in sharp decline of per capita production and availability of pulses with record of 4.0 million tonnes of improved pulses in 2012-13 (Singh *et al.*, 2017) [1]. Furthermore, the nutrients management is one of the key elements that influence the growth and yield of black gram. It requires both macro and micro nutrients for their growth and development just as soybean (Nambiar and Abrol., 1992) [7].

Therefore, the important role of this research was to find out the Residual effect of biofertilizer consortium and foliar nutrition on plant height of summer blackgram (*Vigna Mungo*) under different fertility levels.

### Materials and Methods

Field experiments were carried out during two consecutive Summer seasons of 2018-19 and 2019-20 to study Residual effect of biofertilizer consortium and foliar nutrition on plant height of summer blackgram (*Vigna Mungo*) under different fertility levels subtropical condition of Jammu at the Research Farm, Division of Agronomy, SKUAST- J, Chatha. The experimental site is situated at 32.6529° N latitude and 74.8071° E longitude at an elevation of 332 meters above mean sea level. The soil of the experimental site was sandy clay loam in texture, slightly alkaline in reaction, low in organic carbon and available nitrogen but medium in phosphorus and potassium. During the crop growth period of blackgram about 137.8 mm of rainfall was received during the first year of cropping (2018-19), whereas 147.8 mm of rainfall was received during the second-year wheat crop growth period (2019-20). The total rainfall in the crop growing recorded during the second year of cropping remained substantially higher as compared to first year. The experiment was laid out in split-split plot design with three factors replicated thrice. Eighteen treatment combinations comprising of three fertility levels, viz. Control, RDF and 75% of RDF were taken as main plot treatments, two subplot treatment comprising of biofertilizer consortium viz., seed treatment (1.25kg/ha) and soil application (1.25kg/ha) and three foliar application of 2% NPK (19:19:19) viz., at tillering, flowering and tillering+ flowering stage as sub-sub-plot treatments. Wheat crop was sown at spacing of 20 cm with seed rate of 100 kg/ha. Half dose of nitrogen as per the treatment combination and uniform basal application of 50 kg P<sub>2</sub>O<sub>5</sub> and 25 kg K<sub>2</sub>O per hectare was applied to all the treatments through urea, DAP and MOP and the remaining nitrogen was top dressed in two equal splits at CRI and before booting stages. However, blackgram was sown after wheat to study the residual effect of treatment applied to wheat crop at spacing 30 cm with seed rate of 20 kg/ha. The recommended dose of NPK was 100:50:25 kg/ha for wheat crop and the sources of nitrogen, phosphorus and potassium were urea, diammonium phosphate and muriate of potash, respectively. Half of the nitrogen along with full dose of phosphorus and potassium was applied at the time of sowing as basal dose. The remaining half of nitrogen was top dressed in two equal splits i.e at crown root initiation (CRI) stage and before booting of wheat crop. The experiment was conducted on same site without changing the randomization of the treatment for the successive year to assess the residual effects.

Wheat cv. HD-3086 was sown with spacing 20cmx5 cm in the third week of November and harvested in fourth week of April during both the years. The Blackgram cv pant u 31 was sown with spacing 30cm x10cm.

### Observations recorded

#### Plant height (cm)

For plant height five plants were selected randomly and tagged in each plot from border rows (second row). The plant height from ground surface to the tip of the main stem was measured at 20, 40 days after sowing and at harvest. Average height of the randomly selected five plants was recorded and expressed as plant height in centimeters. Average of all the

five plants was taken for statistical analysis. The observation is statistically analysed by using the analysis of variance. The results were tested for the treatments mean by applying F-test of significance on the basis of null hypothesis (Cochran and Cox, 1957) [3]. Wherever necessary, standard errors along with critical difference at 5 per cent of significance were computed for discriminating the treatment effects for chance effects. The key for degrees of freedom used in analysis of variance (ANOVA).

### Results and Discussion

#### Plant height

The data presented in Table 1 revealed that there was conspicuous increase in plant height of black gram with the advancement in crop age. The fertility levels showed a non-significant effect on the plant height of black gram at different days after sowings and at harvest stage. Among different fertility levels at 20 DAS, the highest plant height (23.78 cm and 25.19 cm) were recorded under 100% RDF followed by 75% RDF (22.28 cm and 23.75 cm) and control (21.93 cm and 23.51 cm) during 2018-19 and 2019-2020, respectively. The same trend was also noticed at 40 DAS and at harvest stage during both the years. Residual effect of fertility levels showed a non-significant effect on the plant height of black gram at different days after sowings and at harvest stage. Among different fertility levels at 20 DAS, the numerically highest plant height was recorded under 100% RDF followed by 75% RDF and control during with the study years. Though, numerical values of plant height increased with the increasing levels of fertility. A perusal of the data indicated that application of 100% of RDF in wheat crop did not show in any significant effect with effect of in plant height of black gram during both years of experimentation. This evidently indicates that higher level of nutrients facilitated in the elongation of stem due to development of cells, rapid cell division and cell elongation in meristematic region of plant. Therefore, taller plants of black gram were recorded in treatment under 100% recommended dose of fertilizer application in comparison with lower levels of nutrition applied to wheat crop as a main crop. Similar results were also reported by, Imade (2014) [4].

At 20 DAS, soil application of bio-fertilizer consortium (1.25 kg/ha) recorded highest plant height to the tune of 22.84 cm and 24.27 cm as compared to the seed application of bio-fertilizer consortium (22.49 cm and 24.03 cm) during 2018-19 and 2019-2020, respectively. The same trend was noticed at 40 DAS and at harvest stage during both the years of cultivation. Study the residual effect of black gram 20 DAS, soil application of bio fertilizer consortium (1.25 kg/ha) recorded highest plant height as compared to the seed application of bio fertilizer consortium applied to wheat crop residual. Similar positive residual; effect of organic sources of nutrient applied to previous crop in increasing the plant height of green gram was evidenced from the work of Meena *et al.* (2012) [6].

The foliar application of 2% NPK (grade of 19:19:19) showed a non-significant effect on plant height of black gram at different days after sowings and at harvest stage. At 20 DAS, foliar application of 2% NPK at flowering stage recorded highest plant height to the tune of 22.80 cm and 24.27 cm as compared to the foliar application of 2% NPK at tillering stage (22.68 cm and 24.20 cm) and tillering + flowering stage (22.52 cm and 23.99 cm) during 2018-19 and 2019-2020, respectively. The same trend was with respect to plant height

was also noticed at 40 DAS and at harvest stage during 2018-19 and 2019-2020. Similar in core of the foliar application of 2% NPK (grade of 19:19:19) solution showed a non-significant effect on plant height of black gram at different days after sowings and at harvest stage. At 20 DAS, foliar application of 2% NPK at flowering stage recorded highest plant height to the tune of as compared to the foliar application of 2% NPK at tillering stage and tillering +

flowering stage it might be due to less uptake of nutrients by the main crop wheat Patel *et al* (2017) [8].

Interaction effect between fertility level (N) × bio-fertilizer consortium (C), bio-fertilizer consortium (C) × foliar application (F), fertility level (N) × foliar application (F) and N × C × F were found to be non-significant regarding plant height of black gram during both the years of cultivation.

**Table 1:** Soil fertility with respect to pH, O.C, N, P and K as affected by fertility levels, bio-fertilizer consortium and foliar nutrition after harvest of black gram

Treatment	Soil studies									
	pH (1:2.5)		O.C (g/kg)		N (kg/ha)		P (kg/ha)		K (kg/ha)	
	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20
N1 = Control	7.89	7.84	4.3	4.6	238.68	240.43	15.13	14.79	143.77	150.32
N2 = RDF (100:50:25 kg/ha)	7.86	7.82	4.5	4.9	254.36	256.80	16.58	15.35	147.58	154.10
N3 = 75% RDF	7.94	7.89	4.4	4.7	243.56	248.79	15.98	15.04	145.18	151.53
SEm+	0.04	0.03	0.003	0.006	5.61	5.606	0.31	0.16	0.74	0.77
CD (5%)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
<b>Sub plots: Bio-fertilizer Consortium</b>										
C1 = Seed treatment (1.25 kg/ha)	7.89	7.84	4.4	4.8	242.05	246.47	15.53	14.89	145.37	151.63
C2 = Soil application (1.25 kg/ha)	7.90	7.86	4.3	4.7	249.02	250.88	16.26	15.23	145.65	152.34
SEm+	0.04	0.04	0.004	0.01	2.29	1.86	0.30	0.11	0.43	0.54
CD (5%)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
<b>Sub sub plots: Foliar application (2% NPK)</b>										
F1 = Tillering stage	7.90	7.85	4.3	4.7	243.21	247.74	15.89	15.07	145.50	152.20
F2 = Flowering stage	7.87	7.82	4.4	4.8	244.96	248.44	15.98	15.12	145.46	151.39
F3 = Tillering stage and Flowering stage	7.91	7.87	4.4	4.8	248.44	249.83	15.81	15.00	145.56	152.36
SEm+	0.03	0.04	0.004	0.004	2.81	2.58	0.12	0.07	0.31	0.43
CD (5%)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
N × C	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
C × F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
N × F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
N × C × F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

## Conclusion

Application of 100% RDF along with bio-fertilizer consortium at the rate 1.25 kg/ha in soil and foliar spray of 2% solution of NPK at flowering stage to wheat showed better residual effect with the respect plant height succeeding black crop gram which was statistically non-significant.

## References

- Anonymous Annual report on pulses. Agriculture Statistics at a glance, www.dacnet.nic.in/ean 2016.
- Beniwal V, Tomer A. Effect of integrated nutrient management on growth parameters of Blackgram (*Vigna mungo* L.). International Journal of Current Microbiology and Applied Sciences 2019;8(6):2045-2053.
- Cochran WG, Cox GM. Experimental Designs. Asia Publishing House, Bombay, India 1957.
- Imade SR. Effect of integrated nitrogen management in rice- green gram cropping sequence under south Gujarat condition. Ph. D thesis submitted to NAU, Navsari 2014.
- Kokani JM, Shah KA, Tandel BM, Nayakan P. Growth, yield attributes and yield of summer Blackgram (*vigna mungo* L) as influenced by FYM, phosphorus and sulphur. The Ecoscan. Special Issue 2014;6:429-433.
- Meena SR, Kumar A, Jat BP, Meena BP, Rana DS, Idanani LK. Influence of nutrient sources on growth, productivity and economics of baby corn (*Zea mays*)-potato (*Solanum tuberosum*)-mung bean (*Vigna radiata*) cropping system. Indian Journal of Agronomy 2012;57(3):217-221.
- Nambiar KKM, Abrol IP. Long term fertilizer experiments in India – An overview. Fertilizer News 1992;34(4):11-26.
- Patel TG, Khushvadan CP, Patel VN. Effect of integrated nutrient management on yield attributes and yield of wheat (*Triticum aestivum* L.). International Journal of Chemical Studies 2017;5:1366-1369.
- Singh RK, Dawson J, Srivastava N. Effect of sources of nutrient on growth and yield of Blackgram (*vigna mungo* L.) Varieties in NEPZ of India. Journal of Pharmacognosy and Phytochemistry 2017;6(4):1064-1066.