

Effect of phosphorus, sulphur and zinc on nutrient composition in Black gram

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Abstract

A field experiment was conducted during kharif season at the agriculture research farm of Raja Balwant Singh College Bichpuri, Agra (Uttar Pradesh) to find out the effect of phosphorus, sulphur and zinc on nutrient composition in Black gram. The results revealed that nutrient Nitrogen, phosphorus, protein and sulphur also improved in seed composition by the application of 60 kg phosphorus per hectare and sulphur 40 kg per hectare. The present experiment was conducted in split plot design with three replication, Three levels of phosphorus 0kg, 30kg, 60 kg per hectare, three levels of sulphur 0 kg, 20 kg, 40 kg per hectare, three levels of zinc 0 kg, 5 kg, 10 kg per hectare 27 treatments combination and 81 plots were used to conduct this study.

Keywords: Phosphorus, Sulphur, Zinc, composition, Black gram seed.

Introduction

In India the pulse crop have valued for their food, feed and fodder and have played an important role in the agricultural economy of the country as a precious component of major farming system since centuries. Black gram (*Vigna mungo*) is the important pulse crop in India, Japan and other countries. Black gram seeds are highly nutritious containing higher amount of protein (22-26%) and minerals. Which are essential for the growth and development of human and animal body. India produced 1.46 Million tones during 2007-2008. The important states producing black gram are Maharashtra, Uttar Pradesh, Andhra Pradesh, Orissa, Tamilnadu, Rajasthan Chhattisgarh and Madhya Pradesh.

Phosphorus is second most critical plant nutrient but for pulse it assumes primary importance owing to its important role in root proliferation and there by atmosphere nitrogen fixation or phosphorus play a very vital role in crop production in pulses (Negi *et. al* 1985). sulphur is one of the sixteen essential plant nutrient elements which all plants must have for normal growth and development.

This crop seeds have proper nutrient value (Protein, Minerals, etc). Keeping aspects in mind an experiment was conducted to study effect of phosphorus, sulphur and zinc on nutrient composition in Black gram.

Materials and methods

A field experiment was conducted at agriculture research farm of Raja Balwant Singh College Bichpuri, Agra (Uttar Pradesh). Which is situated about 11km to the south west of Agra city on Agra Bharatpur Road. Field experiment was carried out for two consecutive years to assess the effect of phosphorus, sulphur and zinc on nutrient composition in Blackgram. experiment was

conducted in Kharif season on that field whose soil was sandy loam in texture the pH value of the soil 0-25 cm depth was found to be 8.10 in both year.

Table 1: Mechanical Analysis of the soil

Component	Content		Methods of determination
	02-03	03-04	
Sand %	60.19	60.99	International pipette
Silt %	21.98	21.23	methods (piper, 1996)
Clay %	17.83	17.78	

The value of organic carbon, available Nitrogen, Available Phosphorus, Available potash Available sulphur Kg per ha in the soil were found to be 0.42, 171.30 kg ha⁻¹, 18.90 kg ha⁻¹, 212.20 kg ha⁻¹, 8.10 kg ha⁻¹ respectively in the first year. The after in the second year of experimentation the value of organic carbon, available nitrogen, available phosphorus, available potash, available sulphur in the soil were found 0.44, 174.40 kg ha⁻¹, 19.40 kg ha⁻¹, 220.70 kg ha⁻¹, 8.30 kg ha⁻¹.

The experiment was conducted in split plot design with three replication, three levels of phosphorus (0, 30 and 60 kg/ha), three levels of sulphur (0, 20 and 40 kg/ha) and three levels of zinc (0, 5 and 10 kg/ha), 27 treatment combination and 81 plots were used to conduct this study.

Results and discussion

(i) Nitrogen content in seed

The data present in Table 2 Clearly shows that phosphorus, sulphur plays an important role in the nutrient content of Black gram. Among the three levels of phosphorus (0, 30 and 60 kg P₂O₅ ha⁻¹) 60 kg phosphorus produced higher nitrogen content in seed. The sulphur produced significant influence on nitrogen content of seed. The difference between 20 kg sulphur and 40 kg sulphur was found non-significant in first year. However in

Table 2: Nitrogen, Protein, Phosphorus and sulphur content % in seed as Effected by various treatments

Treatments	N content % in seed		Protein content % in seed		P content % in seed		S content % in seed	
	2002-03	2003-04	2002-03	2003-04	2002-03	2003-04	2002-03	2003-04
Phosphorus Levels (kg/ha):								
P ₀	3.60	3.78	22.50	23.62	0.22	0.23	0.21	0.22
P ₁	3.75	3.94	23.44	24.62	0.24	0.25	0.22	0.23
P ₂	3.85	4.04	24.06	25.25	0.25	0.26	0.23	0.24
CD at 5%	0.108	0.114	0.724	0.761	0.012	0.012	0.019	0.019
Sulphur Levels (kg/ha):								
S ₀	3.64	3.82	22.75	23.87	0.22	0.23	0.20	0.21
S ₁	3.76	3.89	23.50	24.31	0.23	0.24	0.22	0.23
S ₂	3.86	4.02	23.94	25.12	0.25	0.26	0.23	0.24
CD at 5%	0.102	0.111	0.699	0.753	0.012	0.012	0.019	0.019
Zinc Levels (kg/ha):								
Zn ₀	3.73	3.90	23.31	24.37	0.24	0.25	0.22	0.23
Zn ₁	3.74	3.92	23.37	24.50	0.24	0.25	0.22	0.23
Zn ₂	3.75	3.94	23.44	24.62	0.23	0.24	0.21	0.22
CD at 5%	NS	NS	NS	NS	NS	NS	NS	NS

second year the difference among various levels of sulphur crossed the levels of significant and zinc application had little effect in nitrogen content in Black gram seed.

(ii) Protein content in seed

The Table 2 showed that phosphorus application play important effect on protein content (%) in seed of black gram during first year of experimentation. On average protein content in seed was improved with every increase in the level of phosphorus up to 60 kg Phosphorus and maximum protein content % was recorded at 60 kg (P₂O₅) phosphorus. which was 1.59 and 0.62 units more than the content % recorded on P₀ and P₁ levels of phosphorus application respectively. protein content (%) in black gram in both the years of study P₁ and P₂ were noted to be at par but significant over control result supported by Garg et al. (1971).

Protein content in legumes was appreciably increased with the application of phosphorus and adequate quantities of sulphur play an important role in improving the crop quality. Such beneficial effects have been reported by several scientists increase in protein content in seeds Aulakh and Pasrich (1986), Chopra et. al, (1986). Application of 40 kg S ha⁻¹ may be regarded as beneficial dose of sulphur application from the point of view of more protein content in seed of black gram. Zinc application showed slow increased non significant effect on protein content % in black gram seed.

(iii) Phosphorus content % in seed

It is proved from the Table 2 that 60 kg phosphorus per hectare produced numerically and statistically maximum phosphorus content in seed during both the years of experimentation and similar observation were also reported by Mahadkar and saraf (1988), Jaswal et al. (1986). While in zinc application showed non-significant effect on all the characters.

Sulphur application at higher dose (S₂) 40 kg sulphur ha⁻¹ also produced significantly higher phosphorus content in the seed over S₀ and S₁ in both the year of experimentation.

(iv) Sulphur content % in seeds

The application of phosphorus at 0, 30 and 60 kg per hectare showed significantly. Influence on sulphur content in Black gram. The application of 60 kg phosphorus per hectare produced significantly highest sulphur content % in seed. Sulphur produced significantly impact on sulphur content of seed. The response was observed up to 40 kg hectare level of sulphur application which produced higher sulphur content over its lower level S₀ and S₁ levels and Zinc application decreased the sulphur content in seeds of Black gram.

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