

Effect of calcium and sulphur on the growth and yield of urdbean [*Vigna mungo* (L.) Hepper]

ANUJ KUMAR, DEVENDRA KUMAR AND K.P.S. ARYA

Accepted : June, 2009

SUMMARY

The effect of calcium and sulphur was studied on plant height (cm), number of leaves, leaf area (sq.cm.), dry weight per plant, number of pods per plant, seed yield per plant and 1000 seeds weight (Test weight) of urdbean (*Vigna mungo* L.) var. PDU-1 and PU-19. The experiment was conducted at C.C.R. (P.G.) College, Muzaffarnagar, U.P. during the years 2002-2003. Simple Randomized Block Design was followed with 4 concentrations of calcium, 4 concentrations of sulphur along with control and 4 replications. The doses of calcium were 25ppm, 50ppm, 100ppm and 200ppm. The concentrations of sulphur were 25ppm, 50ppm, 75ppm and 100ppm. The results were found significant for both the varieties of urdbean.

Key words : Calcium, Sulphur, Urdbean, PDU-1, PU-19 FeSO₄, MnSO₄, ZnSO₄, H₂SO₄

In Uttar Pradesh the cultivation of urdbean is done in summer and *kharif* seasons. The major division in which urdbean is grown are Lucknow, Faizabad, Bareilly, Jhansi, Fatehpur, Varanasi, Unnao, Raibareilly and Pratapgarh. The cultivation area and production have been discussed by Kushwah and Nagar (2006).

At present urdbean and mungbean are the second largest protein producing legume crops of the world whereas, soybean and groundnut rank first position. Since they contain about 23-25% protein in their grain, they could provide an answer to the problem of protein deficiency as well as protein malnutrition (Rosario *et al.*, 1980)

Since seed is the carrier of production technology, adequate quantity of good quality seed should be made available to the farmers for realizing the impact of hybrid technology on agriculture production. The concept of seed quality includes several aspects like germination, vigour, seed health etc. with ultimate purpose of obtaining optimum plant stand for good economic yield.

Alfaia and Murako (1998) reported the residual effect of lime and micronutrients under a rotation of soybean, rice and cowpea. The treatments were 0, 2, 3 and 5 t/ha of lime and 3 and 5t/ha of lime plus micronutrients. Significant increase in yield were obtained with lime and micronutrients.

MATERIALS AND METHODS

The present trials were conducted at C.C.R. (P.G.)

Correspondence to:

K.P.S. ARYA, R.M.P. (P.G.) College, Narsan, HARDWAR (UTTARAKHAND) INDIA

Authors' affiliations:

ANUJ KUMAR AND DEVENDRA KUMAR, C.C.R. (P.G.) College, MUZAFFARNAGAR (U.P.) INDIA

College, Muzaffarnagar (U.P.) during the year 2002-2003. The seeds of urdbean var. PDU-1 and PU-19 were obtained from I.I.P.R. Kanpur. The seeds were pre-soaked in different concentrations of calcium and sulphur for 12 hours. They were washed thoroughly with tap water and were sown in petridishes for germination test. The seeds (untreated) were sown directly in the plots in Randomized Block Design was followed with four replications. After 30 days of sowing the crop was sprayed with different concentrations of calcium and sulphur solutions.

The concentrations of calcium and sulphur were recorded as 25ppm, 50ppm, 100ppm and 200ppm for calcium, 25ppm, 50ppm, 75ppm and 100ppm for sulphur.

Symbols of treatments:

T ₁ – 25ppm Ca	T ₅ – 25ppm S
T ₂ – 50ppm Ca	T ₆ – 50ppm S
T ₃ – 100ppm Ca	T ₇ – 75ppm S
T ₄ – 200ppm Ca	T ₈ – 100ppm S
	T ₉ – Control (c)

The main characters studied were plant height (cm), number of leaves/plant, leaf area (sq.cm.)/plant, dry weight (g)/plant, number of pods/plant, yield of seed/plant and 1000 seeds weight (Test weight)

The data were collected from 3 plants and then they were averaged for each treatment. The height (cm) was recorded with the help of meter scale and leaf area was calculated with the help of planimeter. The data were statistically analysed at I.A.R.I., New Delhi. The results of the findings were interpreted with C.D. at 5% level of significance.

RESULTS AND DISCUSSION

The results regarding the effect of calcium and

sulphur on growth and yield characters in urdbean (*Vigna mungo* L.) var. PDU-1 and PU-19 are presented in Table 1 and 2.

The plant height (cm) of urdbean (PDU-1 and PU-19) was found significant of calcium treatments from T₁ to T₄. As the concentrations of calcium increased the height also increased. Plant height in var. PDU-1 was found 51.00 cm in T₄ while it was only 44.00 cm in T₉ (control) in 2003 (Table 1). In var. PU-19 it was recorded 53.6 in T₄ and 49.6 cm in T₉ (control) in 2003. The data indicate that PU-19 was found better than PDU-1 in height gain in plants in urdbean.

As regards the effect of sulphur on height, T₆ produced maximum height and minimum was found in T₈ (sulphur) in both varieties of urdbean in 2003. The height in T₆ in PU-19 was 50.3 cm while in T₈ it was 41.6 cm in 2003. Similar trend was found in PDU-1.

Srinivasam and Shankran (2002) reported the sulphur management in blackgram and its effects on yield. A field experiment was conducted to study the effects of Sulphur source (elemental S, gypsum and pyrite) at the rate of (0,

10,20, 30 and 40 kg/ha) on blackgram. Gypsum (Ca) gave the greatest plant height, number of pods/plant and grain yield.

The effect of calcium from T₁ to T₄ increased the height of urdbean plants because the calcium promoted the growth of plants. T₅ to T₆ sulphur also increased the height but due to the toxic effect T₈ reduced the height. Sulphur ions accumulation retards all the growth parameters including height.

Number of leaves, leaf area (sq.cm.), dry weight (g)/plant and number of pods/plant increased in T₄ (Ca) but reduced in T₈ due to toxic effect of sulphur in urdbean. Sengupta *et al.* (2002) reported that the effect of sulphur on growth *i.e.* leaf area, yield, yield attributes and yield of green gram were found significant. Higher concentration of sulphur reduced leaf area. Calcium increased the leaf area, growth and yield in urdbean and mungbean.

The effect of calcium on seed yield/plant has been shown in Table 1. T₄ treatment of calcium produced 62.6 and 64.6 (g) seed yield in PDU-1 and PU-19 in 2003 respectively. The effect of sulphur on seed yield/plant has

Table 1: Effect of different concentrations of calcium on growth and yield characters of urdbean (2003)

PDU-1	Height (cm)/plant	No. of leaves/plant	Leaf area (sq.cm.)/plant	Dry weight (g)/plant	No. of pods/plant	Yield of seed/plant	1000 seeds weight
T ₁	44.6	46.3	1045	58.6	42.5	58.8	61.6
T ₂	46.3	47.7	1047	58.9	43.5	59.9	64.9
T ₃	49.6	48.0	1050	59.9	45.3	61.2	64.4
T ₄	51.0	48.3	1052	60.7	46.9	62.6	65.8
T ₉ (C)	44.0	45.8	1040	57.3	40.8	57.5	64.0
PU-19							
T ₁	50.6	47.6	1161	60.0	50.3	61.9	67.0
T ₂	51.6	48.6	1166	61.3	52.2	62.8	67.5
T ₃	52.6	48.9	1171	62.7	54.0	63.9	67.9
T ₄	53.6	49.7	1176	63.3	55.0	64.6	68.5
T ₉ (C)	49.6	46.1	1155	59.2	48.9	60.8	66.2

Table 2: Effect of different concentrations of sulphur on growth and yield characters of urdbean (2003)

PDU-1	Height (cm)/plant	No. of leaves/plant	Leaf area (sq.cm.)/plant	Dry weight (g)/plant	No. of pods/plant	Yield of seed/plant	1000 seeds weight
T ₅	45.3	45.8	1044	58.6	42.4	59.2	65.7
T ₆	47.3	47.8	1047	59.6	43.3	60.4	66.0
T ₇	42.6	44.4	1039	57.4	40.0	58.2	64.2
T ₈	40.0	42.2	1027	56.0	39.2	57.4	63.8
T ₉ (C)	44.0	45.7	1040	57.3	40.8	57.9	64.0
PU-19							
T ₅	48.0	46.5	1156	60.6	51.0	65.0	67.4
T ₆	50.0	48.0	1161	61.4	52.7	65.9	67.8
T ₇	45.0	45.0	1148	59.1	48.7	60.5	66.5
T ₈	41.6	43.2	1141	57.8	47.3	60.0	65.2
T ₉ (C)	49.6	46.1	1155	59.5	48.9	60.8	66.2

been shown in Table 2. T_6 produced maximum seed yield/plant and minimum by T_8 treatment in both varieties of urdbean. Similar trend was found in 1000 seeds weight in calcium and sulphur treatments (Table 1 and 2) in urdbean var. PDU-1 and PU-19 in 2003.

Singh and Aggarwal (2000) reported the effect of Ca and S on yield and quality of blackgram. Uptake of N, P and S by blackgram was increased by gypsum application. 30 kg/ha significantly increased the yield forming characters and yield

REFERENCES

- Kushwah, D.P.S. and Nagar, N.N. (2006) Cultivation and plant protection of urdbean (*Vigna mungo*). Jour. Agriculture Animal husbandry. Agriculture Department, U.P., 9, University Marg, Lucknow: 85-88.
- Rosario, R.R. Del, Lozano, Y. and Noel, M.G. (1980). The chemical and biochemical composition of legume seeds. Mungbean. *Philippine Agriculturist*, **63** (3): 267-274.
- Sengupta, K., Nandi, S. and Chakraborty, N. (2002). Effect of sulphur containing fertilizers on productivity of rainfed greengram (*Phaseolus radiatus*). *Indian J. agric. Sci.*, **71** (6) : 408-410.
- Singh, O.P., Tripathi, P.N. and Singh, R. (2000). Effect of phosphorus and sulphur nutrition on summer greengram (*Phaseolus radiatus*). *Indian J. agric. Sci.*, **69** (11) : 798-799.
- Singh, Y.P. and Aggarwal, R.L. (2000). Effect of sulphur sources and levels on yield, nutrient uptake and quality of blackgram (*Phaseolus mungo*). *Indian J. Agron.*, **43** (3) : 448-452.
- Srinivasan, K. and Sawarkar, N. (2002). Sulphur management in blackgram and its effect on yield and economics. *Madras agric. J.*, **88** (10-12) : 654-656.
- Thakur, N.S. (2002). Effect of phosphorus and sulphur levels with and without rhizobium inoculation on growth and yield of blackgram (*Vigna mungo* L.). *Advances in Agri. Research in India*, **12** : (67-70).
- Trivedi, S.K., Singh, V. and Shinde, C.P. (2000). Effect of nitrogen, phosphorus and sulphur on yield and chemical composition of blackgram (*Phaseolus mungo*). Gujarat Agri. University, *Res. J.*, **22** (2): 46-50.

