

Response of *Rabi* greengram (*Vigna radiata* L.) to land configuration and inorganic fertilizer with and without FYM

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SUMMARY

A field experiment was conducted during *rabi* season of 2007-08 at Instructional Farm, Navsari Agricultural University, Navsari to find out the response of land configuration, inorganic fertilizers and farm yard manure on *rabi* greengram. Sowing on raised bed recorded significantly the highest plant height, number of branches per plant, dry matter accumulation, number of pods per plant, test weight and seed (972.89 kg ha⁻¹) yield. These were 20.34 per cent higher over flat bed. Among the levels of inorganic fertilizers, 100 per cent RDF out rightly dominated and established its significant performance in respect to almost all the growth and yield attributes. Application of 100 per cent RDF produced significantly the highest plant height, number of branches per plant, dry matter accumulation, number of pods per plant, test weight and seed (998.79 kg ha⁻¹) yield. The increase in seed yield under application of 100 per cent RDF was to the tune of 27.63 per cent over 75 per cent RDF. The results further revealed that seed yield as well as most of the growth and yield attributes were significantly increased by the application of FYM @ 5 t ha⁻¹. Significantly the highest seed (964.27 kg ha⁻¹) yield was recorded with the application of FYM @ 5 t ha⁻¹. This was 18.01 per cent higher seed yield over control.

Key words : Greengram, Land configuration, Inorganic fertilizers and farm yard manure

Greengram is an important pulse crop grown throughout the state. It is grown in *Kharif* and summer seasons, but also cultivated in *Rabi* season in Valsad, Navsari, Surat, Bharuch and Vadodara districts as a post rainy season crop. Poor soil management is one of the major factors responsible for low productivity of crops. Therefore land configuration can play an important role for easy and uniform germination as well as growth and development of plant. Generally greengram is usually sown on flat bed by seed drill. Several research workers have indicated that manipulation of sowing method provides better environment for germination, growth, flowering and pod development which eventually increase the yield. Fertilizer is costly but important input in crop productivity. Its proper management not only improves the efficiency of applied nutrients but also reduces the gap between addition and removal of nutrients. The use of farmyard manure (FYM) along with inorganic fertilizer increases the nutrient use efficiency and also improves the physical properties of soil. Taking into consideration these facts, an experiment was conducted to study the

response of land configuration, inorganic fertilizers with and without FYM on *Rabi* greengram under South Gujarat condition.

MATERIALS AND METHODS

The field experiment was conducted at the Instructional Farm, N.M. College of Agriculture, Navsari Agricultural University, Navsari, during *Rabi* season of 2007-08. The soil of the experimental field was clayey in texture and alkaline in reaction. The soil was low in organic carbon, available nitrogen (212.5 kg ha⁻¹), medium in available phosphorus (32.20 kg ha⁻¹) and fairly rich in available potassium (344.00 kg ha⁻¹) with 7.55 pH. Eight treatment combinations consisting of two levels of land configuration *viz.*, flat bed and raised bed. Two levels of inorganic fertilizers namely 75 per cent recommended dose of fertilizer-RDF and 100 per cent recommended dose of fertilizer-RDF and two levels of farmyard manure *viz.*, control and FYM @ 5 t ha⁻¹ were evaluated in Factorial Randomized Block Design with four replications. The greengram variety Co-4 was sown on 27 November 2007 keeping 30 cm inter-row spacing and intra-row spacing of 10 cm was maintained by thinning operation. Recommended cultural practices were also adopted as per need of crop.

RESULTS AND DISCUSSION

The results obtained from the present investigation have been discussed in the following sub heads :

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Growth attributes:

The plant height, number of branches and dry matter accumulation per plant (Table 1) were significantly highest under raised bed over flat bed sowing. This might be due to maintenance of proper air moisture regimes under raised bed sowing which might have improved the drainage resulting in good supply of available nutrients, soil aeration, soil environment, N fixation by nodule bacteria and better growth and development. The results were in conformity with those reported by Lawand *et al.* (1993) in cowpea as well as Shaikh and Mungse (1998 b) in chickpea with respect to number of branches per plant. Similarly, higher growth of plant in terms of plant height, number of branches per plant under raised bed (L_2) sowing reflected into higher dry matter accumulation per plant. These results are in conformity with those of Shaikh and Mungse (1998 a) in chickpea.

Inorganic fertilizers also had significant effect on growth attributes. The plant height and number of branches per plant (Table 1) of greengram was maximum under treatment receiving 100 per cent RDF over other treatments. This was because of nitrogenous fertilizer induces the growth of the plant through active protein metabolism, transportation of photosynthates and synthesis of nucleic acid and proteins. Hence, during the vegetative stage, N nutrition of the plant to a large extent controls the growth of the plant. Phosphorus has important role in conversion of solar energy into chemical energy and it has also beneficial effect on root proliferation that increases

the absorption of plant nutrients from the soil. This was obvious as phosphorus is closely associated with cell division and development of meristematic activities of the tissue in plant system is bound to increase morphological organs of the plant. These results confirm the findings of Patel *et al.* (1992) and Rajkhowa *et al.* (2002) in greengram. Treatment receiving 100 per cent RDF (F_2) produced significantly the highest dry matter accumulation per plant over 75 per cent RDF (F_1) treatment. This might be due to better growth of plant in terms of plant height and number of branches per plant. Moreover, nitrogen and phosphorus might have increased the photosynthetic efficiency and thus increased the production of photosynthates reflected in better growth and ultimately in higher dry matter accumulation. The present results are in accordance with those of Yakadri *et al.* (2004) in greengram.

Application of FYM were found to have significant effect on most of the growth parameters. Plant height, number of branches per plant and dry matter accumulation (Table 1) were recorded significantly higher under treatment FYM @ 5 t ha⁻¹ over control. This might be due to multifarious role of FYM in supply of nutrients as well as improvement in physical, chemical and biological properties of soil. Finally, it was reflected in better growth of plant with FYM. The results are in close conformity with those of Pathak *et al.* (2003) in chickpea. Better growth of plant in terms of plant height and number of branches per plant, ultimately resulted in significantly

Table 1 : Effect of different treatments on various growth parameters at Maturity, yield attributes and seed yield of *Rabi* greengram

Treatments	Plant height (cm)	No. of branches per plant	Dry matter accumulation (g/plant)	No. of pods per plant	Test weight (g)	Seed yield (kg/ha)
Land configuration (L)						
L_1 = Flat bed	37.35	3.39	15.30	21.10	3.86	808.48
L_2 = Raised bed	39.99	4.18	16.53	23.18	4.14	972.89
S.E. \pm	0.58	0.09	0.25	0.47	0.06	24.29
C.D. (P=0.05)	1.72	0.26	0.74	1.38	0.18	71.45
Inorganic fertilizers (F)						
F_1 = 75 % RDF	36.95	3.52	15.06	20.55	3.77	782.58
F_2 = 100 % RDF	40.39	4.04	16.76	23.73	4.23	998.79
S.E. \pm	0.58	0.09	0.25	0.47	0.06	24.29
C.D. (P=0.05)	1.72	0.26	0.74	1.38	0.18	71.45
FYM levels (M)						
M_1 = No FYM (control)	37.35	3.62	15.29	20.95	3.94	817.10
M_2 = FYM @ 5 t ha ⁻¹	39.99	3.94	16.54	23.33	4.06	964.27
S.E. \pm	0.58	0.09	0.25	0.47	0.06	24.29
C.D. (P=0.05)	1.72	0.26	0.74	1.38	NS	71.45

NS-Non significant

higher dry matter accumulation. These results are in accordance with Reddy *et al.* (1992) in greengram.

Yield attributes and yield:

Land configurations were found significant effect on most of the yield attributes and yield. Sowing on raised bed recorded significantly the highest pods per plant and test weight (Table 1). This might be due to better growth of plant in terms of dry matter accumulation under raised bed sowing which might have adequately supplied more photosynthates for development of sink. Significantly the highest seed (972.89 kg ha⁻¹) yield was obtained under raised bed sowing over flat bed sowing. An increase in seed yield under raised bed was 20.34 per cent over flat bed sowing. This might be due to the cumulative effect exerted from better improvement in drainage, soil environment, aeration, root development, N fixation by nodule bacteria, optimum moisture-air equilibrium throughout the crop growth besides supply of available nutrients to the crop resulting in better growth and development ultimately reflected in better seed yield. The present findings were in accordance with those of Shaikh and Mungse (1998 b) with respect to number of pods per plant and test weight as well as Dhindwal *et al.* (2006) in greengram with respect to seed yield.

An appreciably highest values of yield attributes *viz.*, number of pods per plant and test weight (100-seed weight) and seed (998.79 kg ha⁻¹) yield (Table 1) were noted with the application of 100 per cent RDF than rest of levels. The increase in seed yield might be due to remarkable improvement in the yield attributes such as pods per plant, seeds per pod, length of pod and test weight, better development of various growth parameters such as plant height, number of branches per plant, number of root nodules and dry matter accumulation resulted in higher seed yield. The results were supported by the findings of

Table 2 : Interaction effect of inorganic fertilizers and farm yard manure on seed yield

Inorganic fertilizers	Seed yield (kg/ha)	
	M ₁ = Control	M ₂ = FYM @ 5 t ⁻¹
F ₁ = 75 % RDF	665.73	899.44
F ₂ = 100 % RDF	968.48	1029.10
S.E. ±	34.35	-
C.D. (P=0.05)	101.05	-

Patel *et al.* (1992), Singh *et al.* (1993).

Application of FYM @ 5 t⁻¹ recorded significantly highest number of pods per plant and seed yield (964.27 kg ha⁻¹) over control. However, FYM had no significant effect on test weight due to genetic control on this attribute. Significantly highest number of pods per plant and seed yield was due to favourable effect of FYM in improvement of growth attributes such as plant height, number of branches per plant, dry matter accumulation. Similar results were obtained by Reddy *et al.* (1992) in greengram.

Interaction effect:

Interaction effect of inorganic fertilizers and FYM was found significant on seed yield (Table 2). Application of inorganic fertilizers @ 100 per cent RDF along with FYM @ 5 t ha⁻¹ recorded significantly the higher seed (1029.10 kg ha⁻¹) yield which was at par with 100 per cent RDF without FYM. While significantly the lowest seed yield (665.73 kg ha⁻¹) was produced under treatment combination of 75 per cent without FYM. This might be due to adequate application of 100 per cent RDF along with FYM @ 5 t ha⁻¹ which also provided nutrient to long period of crop life which reflected in better growth and development of plant and ultimately resulted in increased seed yield. The results were supported by the findings of Reddy *et al.* (1992).

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