Research Paper

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Integrated Seed and Crop Management Techniques for Increasing Productivity of Greengram CV.CO 6.

Agriculture

KEYWORDS : Green gram seeds, Seed treatment, Fertilizer management and foliar spray.

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ABSTRACT

The seeds of greengram cv.CO 6 were given existing hardening and the newer seed management techniques (designer seed) with a macro and micronutrients along with different foliar spray application and on the productivity under irrigated eco-system. Among the different treatments tried, designer seed(Hardening with $MgSO_4$ 100 ppm + Polymer 3ml/kg + Carbendazim 2g/kg + Imidacloprid 1ml/kg) NPK + 25:50:0 kg/ha + 0.01% Brassinolide spray on 35th and 45th DAS excelled others in number of pod^{-1},pod yield and seed yield compared to control. The seed yield ha^{-1} in the best treatment was 690 kg ha^{-1} which was 19.2 % increase over the control and 14.5% increase over existing recommendation of designer seed + NPK 25:50:0 kg/ha + Foliar spray (Urea 10 kg, DAP 2.6 kg, MOP 1.75 kg, Potassium Sulphate 1.4 kg, Succinic Acid 40 g, Teepol 120 ml (per ha)) on 35th and 45th DAS.

INTRODUCTION

India is the largest producer and consumer of pulses in the world accounting for 37 per cent of world area and 28 per cent of production. Nearly 8 per cent of the pulse area is occupied by greengram, which is the third most important pulse crop of India in terms of area cultivated and production next to blackgram and pigeon pea. The productivity gap analysis revealed that the national average yield of greengram is 400 kg ha^{-1} as against 850 kg ha^{-1} in Punjab, Haryana and Gujarat. In Tamil Nadu the low productivity of greengram is due to the cultivation of this crop in marginal, sub-marginal lands and rainfed with poor management practices. Scientific seed treatment methods are not adoptable to the farmers, mainly because of non-availability of chemicals and also the high cost. In legume, nitrogen occupies a prime place among the major nutrients. Foliar application of nutrients has been suggested for increasing the fertilizer use efficiency. It provides more rapid utilization of nutrients and permits the correction of observed deficiencies in less time than would be required by soil treatments. In view of the above the present study was undertaken to design an integrated seed and crop management techniques to greengram cv CO 6.

MATERIALS AND METHODS

Genetically pure, freshly harvested breeder seeds of greengram (*Vigna radiata* L.Wilczek) cv. CO 6 obtained from Agricultural Research Station, Bhavanisagar – 638 451 served as the base material for the study. The bulk seeds were imposed with hardening treatment with $MgSO_4$ 100 ppm (soaking in 1/3 volume of seed to solution ratio for 3h) as per CPG and the integrated seed management technique (as per suggested by Anon, 2009). A Field experiment was laid out under RBD with three replications during Rabi 2010 – 2011 (S_1) and Summer 2011 (S_2) having the plot size of 4×5m with the spacing of 45×15 cm to assess the seed yield and quality of greengram cv.CO6 with following treatmental details (Plate 2,3). The experiment was raised in irrigated eco – system To access the seed yield and quality of greengram cv.CO 6 with the following treatmental details.T_1- Control,T_2 - Seed Hardening with $MgSO_4$ 100 ppm,T_3 -Designer seed (T_2+ Polymer 3ml/kg + Carbendazim 2g/kg + Imidacloprid 1ml/kg).T_4 - T_2 + NPK 25:50:0kg/ha +Foliar spray(FS 1) ((Urea 10 kg, DAP 2.6 kg, MOP 1.75 kg, Potassium Sulphate 1.4 kg, Succinic Acid 40 g, Teepol 120 ml (per ha)) on 35th and 45th DAS).T_5 - T_2 + NPK 25:50:0 kg/ha + Foliar spray(FS 2)(0.01% Brassinolide spray on 35th and 45th DAS),T_6 -T_2 + NPK 25:50:25 kg/ha with MN 20 kg /ha + FS 1.T_7 - T_2+ NPK 25:50:25 kg/ha with MN 20 kg /ha+ FS 2.T_8 – T_3+ NPK 25:50:0 kg/ha + FS 1.T_9 - T_3+ NPK + 25:50:0 kg/ha + FS 2.T_{10} - T_3+ NPK + 25:50:25 kg/ha MN 20 kg/ha + FS 1.T_{11} - T_3+NPK 25:50:25 kg/ha with MN 20 kg /ha + FS 2.The observation on days to 50% flowering, no of flowering branches and no of flowers per plant were recorded. The yield attributes like number of pods per plant, pod set (%),number of seeds per pod, pod yield /plant (g),seed yield/plant (g).pod yield/plot(kg),seed yield/plot(kg) were also measured. The yield of pod (ha) and seed (ha) were also recorded. The data collected were statistically scrutinized (Panse and Sukhatme,1980) for the 'F' test of significance.

RESULTS AND DISCUSSION

1. Influence of seed crop management techniques / packages on productivity

1.1. Influence of seed management techniques

The results of the present investigation also exhibited that designer seed recorded the maximum field emergence over hardened and untreated seeds irrespective of its combination with other crop management techniques. The designer seed recorded 5.4 and 6.1 per cent increased field emergence over control and 3.9 and 5.5 per cent over hardened seed ,respectively in rabi and summer seasons .The improvement in field emergence could be attributed to activation of cells, which resulted in the enhancement of mitochondrial activity leading to the formation of more high energy compounds and vital biomolecules, which are made available during the early phase of germination (Dharmalingam *et al*., 1988).

The results of the present study also indicated that designer seed, the advanced seed management technique recommended by Natesan (2006) in blackgram, and Selvakumari (2010) in maize, had increased the productivity of greengram by 5.7 per cent over hardened seed and 9.4 per cent over control seed.

1.2. Influence of macro and micro nutrient management

In the present study, NPK fertilization at two different combinations viz., 25: 50:0 kg ha^{-1}(Anon, 1997) and 25:50:25 kg ha^{-1} (Anon, 2005) i.e. with and without potassium fertilizers and micronutrients were evaluated for their influence on productivity of greengram in combination of other seed and crop management techniques. The increase in field emergence, number of flowering branches, number of flowers and number of pods were also improved with essential macro and micronutrients in the present study by 3.3 per cent in flowering branches and 32 per cent in number of pods with application of potassium along with N & P and micronutrients.

The influence of NPK on crop growth and yield might be due to nitrogen serves as a component of amino acid and coenzyme that have considerable importance in biological reproductivity of living organism (Bakley, 1974). The influence of micronutrient was indicated in many crops (pulses, cotton, groundnut etc.,) and

the beneficial influence might be because of its components (Anon, 2005).

1.3. Influence of foliar nutrition

Influence of foliar nutrition in improving the productivity of quality seed is reported by scientists (Anandhakrishnaveni *et al.*, 2004). In the present study, two different foliar sprays for improving the seed set and productivity were evaluated, between which one spray as per the CPG recommendation (Anon, 1997), while the other is brassinolide recommended by scientists in different crops like greengram (Jeyakumar *et al.,* 2008), ragi (Vigneshwari, 2002).

In the present field experiment, the results on 50 per cent flowering, flowering branches per plant and number of flowers per plant showed significant increase in the plot sown with designer seed and foliar sprayed with 0.01 per cent brassinolide at 35 and 45 DAS in both seasons. The said treated plants showed three days earlier in flowering and 36 per cent increased flowering branches in both seasons when compared to control seeds. Similarly the improvement was 10.9 per cent and 11.8 per cent in number of flowers per plant during rabi and summer season, respectively. The higher number of flowers in brassinolide sprayed treatment might be due to prevention of flower drop by phenolic compound present in brassinolide (Ali *et al.*, 2007) .The increase in seed yield of pulses with foliar application of nutrients could be attributed to reduced flower drop and increased fruit set percentage (Ganapathy *et al.*, 2008). The average yield of the crop is low, mainly due to poor harvest index and shedding of flowers and immature pods. Foliar application of 0.1 ppm brassinolide influenced the drymatter accumulation, number of pods and seeds per plant and thereby maximum seed yield in black gram (Jeyakumar *et al.,* 2008).

2.Synergistic influence of seed and crop management techniques.

Though individually the influence of each of the crop / seed management technique are as expressed in 1.1,1.2,1.3. their combined influence is as follows ,the cause of which could be focused to the earlier reasons and their synergistic influence in improving the productivity.

Conclusion

This study expressed that application of crop and seed management techniques influenced the seed yield and inclusion of newer management techniques had influenced to a greater extent. Designer seed treatment + NPK 25:50:25 kg ha^{-1} with MN 20 kg ha^{-1} + 0.01 per cent brassinolide spray on 35th and 45th DAS increased the yield by 19.2 per cent and 14.5 per cent compared to control and the existing recommendation of designer seed + NPK 25:50:0 kg/ha + Foliar spray (Urea 10 kg, DAP 2.6 kg, MOP 1.75 kg, Potassium Sulphate 1.4 kg, Succinic Acid 40 g, Teepol 120 ml (per ha)) on 35th and 45th DAS..

Table 1. Influence of seed management techniques

Seed management techniques	Percentage increase over control (absolute control)		
	Pod set (%)	Pod yield $plot^{-1}$	Seed yield $plot^{-1}$
Hardened seed *	6.7	5.1	5.7
Designer seed **	13.2	8.5	9.4

*Mean of T_2 and T_4 to T_7 and ** Mean of T_3 and T_8 to T_{11}

Table 2. Influence of macro and micro nutrient management

Macronutrient management technique	Micronutrient management technique	Percentage increase over control (absolute control)		
		Pod set (%)	Pod yield $plot^{-1}$	Seed yield $plot^{-1}$
25:50:0*	-*	9.0	5.2	6.4
25:50:25**	20kg ha^{-1} **	13.6	10.1	10.6

*mean of T_4, T_5, T_8, T_9 and **mean of T_6, T_7, T_{10}, T_{11}

Table 3. Influence of foliar nutrition

Foliar spray management technique	Percentage increase over control (absolute control)		
	Pod set (%)	Pod yield $plot^{-1}$	Seed yield $plot^{-1}$
Urea 10 kg, DAP 2.6 kg, MOP 1.75 kg, Potassium Sulphate 1.4 kg, Succinic Acid 40 g, Teepol 120 ml (per ha)*	10.1	6.7	7.3
0.01% Brassinolide **	12.6	8.8	9.7

*mean of T4, T_6, T_8, T_{10} and** mean of T_5, T_7, T_9, T_{11}

Table 4. Synergistic influence of seed and crop management techniques.

Factors conferred	Percentage increase over control (absolute control)	
	Pod yield kg $plot^{-1}$	Seed yield kg $plot^{-1}$
Seed treatment		
Hardened seed	1.1	1.6
Designer seed	5.2	5.7
Seed management technique - Hardened seed		
NPK 25:50:0 + Urea 10 kg, DAP 2.6 kg, MOP 1.75 kg, Potassium Sulphate 1.4 kg, Succinic Acid 40 g, Teepol 120 ml (per ha)	2.8	3.7
NPK 25:50:0 + 0.01% Brassinoloide	4.8	5.5
NPK 25:50:25 + MN 20 kg ha^{-1} + Urea 10 kg, DAP 2.6 kg, MOP 1.75 kg, Potassium Sulphate 1.4 kg, Succinic Acid 40 g, Teepol 120 ml (per ha)	7.4	8.0
NPK 25:50:25 + MN 20 kg ha^{-1} + 0.01% Brassinoloide	9.3	9.5
Crop management technique - Designer seed		
NPK 25:50:0 + Urea 10 kg, DAP 2.6 kg, MOP 1.75 kg, Potassium Sulphate 1.4 kg, Succinic Acid 40 g, Teepol 120 ml (per ha)	6.3	6.8
NPK 25:50:0 + 0.01% Brassinoloide	6.9	9.5
NPK 25:50:25 + MN 20 kg ha^{-1} + Urea 10 kg, DAP 2.6 kg, MOP 1.75 kg, Potassium Sulphate 1.4 kg, Succinic Acid 40 g, Teepol 120 ml (per ha)	10.1	10.5
NPK 25:50:25 + MN 20 kg ha^{-1} + 0.01% Brassinoloide	13.7	14.0

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