Original Research Article

Effectsof phosphorus and boronon growth, yieldand economicsof green gram (*Vignaradiata* L.)

Formatted: Left

ABSTRACT

A field experiment was conducted during *Kharif*, 2022 at Crop Research Farm, Department ofAgronomy, Sam Higginbottom University of Agriculture, TechnologyAndand Sciences.Prayagraj (U.P) to determine the "Effect of Phosphorus and Boron on growth, yield and economics of summer green gram (*Vignaradiata* L.)". The result showed that treatment 9 [Phosphorus (50kg/ha) + Boron (1.0kg/ha)] recorded significantly higher plant height (42.57 cm), higher number of branches/plant (6.73), higher number of nodules/plant (24.13), higher dry weight (16.88g). Significant and maximum numbers of pods/plant (32.47), maximum numbesr of seeds/pod (8.40), higher test weight (37.0 g), higher seed yield (12.43q/ha), higher stover yield (22.83 q/ha) and higher harvest index (35.28%) was were recorded in treatment in treatment 9 [Phosphorus (50kg/ha) + Boron (1.0kg/ha)]. Maximum gross return (1,16,278 INR/ha), net return (82,434 INR/ha) and highest benefit cost ratio (2.43) was were recorded in treatment 9 [phosphorus (50 kg/ha) + Boron (1.0kg/ha)] as compared to other treatments.

Keywords: GreengramGreen gram, phosphorus,boron, growth, yield and economics.

Introduction:

Green gram is one of the important kharif pulse crops of India which can be grown as acatch crop between rabi and kharif seasons. India is its primary origin and is mainly cultivated in East Asia, Southeast Asia and the Indian subcontinent. India is the largest pulses producer globally, accounting for 24% of the world total production. It is an important pulse crop ~~having~~ withhigh ~~nutritive~~ nutritionalvalue. It is also considered ~~as~~ a cheap source of protein and other minerals. Due to itsshort duration nature, it is an excellent crop to fit in an intercropping system with different major crops. It is an important conventional pulse crop of India. The calorific value of green gram is 334 calories per 100 g. It ~~it~~ is well known for its high nutritional content, viz, crude protein (24.0%), fat (1.3%), carbohydrate (56.6%), minerals 3.5%, lysine (0.43%), methionine (0.10%) and tryptophan (0.04%). The Indian Council of Medical Research (ICMR) has recommended a minimum consumption of 40 gram/day.Green gram is popularly known as ~~mungbean~~mung bean. It was extensively cultivated under varying agro-climatic conditions. India is the world'smajor producer of green gram,which is grown in ~~the world and grown in~~ almost all the states. In India during 2020-21, green gram is grown in about 30.37 lakh/ ha with the total production of 2.64 million ~~tonnes~~tons with a productivity of 888 kg/ha and contributing 10% to the total pulse production. Some of the states like Rajasthan (19.23 lakh/ ha), Karnataka (4.23 lakh/ ha), Maharashtra (4.03 lakh/ ha) Madhya Pradesh (2.10 lakh/ ha), Odisha (1.69 lakh/ ha), Telangana (0.73 lakh/ ha) and Uttar Pradesh (0.30 lakh/ ha) are the major producers of green gram in India **(GOI, 2021).**

Phosphorus is most critical nutrient in pulse crop. It stimulates the symbiotic nitrogen fixation of bacterial cell to root hair for nodulation. Indian soils are poor to medium in available phosphorus. Only about 30 % of the applied phosphorus is available for crops and remaining part converted into insoluble phosphorus. As the concentration of available p~~P~~hosphorus in the soil solution is normally insufficient to support the plant growth, continual replacement of soluble p~~P~~hosphorus from inorganic and organic sources is necessary to meet the p~~P~~hosphorus requirements of crops. Phosphorus is added extra dose in recommended dose of phosphorus which increases nitrogen fixationand, ~~finally~~ ultimately~~improve~~ improves the productivity of green gram. It plays an important role in virtually all main metabolic processes in plants including photosynthesis, energy transfer, signal transduction, macromolecular biosynthesis and respiration (**Singh*et al*~~.,~~ 2021).**

Phosphorus is needed in large quantities during the early stages of cell division, the initial overall symptom is slow, weak, and stunted growth. Phosphorus is relatively mobile in plants and can be transferred to sites of new growth, causing symptoms of dark to blue-green coloration to appear on the older leaves of some plants. Under severe deficiency, purplish~~ng~~ of leaves and stems may appear. Phosphorus deficiency causes delayed maturity and poor seed and fruit development. which lead to yield reduction by limiting the plantsgrowth (**Choudhary *et al*~~.,~~ 2017**).

Boron is very important in plant metabolism through acting activit~~y~~ of certain enzymes, cell division, carbohydrate transport, ~~and~~ calcium and potassium uptake. and protein synthesis, which ultimately ~~it~~ may enhance ~~in~~ pod and seed formation. It is an essential micronutrient required for crop growth and yield due to its major role in the formation and maintenance of cell wall and cell membrane integrity (**Janaki *et al*~~.,~~ 2017).**

Micronutrients like boron is one of the mineral nutrients required for normal plant growth. The most important functions of boron in plants are thought to be its structural role in cell wall development, cell division, seed development. and stimulation or inhibition of specific metabolic pathways for sugar transport and hormone development (**Ahmed*et al*~~.,~~ 2009**). Boron deficiency causes decreases in pollen grain count, pollen germination etc. It also influences growth parameters and the filling up of seeds. It is usually accepted that boron availability is decrease~~d~~ under dry soil conditions. Thus, boron deficiency is often associated with dry weather and low soil moisture conditions. This behavior~~ur~~ may be related to the restricted release of boron from organic complexes. which ultimately impaired ability of plants to extract boron from soil due to a lack of moisture in the rhizosphere. Even when ~~of~~ boron levels in soil ~~is~~ arehigh, then also low soil moisture are also impairs the transport of boron to absorbing root surfaces (**Praveena*et al*~~.,~~ 2018**). Keeping the above aspect in ~~view~~ mind, the present investigation is entitled "Effect of phosphorus and boron application on growth, yield and economics of green gram (*Vignaradiata* L.)''.

MATERIALS AND METHODS:

The field experiment was conducted during *kharif*2022 at Crop Research Farm, the Department of Agronomy, Naini Agricultural Institute, the Sam Higginbottom University of Agriculture, Technology And Sciences, Prayagraj, and Uttar Pradesh. The soil of the experimental field was sandy loam in texture, nearly neutral in soil reaction (pH 8), low level organic carbon (0.62%), medium available N (225 ~~K~~kg/ha), high in available P (38.2

kg/ha) and low available K (240.7 kg/ha). The treatment consists of 3 levels of Pphosphorus *viz*. Pphosphorus (30 kg/ha),Pphosphorus (40 kg/ha) and Pphosphorus (50 kg/ha) with a combination of different levels of Bboron*viz*. B (0.6 kg/ha), B (0.8 kg/ha) and B (1.0 kg/ha). The experiment was laid out in RBD, with 10 treatments, each replicated three times ice. The treatment combinations are T_1 Phosphorus (30 kg/ha) + Boron (0.6 kg/ha). T_2 Phosphorus (30 kg/ha) + Boron (0.8 kg/ha), T_3 Phosphorus(30 kg/ha) + Boron (1.0 kg/ha), T_4 Phosphorus (40 kg/ha) + Boron (0.6 kg/ha), T_5 Phosphorus (40 kg/ha) + Boron (0.8 kg/ha), T_6 Phosphorus (40 kg/ha) + Boron (1.0 kg/ha), T_7 Phosphorus (50 kg/ha) + Boron (0.6kg/ha), T_8 Phosphorus (50 kg/ha)+Boron(0.8kg/ha),T_9Phosphorus (50 kg/ha)+Boron(1.0kg/ha),T_{10}(control)N:P:K25:50:25Kkg/ha. Data recorded on different aspects of the crop, *viz*., growth, and yield attributes, were subjected to statisticallly analysis by the analysis of variance method **(Gomez and Gomez, 1976).**

RESULT AND DISSCUSSION:

Growth parameters

Plant height (cm)

The data (Table1) revealed that significant and higher plant height (42.57cm)was recorded intreatment 9 [Phosphorus(50kg/ha)+Boron(1.0kg/ha)].However, treatment 8 [Phosphorus (50kg/ha) + Boron (0.8kg/ha)] and treatment 7 [Phosphorus (50kg/ha+ Boron(0.6kg/ha)] were found to be statistically at par with treatment 9[Phosphorus (50kg/ha + Boron (1.0kg/ha)]. The significant and higher plant height was observed with the application of phosphorus(50kg/ha) might be due to the adequate availability of plant nutrients through appropriate nutrient supply and sunlight to each plant. An appropriate phosphorus supply indirectly helps in providing nitrogen supply, and its availability helped the plants to attain more vigour in terms of plant height**(khan *et al*.,2017).**Further, the application of boron (1kg/ha) encourages growth promoting hormones and protein synthesis, leading to highermeans more chlorophyll content and leading to higher photosynthesis. These results were in conformity with those of **Yadav *et al.* (2020).**

Number of Branches/plants

Thedata (Table1) revealed that a significant and maximum number of branches/plant (6.13)was recorded in treatment 9 [Phosphorus (50 kg/ha) + (Boron1.0kg/ha)]. However, the treatments 8 [Phosphorus (50 kg/ha) + Boron (0.8 kg/ha)], treatment 7 [Phosphorus (50 kg/ha) +(Boron 0.6 kg/ha)], treatment 6 [Phosphorus (40kg/ha+ Boron (1.0kg/ha)], and

~~treatment~~ 5 [phosphorus (40kg/ha) + Boron (0.8 kg/ha)] were found to be statistically at par with treatment 9 [Phosphorus (50 kg/ha) + (Boron (1.0kg/ha)]. The significant and maximum number of branches/plant was observed with the application of boron (1.0kg/ha) might be due to quick availability of boron,which play ~~to show~~ crucial role in tissue differentiation, carbohydrate metabolism,~~ and necessary for~~ sugar translocation in plants, and the development of new cells in meristematic tissue. Similar results were reported~~ was~~ by **Janaki *et al.* (2018).**

Number of Nodules/plants

The data (Table 1) revealed that a significant and higher number of nodules/plant (24.13) was recorded in treatment 9 [Phosphorus (50 kg/ha) + (Boron1.0kg/ha)] which was significantly superior over the rest of the treatments. However, the treatments 8 [Phosphorus (50 kg/ha) + Boron (0.8 kg/ha)], ~~treatment~~ 7 [Phosphorus (50 kg/ha) +(Boron 0.6 kg/ha)] and,~~treatment~~ 6 [Phosphorus (40kg/ha+ Boron (1.0kg/ha)] were found to be statistically at par with treatment 9 [Phosphorus (50 kg/ha) + (Boron (1.0kg/ha)]. The significant and higher number of nodule/plant was observed with the application of p~~P~~hosphorus (50kg/ha) might be due to better proliferation of roots and increased nodulation due to higher phosphorus availability, which leads to higher plant growth**(Patel*et al.*,2020**). Further, the application of boron (1kg/ha) promoted the nodule due to direct involvement of boron in nodulation, symbiotic nitrogen fixation, and its help in retaining the cell wall and membrane integrity of nodules. These results were in conformity with those of **Sharmila*et al.* (2020)**.

Plant dry w~~W~~eight (g/plant)

The result (Table 1) revealed that plant dry weight was ~~recorded~~significantly higher (16.88g) in treatment 9 [Phosphorus (50kg/ha) +(Boron 1kg/ha)]. However, treatment 8[Phosphorus (50kg/ha) +(Boron 0.8kg/ha)], ~~treatment~~ 7 [Phosphorus (50kg/ha) +(Boron 0.6kg/ha)],~~treatment~~ 6 [Phosphorus (40kg/ha) +(Boron 1kg/ha)] and,~~treatment~~ 5 [Phosphorus(40kg/ha) +(Boron 0.8kg/ha)] were ~~as~~ found statistically at par with treatment 9 [Phosphorus (50kg/ha) +(Boron 1kg/ha)]. Higher p~~P~~lant dry weight (g) was significantly influenced by the application of p~~P~~hosphorus (50kg/ha), might be due to adequate supply and availability of p~~P~~hosphorus increased the dry weight of the plant and improved ~~better~~ photosynthetic activity due to greater exposure to light and increased the availability of nutrients to the plants, which resulted in higher plant dry weight. A s~~S~~imilar result was reported by **Swami *et al.*(2020).**

Yield parameters:

Number of pods/plants

The data (Table 2) revealed that a significant and higher number of pods/plant (32.47) was recorded in tTreatment 9 [Phosphorus (50kg/ha) + (Boron 1kg/ha)]which was significantly superior over the rest of the treatments. However, treatment 8 [Phosphorus (50kg/ha) + (Boron 0.8kg/ha)]and,treatment7 [Phosphorus (50kg/ha) + (Boron 0.6kg/ha)] were statististically at par with the treatment 9 [Phosphorus (50kg/ha) + (Boron 1kg/ha)].A significant and maximum number of pods/plant with the application of pPhosphorus (50kg/ha) might be due to better photosynthetic activities with sufficient availability of light and supply of nutrients in balance quantity at the growing stage. **(Khan*et al.*,2017).**Further, the increase in number of pods/plant with the application of bBoron (1kg/ha) might be due to itsplays an important role in tissue differentiationce, carbohydrate metabolism and sugar translocation (**Satya *et al.* (2020).**

Number of Seeds/pods

The data (Table 2) revealed that a significant and higher number of seeds/pod was recorded in tTreatment 9 [Phosphorus (50kg/ha) + (Boron 1kg/ha)], which was significantly superior over rest of the treatment. However, treatment 8 [Phosphorus (50kg/ha) + (Boron 0.8 kg/ha)] and, treatment 7 [Phosphorus (50kg/ha) + (Boron 0.6 kg/ha)] were was statististically at par with the treatment 9 [Phosphorus (50kg/ha) + (Boron 1kg/ha)].A sSignificant and maximum number of seeds/pods with the application of pPhosphorus (50kg/ha) might be due to the increase in vegetative development and reproductive attributes under proper availability of phosphorus and better physical condition of the soil,resulted in a higher number of seeds per pods. A sSimilar result was reported by **(Mashi*et al.*, (2020).** Further, the increase in seeds/pods with the application of bBoron (1kg/ha) might be due to the translocation of photosynthates, pollen viability, and pollen tube growth. These results are in similar to findings with those of **Ram *et al.* (2017**).

Test weight (g)

The data (Table 2) recorded that the highest test weight (37.70g)wasobserved in treatment 8 [Phosphorus 50kg/ha) + Boron (0.8kg/ha), and though there was no significant difference among other treatments.

Seed yield (q/ ha)

The data (Table 2) revealed that a significant and higher seed yield (12.43 q/ha) was observed in tTreatment 9 [Phosphorus (50kg/ha) + (Boron 1.0kg/ha), which was significantly superior over the rest of the treatments. However, treatment 8 [Phosphorus (50kg/ha) + (Boron 0.8kg/ha)] were statistically at par with the treatment 9 [Phosphorus (50kg/ha) + (Boron 1kg/ha)].The higher and more significant seed yield obtained with application of pPhosphorus (50 kg/ha) might be due to well-developed root system, greater translocation of photosynthates from source to sink (**Balai*et al*., 2017).** Further, increase in seed yield with the application of bBoron (1kg/ha) might be due to enhancement of the cell wall, tissue difference, sugar transport, maintenance of conducting tissue with regulatory effect on another elements and metabolism of nucleic acids, carbohydrate, auxins and phenols. Similar results were reported by **Praveena*et al*. (2018).**

Stoveryield (q/ha)

The data (Table 2) revealed that a significant and higher stover yield (22.83 q/ha) was observed in tTreatment 9 [Phosphorus (50kg/ha) + (1.0 kg/ha)] which was significantly superior over the rest of treatments. However, treatment 8 [Phosphorus (50kg/ha) + (Boron 0.8 kg/ha)]. Were was statistically at par with the treatment 9 [Phosphorus (50kg/ha) + (1.0 kg/ha)].**The** maximum stover yield was obtained with the application of phosphorus (50kg/ha) might be due to an increase in the photosynthetic activities of the plant and a root system that enabled the plant to extract more water and nutrients from the soil depth (**Rekha*et al*., 2018**). Further, increased in Stover yield with the application of bBoron (0.8 kg/ha) might be due to vegetative development creating e too many sites for photosynthetic, translocation. A Similar result was reported by**Karthik*et al*.(2021**).

Harvestindex (%)

The data (Table 2) recorded that the hHighest harvest index (35.38%) was observed in treatment 9 [phosphorus 50kg/ha) + Boron (1kg/ha)] and though there was no significant difference among other treatments.

Economics:

The result showed (Table 3) that the maximum gross return (1,16,278 INR/ha), net return (82,434 INR/ha) andbBenefit cost ratio (2.43) was recorded in treatment 9 [Phosphorus (50kg/ha) + (Boron 1kg/ha) as compared to other treatments. Higher gross return, nNet return and bBenefit cost ratio were was recorded with the application of pPhosphorus (50kh/ha) might be due to higher growth and yield attributes resulting in more higherseed and stover yields. These results are in conformity with those observed by **Singh *et al.* (2020).**

CONCLUSION:

Based on the above findings, iIt can be concluded that in greengramhighest seed yield and benefit cost ratio were observed gram with the application of Phosphorus 50 kg/ha along with the application of Boron 1.0 kg/ha. (Treatment 9) was observed highest seed yield and benefit cost ratio.

REFERENCES:

1. Ahmed, W., Niaz, A., Kanwal, S., &Rahmatullah, A. (2009). Role of boron in plant growth. A Review J. *Agric. Res*, ***47***(3), 329-338.
2. Balai, K., Jajoria, M., Verma, R., Deewan, P., &Bairwa, S. K. (2017). Nutrient content, uptake, quality of chickpea and fertility status of soil as influenced by fertilization of phosphorus and zinc. *Journal of Pharmacognosy and Phytochemistry*, ***6***(1), 392-398.
3. Chena, R., Devendra, S., &Jat, B. L. (2017). Effects of different phosphorus levels and frequency of boron levels on growth and yield of greengram. *Advance Research Journal of Crop Improvement*, ***8***(1), 49-61.
4. Choudhary, P., Gautam Ghosh, N., &Kumari, S. (2015). Effect on Yield and Benefit Cost Ratio of Green gram at Different Phosphorus Levels and Frequency of Boron Levels. *Int. J. Curr. Microbiol. App. Sci*, ***12***(6), 1095-1103.
5. Gomez, K.A. and Gomez, A.A. (1976). Statistical procedures for Agricultural Research, 2nd Edition, John Wiley and Sons. New York, 680p.
6. GOI. (2021) Agricultural Statistics at a Glance: Ministry of Agriculture, Government of India, New Delhi, https://www.agricoop.nic.in. Accessed on October29, 2022.
7. Karthik, B., Umesha, C., Sanodiya, L. K., &Priyadarshini, A. S. (2021). Impact of Nitrogen Levels and Application of Boron on Yield and Growth of Green gram (*Vignaradiata*L.). In *Biological Forum–An International Journal* (Vol. 13, No. **3**, pp. 08-11).
8. Khan, M. M. S., Singh, V. P., & Kumar, A. (2017). Studies on effect of phosphorous levels on growth and yield of kharifmungbean (*Vignaradiata* L. wilczek). *Journal of Pure & Applied Biosciences*, ***5***(4), 800-808.
9. Masih, A., Dawson, J., & Singh, R. E. (2020). Effect of Levels of Phosphorus and Zinc on Growth and Yield of Greengram (Vignaradiata L.). *International Journal of Current Microbiology and Applied Sciences*, ***9***(10), 3106-3112.
10. Movalia Janaki, A., Parmar, K. B., &Vekaria, L. C. (2018). Effect of boron and molybdenum on yield and yield attributes of summer green gram (*Vignaradiata* L.) under medium black calcareous soils. *International Journal of Chemical Studies*, ***6***(1), 321-323.
11. Patel, B. K., Patel, H. K., Makawana, S. N., Shiyal, V. N., &Chotaliya, R. L.

(2020). Effect of various sources of nitrogen and phosphorus on growth, yield and economics of summer green gram (*Vigna radiate* L. Wilczek). *International Journal of Current Microbiology and applied Sciences*, ***11***, 745-752.

12. Praveena, R., Ghosh, G., & Singh, V. (2018). Effect of foliar spray of boron and different zinc levels on growth and yield of kharifgreengram (*Vignaradiata L*). *International Journal of Current Microbiology and Applied Sciences*, ***7***(8), 1422-1428.

13. Rekha, K., Pavaya, R. P., Malav, J. K., Chaudhary, N., Patel, I. M., & Patel, J. K. (2018). Effect of FYM, phosphorus and PSB on yield, nutrient content and uptake by green gram (*Vignaradiata*(L.) Wilckzek) on loamy sand. *International Journal of Chemical Studies*, ***6***(2), 1026-1029.

14. Satya, M. S. S. (2021). Performance of black gram (*Vigna mungo* L. Hepper) under phosphorus and boron fertilization in acid Inceptisol of Meghalaya. *Journal of Environmental Biology*, ***42***, 534-543.

15. Sharmila, S., Pandian, P. S., Indirani, R., & Subramanian, E. (2020). Influence of boron on growth attributes, yield of black gram and available boron status in Typicchromustert. *Int J Chem Stud*, ***8***(6), 2291-4.

16. Singh, R. E., Singh, V., Tiwari, D., &Masih, A. (2020). Effect of Levels of Phosphorus and Sulphur on Growth and Yield of Black gram (*Vignamungo* L.). *Int. J. Curr. Microbiol. App. Sci*, ***9***(10), 2784-2791.

17. Singh, V., & Singh, V. (2021). Influence of Spacing and Phosphorus on Growth and Yield of Green Gram (*Vignaradiata* L.) in Prayagraj Condition. In *Biological Forum-An International Journal* (Vol. 13, No. **2**, pp. 408-412).

18. Swamy, B. M. V., Singh, V., Tiwari, D., & Thakur, I. (2020). Study of System of Crop Intensification (SCI) and Phosphorus Management on Growth, Yield and Economics of Green gram (*Vignaradiata* L.). *International Journal of Current Microbiology and Applied Sciences*, ***9***(8), 1950-1958.

19. Yadav, D. K., Singh, D., Choubey, A. K., & Raj, R. K. (2020). Effect of micro and secondary nutrients on growth and yield of blackgram (*Vigna mungo* (L.) Hepper). *Journal of Pharmacognosy and Phytochemistry*, ***9***(2), 649-651.

Table 1. effect of phosphorus and boron on growth parameter of green gram.

S.No.	Treatmentcombination	At 60 DAS			
		Plant height (cm)	**No of branches/ Plant**	**No of nodules/ Plant**	**Plant dry weight (g)**
1.	Phosphorus 30 kg/ha + Boron 0.6 kg/ha	33.30	4.33	11.40	12.19
2.	Phosphorus 30 kg/ha + Boron 0.8 kg/ha	34.40	4.73	12.67	13.04
3.	Phosphorus 30 kg/ha + Boron 1.0 kg/ha	35.37	5.00	13.93	14.01
4.	Phosphorus 40 kg/ha + Boron 0.6 kg/ha	36.17	5.40	15.47	14.60
5.	Phosphorus 40 kg/ha + Boron 0.8 kg/ha	37.17	5.60	17.07	15.01
6.	Phosphorus 40 kg/ha + Boron 1.0 kg/ha	38.60	5.87	19.00	15.58
7.	Phosphorus 50 kg/ha + Boron 0.6 kg/ha	40.17	6.27	21.07	16.12
8.	Phosphorus 50 kg/ha + Boron 0.8 kg/ha	41.77	6.53	22.73	16.45
9.	Phosphorus 50 kg/ha + Boron 1.0 kg/ha	42.57	6.73	24.13	16.88
10	Control + RDF (NPK-25:50:25 kg/ha)	32.53	3.87	10.73	11.07
	F-test	S	S	S	S
SEm(±)		1.42	0.52	0.87	0.86
	CD(p=0.05)	4.22	1.56	2.60	2.56

Table 2. Effect of phosphorus and boron on yield attribute and yieldof green gram.

S.No.	Treatmentcombination	Yieldattributes and yield					
		No. of pods/plant	No. of seeds/pod	Test weight (g)	Seed yield (q/ha)	Stover yield (q/ha)	Harvest index (%)
1.	Phosphorus 30 kg/ha + Boron 0.6 kg/ha	22.73	5.20	33.76	7.49	14.27	34.45
2.	Phosphorus 30 kg/ha + Boron 0.8 kg/ha	23.73	5.60	33.31	8.77	15.29	36.40
3.	Phosphorus 30 kg/ha + Boron 1.0 kg/ha	24.20	6.00	33.95	8.72	16.56	34.52
4.	Phosphorus 40 kg/ha + Boron 0.6 kg/ha	25.00	6.20	34.75	9.83	18.13	35.15
5.	Phosphorus 40 kg/ha + Boron 0.8 kg/ha	26.93	6.60	34.61	10.54	19.34	35.29
6.	Phosphorus 40 kg/ha + Boron 1.0 kg/ha	27.93	7.00	36.03	10.90	20.27	34.97
7.	Phosphorus 50 kg/ha + Boron 0.6 kg/ha	29.27	7.60	36.11	11.34	20.84	35.23
8.	Phosphorus 50 kg/ha + Boron 0.8 kg/ha	30.80	7.80	37.70	11.83	22.03	34.95
9.	Phosphorus 50 kg/ha + Boron 1.0 kg/ha	32.47	8.40	37.00	12.43	22.83	35.38
10.	Control + RDF (NPK-25:50:25 kg/ha)	21.60	4.60	33.01	6.51	13.58	32.64
	F-test	S	S	NS	S	S	NS
	SEm(±)	1.16	0.37	1.01	0.19	0.58	1.09
	CD(p=0.05)	3.45	1.11	-	0.58	1.74	-

Table 3. Effect of phosphorus and boron on economics of greengram.

S. No.	Treatmentcombination	Economics			
		Costofcultivation(INR/ha)	Grossreturn (INR/ha)	Net return(INR/ha)	B:C ratio
1.	Phosphorus30kg/ha+Boron0.6 kg/ha	31794	70839	39045	1.22
2.	Phosphorus30kg/ha+Boron0.8 kg/ha	32194	80817	48623	1.51
3.	Phosphorus30kg/ha +Boron1.0 kg/ha	32594	82392	49798	1.52
4.	Phosphorus40kg/ha +Boron0.6 kg/ha	32419	92073	59654	1.84
5.	Phosphorus40kg/ha +Boron0.8 kg/ha	32819	98547	65755	2.00
6.	Phosphorus40kg/ha +Boron1.0 kg/ha	33219	102354	68026	2.04
7.	Phosphorus50kg/ha +Boron0.6 kg/ha	33044	106104	73060	2.21
8.	Phosphorus50kg/ha +Boron0.8 kg/ha	33444	111123	77679	2.32
9.	Phosphorus50kg/ha +Boron1.0 kg/ha	33844	116278	82434	2.43
10.	Control(NPK-25:50:25 kg/ha)	28719	63336	34617	1.20