Original Research Article

Effect of seed treatment and phosphorus on growth and yield of green gram (*Vigna radiata* L.)

Abstract

The experiment was conducted in Crop Research Farm, Department of Agronomy, SHUATS, Prayagraj, Uttar Pradesh. ~~The subject test changed into performed all through the~~ during Kharif season (2021) ~~at Crop Research Farm, Department of Agronomy, SHUATS, Prayagraj (U.P).~~ the initial soil nutrient status of experimental plot was pH 7.1 low carbon status (0.36%), N (171.48 kg/ha), P (15.2 kg/ha) and K (232.5kg/ha). ~~The dirt of the trial plot changed into sandy loamy in surface, practically unbiased in soil response (pH 7.1), low in regular carbon (0.36%), to be had N (171.48 kg/ha), to be had P (15.2 kg/ha) and to be had K (232.5kg/ha).~~ The experiment have different phosphrous and seed priming treatment ~~medicines comprised of~~ viz phosphorus (40, 50 and 60 kg/ha) and seed treatment (Dry seed, Hydro preparing, and KCL) ~~V~~viz., ~~whose effect is found on the unpracticed~~ the variety of gram (var. SAMRAT) was taken for experiment purpose. The experiment was laid under ~~test changed into indicated in~~ Randomized Block Design, with ten treatments of three replication ~~10 medicines which can be imitated threefold~~. Results showed ~~gained~~ that the most extreme plant tallness (46.77cm), the quantity of branches (5.51), plant dry weight g (7.62), cases per plant (17.07), Test weight (37.80g), grain yield (2.05 t/ha), stover yield (5.15 t/ha) and reap record (32.30%) had been strikingly roused with the use of 60kg/ha phosphorus + KCL (1%).

Introduction

Greengram [*Vigna radiata* (L.) ~~wilczek~~] is a nutritious legume crop. It has roughly 25% protein, as well as amino acids like arginine, histidine, lysine, and tryptophan. It is also regarded as a low-cost protein and mineral source. It has a good taste and digestion. Whole grains and uncooked grains are legumes and vegetables in the human diet. Its curry is often advised for patients due to its healthy digestion. It is essential not just for human nutrition but also for enhancing soil fertility by stabilising atmospheric nitrogen levels. Due to its short lifetime, this crop is ideal for intercropping with other main crops (**Singh *et al.*, 2017**).

Seed treatment before sowing promotes germination, enhances vigor and root system growth, enhances drought tolerance and aids in high nutrient uptake, resulting in higher crop yields in low soil moisture conditions **Khan and Khan (2001).**

Phosphorus is a component of all biological substances that allow plants to exist. It is necessary for green plants to grow and develop normally. When gram phosphorus is applied to greengram, the plant's growth, yield qualities, and grain yield improve. Early root growth and lateral, fibrous formation are aided by phosphorus, which is also a vital healthy source for nodule production and nitrogen stabilisation in the atmosphere **(Singh *et al.*, 2008 and Vikram *et al.*, 2017).**

Comment [HC1]: Write in italic

Comment [HC2]: Paragraph is not change

Comment [HC3]: Paragraph is not change

UNDER PEER REVIEW

Materials and Methods

The analysis was completed during the Kharif period of 2020 at Crop Research Farm, Department of Agronomy, Naini Agricultural Institute, SHUATS, Prayagraj (U.P.), situated at 250 30' 42"N scope, 810 60' 56" E longitude and 98 m height above mean ocean level. ~~The dirt of the test plot was sandy topsoil in surface, almost impartial in soil response (pH 7.1), low in natural carbon (0.36 %), accessible N (171.48 kg/ha), accessible P (15.2 kg/ha), and accessible K (232.5 kg/ha).~~ The yield was planted on 30th June 2021 utilizing the assortment Nidhi Samrat. The investigation was spread out in Randomized Block Design included 3 replications and a sum of ten treatments ~~medicines~~ viz., T_1: Phosphorus 40 kg/ha + Dry seed, T_2: Phosphorus 40 kg/ha + Hydro preparing, T_3: Phosphorus 40 kg/ha + KCL (1%), T_4: Phosphorus 50kg/ha + Dry seed, T_5: Phosphorus 50 kg/ha + Hydro preparing, T_6: Phosphorus 50 kg/ha + KCL (1%), T_7: Phosphorus 60 kg/ha + Dry seed, T_8: Phosphorus 60 kg/ha + Hydro preparing, T_9: Phosphorus 60 Kg/ha + KCL (%) and T_{10}: Control (N/K). All supplements were applied through the dirt as Urea, Single Super Phosphate (SSP), and Muriate of Potash (MOP). A full portion of N and K was applied in all plots and Phosphorus is applied as per treatments ~~medicines~~ in particular plots. The development boundaries were recorded at periodical timespans and 60 DAS from arbitrarily chose five plants in every treatment. Genuinely, examination was done, and the mean was looked at a 5 % likelihood level of huge outcomes.

Comment [HC4]: Write in italic

Comment [HC5]: Variety of gram was change as above

Chart 1 : TREATMENT COMBINATIONS

S.NO	TREATMENTSNO.	TREATMENT COMBINATIONS
1	T_1	Phosphorus 40kg/ha + Dry seed
2	T2	Phosphorus 40kg/ha + Hydro priming
3	T3	Phosphorus 40kg/ha + KCL (1%)
4	T4	Phosphorus 50kg/ha + Dry seed
5	T5	Phosphorus 50kg/ha + Hydro priming
6	T6	Phosphorus 50kg/ha + KCL (1%)
7	T7	Phosphorus 60kg/ha + Dry seed
8	T8	Phosphorus 60kg/ha + Hydro priming
9	T9	Phosphorus 60kg/ha + KCL (1%)
10	T10	Control (N/K)

UNDER PEER REVIEW

Results & Discussion

The effect of seed treatment and phosphorus Management on the growth parameters of a Greengram are presented in Table 1.

GROWTH PARAMETERS

Plant Height (cm)

The study indicates that the applications of Phosphorus 60 kg/ha+ KCL (1 %) produced the highest plant height (38.46cm), while the lowest value (24.90cm) was reported in the treatment control. However, Phosphorus 50kg/ha + KCL (1%) (37.90cm), Phosphorus 40kg/ha + Hydro priming (37.10cm) and Phosphorus 60kg/ha + Hydro priming (35.66cm) were statistically at par with Phosphorus 60kg/ha + KCL (1%). Similar findings were obtained from **Ramamurthy *et al.*, (1997)** ~~in~~ Blackgram.

No. of Branches

The results indicate that there was a substantial difference between the treatments, with the applications of Phosphorus 60 kg/ha+ KCL (1 %) having the highest number of branches per plant (4.48) and the treatment control having the lowest value (2.24). However, Phosphorus 50kg/ha + KCL (1%) (4.14), Phosphorus 40kg/ha + KCL (1%) (4.08) and Phosphorus 50kg/ha + Hydro priming (3.81) were statistically at par with Phosphorus 60kg/ha + KCL (1%). Similar findings were obtained from **Singh *et al.*, (2004)** in green gram.

Dry Weight (g/plant)

The analysis revealed that there was a substantial difference between the treatments, with the maximum Dry weight (g/plant) (5.44) recorded with Phosphorus 60 kg/ha+ KCL (1 %), and the lowest value (2.32) observed with control. However, Phosphorus 50 kg/ ha + KCL (1%) (5.21) and Phosphorus 40kg/ha + KCL (1%) (5.09) were statistically at par with Phosphorus 60 kg/ ha + KCL (1%). Similar findings were obtained from **Singh *et al.*, (2004)** in greengram.

YIELD AND YIELD ATTRIBUTES

Impact of seed treatment and phosphorus Management on Endlessly yield Attributes of a Greengram are introduced in Table 2.

Number of pods/plant

The result revealed that there was a substantial difference between the treatments, with the application of Phosphorus 60 kg/ha+ KCL (1 %) producing the Maximum number of pods per plant (17.07), However, Phosphorus 50kg/ha + KCL (1%) (16.53) is statistically at par with Phosphorus 60 kg/ha+ KCL (1%). Maximum similar results were found in **Ardeshna *et al.*, (1993)** in greengram.

Comment [HC6]: Mention reference

UNDER PEER REVIEW

Number of seeds per pod

The results revealed that there was significant difference between the treatments and maximum No. of seeds pod^{-1} (9.41) was observed by the application of Phosphorus 60 kg/ha + Kcl (1%), However, Phosphorus 50kg/ha + KCL (1%) (8.60) is statistically at par with Phosphorus 60 kg/ha + KCL (1%).

Comment [HC7]: Mention reference

Test weight (g)

The results demonstrated that there was a big variation between the treatments, with the application of Phosphorus 60 kg/ha+ KCL (1 %) producing the highest test weight (37.80g), However, Phosphorus 40kg/ha +Hydro priming (36.09) is statistically at par with Phosphorus 60 kg/ha + KCL (1%).

Comment [HC8]: Mention reference

Grain yield (t/ha)

The results revealed that there was a significant difference between the treatments and maximum Grain yield (2.05 t/ha) was observed by the application of Phosphorus 60 kg/ha+ KCL (1%), However, Phoshorus 50kg/ha + KCL (1%) (1.90) is statistically at par with Phosphorus 60kg/ha + KCL (1%). Maximum similar findings were obtained from **Deka and Kakati (1996**) in greengram.

Stover yield (t/ha)

The results demonstrated that there was a substantial difference between the treatments, with the application of Phosphorus 60 kg/ha+ KCL (1 %) producing the highest Stover yield (5.15 t/ha, However, Phosphorus 60 kg/ha + KCL (1%) (5.15) is statistically at par with Phosphorus 60 kg/ha + Hydro priming. Maximum similar findings were obtained from **Chovatia *et al.*, (1993**) in greengram.

Harvest index (%)

The results demonstrated that there was a substantial difference between the treatments, with the application of Phosphorus 60 kg/ha+ KCL (1%) producing the highest Harvest index (32.30 %), However, Phosphorus 50 kg/ha + KCL (1%) (27.60) is statistically at par with Phosphorus 60 kg/ha + KCL (1%). Maximum similar findings were obtained from **Chovatia *et al.*, (1993)** in greengram.

UNDER PEER REVIEW

Table 1: Effect of Seed Treatment and Phosphorus on growth parameters of Greengram

S.No.	Treatment combinations	Plant Height (cm)	No of Branches	Dry Weight (g/plant)
1.	Phosphorus 40 kg/ha+ Dry seed	34.59	3.46	4.23
2.	Phosphorus 40 kg/ha+ Hydro priming	34.75	3.54	4.04
3.	Phosphorus 40 kg/ha+ KCL (1%)	37.10	4.08	5.09
4.	Phosphorus 50 kg/ha+ Dry seed	32.16	3.30	3.42
5.	Phosphorus 50 kg/ha+ Hydro priming	33.63	3.81	3.66
6.	Phosphorus 50 kg/ha+ KCL (1%)	37.90	4.14	5.21
7.	Phosphorus 60 kg/ha+ Dry seed	32.86	3.36	3.77
8.	Phosphorus 60 kg/ha+ Hydro priming	35.66	3.66	3.77
9.	Phosphorus 60 kg/ha+ KCL (1%)	38.46	4.48	5.44
10.	Control (N/K)	24.90	2.24	2.32
	~~F Test~~	**~~S~~**	**~~S~~**	**~~S~~**
	S.Em(±)	**1.308**	**0.180**	**0.342**
	CD at 0.5	**3.886**	**0.534**	**1.015**

UNDER PEER REVIEW

Table 2: Effect of seed treatment and phosphorus on yield attributes of Greengram

S.No.	Treatment Combinations	Yield and yield attributes					
		No. of pods per plant	**Seeds pod**	**Test weight (g)**	**Grain yield (t/ha)**	**Stover yield (t/ha)**	**Harvest index (%)**
1.	Phosphorus 40 kg/ha+ Dry seed	12.43	6.16	34.03	1.35	4.17	24.41
2.	Phosphorus 40 kg/ha+ Hydro priming	14.30	6.54	36.09	1.58	4.44	26.28
3.	Phosphorus 40 kg/ha+ KCL (1%)	15.29	8.42	34.64	1.75	4.70	27.13
4.	Phosphorus 50 kg/ha+ Dry seed	13.04	6.45	32.94	1.48	4.08	26.56
5.	Phosphorus 50 kg/ha+ Hydro priming	13.49	6.42	34.39	1.44	4.55	24.07
6.	Phosphorus 50 kg/ha+ KCL (1%)	16.53	8.60	35.91	1.90	4.97	27.60
7.	Phosphorus 60 kg/ha+ Dry seed	13.39	7.10	32.66	1.45	4.75	23.43
8.	Phosphorus 60 kg/ha+ Hydro priming	13.33	7.49	30.74	1.67	5.33	24.00
9.	Phosphorus 60 kg/ha+ KCL (1%)	17.07	9.41	37.80	2.05	5.15	32.30
10.	Control (N/K)	10.51	5.39	23.01	1.06	4.09	20.98
	~~F Test~~	~~S~~	~~S~~	~~S~~	~~S~~	~~S~~	~~S~~
	S.Em(±)	**1.01**	**0.36**	**1.485**	**0.072**	**0.229**	**1.876**
	C.D. at 0.5	**3.01~~6~~**	**1.08~~6~~**	**4.413**	**0.215**	**0.680**	**5.574**

Comment [HC9]: Only after point two digit mention in all data

UNDER PEER REVIEW

Conclusion

In light of the discoveries of the Studies it could be finished up of treatment phosphorus 60kg/ha + KCL (1%) performed outstandingly in acquiring the most noteworthy gross, net returns and B:C proportion.

Bibliography

Ahmed, S.A. (1999). Filed performance of hardened Greengram (*Vigna radiata*) seeds. *Legume Research*.**22**(3): 207-8.

Ardeshna, R.B., Modhwadia, M.M., Khanpara, V.D. and Patel, J.C. (1993), Response of greengram (*Phaseolus radiatus*) to nitrogen, phosphorus and Rhizobium inoculation *Indian Journal of Agronomy*.**38**(9):490-492.

Baboo, R. and Mishra, S. K. (2001). Growth and pod production of cowpea (*Vigna sinensis Savi*) as affected by inoculation, nitrogen, and phosphorus. *Annals of Agriculture research*. **22**(1): 104-106.

Bhadoria, R.B.S., Tomar, R.A.S., Khan, S. and Sharma, M.K. (1997). Effect of phosphorus and sulfur on yield and quality of cluster bean [*Cyamopsis tetragonoloba* L.*)* Taub.] *Indian Journal of Agronomy*.**42**(1): 131-134.

Chovatia, P. K., Ahlawat, R.P.S. and Trivedi, S.J. (1993). Growth and yield of summer Greengram (*Phaseolus radiatus*) as affected by different dates of sowing, rhizobium inoculation, and levels of phosphorus. *Indian Journal of Agronomy*.**38**(3): 492-494.

Khan, M.S. and Khan, N.A. (2001). Response of mustard and wheat to pre-sowing sced treatment with pyridoxine and basal level of calcium. *Indian Journal of Plant Physiology*, **6**(3): 300-5.

Lokhande, P.B., Indulkar, B.S., Vaidya, P.H., Padghan, A.D., Wagh, C.B., Ingole A.J, Patil, N.M., Aundhkar A.V., (2018). Effect of Phosphorus and Zinc on yield and quality of greengram (*Vigna radiata* L.) in Inceptisol. *International Journal of Engineering Science and Computing*, Vol.**8**(7).

Luikham, E., Lhungdiam, J. and Singh, A.I. (2005). Influence of sources and levels of phosphorus on growth and yield of greengram [(*Vigna radiata* L.*) WiLczek*]. *Legume Research.* **28**(1): 59-61.

Meena, K. N., Pareek, R.G. and Jat, R. S. (2001). Effect of phosphorus and biofertilizers on yield and quality of chickpea (*Cicer arietinum L.*). *AnnaLs of Agriculture Research.* **22**(3): 388-390.

Nailesh Kumar. P.K. Effect of Irrigation schedules based on Critical Growth stages and Levels of Phosphorus on Growth, Yield Attributes and Yield of Rabi Greengram (*Vigna Radiata.* L.) Cultivar CO-4 Under Middle Gujarat Conditions. M.Sc. (Agri) Thesis. B.A. College of Agriculture Anand Agricultural University, Anand.

Ramamoorthy, K., Balasubramanian, A., and Arokiaraj, A, (1997). Response of rainfed black gram (*Phaseolus mungo*) Phosphorus and Sulphur nutrition in red lateritic soils. *Indian Journal of Agronomy*.**42**(1):191-193.

Sarkar, R.K. and Pal, P.K. (2006). Effect of pre-sowing seed treatment and foliar spray of nitrate salts on growth and yield of greengram (*Vigna radiata*). *Indian Journal of Agricultural Sciences*, **6** (1): 62-5.

Sarkar, R.K. and Pal, P.K. (2006.) Effect of pre-sowing seed treatment and foliar spray of nitrate salts on growth and yield of greengram (*Vigna radiata*). *Indian Journal of Agricultural Sciences.* **76**(1):62-5.

UNDER PEER REVIEW

Shukla, S. K. and Dixit, R. S. (1994). Effect of rhizobium inoculation, plant population, and phosphorus on growth and yield of summer greengram (*Phaseolus radiatus) Indian Journal of Agronomy*. **41**(4): 611-615.

Singh, A.P., Chaturvede, S., Tripathi, M.K. and Sharma, S. (2004). Growth and yield of greengram [(*Vigna radiata* L.) *Wilczek*] as influenced by bio-fertilizers and phosphorus application. *Annals of Biology*.**20**(2):227-232.

Singh, G., Sekhon, H.S. and Sharma, P. (2008). Effect of fertilizer application on nodulation, growth and yield of summer mungbean (*Vigna radiata* L.). *Indian Journal of Ecology*, **35**: 28-30.

Singh, V., Sharma, S.K., Thakral, S.K. and Sharma, M.K. (2017). Effect of phosphorus on the performance of greengram (*Vigna radiata* L.) varieties during summer. *Legume Research.* DOI: 10.18805/LR-3885.

Srivastava, S.N.L. and Verma, S. C. (1981). Effect of biological and inorganic fertilization on the yield and yield attributes of greengram (*Phaseolus aureus*). *Indian Journal of Agriculture Research*. **15**(1) :25-29.

Yadav, S. S. (2004). Growth and yield of Greengram (*Vigna radiata* L.) as influenced by phosphorus and sulfur fertilization. *Haryana Journal of Agronomy*.**20** (1-2): 10-12.

UNDER PEER REVIEW

UNDER PEER REVIEW