Response of seed priming and nutrient management on green gram growth and yield-related attributes (*Vigna radiate* L Wilczek).

Abstract

Green gram (*Vigna radiate* L) is one of the most important nutritive pulse crop . It is an excellent source of protein with high-quality of lysine. Seed priming techniques are used to improve germination, to reduce the time between sowing and emergence and for uniform emergence in the main field, especially under adverse environments. Keeping in view the nutritive importance of green gram, an investigation was carried out to assess the effects of seed priming and nutrient management for higher yield in green gram at the research farm of Division of Agronomy, Faculty of Agriculture Wadura SKUAST-K Sopore during kharief-2021&2022 and the experiment was laid out in factorial randomized complete block design (RCBD) with twelve treatments. Among the treatments studied in both years, the highest number of pod cluster per plant (9.66 and 9.33), number of pods per cluster (18.33 and 19.00), number of seeds per pod (13.00 and 13.33), 1000 - seed weight (43.66& 44.50 g) and yield per hectare (12.83 &13.30 q) respectively were noticed with full recommended dose of fertilizer along with seed priming by 1% KNO_3.

Key Words: Green gram, priming, potassium nitrate, growth, yield,

Introduction

Pulses are wonder gift of nature to the living universe and are the real gateway of sustainable agriculture(R.K.Bhairawa *et al*.,2014).Green gram (*Vigna radiate* L) is one of the most important pulse crop of the global economic importance; also called moong or mung bean and belongs to the family Leguminoceae. It is an excellent source of protein (24.5%) with high quality of lysine 460mg/g, tryptophan 60mg/g and fair amount of fat0.6%, fiber 0.9% and ash 3.7% (Dharwe et al., 2018).One possible way to mitigate the nutrients requirement of plant by the efficient utilization of biofertilizers as an eco-friendly technologies and based on renewable energy sources has gained momentum in recent years to supplement the parts of chemical fertilizers (Meena *et al.,* 2017). In leguminous crops the *Rhizobium* plays a significant role in maintaining and improving the soil fertility and sustainability through its ability to fix atmospheric nitrogen in the soil through root nodules (Patel *et al.,* 2016).An efficient use of microbes increased yield reduces the soil borne

pathogens and improves soil health (Haque *et al.*,2012; Kumar *et al.*, 2017). Seed priming techniques are used to improve germination, to reduce the time between sowing and emergence and for uniform emergence in the main field, especially under adverse environment (Gupta et al., 2008). Seed priming is much beneficial in legumes as it substantially increases the yield of mung bean (Rashid *et al.*, 2004). Keeping in view the nutritive importance of green gram, an investigation has been carried out to assess the effects of seed priming and nutrient management for higher yield in green gram under temperate agro climatic conditions. Potassium nitrate (KNO_3) is a chemical which can impact on growth, amount of nitrate, its reduction and assimilation in plants. Potassium deficiency reduces the photosynthetic CO_2 fixation and transport and utilization of assimilates. Membrane and chlorophyll degradation are common in potassium deficient plants. Foliar application of potassium can also be considered as one of the alternative in order to reduce such problems. Foliar application of nutrients may result in economic use of fertilizer by virtue of reducing loss through different processes and supplying nutrients instantly to the crop. Under the moisture stress conditions application of potassium may be considered as one promising option as it influences the water economy and crop growth, through its effect on water uptake, root growth, maintenance of turgor, transpiration and stomata behavior (Hsiao and Lauchi, 1986). Considering the above facts, an experiment has planned to study the effect of salicylic acid and potassium nitrate on growth and yield of lentil under the rain fed condition of Manipur.

Material and Methods

The experiment was laid out at Experimental Farm of Division of Agronomy, Faculty of Agriculture Wadura SKUAST-K Sopore during kharief-2021&2022 and the experiment was laid out in factorial randomized complete block design (RCBD) with twelve treatments. The soil has pH 7.0, E.C0.85dsm1, OC 0.51%, avg. N 340 kg/ha, avg. P35 kg/ha, avg. K 230kg/ha. The field was cleared manually, ploughed and weeded before seedbeds were marked and demarked. The seeds of green gram var. Shalimar mung-1 were sown in plots of 3.0 × 1.5 m size in the 1st week of June. The row to row spacing of 25 cm and plant to plant spacing of 10 cm has been adapted. 15 days after germination, the thinning activities have been done. The sources of different organic manures tried in experiment were applied at the time of land preparation. Agronomic cultural practices recommended by SKUAST-K were adopted to raise the crop. Observations on various growth and yield related attributes were recorded, using standard procedures. The data thus

collected was subjected to analysis of variance, using the method proposed by Panse and Sukhatme (1985).

RESULTS AND DISCUSSION

Growth and Yield Parameters

It is evident from the date of two years presented in Table 1, that there was significant difference among treatments tried in experiment related to growth and yield related attributes of green gram. Among different treatment combinations, T_3-Full recommended dose of fertilizer along with seed priming by 1%KNO_3 registered maximum number of pod cluster per plant (9.66 and 9.33), number of pods per cluster (18.33 and 19.00), number of seeds per pod (13.00 and 13.33), 1000 seed weight (43.66& 44.50 g) and yield per hectare (12.83 &13.30 q) respectively in both years followed by T_2 and T_9 and T_1 was found statistically significant as compared to rest of the treatments. Seed priming by potassium nitrate in mung bean might be due to the better tolerance towards moisture stress and in turn might have boosted plant growth effectively. The nutrient status in the plant plays a vital role in improving the resistance of plant to stress conditions (Yadov, 2006). Similar findings have been reported by Bardhan *et al.,* (2007). Increase in number of branches by potassium nitrate application might be attributed to the fact that potassium enhances plant vigor and strengthens the stalk which might have resulted in better plant growth and more number of branches. Similar findings have been reported by Deotale *et al.,* (2015). The increase in number of seeds per pod might be due to the application of KNO_3 which have active biochemical functions in plants, enzyme activation, photosynthesis and cell division that increased the number of seeds per pod. Similar findings have been reported by Golezani *et al.,* (2011). KNO_3 is effective in improving the yield parameters under moisture stress conditions by delaying maturity due to enhancement of biochemical and physiological processes (Rahman and Attia, 2016).

Conclusion

Application of recommended dose of fertilizers along with seed priming by 1%KNO_3 had a significant response on growth and yield of green gram. The results obtained revealed that green gram responded well to the full recommended dose of fertilizers along with seed priming by 1%KNO_3 to other treatments in the study. Based on the findings of this study, it may be

recommended that full recommended dose of fertilizers along with seed priming by 1%KNO_3 is adequate for maximum growth and yield of green gram in the study location.

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Table 1: Response of seed priming and nutrient management on growth and yield related attributes of green gram (*Vigna radiate* L).

Treatments	No. of Pod Cluster/Plant		No. of Pods/Cluster		NO.OF Seeds/Pod		1000-Seed Weight(g)		Yield/ha(q)	
	2021	2022	2021	2022	2021	2022	2021	2022	2021	2022
T_0 –Control	2.33	2.66	9.00	8.66	5.00	5.33	34.16	33.83	6.30	6.06
T_1 – Priming with 1%KNO_3	3.00	3.33	10.33	10.66	6.00	6.00	35.83	36.50	7.23	7.46
T_2 –(RFD)	8.66	8.33	17.00	17.33	12.33	12.33	42.33	43.33	11.90	12.13
T_3– RFD+ Priming with 1%KNO_3	9.66	9.33	18.33	19.00	13.00	13.33	43.66	44.50	12.83	13.30
T_4– 1/$_2$RFD	6.33	6.00	14.00	14.33	9.00	9.33	38.50	39.00	9.80	10.03
T_5–1/$_2$RFD + Priming with 1%KNO_3	7.00	7.66	14.66	15.33	10.33	10.00	40.00	40.50	10.26	10.73
T_6 –1/$_4$RFD	3.66	3.66	11.66	12.33	6.66	7.00	36.50	37.00	8.16	8.63
T_7 –1/$_4$RFD + Priming with 1%KNO_3	4.33	4.00	12.33	12.66	7.00	7.00	37.16	38.16	8.63	8.86
T_8 –1/$_2$RFD + VAM	7.66	7.00	15.66	15.33	10.33	10.66	41.66	42.16	10.96	10.73
T_9– 1/$_2$RFD +VAM+ Priming with 1%KNO_3	8.33	8.00	16.33	16.66	11.00	11.66	41.83	42.16	11.43	11.66
T_{10}– 1/$_4$RFD + VAM	5.00	5.00	11.33	11.66	8.33	7.66	37.50	37.50	7.93	8.16
T_{11}– 1/$_4$RFD +VAM+ Priming with 1%KNO_3	5.66	5.33	12.66	13.00	8.66	8.00	38.00	38.50	8.86	9.10
C.D($P \leq 0.05$)	0.78	0.86	1.23	1.41	1.25	1.35	0.91	1.42	0.86	0.99