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Response of Greengram to Pre-Sowing Seed Priming Chemicals

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ABSTRACT

Field experiment was conducted at Experimental Farm, Annamalai University, Annamalainagar to evaluate the effect of different priming treatments on the growth and yield attributes of blackgram. Seed were fully soaked in GA_3, CaCl, KH_2PO_4, kBr, Rhizobium + Pseudomonas, Rhizobium + Trichoderma viride, hydro priming and control for 24 hours at 15 ℃. Seed priming treatments enhances seed germination, early canopy development and flower initiation in comparison to the untreated control. Different priming treatments were recorded significantly in growth and yield attributes of greengram. Results shows that seed priming with Rhizobium + Trichoderma viride recorded the highest values of growth and yield components when compared to other treatments.

Key words: *Greengram, Hydropriming, Seed germination, Biofertilizers and Seed priming.*

INTRODUCTION

India is the largest producer of pulses and accounts for about 25 per cent of the global share. In India, pulse crops grown over an area of 26.28 million ha with an annual production of 18.09 million tones and productivity of 689 kg ha^{-1}. Being an inseparable ingredient in the diet of the vast majority of vegetarian population and main stay of sustainable farming pulses continue to be an important component of the rainfed agriculture, since time immoral. Pulses are second most important source of human food. These plants fix and improve soil fertility, prevent soil erosion and play an important role in sustainability of agrl. Systems[13].

Among the pulse crops, blackgram is more cosmopolite and grown in most of the regions of India which showed very encouraging results and leads to achieve a break through in the pulse production. They also supply nutritive fodder and maintain soil fertility through biological nitrogen fixation. Blackgram (*Vigna mungo* L.) is suitable to multiple cropping system, because of its short duration and rapid growth. It can be grown as intercrop with sugarcane, cotton, maize and sorghum. It can also be grown as a fodder and green manure crop.

In India, the total area under blackgram is 3.06 million hectare with a production of 1.70 million tonnes and a productivity 555 kg ha^{-1} during 2014. India Tamil Nadu, the total area under blackgram is 94.8 (′000 ha) with a production 160.4 (′000 tonnes) and productivity 406 kg ha^{-1} during 2015[10].

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Seed priming is pre germination treatments which involves uptake of water by the seed followed by drying to initiate the early event of germination upto the point of radical emergence but prevents radical protrusion[4]. 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[8]. Seed priming is a low cost technology in which controlled hydration of seeds followed by drying is done to break dormancy, improve germination and stand establishment[1]. This technique was shown to improve crop stand, lead to faster growing and early flowering, and increase in yield chickpea, maize and sorghum. Priming treatments had significant improvement in seed germination synchronized[4,11].

MATERIAL AND METHODS

Field investigation was carried out during summer season of January – April, 2015 at Experimental Farm, Annamalai University, Annamalainagar, to find out suitable seed priming chemical for blackgram. The soil of the experimental site was clay loam with pH 6.9, EC 0.14 dS m^{-1}, organic matter 0.65% with medium available nitrogen (329.3 kg/ha), phosphorus (42.1 kg/ha) contents and high in available potassium (376.4 kg/ha). The experiment was laid out in randomized block design with three replications. The size of experimental plot size 5.0 × 4.0 m was maintained. Treatment schedule were as follows.

T_1 – GA_3 (100 ppm)

T_2 – $CaCl_2$ (10^{-3} M)

T_3 – KH_2PO_4

T_4 – kBr (10^{-3} M)

Rhizobium + *Pressmud fluorescens* @ 10% for 12 hrs

Rhizobium + *Trichoderma viride* @ 10% for 12 hrs

T_7 – Hydro priming

T_8 – Control

The seeds were primed at 15°C for 24 hours, prior to seed priming the seeds were treated with carbendazim at rate of 2 g kg^{-1} of seed to protect them from fungal infestations. The variety VBN 1 was used for sowing purpose with the spacing of 30 × 10 cm. Farmyard manure was applied in to main field at the rate of 12.5 tonnes ha^{-1} in soil for fiftee days before sowing. The recommended dose of fertilizer was applied 25 N, 50 P_2O_5, 0 K_2O (kg ha^{-1}), per hectare in the form of urea, SSP and MOP, respectively. Weeding and cultural practices were followed as per growth stages of the crop in all plots. Germination per cent has been recorded on seven day after sowing and expressed in percentage. Biometric observations were recorded at 30 days after sowing, 60 days after sowing and at harvest stages.

The data recorded on various observations were subjected to Gomez and Gomez[7].

RESULTS AND DISCUSSION

It was revealed from this study that different priming treatments can have various effects on growth and yield components of greengram (Table 1). All the seed priming techniques recorded significantly enhanced the germination count m^{-2} as compared to non-priming treatments. Uniform and early emergence of seedlings in field enable the crop to best utilize the available resources under stressful conditions. Poor germination percentage due to soil moisture stress in greengram. The results were in agreement with the findings of Arshad Aslam *et al.*[2], and Pradeep Kumar Sharma *et al.*[14].

Seed priming treatments also significantly improved the plant height, no. of pods/plant, no. of seeds/pod, 1000 seed weight (g) and seed yield (Table 1) due to stimulation of cell elongation, cell division and enlargement as reported by Kalpana *et al.*[9].

Higher grain and biomass yield in pre-germinated seeds could be attributed to early germination and vigorous growth with consequently good crop establishment. Poor translocation of metabolites to the reproductive stage may be one of the reasons for lower yield in control. Similar findings were reported by Mohammad Mazid[12] in chickpea and Kalpana *et al.*[9], in wheat, Farnia

et al.[6], Bapurayagbuda[3]. Sayet Eayat Qasemi *et al.*[15], Toklu *et al.*[16], and Elouaer and Hannachi[5].

The results revealed that seed priming promoted early emergence and improved the total germination cont and growth of greengram under soil moisture stress condition. Increase in the no. of pods/plant, no. of seeds/pod, 1000 seed weight (g) and seed yield by seed priming increased seed yield. It is concluded that seed priming with GA_3 at 15°C for 24 hours can be suitable and enhancing the seed yield under varying moisture conditions.

Table 1. Impact of priming on germination and seedling establishment of greengram

Treatments	Germination percentage (%)	Shoot length (cm)	Root length (cm)	Seedling length (cm)	Seedling dry weight (g)
T_1	69.03	12.79	9.32	24.46	116.28
T_2	75.68	13.62	10.31	26.41	120.69
T_3	80.03	16.04	13.19	29.38	135.18
T_4	71.05	18.21	15.01	32.89	139.07
T_5	74.19	14.75	13.92	27.52	127.02
T_6	87.03	20.58	16.21	28.36	149.68
T_7	76.24	17.09	14.18	30.04	137.29
T_8	65.29	11.24	12.06	28.15	131.56
S.Ed.	2.14	0.84	0.12	0.90	2.76
CD (p=0.05)	4.28	1.68	0.25	1.81	5.53

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