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EFFECT OF PRESOWING SEED PRIMING TREATMENT USING BOTANICAL LEAF EXTRACT ON GROWTH AND YIELD CHARACTERS IN BLACKGRAM (*VIGNA MUNGO* [L.] HEPPER) cv. CO 6

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Abstract

Field experiment was conducted to study the effect of seed priming using botanical leaf extract on growth and yield parameters of blackgram. The seeds of blackgram were given priming treatments *viz.,* priming with 1% various leaf extract and sown along with dry seeds (control) in a field experiment. The results revealed that 1% *Prosopis* leaf extract primed seeds recorded higher plant height, number of branches per plant, number of leaves per plant, minimum days to 1st and 50% flowering, number of pods per plant, number of seeds per pod, 100 seed weight, seed yield per plant and seed yield per plot compared to control. From the results found that *Prosopis* leaf extract records the highest seed yield per plant was 5.37g (*i.e.*) 8.48% increase over the control.

Key words: Blackgram CO 6; Leaf extract; Pre-sowing seed treatment; Prosopis; Neem; Moringa; Arappu; Seed priming; Seed yield.

Introduction

Blackgram (*Vigna mungo* L.) is the most important pulse crop in India and ranks fourth among the major pulse crop cultivation. Blackgram plays a major role in supplying a balanced protein component and vegetarian diet. Blackgram is cultivated both in *kharif* and *rabi* season in India have an area about 3.24 lakh hectares and production of 1.95 lakh tonnes. The major constraint in blackgram is low productivity which may be due to the poor soil moisture, poor crop production and low soil fertility. To overcome these problems, seed priming is given as a presowing treatment to withstand the adverse climatic conditions. Applications of nutrients to the dryland is a problematic one, by giving the nutrients to the seed itself as presowing treatment will improve the viability and vigour of the seed and that will give good yield (Vijaya, 1996). Botanical seed treatment is derived from natural sources based on botanical ingredient. It is liquid, natural seed treatment and root growth promoter formulation. It also stimulates indigenous microbes in the root zone. It proven to be a reliable performer in low and high rainfall areas and in all soil types. It is an affordable and effective way to optimize early growth and yield potential. It is also one of the lowest financial investments through which a grower can make to maximize productivity and improve the bottom line. Seed priming is a common practice followed to improve seed performance with respect to uniformity of germination and rate of germination (De Lespinay *et al.,* 2010). Seed priming is the process of regulating germination by managing the temperature and seed moisture content, in order to maximize the seed's potential. Hence the present study was undertaken to evaluate the various seed priming treatments on growth and yield characters of blackgram cv. CO 6.

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Materials and Methods

The present study was carried out by using genetically pure seeds of blackgram obtained from Tamilnadu Agricultural University, Coimbatore, Tamilnadu. The bulk seeds were manually cleaned to remove unwanted material from the seed lot and was graded using BSS 8 × 8 sieve for uniformity. Field experiment was conducted at Experimental Farm, Sevathur Village, Sevathur Taluk, Vellore District, Tamilnadu. After cleaning and grading

the seeds were first, pre-conditioned by keeping the seeds in between two layers of moist gunny bag for one hour to avoid soaking injury. After preconditioning, the seeds were soaked in respective priming solutions at 1/3rd volume of seeds for four hours. Then the seeds were air dried under the shade to bring back to their original moisture content and used for sowing (Renganayaki and Ramamoorthy, 2015).

Preparation of plant leaf extract

The fresh leaves of the concerned plants were collected separately and dried under shade. The shade dried leaves were powdered using mortar and pestle. Then exactly weigh one gram of leaf powder using weighing balance and dissolved in 100 ml of distilled water which was measured already in the beaker to make 1% leaf extract. The leaf extract was filtered by using muslin cloth to remove unwanted material and leaf debris.

Treatment details

$\mathbf{T_0}$ – Control

$\mathbf{T_1}$ – *Moringa* leaf extract 1%

$\mathbf{T_2}$ – *Prosopis* leaf extract 1%

$\mathbf{T_3}$ – *Neem* leaf extract 1%

$\mathbf{T_4}$ – *Pungam* leaf extract 1%

$\mathbf{T_5}$ – *Arappu* leaf extract 1%

Experiment was conducted to study the effect of presowing seed priming using various leaf extract on growth and yield characters in blackgram. Observations on growth and seed yield characters *viz.,* plant height, number of branches per plant, number of leaves per plant, days to 1st and 50% flowering, number of pods per plant, pod length, number of seeds per pod, 100 seed weight, seed yield per plant and seed yield per plot were recorded. The data were statistically analysed using ANOVA.

Results and Discussion

In the present study, seeds of blackgram was primed with various leaf extracts and used for sowing. Presowing seed priming has a positive significance which influences the growth and seed yield characters of blackgram. Highly significant differences were recorded among the seed treatments. *Prosopis* leaf extract 1% primed seed ($\mathbf{T_2}$) recorded the maximum height (39.50cm) and the untreated seed ($\mathbf{T_0}$) recorded the minimum plant height (31.20cm). Among the treatments, the highest plant height and 26.60% increase in plant height was recorded by $\mathbf{T_2}$ over control ($\mathbf{T_0}$). Increased plant height may be due to the translocation of GA_3 to the aerial part of plants, which perhaps to an extent that is enough to increase hypocotyl size and the consequent increase in first nodal height hence sufficient to positively affect plant height. This increase in plant height may also due to the early availability of high energy compounds and vital bio-molecules to the growing seedlings (Renugadevi and Vijayageetha, 2006).

Beside this *prosopis* leaf extract contain the fertilizing plant mineral nutrients like nitrogen (5.6 %), phosphorous (P_2O_5-0.9 %), potassium (K_2O-3.11 %) and calcium (CaO-1.0 %) (Nadeem Binzia, 1992) which favours plant growth and development. Improved plant height seems to be the result of vigourous seedling growth which gave an energetic start by evident from the increased speed of germination by $\mathbf{T_2}$ over control ($\mathbf{T_0}$). The increase in plant height might be due to the role of calcium, potassium & nitrogen which activates the synthesis of proteins & soluble sugars in the first phase of germination which have advantages for further growth & development.

Days to 1st flowering was maximum in the control ($\mathbf{T_0}$) (33.00days) and the minimum days to 1st flowering was recorded in the treatment ($\mathbf{T_2}$) (30.50days). Days to 50% flowering was maximum in the control ($\mathbf{T_0}$) (40.50days) and the minimum days to 50% flowering was recorded in the treatment ($\mathbf{T_2}$) (36.50days). The days to 1st flowering (30.50 days after sowing) and days to 50 % flowering (36.50 days after sowing) were recorded earlier flowering in *prosopis* leaf extract primed seed. This is because of the effect of fast emergence of the seeds at the beginning as the correlation between the days to 1st flowering and the days to 50 % flowering was significantly higher and positive. The early flowering was due to the release of toxic substances which cause the breakdown of the seed coat that favours the early emergence Cohn (1996) in *prosopis* leaf extract primed seed. The growth promoting regulators like gibberellins which stimulates the translocation of photo-assimilates or effective partitioning of the accumulates from source to sink thereby it helps in effective flower formation, reduced abscission of flower, fruit and seed development which leads to increase in the productivity of seed in field crops (Solaimalai *et al.,* 2001; Brady and McCourt, 2003 and Harris *et al.,* 2007).

Highly significant differences were recorded among the seed treatments, *Prosopis* leaf extract 1% primed seed ($\mathbf{T_2}$) recorded the maximum number of leaves per plant (16.00) and the untreated seed ($\mathbf{T_0}$) recorded the minimum number of leaves (11.00). *Prosopis* leaf extract 1% primed seed ($\mathbf{T_2}$) recorded the maximum number of branches (3.80) and the untreated seed ($\mathbf{T_0}$) recorded the minimum number of branches per plant (2.40). Higher number of leaves and 45.45% increase in number of

leaves, more number of branches and 58.33 % increase in number of branches was recorded by T_2 over the control (T_0) respectively. Increase in vegetative growth might be due to the presence of growth regulating substances like GA_3 which causes increase in enzyme activity which leads to more availability of energy biomolecules for plant growth and development thereby increasing light trapping area for photosynthesis which induces more photoassimilation and vegetative growth as evident from the increased leaf number recorded by T_2.

Among the seed treatments, *Prosopis* leaf extract 1% primed seed (T_2) recorded the maximum number of pods per plant (26.00) and the untreated seed (T_0) recorded the minimum number of pods per plant (21.00). Among the seed treatments, *Prosopis* leaf extract 1% primed seed (T_2) recorded the highest pod length (5.50 cm) and the untreated seed (T_0) recorded the lowest pod length (4.50 cm). Among the seed treatments, *Prosopis* leaf extract 1% primed seed (T_2) recorded the higher number of seeds per pod (7.00) and the untreated seed (T_0) recorded the lower number of seeds per pod (4.00). Among the seed treatments, *Prosopis* leaf extract 1% primed seed (T_2) recorded the higher seed yield per plant (5.37g) and the untreated seed (T_0) recorded the lower seed yield per plant (4.95g). Among the seed treatments, *Prosopis* leaf extract 1% primed seed (T_2) recorded the highest seed yield per plot (1.45kg) and the untreated seed (T_0) recorded the lowest seed yield per plot (1.25kg).

Among the seed treatments, *Prosopis* leaf extract 1% primed seed (T_2) recorded the highest 100 seed weight (6.30 g) and the untreated seed (T_0) recorded the lowest 100 seed weight (5.10 g). The highest number of pods per plant and 23.81% increase in number of pods per plant, lengthier pod and 22.22% increase in pod length, more number of seeds per pod and 40.00% increase in number of seeds per pod, maximum seed yield per plant and 8.48% increase in seed yield per plant, maximum seed yield per plot and 16.00% increase in seed yield per plot, greater 100 seed weight and 23.53% increase in 100 seed weight respectively was recorded by T_2 over the control (T_0).

The increase in yield parameters might be due to the bioactive chemicals/allelopathic chemicals present in the *prosopis* leaf extract which triggers the synthesis of gibberellin that improves the germination percentage by quickening the germination process which leads to increase in crop growth & development. Vijaya (1996) in blackgram & cowpea. Susheela (1996) reported that the increase in number of seeds may be due to increased pollen production resulted in enhanced fertilization (which might be due to improved mobilization of nutrient and moisture supply) that leads to increased number of filled seeds and the seed yield and also due to the production of more fertile pollen, lesser sterile pollen and lesser abortive pollen induced by calcium metabolism (Lee

Table 1: Effect of botanical seed treatment on plant growth characters in blackgram cv. CO 6.

Treatment (T)	Plant height (cm)	Days to 1st flowering	Days to 50% flowering	No. of leaves/ plant	No. of branches /plant
T_0	31.20	33.00	40.50	11.00	2.40
T_1	38.90	31.25	37.00	15.00	3.00
T_2	39.50	30.50	36.50	16.00	3.80
T_3	36.20	32.25	37.15	13.00	2.80
T_4	37.80	31.75	38.25	14.00	3.20
T_5	35.20	32.75	40.25	12.00	2.60
Mean	36.46	31.91	38.27	13.50	2.96
SEd	0.2289	0.1882	0.1838	0.2689	0.1570
CD (P=05)	0.5105	0.4196	0.4098	0.5997	0.3501

Table 2: Effect botanical seed treatment on yield and yield contributing characters in blackgram cv. CO 6

Treatment (T)	No. of pods per plant	Pod length (cm)	Number of seeds per pod	Seed yield per plant (g)	Seed yield per plot (kg)	100 seed weight (g)
T_0	21.00	4.50	4.00	4.95	1.25	5.10
T_1	25.00	5.20	6.00	5.00	1.43	6.10
T_2	26.00	5.50	7.00	5.37	1.45	6.30
T_3	23.00	4.90	5.00	5.07	1.40	5.60
T_4	24.00	5.10	5.00	5.25	1.41	5.80
T_5	22.00	4.70	4.00	4.97	1.38	5.20
Mean	23.50	4.98	5.16	5.10	1.38	5.68
SEd	0.3588	0.0495	0.3675	0.0627	0.0026	0.0447
CD (P=05)	0.8001	0.1105	0.8196	0.1399	0.0057	0.0998

and Kim, 2000).

Improved seed yield by *prosopis* priming treatment is the result of improved number of pods per plant and increased number of seeds per pod as evident from the present study. Pollen sterility was more in case of control which resulted in lower seed yield, while priming treatment ($\mathbf{T_2}$) improved the pollen fertility leading to more fertilization and more seed yield per plant.

Conclusion

The study concludes that seeds primed with *Prosopis* leaf extract 1% for 4 hours ($\mathbf{T_2}$) recorded higher values for growth parameters in field evaluation such as plant height (39.50cm), days to first flowering (30.50), days to 50 % flowering (36.50), number of leaves per plant (16.00), number of branches per plant (3.80), yield parameters in field evaluation such as number of pods per plant (26.00), pod length (5.50cm), number of seeds per pod (7.00), seed yield per plant (5.37g), seed yield per plot (1.45kg), 100 seed weight (6.30g). The increase in growth and yield characters was due to the presence of growth promoting substances like gibberellins and other several metabolites. Hence *Prosopis* leaf extract 1% is adopted to enhance the growth and yield characters of blackgram.

References

Brady, S.M. and P. McCourt (2003). Hormone cross-talk in seed dormancy. *Pl. Growth Regul.,* **22(1)**: 25-31.

Cohn, M.A. (1996). Operational and philosophical decisions in seed dormancy research. *Seed Sci. Res.,* **6**: 147 – 153.

De Lespinay, A., H. Lequeux, B. Lambillottee and S. Lutts (2010). Protein synthesis is differentially required for germination in *Poa pratensis* and *Trifolium repens* in the absence or in the presence of cadmium. *Pl. Growth Regul.,* **61**: 205-214.

Harris, D., A. Rashid, A. Hollington, L. Jasi and C. Riches (2007). Prospects of improving maize yield with on farm seed priming. In. Rajbhandari, N.P. and Ransom, J.K. 'Sustainable Maize Production Systems for Nepal'. NARC and CIMMYT, Kathmandu, pp. 180-185.

Lee, S.S., and J.H. Kim (2000). Total sugar, α-amylase activity and emergence after priming of normal and aged rice seeds. *Korean J. Crop Sci.,* **45**: 108-111.

Nadeem Binzia (1992). Investigation of the chemical constituents of *Prosopis juliflora* and circular Dichroismic studies of cholestano Quinaxaliner. *Ph.D Thesis,* NEJ Research Institute of Chemistry, University of Karachi, Pakistan.

Renganayaki, P.R. and K. Ramamoorthy (2015). Enhancing planting value of marginal seed lots of blackgram through Hydration-Dehydration (HD) treatment. *Res. J. Seed Sci.,* **8(1)**: 22-29.

Renugadevi, J. and V. Vijayageetha (2006). Organic seed fortification in cluster bean (*Cyamopsis tetragonoloba* L.) TAUB. International conference on indigeneous vegetables and legumes. *Prospects for fighting poverty, hunger and malnutrition,* **8(3)**: 294-299.

Solaimalai, A., C. Sivakumar, S. Anbumani, T. Suresh and K. Arulmurugan (2001). Role of plant growth regulators in rice production-a review. *Agric. Rev.,* **22**: 33–40.

Susheela, C. (1996). Studies on the effect of phosphorus and boron on the yield and seed setting in Sunflower, *M.Sc. (Ag.) Thesis,* Tamil Nadu Agricultural University, Coimbatore.

Vijaya, J. (1996). Standardisation of presowing seed management technique for pulses. *M.Sc. (Ag.) Thesis,* Tamil Nadu Agricultural University, Coimbatore.