Plant Archives Vol. 20, Supplement 2, 2020 pp. 1672-1674 **e-ISSN:2581-6063 (online), ISSN:0972-5210**

EFFECT OF BIOLOGICAL SEED PRIMING METHODS ON FIELD PERFORMANCE AND SEED QUALITY OF BLACK GRAM (*VIGNA MUNGO* L.). CV. VBN 5

[2]G. Vighneshawaran, *[2]R. Ebenezer Babu Rajan, [2]C. Praveen Sampath Kumar, [1]J. Sam Ruban, [2]J.L. Joshi and [1]Ajish Muraleedharan

[1]Department of Horticulture, Faculty of Agriculture, Annamalai University, Annamalainagar 608 002, Tamil Nadu, India
[2]Department of Genetics and Plant Breeding Faculty of Agriculture, Annamalai University, Annamalainagar 608 002, Tamil Nadu, India
*Corresponding author: ebenezer.babu18@gmail.com

Abstract

The present study was carried out at T. Palur village, Udayarpalayam Taluk, Ariyalur District, Tamilnadu. during 2018 in order to find out the effect of biological seed priming on field and growth performance were evaluated by given priming treatment with liquid formulation *viz*., rhizobium 6%, vermiwash 6%, panchagavya 6%, cow urine 6%, goat urine 6%, azospirillum 6% and sown along with control in field experiments. In field evaluation, panchagavya 6% recorded higher growth and yield parameters such as plant height, number of branches, days to first flowering, days to 50% flowering, number of nodules per plant, number of pods per plant, pod length, number of seeds per pod, 100 seed weight, seed yield per plant and seed yield per plot compared to control. Panchagavya recorded the highest seed yield per plant was 6.73g *i.e.* 59.10 % increase over the control. The study helps to improve the quality of seeds with the help of seed priming treatments which are cost effective, economic, non-toxic and eco-friendly.

Keywords: Blackgram VBN 5, Seed priming, Panchagavya, Cow urine, organic priming.

Introduction

Pulses are important source of vegetable protein. Pulses are the second most important source of human food. These plants fix nitrogen, and improve soil fertility, prevent soil erosion and play an important role in sustainability of agricultural systems (Parsa and Bagheri, 2009). Black gram *(Vigna mung*o) belonging to the family Leguminosae with chromosome number (2n=22). It is the third most important pulse crop of India and is native to central Asia. It is also extensively grown in West Indies, Japan, and other tropical and sub-tropical countries. In India black gram is very popularly grown in Maharashtra, Andhra Pradesh, Uttar Pradesh, Madhya Pradesh, Tamilnadu and Bihar.Black gram seeds are highly nutritious containing higher amount of protein (24-26%) and also rich in vitamin (A, B_1, B_3) and minerals (potassium, phosphorus, calcium and sodium). It has some medicinal properties and used in the treatment of diabetes, sexual dysfunction, nervous disorder, digestive system disorders and rheumatic afflictions (Anonymous, 2010).In India black gram is cultivated in an area of 2.1 million ha with total production of 0.95 million tons. India is the major producer and consumer of pulses in the world accounting for 33 and 22% of world's area and production under pulses respectively (FAO, 2017).

As per the world health organization, every man needs 80g of pulses every day and as per the Indian Council of Medical Research, every man needs a minimum consumption of 47g protein day^{-1} to meet out the protein requirement. But at present the per capita availability of pulses is only 30 to 35g day^{-1}. This situation warrants producing threefold increase as that of current pulse production. The low productivity is due to the fact that pulses are grown mostly in marginal and rainfed areas. The main constraint in raising the productivity levels of pulses in dry lands inadequacy of soil moisture and poor fertility status of the soil. The low productivity is also due to the lack of high yielding varieties and hybrids. Seed priming has been successfully demonstrated to improve germination and emergence in seeds of many crops especially vegetable and small seeded grasses. Seed priming has presented promising, and even surprising result, for many seed include legume seeds.

Cow urine contains about 1.0% nitrogen, traces of P_2O_5 and 1.0% of K_2O. Approximately 2400 to 2500 L of urine are produced per animal. If this urine were nit conserved, nitrogen in the urine, which is mainly in the form of urea, would be quickly lost as ammonia. It is also considered as a natural disinfectant and pest repellent and forms the main components of panchagavya (an organic crop booster prepared and sprayed by Indian farmers) (Tharmaraj *et al*., 2011). Organic seed priming is more affordable so even small scale farmers can practice. Keeping these into consideration, there is need for its improvement for yield. This can be achieved by maintaining plant population by organic seed priming.

Materials and Methods

The present study was carried out at T. Palur village, Udayarpalayam Taluk, Ariyalur District, Tamilnadu. The genetically pure seed of blackgram cv. VBN 5 was obtained from National Pulses Research Station, Vamban. The seeds were cleaned and were graded using BSS 8×8 sieve for uniformity. 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 $1/3^{rd}$ 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 (Renugadevi and Ramamoorthy, 2015).

Treatment details

T_0- control
T_1- 6% Rhizobium
T_2 - 6% Vermiwash
T_3- 6% Panchagavya
T_4 - 6% Cow urine
T_5- 6% Goat urine
T_6 - 6% Azospirillum

The 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 yield characters *viz.,* plant height, number of branches, days to first flowering, days to 50% flowering, number of nodules per plant, 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 from various experiments were analysed statistically adopting the procedure described by Panse and Sukhatme (1985).

Result and Discussion

The use of chemicals, such as fertilizers and pesticides for the enhancement of productivity of crops has become the order of the day. After the initiation of green revolution the crop productivity has increased manifold to meet the demand of ever growing population the world over. But the use of these chemicals have caused great damage to the environment in the form of pollution to air, water and soil and also led to various diseases to human beings, animals and plants. Heavy use of chemicals in agriculture has weakened the ecological base in addition to degradation of soil, water recourses and quality of the food. At this juncture, a keen awareness has sprung on the adoption of "organic farming" as a remedy to cure the ills of modern chemical agriculture (Kannaiyan, 2000). It is very much essential to develop a strong workable and compatible package of nutrient management through organic resources for various crop based on scientific fact, local conditions and economic viability.

Hence, a study was formulated to evaluate the effect of biological seed treatment on seed yield and quality in black gram cv. VBN 5. The fresh seeds of black gram cv. VBN 5. were treated with various organic manure extract i.e., cow urine @ 6%, goat urine @ 6%, panchagavya @ 6%, rhizobium @ 6%, vermiwash @ 6%, azospirillum @ 6%. Then treated seeds were evaluated or their seed qualities and productivity using untreated seed as control. The improvement in the seed quality characters with panchagavya due to the action of microorganisms and growth hormones (IAA and GA_3) which are present in the panchagavya (Ratnoo and Bhatnagar, 1993). Saritha *et al.* (2013) reported that panchagavya possess almost all the major nutrients, micronutrients and growth hormones enhances the metabolic activity of plants and supports better seed invigouration. Naik and Sreenivasa (2009) opined that Panchagavya contains bacteria producing plant growth promoting substance as well as bacteria having biological deterrent activities. Microbes such as *rhizobium, azotobacter, azospirillum,* Phosphorous solubilizing bacteria, *Trichoderma* and *pseudomonas* present in panchagavya act as liquid bio fertilizer and bio pesticides (Ali, 2011).

The above primed seeds were also evaluated under field condition, the biometrical and yield parameters were observed. It revealed that the 6% panchagavya extract pre sowing seed recorded higher values for the biometrical traits *viz.*, field emergence, plant height, number of branches per plant at 30 and 60 days which were 21.18, 35.75, 50, 58.36, percentage higher than the control respectively with the above mentioned characters and the days to first flowering (26.23 days after sowing) and days to 50 % flowering (31.53 days after sowing) were recorded earlier flowering in panchagavya primed seeds. These results are in conformity with findings of Vijayan and Krishnasamy (2014) in rice. The increase in the above growth parameters was due to auxins, which is present in panchagavya attributed to the activation of cell division and cell elongation in the auxiliary buds which had a promoting effect in increased number of branches and other growth characters. The application of panchagavya would have induced the endogenous synthesis of native auxins resulting in an early active growth (Prabhu *et al.,* 2010) in plants.

Table 1: Effect of biological seed treatment on plant growth characters in blackgram cv. VBN 5.

Treatment (T)	Plant height (cm)	Number of branches per plant		Days to First flowering	Days to 50% flowering	Number of nodules per plant
		30 Days	60 Days			
T_0	29.65	1.70	2.57	*33.55	39.81	7.59
T_1	30.75	1.85	3.45	29.30	38.19	9.94
T_2	32.25	1.95	3.32	30.90	36.78	10.03
T_3	40.25	2.55	4.07	26.23	31.53	12.35
T_4	39.50	2.20	3.97	29.70	35.99	11.66
T_5	36.20	2.13	3.33	30.29	38.30	10.06
T_6	37.00	2.05	3.20	26.74	32.32	10.42
Mean	35.08	2.06	3.41	29.53	36.13	10.30
S.Ed	1.4314	0.0861	0.1630	1.1410	1.1729	0.3917
CD(P=05)	3.1204	0.1876	0.3553	2.4875	2.5569	0.8538

Table 2: Effect of biological seed treatment on yield and yield contributing characters in blackgram cv. VBN 5.

Treatment (T)	Number 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	19.31	3.55	4.42	4.23	1.28	5.17
T_1	22.86	4.24	5.35	4.93	1.36	5.47
T_2	23.34	4.32	5.65	4.62	1.35	5.23
T_3	27.44	5.58	7.58	6.73	1.74	6.56
T_4	26.04	5.37	7.04	6.24	1.73	6.17
T_5	21.75	5.08	6.51	5.25	1.37	5.25
T_6	23.69	4.66	6.18	5.37	1.42	5.45
Mean	23.50	4.69	6.10	5.34	1.47	5.61
S.Ed	0.8503	0.2140	0.2955	0.2129	0.0767	0.1489
CD(P=05)	1.8536	0.4666	0.6443	0.4641	0.1671	0.3245

This treatment was also recorded the higher yield attributes characters such as number of nodules per plant, number of pods per plant, pod length, number of seeds per pod, seed yield per plant, seed yield per plot and 100 seed weight were also 62.71, 42.10, 57.18, 71.50, 59.10, 35.93, 26.88 percentage higher than control respectively with the above mentioned characters. This was might be due to quantities of IAA and GA_3 present in panchagavya could create stimuli in the plant system and increased the production of growth regulator in cell system and the action of growth regulators in plant system stimulated the necessary growth and development of crop. Panchagavya is also being sought to improve crop establishment and health (Shakuntala *et al*., 2012). Therefore panchagavya has played a significant role in providing resistance to pests and disease, resulting in increased overall yields (Tharmaraj *et al.,* 2011). Panchagavya possess the properties of fertilizers and bio pesticides (Sireesha, 2013). Panchagavya has resulted in positive effect on growth and productivity of crops as reported by of Somasundharam *et al.,* (2007).

Conclusion

It is concluded that seeds primed with panchagavya 6% for 4 hours (T_3) recoded higher values for growth and yield parameters in field evaluation. The increase in growth and yield characters was due to the presence of growth promoting substance like GA_3 and other several metabolites. Hence panchagavya 6% is adopted to enhance the growth and yield characters of blackgram.

Reference

Ali, M.N. (2011). Sustainable Agriculture with Low Cost Technologies, School of Agriculture and Rural Development, Ramakrishna Mission Vivekananda University, Belur Math, West Bengal, 47.

Anonymous (2010). Ministry of information and broad casting, Govt. of. India, New Delhi., 405.

Food and Agriculture Organization, 2017, WWW.FAO.Org., Area, production and productivity of pulses.

Kannaiyan, K. (2000). Biofertilisers- ket factors in organic farming. The Hindu survey of India Agriculture, 165-173.

Naik, N. and Sreenivasa, M.N. (2009). Influence of bacteria isolated from Panchagavya on seed germination and seed vigour in wheat. Karnataka J. Agric. Sci., 22(1): 231-232.

Panse, V.G. and Sukhatme, P.V. (1985). Statistical Methods for agriculture Workers, ICAR, New Delhi.

Parsa, M. and Bagheri, A. (2009). Pulses. JDM Publication Institute, Mashhad, Iran.

Prabhu, M.; Ramesh, K.A. and Rajamani, K. (2010). Influence of different organic substances on growth and herb yield of sacred basil *(Ocimum santu* L.). Indian J. Agric. Res., 44(1): 48-52.

Ratnoo, R.S. and Bhatnagar, M.S. (1993). Neem cake in disease control. Indian J. Mycol. Plant Pathol., 23: 186-188.

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

Saritha, M.; Vijayakumari, B.; Hiranmai, Y.R. and Kandari, L.S. (2013). Influence of selected organic manures on the seed germination and seedling growth of cluster bean (*Cyamopsis tetragonoloba* (L.) *Taub*), Sci. Technol. Arts Res. J., 2(2): 16-21.

Shakuntala, N.M.; Vasudevan, S.N.; Patil, S.B.; Doddagoudar, S.R.; Macha, R.C.M.S.I. and Vijayakumar, A.G. (2012). Organic biopriming on seed vigour inducing enzyme in paddy- An alternative to inorganics. Ecoscan, 1: 251-257.

Sireesha, O. (2013). Effect of plant products, panchagavya and bio-control agents on rice blast disease of paddy and yield parameters. Int. J. Res. Biol. Sci., 3(1): 48-50.

Somasundharam, E.; Mohamed, M.; Manullah, A.; Thirukkumaran, K.; Chandrasekaran, R.; Vaiyapuri, K. and Sathyamoorthi, K. (2007). Biochemical changes, Nitrogen flux and yield of crops due to organic sources of nutrients under maize based cropping system. J. Appl. Sci. Res., 3(12): 1724-1729.

Tharmaraj, K.; Ganesh, P.; Sureshkumar, R.; Anandan, A. and Kolanjinathan, K. (2011). A Critical Review on Panchagavya- A Boon Plant Growth. Int. J. Pharm. Biol. Arch., 2(6): 1611-1614.

Vijayan, R. and Krishnasamy, V. (2014). Impact of organic techniques of seed crop management on seed yield and quality in rice cv. ADT 43. Sci. Res. Essays, 9(13): 611-618.