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Standardization of Selected Organics Seed Treatments on Growth Yield and Yield Attributing Traits of Black Gram (*Vigna mungo*) Var. PU-19

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ABSTRACT

Due to usage of chemical fertilizers and pesticides, severe deterioration of soil, production and quality was effected, to avoid over usage of these inorganic inputs may affect the production of food materials, which are produced by these methods with toxic residues can possess a threat to human health. The trail was conducted to see the response of panchagavya, Vermiwash, Beejamrutha and jeevamurtha with different intensity and time duration on black gram. The trail was conducted on the variety PU-19 and treated by using Panchagavya (3%, 5% and 7%) for 12 hrs, vermiwash (3%, 5%, 7%) for 12 hrs and Beejamrutha (3%, 5%, 7%) for 12 hrs and Jeevamrutha (3%, 5% 7%) for 12 hrs. Field observations like plant height (62.00), number of branches (10.00), days to flowering (40.00) and maturied early (69.00) with number of pods per plant (34.00), number of seeds per pod (14.00), pod length (7.00 cm), seed yield per plant (31.45 gm), seed yield per plot (157.25), biological yield (573.01 gm), harvest index (18.01), seed index (12.71) were recorded higher in the treatment (T_3) Panchagavya–7% for 12 hrs followed by T_2 – Panchagavya (5%). Since the results are from the experiment conducted in one season further trails are recommended before suggesting to the farming communities.

Keywords Black gram, Panchagavya, Vermiwash, Beejamrutha, Jeevamrutham.

INTRODUCTION

Black gram (*Vigna mungo* (L.) Hepper), occupies a unique place among pulses for its use as seed and vegetable and it is grown both as pure and mixed crop. It is native to India, belong to the family Leguminaceae. It also suppliments the income of many small scale farmers and contributes to the maintance of soil fertility by fixing nitrogen in the soil. Black gram is rich protein food, Black gram is consumed in various forms as dal (whole or split, husked and un husked).

About 70% of the world's blackgram production comes from India. India is the world's largest producer as well as consumer of blackgram. It produces about 24.5 lakh tonnes of Urad annually from about 4.6 million hectares of area, with an average productivity of 533 kg per hectare in 2020-21 (agricoop.nic.in). Blackgram area accounts for about 19% of India's total pulse acreage which contributes 23% of total pulse production. Black gram has anti nutritional factors. Black gram is very nutritious as it contains high levels of protein (25g/100 g), potassium (983 mg/100 g), calcium (138 mg/100 g), iron (7.57 mg/100 g), niacin (1.447 mg/100 g), Thiamine (0.273 mg/100 g), and riboflavin (0.254 mg/100 g).

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Black gram has been shown to be useful in mitigating elevated cholesterol levels (Divyavani *et al.* 2020) on dry weight basis and it is rich source of calcium and iron. The quality of seeds in storage is influenced by several factors like variety of seed, initial seed quality, storage condition, moisture content, insect pest, bacteria and fungi. The poor storage of black gram seeds is problem because of *Callasobruchus chenensis* (L.) and *C. maculates* (F.) belonging to the family of Bruchidae, which causes qualitative and quantitative losses. Therefore, maintenance of seed viability and vigour during storage is a matter of prime concern. The seed potentiation is mainly achieved by treating the seeds with various chemicals and botanicals can reduce the infestation and maintain the quality of the seed in term of viability and vigour for longer period in storage (Duruigbo 2010, Basavegowda and Arunkumar 2013).

Pulses are an important group of food crops that can play a vital role to address national food and nutritional security and also tackle environmental challenges.

Pulses absorb moisture on storage that leads to degradation of seed quality and death of seed. Hence, there is a need to develop environment friendly crop protective agents from botanicals. Use of plant products as insecticide is important to the management of stored grain pests. Botanical pesticides are being manufactured and exported to various countries. Numerous literatures indicate that plants could be source for new insecticides. Therefore, there is a great potential for a plant-derived insecticidal compounds. Moisture content, temperature, relative humidity, duration of storage and storage devices used are the most important factors affects the stability of stored pulses.

Objectives

Hence, present study was undertaken to assess the effect of panchagavya, Vermiwash, jeevamrutha and beejamrutha on growth, yield and yield attributing traits of black gram.

MATERIALS AND METHODS

Variety details : It was developed in 1981 by the cross of UPU 1 × UPU 2. Plants are erect, early maturing (80-85 days in *kharif* and 75 days in spring/ summer), pods hairy, seed black, medium in size, resistant to yellow mosaic virus disease. It is suitable for north and eastern plains. Average yield is 10-12 q/ha.

The present research on pre-sowing seed treatments on standardization of selected organic seed treatments on growth yield and yield attributing traits of Black gram variety- PU–19 (Pant U-19) was made to identify the effect of seed priming of different kinds on seed quality parameters of black gram and to find out suitable seed priming method for black gram. The experiment was laid out in Randomized Block Design with thirteen treatments including control which were replicated thrice in *kharif* 2021. The treatments are as follows, T_O- Control, (T_1, T_2, T_3 - Panchagavya – 3%, 5%, 7%), (T_4, T_5, T_6, – Vermiwash - 3%, 5%, 7%), (T_7, T_8, T_9 – Beejamrutha - 3%, 5%, 7%), (T_{10}, T_{11}, T_{12} – Jeevamrutha – 3%, 5%, 7%) respectively. The black gram seeds were primed with above different priming agents in above different concentrations and intensities for a given duration. After priming seeds were dried to initial moisture content at room temperature. After that the primed seeds were used to grow under field conditions.

Methodology

Panchagavya

Panchagavya was prepared from cow products viz. ,cow milk (5 L), ghee (2 L), curd (2 kg), cow urine (5 L) and cow dung (5 kg), these ingredients were mixed together along with15 kg of jaggery in a circular container. The mixture was added with 15 L of water and kept as such for 30 days. Fermentation took place by making the mixture to a fine concentrate giving out the sweet odour. The fermented liquid was filtered through cotton and the final volume of filtrate was made 1000 ml. The solution was stored in refrigerator. 5% solution was used for treatments.

Vermiwash

Vermiwash is a one of the examples for organic liquid fertilizer which is produced with the help of earthworms. Vermiwash contains micro and macro nutri-

Table 1. Influence of Panchagavya, Vermiwash, Beejamrutha, Jeevamrutha on Plant height, Number of branches, Days to 50% flowering, Days to maturity. T_0-Control, T_1-Panchagavya (3%), T_2-Panchagavya (5%), T_3-Panchagavya (7%),T_4-Vemiwash (3%), T_5-Vermiwash (5%), T_6-Vermiwash-(7%), T_7- Beejamrutha (3%), T_8-Beejamrutha (5%), T_9-Beejamrutha (7%), T_{10}-Jeevamrutha (3%), T_{11}-Jeevamru, Tha (5%), T_{12}-Jeevamrutha (7%).

Treatments	Plant height	Number of branches	Days to 50% flowering	Days to maturity
T_0 – Control	56	8	49.00	78.00
T_1	61	10	42.00	70.00
T_2	62	10	41.00	69.00
T_3	62	10	40.00	69.00
T_4	59	9	44.00	72.00
T_5	60	9	43.00	72.00
T_6	60	10	42.00	71.00
T_7	57	8	47.00	78.00
T_8	59	9	45.00	76.00
T_9	59	9	44.00	74.00
T_{10}	57	8	46.00	77.00
T_{11}	59	9	45.00	75.00
T_{12}	59	9	44.00	73.00
SEm±	1.0364	0.1654	0.6993	1.1471
CD (P=0.05)	3.0249	0.4828	2.0411	3.348

ents, hormones which promote plantgrowth and yield (Sharma *et al.* 2005), increases soil fertility (Leifeld and Fuhrer 2010), reduces agricultural greenhouse gas emissions (Gomiero *et al.* 2008) and reduces nitrogen losses from the system (Drinkwater *et al.* 1998). Further, it is less expensive compared with chemical fertilizer and ease to produce. Vermiwash is an ecofriendly organic liquid fertilizer which could be used as a foliar spray on many different crops.

Jeevamrutha

Take any fresh leaves of tender succulent plants, leaves and shoots, which are crushed into a paste. To this add fresh urine in a ratio of 1:3 (leaves : urine by weight). Creatinine present in the urine inhibits bacterial growth but permits yeast or fungal growth. ext, soaking dry yeast (1-2 gms) in sugar/ jaggery, mixed in water 9100 ml for 10 l of biopesticide) – this baker's yeast culture is added to the rest of the ingredients. The mixture is then allowed to ferment for at least 2 weeks and the solid sludge is separated and squeezed. The separated sludge is then used as an organic fertilizer and the filtered liquid is used as bio-pesticides to kill the eggs, larve and adult pests on the crops and trees.

Beejamrutha

Bijamrita/Beejamrutha is a treatment for plants, seedlings or any planting material. It is effective in protecting young roots from fungus along with soil-borne and seed-borne illnesses that frequently affect crops after the monsoon period. It is composed of similar ingredients as Jevamrutha : Take 20 l of water, 5 kg of local cow dung, 5 l of local cow urine, 50 g lime and handful soil from the bund of farm. Preparation method : Take 5 kg local cow dung in a cloth and bound it by tape. Hang this in the 20 l water up to 12 hrs. Take one-liter water and add 50 gm lime in it, let it stable for a night. Then next morning, squeeze this bundle of the cow dung in that water thrice continuously, so that all essence of cow dung is accumulated in that water. Add a handful of soil in that water solution and stir it well. Finally add 5 l deshi cow urine or human urine in that solution and add the limewater and stir it well.

RESULTS AND DISCUSSION

Pre - harvest

Plant height **:** Minimum plant height at harvest was exhibited by treatment T_0 [control] (56.00), while maximum plant height at harvest was recorded in treatment T_3 – Panchagavya – 7% - (62.00) and T_2 – Panchagavya – 5% (62.00) followed by T_1 – Panchagavya – 3% (61.00) were significantly higher than other significant treatments (Table 1).

Panchagavya is a powerful plant growth stimulant that increases the biological productivity of plants. It is used to revitalize the soil, protect crops from disease and improve the nutritional value of fruits and vegetables. It can be sprayed on the leaves, applied to the soil together with irrigation water, or used to treat seeds and seedlings. The optimum concentration for foliar application is 3% Panchagavya. The biochemical properties of Panchagavya include almost all important nutrients such as N, P and K, as well as micronutrients and growth hormones necessary for plant growth, such as IAA and GA (Selvaraj

Table 2. Influence of Panchagavya, Vermiwash, Beejamrutha, Jeevamrutha on Number of pods per plant, Number of seeds per pod, Pod length. T_0-Control, T_1-Panchagavya (3%), T_2-Panchagavya (5%), T_3-Panchagavya (7%), T_4-Vemiwash (3%), T_5-Vermiwash (5%), T_6-Vermiwash (7%), T_7- Beejamrutha (3%), T_8-Beejamrutha (5%), T_9-Beejamrutha(7%),T_{10}-Jeevamrutha (3%), T_{11}-Jeevamrutha (5%), T_{12}-Jeevamrutha (7%).

Treatments	Number of pods per plant	Number of seeds per pod	Pod length
T_0 – Control	21	9	4
T_1	32	12	6
T_2	32	13	7
T_3	34	14	7
T_4	29	11	6
T_5	30	12	6
T_6	31	12	6
T_7	25	9	4
T_8	27	10	5
T_9	28	10	5
T_{10}	27	10	5
T_{11}	28	10	5
T_{12}	28	11	6
SEm ±	0.3847	0.1331	0.0893
CD (P=0.05)	1.1227	0.3884	0.2605

et al. 2007).

Number of branches **:** Minimum number of branches was exhibited by treatment T_0 [control] (8.00), while maximum number of branches was recorded in treatment T_3 – Panchagavya – 7% - (10.00, T_2 – Panchagavya – 5% (10.00) and T_1 – Panchagavya – 3% (10.00) followed by T_4 – Vermiwash – 3% (9.00), T_5 – Vermiwash – 5% (9.00) were significantly higher than other significant treatments. That all the growth parameters viz., plant height, number of branches plant and number of flowers plant recorded significant difference when subjected to different treatments levels of organic and inorganic nutrient sources including control. Kumar *et al.* (2020) (Table 1).

Days to 50% flowering **:** Minimum Days to 50% flowering was exhibited by treatment T_3 – Panchagavya – 7% - (40.00) while maximum Days to 50% flowering was recorded in treatment T_0 [control] (49.00), followed by T_{10} – Jeevamrutha – 3% (46.00) was significantly higher than other significant treatments. The panchagavya and jeevamrutha is a powerful plant growth stimulant that improves the biological effectiveness of crops, fosters intense biological activity in the soil and makes nutrients available to crops. The use of these organic liquid formulations increased soil microbial activity and population to a higher extent and was beneficial for phosphate solubilization, nitrogen fixation and other processes (Table 1).

Days to maturity **:** Minimum Days to maturity was exhibited by treatment T_3 – Panchagavya – 7% - (69.00) while maximum Days to 50% maturity was recorded in treatment T_0 [control] (78.00), and T_7 – Beejamrutha – 3% (78.00) followed by T_{10} – Jeevamrutham – 3% (77.00), T_{11} – Jeevamrutham – 5% (75.00) was significantly higher than other significant treatments (Table 1).

Post-harvest

Number of pods per plant (34.00) and seeds per pod (14.00) were recorded significantly higher in the treatment higher in the treatment panchagavya with concentration of 7% compared to treatments jeevamrutha and Beejamrutha concentrations levels of 3 to 5% and control, due. The fast cell proliferation and elongation that panchagavya may have favoured due to the presence of growth enzymes (Table 2).

Pod length **:** Minimum pod length was exhibited by treatment T_0 [control] (4.00 cm), while maximum pod length was recorded in treatment T_3 – Panchagavya – 7% - (7.00 cm) and T_2 – Panchagavya – 5% (7.00 cm) followed by T_4 – Vermiwash – 3% (6.00), T_5 – Vermiwash – 5% (6.00) was significantly higher than other significant treatments (Table 2).

Seed yield per plant (gm) **:** Minimum seed yield per plant was exhibited by treatment T_0 [control] (9.26 gm), while maximum seed yield per plant was recorded in treatment T_3 – Panchagavya – 7% - (12.71 gm) followed by T_2 – Panchagavya – 5% (12.65 gm), T_1 – Panchagavya – 3% (12.37 gm), T_5 – Vermiwash – 5% (12.22 gm) was significantly higher than other significant treatments (Table 3).

Biological yield per plot **:** Minimum biological yield per plot was exhibited by treatment T_0 [control] (410.23 gm), while maximum biological yield per plot was recorded in treatment T_3 – Panchagavya –

Table 3. Influence of Panchagavya, Vermiwash, Beejamrutha, jeevamrutha on Seed yield per plant, Biological yield, Seed index, Harvest index. T_0-Control, T_1-Panchagavya (3%),T_2-Panchagavya (5%), T_3-Panchagavya (7%), T_4-Vemiwash (3%), T_5-Vermiwash (5%), T_6-Vermiwash(7%),T_7- Beejamrutha (3%), T_8-Beejamrutha (5%),T_9-Beejamrutha (7%),T_{10}-Jeevamrutha (3%),T_{11}-Jeevamrutha (5%), T_{12}-Jeevamrutha (7%).

Treatments	Seed yield per plant	Biological yield	Seed index	Harvest index
T_0 – Control	9.26	410.23	14.26	19.55
T_1	12.37	565.31	17.37	21.45
T_2	12.65	570.25	17.65	21.81
T_3	12.71	573.01	17.71	21.84
T_4	11.91	554.23	16.91	20.94
T_5	12.22	561	17.22	21.29
T_6	12.33	563.24	17.33	21.43
T_7	10.16	456.14	15.16	20.16
T_8	10.95	521.06	15.95	20.00
T_9	11.04	543.65	16.04	19.63
T_{10}	10.70	511.42	15.70	19.79
T_{11}	11.04	543.04	16.04	19.64
T_{12}	11.70	552.27	16.70	20.59
SEm±	0.18	10.41	0.1770	0.2739
CD (P=0.05)	0.51	30.38	0.5168	0.7995

7% - (573.01 gm) followed by T_2 – Panchagavya – 5% (570.25 gm), T_1 – Panchagavya – 3% (565.31 gm), T_5 – Vermiwash – 5% (561.00 gm), T_4 – Vermiwash – 3% (554.23 gm) and T_6 – Vermiwash – 7% (563.24 gm) was significantly higher than other significant treatments (Table 3).

Seed index **:** Minimum seed index was exhibited by treatment T_0 [control] (14.26 gm), while maximum seed index was recorded in treatment T_3 – Panchagavya – 7% - (17.71 gm) followed by T_2 – Panchagavya – 5% (17.65 gm), T_1 – Panchagavya – 3% (17.37 gm), T_5 – Vermiwash – 5% (17.22 gm), T_4 – Vermiwash – 3% (16.91 gm) and T_6 – Vermiwash – 7% (17.33 gm) was significantly higher than other significant treatments (Table 3).

Harvest index **:** Minimum biological yield per plot was exhibited by treatment T_0 [control] (19.55), while maximum biological yield per plot was recorded in treatment T_3 – Panchagavya – 7% - (21.84) followed by T_2 – Panchagavya – 5% (21.81), T_1 – Panchagavya – 3% (21.45), T_4 – Vermiwash – 3% (20.94) and T_6 – Vermiwash – 7% (21.43) was significantly higher than other significant treatments (Table 3).

CONCLUSION

It is concluded from the present study that the seeds of black gram (*Vigna mungo*) Var PU-19 were treated with Panchagavya – 7% (T_3) showed significant increase in seed yield per plant (12.71 g). Findings are based on research done in one season in Prayagraj (Allahabad) UP further trails may be required for considering it for the recommendation.

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