

“Standardization of Different Pre Sowing Seed Treatments of Panchagavya, Beejamrutha, Jeevamrutha and Neem Oil on Plant Growth, Yield and Yield Attributing Traits of Greengram (*Vigna Radiata L.*) Var. PDM-139 Samrat”

Koppera Samatha^{1*} and Prashant Kumar Rai²

¹M.Sc. Scholar, Department of Seed Science and Technology, Naini Agriculture Institute, SHUATS, Prayagraj, Uttar Pradesh, India
²Assistant professor, Department of Genetics and Plant Breeding, SHUATS, Prayagraj, Uttar Pradesh, India.

Abstract

An experiment was conducted under the field condition during *Kharif* season (2021- 22) at Central Research Farm, Department of Genetics and Plant Breeding, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology & Sciences, Prayagraj, Uttar Pradesh. This experiment was done to determine the effect of Pre-sowing seed treatments of Panchagavya, Beejamrutha, Jeevamrutha and Neemoil on plant growth, yield and yield attributing traits of Greengram (*Vigna radiata L.*)var.PDM-139 Samrat. The experiment was laid out in Randomized Block Design with thirteen treatments including control which were replicated thrice. The treatments are as follows. T₀-Control, (T₁, T₂, T₃ Panchagavya - @ 3% 5% and 7%), (T₄, T₅, T₆ Beejamrutha @ 1%, 3% and 5%), (T₇, T₈, T₉ Neem oil @ 1% 3% and 5%) and (T₁₀, T₁₁ and T₁₂ Jeevamrutha 3%, 5% and 7%) respectively. The experiment results revealed that seeds treated with T₁₂ – Jeevamrutha 7% gave better results than other treatments viz. Field emergence (22.46), Plant height 20, 40 and 60 DAS (14.10 cm, 24.26 cm and 50.90 cm), Days to 50% flowering (32.33), Days to maturity (45.33), Number of primary branches per plant (10.60), Seed index (4.10), Number of pods per plant (19.50), Number of Seeds per pod (9.73), Seed yield per plant (3.06g), Seed yield per plot (82.33 gm) and Biological yield per plot (251.4 gm) were recorded significantly higher compared to other treatments with Harvest index (32%). Overall, seed treatment with treatment T₁₂ – Jeevamrutha at 7% for 8 hours attained the best results out of the thirteen treatments evaluated in the study and untreated control (T₀) performed least with low vigor and yield amongst the treatments.

Keywords: Greengram; Growth; Yield; Panchagavya; Jeevamrutha; Neem Oil; Beejamrutha

Introduction

Green gram (*Vigna radiata L.*) also known as mungbean is a self pollinated leguminous crop which is grown during kharif (July-October) as well as summer (March- June) seasons in arid and semi arid regions of India. It is primarily a rainy season crop but with the development of early maturing varieties, it has also proved to be an ideal crop for spring and summer season. It is tolerant to drought and can be grown successfully on drained loamy to sandy loam soil in areas of erratic rainfall. It is a native of Central Asia. It is a short duration crop, fits well in various multiple and intercropping systems. After picking of pods, mungbean plants may be used as green fodder or green manure. Besides these, the crop also enriches soil by fixing atmospheric nitrogen. Green gram is an excellent source of protein (24.5%) with high quality of lysine (460 mg/g N) and tryptophan (60 mg/g N). It contains also remarkable quantity of ascorbic acid and riboflavin (0.21 mg /100 g). Pulses are also known as “the meat of the poor” as they are the most economical source of protein [1] Likewise, to improve protein malnutrition, per capita consumption of pulse should be 50 g/day in addition to other sources of protein such as cereals, milk, meat and eggs [2] It is also resistant to adverse climatic condition and recovers the soil fertility by fixing atmospheric nitrogen in the soil [3].

Pre-sowing seed treatment techniques has been used as an alternate approach to overcome the effects of abiotic stresses in agricultural production because of its low cost and risk [4]. The primed/hardened treatments proved to be better for vigor improvement than traditional soaking [5]. Subsequently, Greengram crop plants will produce more yield by treating the seeds with organics like Panchagavya, Beejamrutha, Jeevamrutha etc (Tables 1). Increased availability of nutrients from organic sources would lead to a translocation of more photosynthesis

Table 1: Treatment details.

Notation	Treatment	Concentration	Duration
T ₀	Water	-	-
T ₁	Panchagavya	3%	8hr
T ₂	Panchagavya	5%	8hr
T ₃	Panchagavya	7%	8hr
T ₄	Beejamrutha	1%	8hr
T ₅	Beejamrutha	3%	8hr
T ₆	Beejamrutha	5%	8hr
T ₇	Neem oil	1%	8hr
T ₈	Neem oil	3%	8hr
T ₉	Neem oil	5%	8hr
T ₁₀	Jeevamrutha	3%	8hr
T ₁₁	Jeevamrutha	5%	8hr
T ₁₂	Jeevamrutha	7%	8hr

from source to sink, which ultimately improve the growth, yield and yield-attributing characteristics of Greengram. Considering the above facts, the present study was therefore undertaken to determine the

***Corresponding author:** Koppera Samatha, M.Sc. Scholar, Department of Seed Science and Technology, Naini Agriculture Institute, SHUATS, Prayagraj, Uttar Pradesh, India, E-mail: samathakoppera0702@gmail.com

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effect of Pre-sowing seed treatments of Panchagavya, Beejamrutha, Jeevamrutha and Neemoil on plant growth, yield and yield attributing traits of Greengram (*Vigna radiata L.*) var.PDM-139 Samrat.

Material and Methods

A field experiment was conducted during *Kharif* season (2021-22) at Central Research Farm, Department of Genetics and Plant Breeding, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology & Sciences, Prayagraj, Uttar Pradesh. It is in South-East part of UP and with both the extremes in temperature i.e., the summer and the winter. The region has a sub-tropical climate and is situated 78 meters above the sea level. The soil of experimental plot was sandy loam in texture, with moderate water holding capacity having (pH 7.0 to 8.0), available N (125 kg/ha), available P (75 kg/ha) and available K (62.5 kg/ha). The present experiment was laid out in Randomised Block Design with 3 replications involving 13 treatment combinations consisting of control (Tables 2).

The experimental material consist of PDM-139 Samrat variety of Greengram seeds with pre sowing seed treatments comprising three doses of (T₁, T₂, T₃ Panchagavya - @ 3% 5% and 7%), (T₄, T₅, T₆ Beejamrutha @ 1%, 3% and 5%), (T₇, T₈, T₉ Neem oil @1% 3% and 5%) and (T₁₀, T₁₁ and T₁₂ Jeevamrutha 3%, 5% and 7%) as pre sowing seed treatments for Greengram (*Vigna radiata L.*)var.PDM-139 Samrat. These treatments was prepared from their respective ingredients shown below.

Preparation of Panchagavya

It was prepared from five cow products namely cow milk (5L), cow ghee (2L), curd (2Kg), cow urine (5L), cow dung (5Kg) these ingredients were mixed together along with 15 kilograms of jaggery in a circular container. The mixture was added with 15 liters of water and kept search for 30 days. Fermentation took place by making the mixture to a fine concentrate giving out the sweet order the fermented liquid was filtered through cotton and the final volume of filtrate was made 1000ml. The solution was stored in refrigerator and 7% (7ml in 100ml of water) solution was used for treatments. Vallimayil and Sekar (2012) reported to Panchagavya is an organic product blended from five different cowproducts, commonly applied to crop plants in organic farming. It is used as foliar spray, soil application and seed treatment.

Preparation of Beejamrutha

It was prepared using cow dung cow urine water and lime. Cow

dung 5 kilograms tied in a cloth was dipped in a bucket containing 50 liters of water overnight. To the resultant liquid 5 liters of cow urine, a handful of soil and 50 grams of calcium chloride was added to make the final product. Collect seeds to be treated in a cotton cloth. Stir the solution once again clockwise before using for seed treatment. Dip the bundle of seeds in Beejamrutha solution and place there up to it gets completely soaked in solution. After that remove the bundle of seeds and dry in shady area avoid direct sunlight and rainfall over it (Tables 3).

Preparation of Jeevamrutha

It was prepared by mixing 10 kilograms of cow dung 10 litre of cow urine 2 kilograms of local jaggery 2 kilograms of pigeonpea floor and handful of soil collected from farm. All these were put in 200 litre capacity plastic drum and mix thoroughly and volume was made up to 200 liters. The mixture was stirred well in clockwise direction and kept in shade covered with wet jute bag. The solution was regularly stirred clockwise in the morning in the afternoon and in the evening continuously for 10 days and it was used for soil application. The resultant solution was applied when the soil was wet near the root zone of the crop as per the treatment [6].

Preparation of Neem oil

The oil can be obtained through pressing or crushing of the seed kernel both through cold pressing and through a process incorporating temperature controls 40 degrees to 45 degrees Celsius. Neem seed oil can be obtained by solvent extraction of the name seed fruit oil cake or kernel.

After this Greengram seeds were be soaked in required solution for 8 hours. Untreated seeds are called as control. After 8 to 12 hours of soaking the solution was drained out from the beaker and pre-soaked was air dried to original weight and then the greengram seeds were sown on 16th July 2021 at 30 cm row to row spacing and 10 cm plant to plant spacing. The all other agronomic practices were adopted as per need of the crop.

Results and Discussion

Growth attributes

Rate of field emergence shows highest in the Treatment 12 (24.33) with seeds that are treated with jeevamrutha @ 7% and lowest numbers are recorded in control (14.66). The treatment with statistically at par is T2 treated with Panchagavya @ 5% (21.54).

Table 2: Pre-sowing seed treatment of Panchagavya, Jeevamruth, Bheeamruth, Neem oil and Fermented buttermilk on growth attributes of greengram.

S.no	Treatments	Number of pods per plant	Number of seeds per pod	seed yield per plant	seed yield per plot	seed yield per hectare	Seed index	Biological yield/plot	Biological yield kg/ha	Harvest index
1	T0	9.33	3.86	2.96	60.0	600.0	2.09	219.4	2194.0	26.66
2	T1	14.16	5.0	3.16	64.33	643.33	2.53	218.9	2189.66	28.66
3	T2	17.80	7.80	3.83	77.36	776.66	2.83	241.6	2416.66	31.66
4	T3	14.26	5.26	3.43	69.0	690.00	2.60	237.5	2375.66	29.0
5	T4	14.0	5.06	3.36	70.0	700.0	2.56	234.7	2347.66	29.66
6	T5	14.20	5.20	3.40	69.16	688.33	2.36	231.5	2315.66	29.33
7	T6	14.33	5.40	3.46	69.83	691.66	2.46	229.1	2291.33	30.0
8	T7	13.60	5.86	3.26	70.16	711.66	2.33	233.5	2335.33	28.0
9	T8	13.66	5.66	3.13	65.66	656.66	2.50	231.8	2318.66	27.66
10	T9	16.20	6.80	3.66	72.33	723.33	2.66	239.3	2393.66	30.66
11	T10	13.46	6.0	3.33	68.23	689.0	2.43	217.6	2176.66	31.33
12	T11	14.46	5.93	3.30	66.66	666.66	2.40	227.9	2279.66	28.33
13	T12	19.53	9.73	4.10	82.33	823.33	3.06	251.4	2541.66	32.0
Grand Mean		14.537	5.943	3.413	69.619	696.970	2.54	231.8	2321.25	29.45

Table 3: Pre-sowing seed treatment of Panchagavya, Jeevamruth, Bheejamruth, Neem oil and Fermented buttermilk on yield and yield attributes of greengram.

S.No	Treatments	Field emergence @4 days	Field emergence @7 days	Field emergence @10 days	Days to 50% flowering	Days to maturity	Plant height @20 days	Plant height @ 40 days	Plant height @60 days	Number of branches per plant
1	T0	14.667	33.333	82.00	40.333	55.333	8.72	17.33	40.63	5.60
2	T1	19.667	41.333	85.00	36.333	43.00	10.03	19.60	46.20	6.73
3	T2	22.333	49.333	87.667	32.333	46.667	13.10	21.76	48.36	9.53
4	T3	19.00	44.333	86.333	34.667	48.333	11.10	19.26	44.90	6.46
5	T4	15.667	39.333	84.333	34.333	48.667	10.83	18.76	44.33	7.20
6	T5	16.333	40.667	83.667	34.667	49.667	10.43	18.43	43.43	6.53
7	T6	17.00	41.667	84.00	34.333	49.00	11.13	20.0	43.20	7.40
8	T7	17.333	42.00	83.00	35.00	49.00	11.03	19.73	41.80	7.26
9	T8	18.00	44.00	85.333	36.00	50.667	10.36	20.23	43.80	6.70
10	T9	21.00	46.667	86.667	33.333	47.333	12.13	20.73	46.90	8.0
11	T10	18.333	43.667	84.667	34.567	49.333	10.04	18.16	42.13	6.60
12	T11	18.667	44.667	86.00	34.667	51.00	9.73	19.33	41.40	6.66
13	T12	24.333	54.00	90.333	32.333	45.333	14.10	24.26	50.90	10.60
Grand Mean		18.641	43.461	85.307	34.837	43.717	10.979	18.480	47.723	6.820

Plant Height shows highest in the Treatment 12 (50.90) with seeds that are treated with jeevamrutha @ 7% and lowest numbers are recorded in control (40.63). The treatment with statistically at par is T2 treated with panchagavya @ 5% (48.36). [7] also observed higher plant height (191.78 cm), green cob yield (16.15 t ha⁻¹) and fodder yield (20.07 t ha⁻¹) of sweet corn with the application of jeevamrutha @ 600 L ha⁻¹ three times through irrigation water.

Days to 50% Flowering shows least days in the Treatment 12 (32.33) with seeds that are treated with jeevamrutha @ 7% and highest numbers are recorded in control (40.33). The treatment with statistically at par is T2 treated with panchagavya @ 5% (32.33) [8].

Number of Primary branches shows highest in the Treatment 12 (8.73) with seeds that are treated with jeevamrutha @ 7% and lowest numbers are recorded in control (4.16). The treatment with statistically at par is T2 treated with panchagavya @ 5% (8.16).

Days to Maturity shows least days in the Treatment 12 (45.33) with seeds that are treated with jeevamrutha @ 7% and highest numbers are recorded in control (55.33). The treatment with statistically at par is T2 treated with panchagavya @ 5% (46.66).

Yield attributes

Number of pods per plant shows highest in the Treatment 12 (19.53) with seeds that are treated with jeevamrutha @ 7% and lowest numbers are recorded in control (9.33). The treatment with statistically at par is T2 treated with panchagavya @ 5% (17.80) [9].

Number of seeds per pod shows highest in the Treatment 12 (9.73) with seeds that are treated with jeevamrutha @ 7% and lowest numbers are recorded in control (3.86). The treatment with statistically at par is T2 treated with panchagavya @ 5% (7.80).

Seed yield per plant (g) shows highest in the Treatment 12 (4.10) with seeds that are treated with jeevamrutha @ 7% and lowest numbers are recorded in control (2.96). The treatment with statistically at par is T11 treated with panchagavya @ 5% (3.83).

Seed yield per plot (g/m²) shows highest in the Treatment 12 (70.40) with seeds that are treated with jeevamrutha @ 7% and lowest numbers are recorded in control (51.03). The treatment with statistically at par is T3 treated with panchagavya @ 5% (68.20). [10] revealed that application of panchagavya along with jeevamrutha+mulching +IFS compost + vermicompost gave higher plant height (183.11 cm), leaf

area, biological yield and total number of tillers at harvest (2.73), grain yield (1842kg/ha) and harvest index (0.21) in Foxtail [11].

Seed yield per hectare (kg/ha) shows highest in the Treatment 12 (823.3) with seeds that are treated with jeevamrutha @ 7% and lowest numbers are recorded in control (600). The treatment with statistically at par is T2 treated with panchagavya @ 5% (776.6).

Biological yield shows highest in the Treatment 12 (2541kg/ha) with seeds that are treated with jeevamrutha @ 7% and lowest numbers are recorded in control (2194kg/ha). The treatment with statistically at par is T2 treated with panchagavya @ 5% (2416kg/ha).

Harvest Index shows highest in the Treatment 12 (32) with seeds that are treated with jeevamrutha @ 7% and lowest numbers are recorded in control (26.66). The treatment with statistically at par is T2 treated with panchagavya @ 5% (31.66) [12].

Conclusion

It is concluded that the Greengram seeds treated with Jeevamrutha @ 7% was found to be more desirable for producing significantly higher seed yield per plant (4.10 g), seed yield per plot (82.33 g). Findings are based on research done in one season in Prayagraj (Allahabad) U.P. further trails may be required for considering it for the recommendation.

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