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Standardization of Selected Seed Treatments with Organics and Neem Leaf Extract on Growth, Yield and Yield Attributing Traits of Green Gram (*Vigna radiata* L.) Var. (SAMRAT)

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ABSTRACT

In recent years usage of chemical fertilizers and other inorganic inputs are used to enhance the production of the crops. The 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 study was designed to see the response of panchagavya, Neem leaf extract, Vermiwash and Beejamrutha with different intensity and time duration on green gram. The trail was conducted on the variety SAMRAT and treated by using Panchagavya (1%, 3% and 5%) for 8 hrs, Neem leaf extract (1%, 3%, 5%) for 10 hrs, vermiwash (1%, 3%, 5%) for 8 hrs and Beejamrutha (1%, 3%, 5%) for 10 hrs. Field observations like plant height (61.2), number of branches (10.00), and matured early (65.00) with number of pods per plant (21.00), number of seeds per pod (11.00), pod length (9.4), seed yield per plant (4.62 g), seed yield per plot (138.60), biological yield (972.15 g), seed index (4.78) was recorded higher in the treatment (T_3) Panchagavya – 5% for 8 hrs followed by T_2 – Panchagavya (3%).

Keywords Green gram, Panchagavya, Neem leaf extract, Vermiwash, Beejamrutha.

INTRODUCTION

Legumes are the most important crops in our country and the main source of vegetable protein. The main protein component of the Indian diet comes from legumes, which are easily digestible, inexpensive and of high biological value. It is grown in semi-arid regions and is also known as mung bean. It is native to the Indo-Burma region and regions of Southeast Asia. It is drought tolerant and can be grown in a wide variety of soils and climates. The major states in India that grow green gram are Andhra Pradesh, Madhya Pradesh, Uttar Pradesh, Rajasthan, Bihar, Gujarat and Orissa. In India, it is cultivated on an area of about 300 million hectares. However, his per capita consumption of legumes in 2013-2014 was 43.3 g/day and 47.2 g/day, respectively. Shukla and Mishra (2020) green gram contains approximately 24.3% protein and is an excellent source of riboflavin and thiamine. It is an excellent cover crop and erosion resistant cover crop. Harvesting also improves soil fertility through

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the symbiotic fixation of atmospheric nitrogen and grains. The grain is mainly used as dal or to make flour. However, at this time the actual consumption is much lower, around 30-35 g.

Legumes play an important role in Indian agriculture as they restore soil fertility by fixing atmospheric nitrogen through their tubers. These excellent qualities make legumes a low water crop, and the deep root system and good soil cover prevent soil erosion. Legumes have been called "nature's wonders". Legumes are like mini fertilizer factories because they fix atmospheric nitrogen through symbiotic nitrogen fixation. Legumes are cheaper than meat. In developing countries like India, it is often referred to as "poor man's meat". Legumes are an integral part of farming systems for farmers across the country as they fit well into crop rotations and fruit mixes part. Legumes are an integral part of farming systems for farmers across the country as they fit well into crop rotations and fruit mixes a portion. A green gram contains about 25% protein, which is about two-thirds as much as soybeans, twice as much as wheat and three times as much as rice.

Objectives

Hence, present study was undertaken to assess the effect of panchagavya, Neem leaf extract, Vermiwash and Beejamrutha on growth, yield and yield attributing traits of green gram.

MATERIALS AND METHODS

Variety details : Resistance to MYMV (Yellow mosaic virus), shining green seeds, Synchronous maturity, matures in 55-60 days, suitable for summer and spring seasons in uttar pradesh, average yield 10-15 q/ha.

The present research on Pre-sowing seed treatments of selected organic on growth, yield and yield attributing traits in green gram variety-SAMRAT (PDM - 139) was made to identify the effect of seed priming of different kinds on seed quality parameters of green gram and to find out suitable seed priming method for green 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 – 1%, 3%, 5%), (T_4, T_5, T_6, – Neem leaf extract - 1%, 3%, 5%), (T_7, T_8, T_9 –Vermiwash - 1%, 3%, 5%), (T_{10}, T_{11}, T_{12} – Beejamrutha – 1%, 3%, 5%) respectively. The green 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.

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 with 15 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 odor. 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 nutrients, hormones which promote plant growth 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 eco-friendly organic liquid fertilizer which could be used as a foliar spray on many different crops.

Neem leaf extract

For 5 liters of water, 1 kg of green neem leaf is required. Since the quantity of leaves required for preparation of this extract is quite high (nearly 80 kg are required for1 hectare). The leaves are soaked over-

Table 1. Influence of Panchagavya, Neem leaf extract, Vermiwash, Beejamrutha on plant height, number of branches, Days to maturity.

Treatment	Plant height	Number of branches	Days to maturity
T_0 – Control	50.00	7	71
T_1	57.00	8	67
T_2	59.00	10	65
T_3	61.20	10	65
T_4	56.40	8	68
T_5	57.20	8	67
T_6	58.40	9	66
T_7	52.10	7	70
T_8	54.00	7	69
T_9	54.30	7	68
T_{10}	53.20	6	69
T_{11}	54.30	7.00	68.00
T_{12}	56.10	7.00	68.00
SEm(±)	0.83	0.13	0.84
CD (P=0.05)	2.43	0.38	2.46

Table 2. Influence of Panchagavya, Neem leaf extract, Vermiwash, Beejamrutha on number of pods per plant, number of seeds per pod, pod length.

Treatment	Number of pods per plant	Number of seeds per plant	Pod length
T_0 – Control	11	6.00	7.2
T_1	17	8.00	9.0
T_2	19	10.00	9.4
T_3	21	11.00	9.4
T_4	16	8.00	9.0
T_5	18	9.07	9.2
T_6	18	10.00	9.3
T_7	11	6.00	7.5
T_8	14	7.00	7.7
T_9	15	7.00	8.1
T_{10}	13	7.00	7.7
T_{11}	15.00	8.00	8.3
T_{12}	16.00	8.00	8.7
SEm (±)	0.29	0.12	0.14
CD (P=0.05)	0.87	0.37	0.42

night in water. The next day the leaves are grounded and the extract is filtered. The extract is beneficial against leaf eating caterpillars, grubs, locusts and grasshoppers. To the extract, emulsifier is added as mentioned in kernel extract. It reduces insect feeding and acts as a repellent. It also interferes with insect hormone systems, making it harder for insects to grow and lay eggs. Azadirachtin can also repel and reduce the feeding of nematodes. Other components of neem oil kill insects by hindering their ability to feed.

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 Jeevamrutha: Take 20 liters of water, 5 kg of local cow dung, 5 liters 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 liters water up to 12 hrs. • Take one-liter water and add 50g 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 litres 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 60 DAS was exhibited by treatment T_0 [control] (50.00), while maximum plant height at 60DAS was recorded in treatment T_3 – Panchagavya – 5% - (61.20 cm) followed by T_2 – Panchagavya – 3% (59.00) was statistically at par with Treatment (T_3) in (Table 1).

Number of branches **:** Minimum number of branches was exhibited by treatment T_0 [control] (7.00), while maximum number of branches was recorded in treatment T_3 – Panchagavya – 5% - (10.00) followed by T_2 – Panchagavya – 3% (10.00) was significantly higher than other significant treatments in (Table 1).

Days to maturity **:** Minimum days to maturity was exhibited by treatment T_3 – Panchagavya – 5% - (65.00), while maximum days to maturity was recorded in treatment T_0 [control] (71.00) followed by T_7 – Ver-

Table 3. Influence of Panchagavya, Neem leaf extract, Vermiwash, Beejamrutha on seed yield per plant, biological yield, Seed index, Harvest index, B:C ratio.

Treatment	Seed yield per plant	Biological yield	Seed index	Harvest index	B:C ratio
T_0 – Control	3.2	880.5	3.35	10.90	1.49
T_1	4	955.2	4.13	12.57	1.92
T_2	4.36	970.24	4.65	13.48	2.10
T_3	4.62	972.15	4.78	14.26	2.23
T_4	3.72	950.51	3.97	11.75	1.77
T_5	4.05	959.3	4.13	12.67	1.92
T_6	4.21	962.36	4.62	13.13	1.99
T_7	3.22	927.2	3.35	10.42	1.53
T_8	3.36	935.22	3.41	10.79	1.60
T_9	3.45	937.6	3.58	11.04	1.65
T_{10}	3.32	930	3.41	10.72	1.56
T_{11}	3.45	943.12	3.86	10.98	1.63
T_{12}	3.47	947.20	3.97	11.00	1.65
SEm (±)	0.05	13.96	0.04	0.35	
CD (P= 0.05)	0.14	40.76	0.13	1.03	

miwash – 1% (70.00) was significantly higher than other significant treatments in (Table 1).

Post - harvest

Number of pods per plant and seeds per pod **:** Maximum number of pods per plant (21.00) and seeds per pod (11.00) was recorded in treatment T_3 – Panchagavya – 5% in (Table 2).

Pod length **:** Maximum pod length was recorded in treatment T_3 – Panchagavya – 5% - (9.4) followed by T_2 – Panchagavya – 3% (9.4) in (Table 2).

Seed yield per plant **:** Minimum seed yield per plant was exhibited by treatment T_0 [control] (3.2 g), while maximum seed yield per plant was recorded in treatment T_3 –Panchagavya – 5% - (4.62 g) followed by T_2 – Panchagavya – 3% (4.36 g) was statistically at par with treatment (T_3) in (Table 3).

Biological yield per plot **:** Minimum biological yield per plot was exhibited by treatment T_0 [control] (880.5 g), while maximum biological yield per plot was recorded in treatment T_3 – Panchagavya – 5% - (972.15 g) followed by T_2 – Panchagavya – 3% (970.24 g) was significantly higher than other significant treatments in (Table 3).

Seed index **:** Minimum seed index was exhibited by treatment T_0 [control] (3.35 g), while maximum seed index was recorded in treatment T_3 – Panchagavya – 5% - (4.78 g) followed by T_2 – Panchagavya – 3% (4.65 g) was significantly higher than other significant treatments in (Table 3).

Harvest index **:** Minimum harvest index was exhibited by treatment T_0 [control] (10.90), while maximum harvest index was recorded in treatment T_3 – Panchagavya – 5% - (14.26) followed by T_2 – Panchagavya – 3% (13.48) was significantly higher than other significant treatments in (Table 3).

The increase in the above growth parameters was attributed to the activation of auxiliary bud cell division and cell elongation by the auxin present in Panchagavya (Vijayan and Krishnasamy 2014), which had a stimulatory effect on increased branch number and other growth characteristics. Application of Panchagavya induced endogenous synthesis of native auxin, resulting in early vigorous plant growth (Prabhu *et al.* 2010). Saritha *et al.* (2013) reported that panchagavya possesses almost all essential nutrients, micronutrients and growth hormones,improves plant metabolic activity and supports better seed rejuvenation. The levels of IAA and GA_3 present in Panchagavya may generate stimuli in plant systems and increase the production of growth regulators in cell lines, and the action of growth regulators in plant systems may affect plant needs. Stimulates healthy growth and development. Panchagavya is also sought to improve crop establishment and health (Shakuntala *et al.* 2012).

CONCLUSION

It is concluded from the present study that the seeds of green gram (*Vigna radiata* L.) Var. (SAMRAT) were treated with Panchagavya – 5% (T_3) showed significant increase in seed yield per plant (4.62 g), with B:C Ratio (2.23). 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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REFERENCES

Gomiero T, Paoletti MG, Pimentel D (2008) Energy and environmental issues in organic and conventional agriculture. *Critical Rev Pl Sci* 27 : 239 —254.

Leifeld J, Fuhrer J (2010) Organic farming and soil carbon sequestration : What do we really know about the benefits. *J Ambiol* 39 (8) : 585—599.

Saritha M, Vijayakumari, Hiranmai YR, Kandari LS (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 NM, Vasudevan SN, Patil, Doddagoudar, Macha R CMSI, Vijayakumar AG (2012) Organic biopriming on seed vigor inducing enzyme in paddy- An alternative to inorganics. *Ecoscan* 1 : 251—257.

Shukla UN, Mishra ML (2020) Present scenario, bottlenecks and expansion of pulse production in India : A review. *Legume Res* 43 (4) : 461—469.

Vijayan R, 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.