Original Research Article

Study the efficacy of organic manures on varieties of Greengram (*Vigna radiata* L.)

Abstract:

The field experiment was entitled "Study the efficacy of organic manures on varieties of greengram (*Vigna radiata* L.) conducted during Kharif 2021.SMOF (SHIATS Model Organic Farm), Department of Agronomy, SHUATS, Prayagraj (U.P). The treatment consisted of organic manures (5 t/ha Farm Yard manure, Panchagavya 3%, Jeevamrutha 5%, panchagavya 5%, vermiwash 3%) and varieties (PDM- 139 (Samrat), SML- 668, K-851). The experiment was laid out in Randomized Block Design, nine treatments replicated thrice. The result showed that *viz*: Plant height (59.80 cm), number of branches per plant (6.14), number of root nodules per plant (13.42), and dry weight (13.90 g/plant) and crop growth rate at 60 DAS-at harvest interval (3.04 g/m^2/day) was recorded significantly higher with application of Panchagavya 5% + Vermiwash 3% + 5 t/ha FYM + Samrat. Number of pods per plant (44.74), seed yield (883.82 kg/ha) and stalk yield (2156.73 kg/ha) is recorded significantly higher with the application of Panchagavya 5% + Vermiwash 3% + 5 t/ha FYM + Samrat.

Key words: Panchgavya, Jeevamrutha, Farm yard manure.

Introduction

India has the largest demand and market for the pulses. Although it has great potential to produce the pulses, but the negligible attention and poor frame working of policy could be the reason for the lower productivity of pulses. Modern agricultural farming practices, along with irrational use of chemical inputs over the past 4 decades have resulted in not only the loss of natural habitat balance and soil health but have also caused many hazards like soil erosion, decreased ground water level, soil salinization and desertification, pollution due to fertilizers and pesticides, genetic erosion, ill-effects on environment, reduced food quality and increased the cost of cultivation, rendering the farmer poorer year by year (Suresh Reddy, 2010). Realizing the importance of clean food by the people, demand for organic products, especially in developed countries has been increasing day by day. India has potential to produce range of organic products owing to its agro-climatic variability. In several parts of the country, the inherited tradition of organic farming is an added advantage. This holds promise for the organic producers to tap the market which is growing steadily in the domestic market related to the export market. Pulses are grown especially in rainfed areas with very low use of inorganic nutrients resulting in low productivity in the country. Low application rate of inorganic inputs provides the opportunity for the use of bulky organic manures to grow pulses in the country which will not only increase the yield but also improve the soil health. The scope for exploiting direct and residual soil fertility owing to legumes obviously has great potential. Nitrogen substitution with the available resources especially farmyard manure, vermicompost and suitable strains of bio-fertilizers is required for economical and sustained production (Singh *et al*., 2015). Several researches showed that foliar spray of panchagavya @ 3% enhanced the growth rate of plant since it contains the favourable micro- and macro-nutrients and growth hormones. The enzyme present in panchagavya favoured rapid cell-division and multiplication resulting in enhanced growth pattern of plants. Kumaravelu and Kadambian (2009) reported that panchagavya spray (3%) at 10 days after sowing (DAS) significantly increased the growth of greengram plants, resulting in higher grain yield. A wide variation was observed that lateral roots, number of nodules, fresh and dry mass of the plants increased significantly at 3% and 4% treatment. Keeping those points in view a research trail has under taken to assess the efficacy of organic manures on varieties of Greengram.

Materials and Methods

The experiment was conducted during the *kharif* 2021, SMOF (SHIATS Model Organic Farm), Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj (U.P.) The soil of the experimental field constituting a part of central Gangetic alluvium is neutral and deep. The soil of the experimental plot was sandy loam in texture, low in available nitrogen, medium in available phosphorus and high in available potash with 7.3 soil pH. The treatments consist of three levels of bulky and liquid organic manures with combination of three varieties. The experiment was laid out in randomized block design with nine treatments each replicated thrice. T_1: Water spray + 5 t/ha FYM + Samrat, T_2: Panchagavya 3% + Jeevamrutha 5% (30 DAS) + 5 t/ha FYM + Samrat, T_3: Panchagavya 5% + Vermiwash 3% (30 DAS) + 5 t/ha FYM + Samrat, T_4: Water spray + 5 t/ha FYM + SML – 668, T_5: Panchagavya 3% + Jeevamrutha 5% (30 DAS) + 5 t/ha FYM + SML – 668, T_6: Panchagavya 5% + Vermiwash 3% (30 DAS) + 5 t/ha FYM + SML – 668, T_7: Water spray + 5 t/ha FYM + K – 851, T_8: Panchagavya 3% + Jeevamrutha 5% (30 DAS) + 5 t/ha FYM + K – 851, T_9: Panchagavya 5% + Vermiwash 3% (30 DAS) + 5 t/ha FYM + K – 851. All agronomic practices are followed in order in the crop period. Mean data was analysed statistically, using analysis of variation (ANOVA) as described as by Gomez (1984).

Results and Discussion:

Growth parameters:

The experimental data (Table 1) revealed that growth and yield parameters of Greengram were significantly influenced by the treatments. Plant height (Table 1) at significantly higher plant height was observed in treatment with the application of Panchagavya 5% + Vermiwash 3% + 5 t/ha FYM + Samrat (59.80 cm) which is statistically at par to Panchagavya 3% + Jeevamrutha 5% + 5 t/ha FYM + Samrat (59.10 cm) and Panchagavya 5% + Vermiwash 3% + 5 t/ha FYM + K – 851 (58.50 cm). Panchagavya increased synthesis of growth promoting substances which is turn helped in increased growth attributes reported by Choudary *et al.* (2017). Significantly higher number of branches per plant is recorded with application of Panchagavya 5% + Vermiwash 3% + 5 t/ha FYM + Samrat (6.14), which is statistically at par with Panchagavya 3% + Jeevamrutha 5% + 5 t/ha FYM + Samrat (6.05). At harvest the significantly higher number of root nodules per plant is observed in Panchagavya 5% + Vermiwash 3% + 5 t/ha FYM + Samrat (13.42) which is statistically at par with the application of Panchagavya 3% + Jeevamrutha 5% + 5 t/ha FYM + Samrat (13.07). significantly higher dry weight was observed in Panchagavya 5% + Vermiwash 3% + 5 t/ha FYM + Samrat (13.90 g/plant) and which is superior over all other treatments. At 60 DAS – at harvest interval the significantly higher crop growth rate was observed in Panchagavya 5% + Vermiwash 3% + 5 t/ha FYM + Samrat (3.04 g/m^2/day). In crop growth rate 60 DAS-at harvest interval there is no significant difference among the treatments. By application of soil organic amendments might be due to higher availability of nutrients to plants, besides increased water holding capacity and other physical properties which might have caused increased rate of infiltration and this might be also due to formation of more root nodules, vigorous root development, better nitrogen fixation (Shete *et al.*, 2010) and better development of plant growth leading to higher photosynthetic activity and translocation of photosynthates to the sink which in turn resulted in better development of yield attributes and finally higher seed yield (Ravi kumar *et al.*, 2012).

Yield parameters:

The pertaining data (Table 2) revealed that significantly higher number of pods per plant was obtained in Panchagavya 5% + vermiwash 3% + 5 t/ha FYM + Samrat (44.74). Which was statistically at par

with the application of Panchagavya 3% + Jeevamrutha 5% + 5 t/ha FYM + Samrat (44.65). Significantly higher number of seeds per pod was obtained in Panchagavya 5% + vermiwash 3% + 5 t/ha FYM + Samrat (10.26) there is no significant difference among the treatments. Significantly higher test weight was obtained in Panchagavya 5% + Vermiwash 3% (30 DAS) + 5 t/ha FYM + SML – 668 (37.63) there is no significant difference among the treatments. Significantly higher seed yield was observed in Panchagavya 5% + Vermiwash 3% + 5 t/ha FYM + Samrat (883.82 kg/ha). Which was statistically at par with Panchagavya 3% + Jeevamrutha 5% + 5 t/ha FYM + Samrat (877.19 kg/ha), Water spray + 5 t/ha FYM + K – 851 (871.39 kg/ha), Panchagavya 3% + Jeevamrutha 5% + 5 t/ha FYM + K – 851 (878.29 kg/ha) and Panchagavya 5% + Vermiwash 3% + 5 t/ha FYM + K – 851 (879.74 kg/ha). The significantly higher stalk yield was observed in Panchagavya 5% + Vermiwash 3% + 5 t/ha FYM + Samrat (2156.73 kg/ha). Which was statistically at par with the application of Panchagavya 3% + Jeevamrutha 5% + 5 t/ha FYM + Samrat (2140.69 kg/ha) and Panchagavya 5% + Vermiwash 3% + 5 t/ha FYM + SML – 668 (2132.15 kg/ha). The significantly higher stalk yield was observed in Panchagavya 3% + Jeevamrutha 5% + 5 t/ha FYM + K-851 (31.02 %) there is no significant difference among the treatments. This might be attributed due to organic manures act as nutrient reservoir and upon decomposition produces organic acids, thereby absorbed ions are released slowly during entire growth period leading to higher seed yield and yield components (Maheshbabu *et al.,* 2008). The above findings are agreement with Mohbe *et al.* (2018). Panchagavya application not only increase the vegetative growth of the plant but it also triggers early flowering, pod formation and uniform grain filling, which leads to get higher grain yield. The positive effect of panchagavya on growth and productivity of crops has been reviewed and documented by Swaminathan *et al.* (2007). The higher yield attributes characters of plant might be associated with more availability of nutrients under these treatments which resulted in greater translocation of photosynthates from source to sink site. Beneficial effect of organic manures on yield attributes were also observed by Tripathi *et al.* (2014) and Alagappan and Venkitaswamy (2015).

Table 1. Influence of organic manures and varieties on growth attributes of greengram.

Treatment	Plant height (cm) at harvest	Number of branches/plant at harvest	Root nodules at harvest	Dry weight (g/plant) at harvest	CGR (g/m^2/day) 60 DAS-at harvest
T_1	57.00	5.98	12.71	11.54	1.70
T_2	59.10	6.05	13.07	12.83	2.39
T_3	59.80	6.14	13.42	13.90	3.04
T_4	55.30	5.88	10.04	11.30	2.05
T_5	54.93	6.00	10.34	12.67	2.07
T_6	56.60	6.02	10.39	12.47	2.16
T_7	56.93	5.91	9.04	10.54	1.98
T_8	57.90	5.95	9.26	11.57	2.04
T_9	58.50	6.02	9.78	12.70	2.69
F test	**S**	**S**	**S**	**S**	**NS**
SEm (±)	**0.50**	**0.03**	**0.18**	**0.21**	**0.38**
CD (5%)	**1.50**	**0.09**	**0.55**	**0.62**	**-**

Table 2. Influence of organic manures and varieties on yield attributes of greengram.

Treatment	Number of pods/plant	Number of seeds/pod	Test weight (g)	Seed yield (kg/ha)	Stalk yield (kg/ha)	Harvest Index (%)

T_1	41.50	10.01	37.13	848.23	2046.91	29.62
T_2	44.65	10.06	37.25	877.19	2140.69	29.06
T_3	44.74	10.26	37.34	883.82	2156.73	29.06
T_4	37.42	10.03	37.25	835.74	2014.95	29.31
T_5	38.48	10.13	37.56	844.07	2067.01	28.99
T_6	39.58	10.03	37.63	853.45	2132.15	28.58
T_7	39.48	10.08	37.29	871.39	1969.42	30.75
T_8	41.02	10.18	37.49	878.29	1975.38	31.02
T_9	41.58	10.13	37.11	879.74	1983.02	30.69
F test	**S**	**NS**	**NS**	**S**	**S**	**NS**
SEm (±)	**0.39**	**0.19**	**0.89**	**4.78**	**13.74**	**1.54**
CD (5%)	**1.17**	**-**	**-**	**14.34**	**41.20**	**-**

Conclusion:

It is concluded that samrat variety with application of Panchagavya 5% + Vermiwash 3% + 5 t/ha FYM recorded significantly higher plant height, number of branches, root nodules, dry weight, crop growth rate, more number of pods per plant, seeds per pod, test weight, seed yield, stalk yield and harvest index. These findings are based on one season; therefore, further trails may be required for further confirmation.

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