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Response of panchagavya and phosphobacteria on the yield and economics of green gram *(Vigna radiata L.)*

K Wahab[1], N Indianraj[2*], Maria Graciya M[3], Mohana Sundari M[3], Mohanakrishnan V[3]
[1] Professor, Department of Agronomy, Thanthai Roever Institute of Agriculture and Rural Development, Perambalur, Tamil Nadu, India
[2] Assistant Professor, Department of Agronomy, Thanthai Roever Institute of Agriculture and Rural Development, Perambalur, Tamil Nadu, India
[3] Scholars, Department of Agronomy, Thanthai Roever Institute of Agriculture and Rural Development, Perambalur, Tamil Nadu, India

Abstract
Field Experiment was conducted during May – August, 2022 at Thanthai Roever Institute of Agriculture and Rural Development to study the Effect of Panchagavya and Phosphobacteria on the growth and yield of green gram**.** The experiment was laid out in Randomized Block Design with ten treatments replicated thrice. The growth and yield components of green gram *viz*.. plant height, leaf area index, dry matter production, length of the pod, number of pods plant^{-1}, number of seeds pod^{-1} and test weight were favourably influenced by Application of *Phosphobacteria* (seed and soil) + Two spray of Panchagavya as foliar. It was followed by Application of *Phosphobacteria* (seed and soil) + Two spray of Panchagavya as foliar. Application of *Phosphobacteria* (seed and soil) + Two spray of Panchagavya as foliar recorded the highest seed yield of 850 kg ha^{-1} as compared to other treatment. This treatment also gave the highest return per rupee invested of Rs.2.73 in green gram raised during May- August, 2022.

Keywords: green gram, panchagavya, phosphobacteria, growth, yield and economics

Introduction
Pulse crop plays an important role in Indian agriculture and India is the largest producer and consumer of pulses in the world. Pulses contain high percentage of quality protein nearly three times as much as cereals (Avasthe *et al*., 1999). Thus, they are the source to overcome protein malnutrition among human being. For vegetarian diet, pulses form the major source of protein. Green gram (*Vigna radiata L*.) is the one of the most important pulses of rain fed areas grown throughout the country. This crop is grown in different cropping systems as a mixed crop, catch crop and sequential crop in the country. Green gram seed contains 23.86 per cent protein, 62.62 per cent carbohydrates, 1.15 per cent fat and minerals combinations, amino acid and essential vitamins. It is used as nutritive fodder especially for milch cattle. It is also used as a green manure crop. The yield potential of green gram is very low because of the fact that the crop is mainly grown in rain fed condition with poor management practices and also due to the various physiological, biochemical as well as inherent factors associated with the crop. The productivity of green gram in our country is very low. Hence, there is a need for enhancement of the productivity of green gram by proper agronomic practices.

Materials and Methods
Field experiment was conducted at Thanthai Roever Institute of Agriculture and Rural Development, Perambalur, Tamil Nadu, during May to August 2022 to study the effect of foliar spray of organic and inorganic nutrients on the growth and yield of black gram. The Experimental farm is geographically situated at 11.8◦N latitude and an altitude of 150 m above mean sea level. The average rainfall of Perambalur is 908 mm per annum. The soil is clay loam with low in available nitrogen, medium in available phosphorous and high in available potassium Green gram variety CO 8 was chosen for the study. The experiment was laid out in Randomized Block Design with three replications. Five plants in each replication of individual treatments were selected at random labelled for recording biometric observations. The observations were recorded at 45 DAS and at harvest. The data on observations and characters studied were statistically analysed and whenever the results were found significant, the critical differences were arrived at 5 per cent ted to draw statistical conclusions.

Results and Discussion

Yield attributes and yield (Table 1)

The yield potential of green gram is determined by resultant value of yield components which are greatly influenced by the growth parameters. Among the treatments T 10 (application of Phosphobacteria – seed and soil + two spray of Panchagavya at foliar) significantly recorded the highest number of pods per plant (Fig 3). This might be due to the favorable effect of integrated use of Phosphobacteria and Panchagavya in enhancing the dry matter production of crop thereby contributing to higher number of pods per plant.

Vidya *et al* (2016) [3] concluded that the PSB treated greengram plants showed a slight increase in RWC during water stress period, significant difference was observed in shoot length and root length as compared to untreated plant.

Table 1: Effect of Panchagavya and Phosphobacteria on yield and yield attributes of Greengram

Treatments	Length of the pod (cm)	Number of pods plant^{-1}	Number of seeds pod^{-1}	Test weight (g)	Seed yield (kg ha $^{-1}$)	Haulm yield (kg ha $^{-1}$)
Control	6.05	20	5	5.21	490	810
Application of Phosphobacteria (seed and soil)	7.10	26	5.3	5.65	570	856
One spray of Panchagavya at soil	7.04	23	5.6	5.44	530	833
One spray of Panchagavya at foliar	7.12	27	6	5.77	610	890
One spray of Panchagavya at soil	7.31	31	8.3	6.01	730	960
Two sprays of Panchagavya at foliar	7.13	28	7	5.87	650	912
Application of Phosphobacteria (seed and soil) + One spray of Panchagavya at soil (T2+T3)	7.46	33	8.6	6.08	770	1031
Application of Phosphobacteria (seed and soil) + One spray of Panchagavya at foliar (T2+T4)	7.28	30	7.6	5.91	690	947
Application of Phosphobacteria (seed and soil) + two spray of Panchagavya at soil (T2+T5)	7.48	34	9	6.10	810	1042
Application of Phosphobacteria (seed and soil) + two spray of Panchagavya at foliar (T2+T6)	7.65	40	10.3	6.18	850	1276
SEd	0.38	1.51	0.37	0.423	34.74	49.7
CD (p=0.05)	0.80	3.19	0.78	0.92	73.00	104.60

Economics (Table 2)

The highest net return (Rs.24583.9) and return /rupee invested (2.73) was obtained under T10 (application of Phosphobacteria –seed and soil + two spray of Panchagavya at foliar). It was followed by T9 (application of Phosphobacteria – seed and soil + two spray of Panchagavya at soil). The least net return (Rs.9972) and return /rupee (1.06) was obtained under T1 (control). Bhavya *et al*. (2018) [2] stated that application of PSB 500g per ha of greengram seed reported the higher concentration of N, P and K in grain and haulm and their uptake by greengram.

Table 2: Effect of Panchagavya and Phosphobacteria on Economics of Greengram

Treatment details	Cost of cultivation (Rs./ha)	Gross return (Rs./ha)	Net return (Rs./ha)	BCR
Control	**10,030**	**20002**	**9972**	**1.06**
Application of Phosphobacteria (seed and soil)	10,543	25231	14688	2.39
One spray of Panchagavya at soil	10,987	22654	11667	2.06
One spray of Panchagavya at foliar	11,100	27123	16023	2.44
Two sprays of Panchagavya at soil	11,550	30180	18630	2.61
Two sprays of Panchagavya at foliar	11,740	30000	18260	2.56
Application of Phosphobacteria (seed and soil) + One spray of Panchagavya at soil (T2+T3)	11,990	31400	19410	2.62
Application of Phosphobacteria (seed and soil) + One spray of Panchagavya at foliar (T2+T4)	13,320	34500	21180	2.59
Application of Phosphobacteria (seed and soil) + two spray of Panchagavya at soil (T2+T5)	13,540	35567.87	22027.87	2.63
Application of Phosphobacteria (seed and soil) + two sprays of Panchagavya at foliar (T2+T6)	14,130	38713.90	24583.9	2.73

Conclusion

Based on the result of the experiment, it can be concluded that application of Phosphobacteria (seed and soil) + two spray of Panchagavya as foliar is found to be economical in green gram for realizing higher yield and benefit cost ratio of 2.73. This practice is economically viable, practically applicable and agronomically efficient technology which paves way for the realization of higher returns from green gram besides improvement in soil fertility. Next to this practice, application of Phosphobacteria (seed and soil) + two spray of Panchagavya as soil application recorded higher benefit cost ratio.

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