EFFECT OF *PANCHAGAVYA* ON GROWTH AND YIELD OF COWPEA (*Vigna unguiculata* (L.) WALP.)

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ABSTRACT

An experiment was conducted to study the effect of panchagavya on growth and yield of cowpea at Agronomy Instructional Farm, Chimanbhai Patel College of Agriculture, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar during summer 2011. The treatment T_6 (Foliar spray of Panchagavya 3 % at 20 & 40 DAS) found to be superior and recorded maximum dry matter accumulation, 38.73 g, 66.67 g and 92.00 g at 30 DAS, 60 DAS and at harvest in that order. Similarly, the foliar spray of Panchagavya 3 % at 20 & 40 DAS recorded highest number of branches (6.00), number of pod per plant (12.33), number of seeds per plant (11.33), pod length (11.89 cm) and root nodules per plant (18.33), 100 seed weight (8.30 g) and seed yield per plant (8.33 g). The highest seed yield (1509 kg/ha) and stover yield (2373 kg/ha) was also recorded under this treatment. Therefore, it was recommended for the cowpea growing farmers of Gujarat for getting maximum seed as well as stover yield that foliar spray of Panchagavya @ 3% should be followed two times, once at vegetative stage (20 DAS) and second at flowering stage (40 DAS) along with seed treatment of Rhizobium culture, as the positive effect of Panchagavya was noticed on growth and yield parameters in cowpea.

KEY WORDS: Cowpea, panchagavya,

INTRODUCTION

Among the different pulses, cowpea [*Vigna unguiculata* (L.) Walp.], is one of the most important pulse crop. Cowpea grain play an important role in Indian diet, as it contain about 23.14 per cent protein on dry weight basis, which is more than double than that of cereal. It also contains carbohydrates (56.8 %), fibre (3.90 %), ash (3.20 %) and fat (1.3 %). In Gujarat, it is cultivated in 2.09 lakh hectares with an annual production of 1.14 lakh metric tonnes leading to average productivity of 546 kg/ha (Anonymous, 2011).

Conventional agriculture has made an adverse impact on soil and plant health. This eventually, leads to high demand for organic farming to protect soil and plant health. In India, organic farming was well developed during the past such as 'Vedas' which has specified use of '*panchagavya*' in agriculture. In Sanskrit, *panchagavya* means the blend of five products obtained from cow namely dung, urine, milk, curd and ghee.

Presence of naturally occurring, beneficial, effective micro organisms (EMO's), in *panchagavya* predominantly, lactic acid bacteria, yeast, actinomycetes,

photosynthetic bacteria and certain fungi besides beneficial and proven fertilizers such as *Acetobacter, Azospirillum* and *Phosphobacterium* were detected which have the beneficial effect especially in improving soil quality, growth and yield of crops (Xu and Xu., 2000; Selvaraj *et al.*, 2007). *Panchagavya*, an organic product is a potential source to play great role for promoting growth and providing immunity in plant system. *Panchagavya* consists of cow based five products *viz*. cow dung, cow urine, cow milk, cow curd and cow ghee. Bio- chemical properties of *panchagavya* revealed that it possesses almost all the major nutrients like N P K and micro nutrients necessary for plant and growth hormones like IAA and GA required for crop growth (Selvaraj *et al.*, 2007). Role of foliar application or seed soaking of *panchagavya* in production of many plantation crops had been well documented in India (Selvaraj, 2003).

Very little research work has been reported on effect of *panchagavya* on growth and yield of crops especially on cowpea under North Gujarat condition. Considering the above facts in view, an experiment was planned to study the effect of *Panchagavya* on growth and yield of Cowpea [*Vigna unguiculata* (L.) Walp].

MATERIAL AND METHODS

An experiment was conducted to study the effect of *panchagavya* on growth and yield of cowpea at Agronomy Instructional Farm, Chimanbhai Patel College of Agriculture, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar during *summer* 2011. The experimentation field has even topography with a gentle slope and good drainage. The soil samples were collected randomly from experimental plots to a depth of 0-30 cm before lay out and composite soil sample was prepared and analyzed for physico-chemical properties of soil. The treatments details considered of all possible combinations of *panchagavya* application @ 3% and 6% with soil application and foliar spray are, T_1 = RDF, T_2 = Soil application of *Panchagavya* (6 %) at 20 DAS, T_3 = Soil application of *Panchagavya* (6 %) at 20 & 40 DAS, T_4 = Foliar spray of *Panchagavya* (3 %) at 20 DAS, T_5 = Foliar spray of *Panchagavya* (3 %) at 40 DAS, T_6 = Foliar spray of *Panchagavya* (3 %) at 20 & 40 DAS, T_7 = Foliar spray of *Panchagavya* (6 %) at 20 DAS, T_8 = Foliar spray of *Panchagavya* (6 %) at 40 DAS, T_9 = Foliar spray of *Panchagavya* (6 %) at 20 & 40 DAS, T_{10}= T_2 + T_5, and T_{11} = T_2 + T_8. The seed of cowpea variety GC 5 are inoculated with *Rhizobium* before sowing were used in all the treatments. The experiment was conducted following randomized block design replicated thrice. The sowing was done by keeping row to row distance of 45 cm and plant to plant of 5-10 cm. The observations were recorded on different growth attributing characters such as dry matter accumulation and number of branches per plant and also on yield (seed as well as stover yield) and yield attributing parameters such as number of pod per plant, number of seeds per plant, pod length, root nodules per plant, 100 seed weight and seed yield per plant.

RESULT AND DISCUSION

Effect on growth attributing characters

Dry matter accumulation was considerably influenced due to different treatments The treatment T_6 (Foliar spray of *Panchagavya* 3 % at 20 & 40 DAS) found to be superior and recorded maximum dry matter accumulation, 38.73 g, 66.67 g and 92.00 g at 30 DAS, 60 DAS and at harvest in that order (Table 1). The significant improvement in the accumulation of dry matter in plant and its distribution in different plant parts was attributed to increased supply of plant nutrients, specific weight of leaf chlorophyll synthesis, nitrogen metabolism and phytohormones with the application of *Panchagavya*. Apart from nutrient supply, *Panchagavya* is a proven biofertilizers, *viz.*,

Azospirillium, Azotobacter, Phosphobacter, Pseudomonas that play an important role in stimulation of plant growth by secreting IAA and GA. Sanjutha *et al.* (2008), Vennila and Jayanthi (2008), Kumawat *et al.* (2009), Avudaithai *et al.* (2010) and Kumar *et al.* (2011) reported the similar results.

Significant differences were observed in number of branches per plant due to application of *Panchagavya*. Among the treatments, T_6 (Foliar spray of *Panchagavya* 3 % at 20 & 40 DAS) showed its significant superiority registering highest number of branches (6.00) (Table 1). The increase in the number of branches per plant due to auxins, which is present in *Panchagavya* attributed to the activation of cell division and cell elongation in the auxiliary buds which had a promoting effect in increased number of branches. The application of *Panchagavya* would have induced the endogenous synthesis of native auxins resulting in an early active growth (Prabhu *et. al.*, 2010) in sacred basil (*Ocimum sanctum* L.).

Effect on yield attributing characters

Panchagavya application significantly increased the number of pod per plant, number of seeds per plant, pod length and root nodules per plant. Treatment T_6 (Foliar spray of *Panchagavya* 3 % at 20 & 40 DAS) accounted the highest number of pod per plant, number of seeds per plant, pod length and root nodules per plant with a value of 12.33, 11.33, 11.89 cm and 18.33, respectively (Table 1). The maximum 100 seed weight (8.30 g) and seed yield per plant (8.33 g) were noticed under T_6 (Foliar spray of *Panchagavya* 3 % at 20 & 40 DAS) and the lower 100 seed weight and seed yield per plant in treatment T_8 (Foliar spray of *Panchagavya* 6 % at 40 DAS). This was might be due to quantities of IAA and GA present in *Panchagavya* could created stimuli in the plant system and increased the production of growth regulator in cell system and the action of growth regulators in plant system stimulated the necessary growth and development of crop. The present findings were in line with those of Somasundaram *et al.* (2003), Avuduithai *et al.* (2010) Kumawat *et al.* (2009) and Kumar *et al.* (2011).

Crop yield is the complex function of physiological processes and biochemical activities, which modify plant anatomy and morphology of the growing plants. Seed and stover yield of cowpea was significantly influenced by different treatments of *Panchagavya* application, T_6 (Foliar spray of *Panchagavya* 3 % at 20 & 40 DAS) recorded the maximum seed yield (1509 kg/ha) and stover yield (2373 kg/ha) (Table 1). This might be due to favorable effect of *Panchagavya* on vegetative growth *viz.*, number of branches per plant and reproductive growth *viz.*, pods per plant, pod length, seeds per pod, test weight and seed yield per plant, which were the important yield attributes having significant positive correlation with seed & straw yield. These findings are in the line with those reported by Somasundaram *et al.* (2003), Somasundaram *et al.* (2007), Kumawat *et al.* (2009), Mudigoudra *et al.* (2009), Avudaithai *et al.* (2010), Manimekalai *et al.* (2010) and Kumawat *et al.*(2011).

CONCLUSION

In light of results obtained from present investigation, it is concluded that to achieve quantitative, qualitative, and sustainable production of cowpea GC.5, foliar spray of *Panchagavya* @ 3% should be followed two times (vegetative and flowering stage) along with seed treatment by *Rhizobium* culture.

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Table: 1 Effect of *panchagavya* application on growth, yield and yield attributing characters of cowpea crop.

Treatments	Dry Matter Accumulation			No. of Branches Per Plant	N0. of Pods Plant	No. of Seeds Per Pod	Pod Length (cm)	Root Nodules Per Plant	100 Seed Weight (g)	Seed Yield Per Plant (g)	Seed Yield (Kg/ha)	Stover Yield (Kg/ha)
	30 DAS	60 DAS	At Harvest									
T_1 = RDF	37.00	61.00	86.67	5.70	10.67	11.00	11.23	18.00	8.23	7.90	1395	2267
T_2 = Soil application of *Panchagavya* (6 %) at 20 DAS	32.33	54.67	76.33	3.50	7.67	8.33	10.22	13.00	7.30	7.30	1112	1913
T_3 = Soil application of *Panchagavya* (6 %) at 20 & 40 DAS	34.33	55.33	80.00	3.67	8.67	9.33	10.50	13.67	7.33	7.37	1181	2003
T_4 = Foliar spray of *Panchagavya* (3 %) at 20 DAS	34.67	59.17	84.33	4.63	9.33	10.17	10.83	14.67	8.13	7.73	1355	2237
T_5 = Foliar spray of *Panchagavya* (3 %) at 40 DAS	35.33	59.33	84.67	5.17	10.83	10.33	11.00	15.33	8.20	7.77	1377	2250
T_6 = Foliar spray of *Panchagavya* (3 %) at 20 & 40 DAS	38.73	66.67	92.00	6.00	12.33	11.33	11.89	18.33	8.30	8.33	1509	2373
T_7 = Foliar spray of *Panchagavya* (6 %) at 20 DAS	33.67	55.00	80.50	4.00	8.33	9.00	10.31	13.33	7.23	7.23	1121	1950
T_8 = Foliar spray of *Panchagavya* (6 %) at 40 DAS	30.33	52.17	75.47	3.33	7.33	7.50	9.05	12.83	7.03	6.47	1102	1903
T_9 = Foliar spray of *Panchagavya* (6 %) at 20 & 40 DAS	34.67	56.00	82.67	4.33	9.00	9.67	10.52	14.00	7.80	7.63	1216	2033
T_{10}= T_2 + T_5	35.67	59.67	85.33	5.33	10.00	10.33	11.22	17.67	8.17	7.87	1393	2257
T_{11} = T_2 + T_8	35.00	57.33	83.67	4.33	9.00	9.00	10.73	14.33	8.13	7.70	1275	2027
S.E.M. ±	1.43	2.54	2.90	0.29	0.76	0.58	0.46	0.61	0.30	0.31	71.98	86.36
C.D. at 5 %	4.21	7.49	8.55	0.86	2.24	1.70	1.34	1.80	0.88	0.92	212.35	254.77
C. V. %	7.13	7.60	6.05	11.14	14.05	10.35	7.39	7.02	6.60	7.17	9.77	7.09

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