

## Nutrient management with *panchgavya* in *kharif* clusterbean (*Cyamopsis tetragonoloba* L.)

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### ABSTRACT

A field was conducted at Agronomy Instructional Farm, S.D. Agricultural University, Sardarkrushinagar during *kharif* 2016 to study the Nutrient management with *panchgavya* in *kharif* clusterbean (*Cyamopsis tetragonoloba* L.). Two levels with FYM (0 and 5 tonnes/ha) and six fertilizers levels with *panchgavya* (50 %, 75 %, 100 % RDF with *panchgavya* spray @ 3 % and 6 % at branching + flowering RDF with 25:50:00 NPK kg/ha were compared. Application of 5 tonnes FYM/ha significantly increased plant height at harvest, number of branches/plant, number of pod/plant, length of pod, 1000 seed weight, seed yield and stover yield over the control, whereas number of seeds/pod remained unaffected. The higher value of all above parameters (except length of pod and number of seeds/pod) were recorded significantly with application of 100% FYM + *panchgavya* spray @ 3% at branching + flowering which ultimately reflected in higher seed yield (879 kg/ha) and stover yield (1699 kg/ha). However, it was remained at par with application of 100% RDF+ *panchgavya* spray @ 6% at branching + flowering. The higher net return and benefit: cost ratio can be achieved by fertilizing *kharif* clusterbean with the application of 5 tonnes FYM/ha along with 100 % RDF (25:50:00 NPK kg/ha) with *panchgavya* spray @ 3 % at branching and flowering stages.

**Key words:** Foliar application, Farm yard manure, Growth, Panchgavya

Clusterbean (*Cyamopsis tetragonoloba* L.) is popularly known as guar and has been recognized as one of the most important commercial crop of arid and semi arid regions. It is a good source of carbohydrates, protein, fiber and minerals like calcium, phosphorus and iron and contains appreciable amount of vitamin 'C.' In India, clusterbean is cultivated in 56.03 lakh hectares with production and productivity of 27.15 lakh tonnes and 485 kg/ha, respectively during 2013-14 (Annual Report, 2014). In Gujarat, it is cultivated in 2.79 lakh hectares with a production of 1.68 lakh tonnes and productivity of 604 kg/ha, respectively during 2014-15 (DOA, 2015). Conventional agriculture has made an adverse impact on soil and plant health.

To achieve soil fertility and crop productivity in a sustainable manner, the role of organic manures and nutrient management with fermented liquid organic fertilizer (*panchgavya*) are very vital. It has in addition to nutrients, plant growth promoting substances and microbial load/count which help in stimulating plant growth, yield, metabolic activity and resistance to pest and diseases.

Keeping this in views, present investigation was undertaken by to find out effect of FYM of INM on productivity and nutrient uptake in *kharif* cluster bean.

### MATERIALS AND METHODS

A field experiment was conducted during *kharif* 2016 at Agronomy Instructional Farm, C. P. College of Agriculture, S. D. Agricultural University, Sardarkrushinagar, Gujarat. The soil was loamy sand in texture, low in organic carbon (0.17 %) and available nitrogen (161 kg/ha), medium in available phosphorus (39 kg/ha) and potash (159 kg/ha) with pH 7.20.

The treatments consisted of two levels with FYM (0 and 5 tonnes/ha, six fertilizers levels with *panchgavya* (50 %, 75 %, 100 % RDF with *panchgavya* spray @ 3 % and 6 % at branching + flowering RDF (25 : 50 : 00 NPK kg/ha). these treatments were evaluated in randomized block design with factorial concept. Cluster bean variety Gujarat Guar was sown by keeping 45 cm row spacing using a seed rate of 15 kg/ha on July 25, 2016. Application of fertilizers was applied basal as per treatment. FYM was mixed in the soil before 2 weeks of field preparation as per treatments. The procedure followed for preparation as per treatments. The procedure followed for preparation of *panchgavya* is as under (Natarajan, 2002).

**Preparation of Panchgavya:** *Panchgavya* is a special preparation made from five products of cow along with certain other ingredients incubated for specific duration in an earthen or wide plastic container. Ingredients for preparation of *Panchgavya* are :

Fresh cow dung	:	7 kg.
Cow urine	:	10 lit.
Cow milk	:	3 lit.
Cow curd	:	2 lit.
Cow ghee	:	1 kg.
Jaggery	:	3 kg.
Tender coconut water	:	3 lit.
Ripe banana	:	2 kg.
Water	:	10 lit.

*Panchgavya* solution was prepared by thorough mixing of above ingredients at different time in an open (broad) mouth plastic container. The procedure followed for preparation of *Panchgavya* is as under (Natarajan, 2002).

**Step-I:** On the first day, 7 kg fresh cow dung was mixed with 1 kg cow ghee in a 25.0 lit. plastic barrel and kept for 3 days (72 hrs.) with intermittent stirring to exhaust methane gas.

**Step-II:** On the fourth day, add 10 lit. cow urine and 10 lit. water in above mixture. The mixture was stirred twice in a day and allowed to ferment for 15 days. The mouth of the container was covered with a thin cloth and kept in open shade.

**Step-III:** On 19<sup>th</sup> day, 3.0 lit. cowmilk, 2.0 lit. cow curd, 3.0 kg jaggery, 2.0 kg ripe banana and 3.0 lit. tender coconut water were added in the mixture and allowed to ferment for seven days while stirring twice a day, both in the morning and evening to facilitate aerobic microbial activity. Addition of jaggery, tender coconut water and ripe banana can help to accelerate the fermentation process. The mixture was filtered through a muslin cloth. The *Panchgavya* stock solution was ready for use after 25 days. It was applied as foliar spray by sprayer in a standing crop as per treatments.

*Spraying of Panchgavya* sprayed @ 3 % and 6 % at branching and flowering stages was done as per treatments. Crop was harvested on November 19, 2016. Total amount of rainfall during the crop life period was 572.2 mm in 28 rainy days. The weather conditions were normal, but there was a long dryspell of rainfall during September, 2016. Therefore a protective irrigation was applied in crop. Growth and yield parameters were recorded at harvest of the crop. Seed and stover yields/ha were worked out based on yields record in each plot.

## RESULTS AND DISCUSSION

**Effect of FYM:** Significant effect of FYM was observed on plant height, number of branches/plant, number of pods/plant, length of pods and 1000-seed weight, whereas number of seeds/pod remain unaffected (Table 1). An application of FYM 5 t/ha increased seed and stover yields by 16.93 and 10.92 %, respectively over control (Table 3). The marked increase in various yield components with addition of FYM of assimilates per nutrients, but also to its pivotal role in enhancing physicochemical and biological properties of the soil. In the recent years with increasing evidences on potential role of growth hormones in yield formation, it has been advocated that balanced hormonal pattern in plant system exert profound influence on proper development of growth and reproductive structures ultimately leads to productivity of the crop. Singh *et al.* (2010) and Dutt *et al.* (2013), also similar finding in terms of crop yield performances.

**Effect of fertility levels and panchgavya spray:** Fertility levels and panchgavya spray had significant effect on growth parameters viz., plant height and number of branches/plant. Application of 100% RDF with panchgavya spray @3% at branching and flowering attained significantly higher plant height (98.0 cm) and number of branches per plant (9.30) over RDF. However, they were at par with application of 100 % RDF with panchgavya spray @ 6 % at branching and flowering. Panchgavya is a proven biofertilizers, viz., Azospirillum, azotobactor, phosphobactor,

**Table 1.** Effect of different treatments on growth and yield parameters of clusterbean

Treatments	Plant height (cm) at harvest	Number of branches per plant	Number of pods per plant	length of pod (cm)	Number of seeds per pod	1000-seed weight (g)
Levels of organic manure (M) :						
M <sub>1</sub> : No FYM	89.25	7.67	72.35	5.33	8.52	31.99
M <sub>1</sub> : With FYM (5 t/ha)	94.15	8.30	77.24	5.85	8.72	32.82
S.Em. ±	1.46	0.16	1.66	0.10	0.08	0.20
C. D. (P = 0.05)	4.23	0.48	4.82	0.30	NS	0.59
Levels of fertilizer application and panchgavya spray (N) :						
N <sub>1</sub> : 50% RDF + panchgavya spray @ 3% at branching + flowering	88.52	7.77	73.77	5.40	8.53	32.21
N <sub>2</sub> : 50% RDF + panchgavya spray @ 6% at branching + flowering	87.60	7.23	67.88	5.30	8.27	31.26
N <sub>3</sub> : 75% RDF + panchgavya spray @ 3% at branching + flowering	93.35	8.17	76.77	5.75	8.80	32.99
N <sub>4</sub> : 75% RDF + panchgavya spray @ 6% at branching + flowering	91.17	7.62	71.63	5.62	8.68	32.54
N <sub>5</sub> : 100% RDF + panchgavya spray @ 3% at branching + flowering	98.00	9.30	82.93	6.07	8.87	33.62
N <sub>6</sub> : 100% RDF + panchgavya spray @ 6% at branching + flowering	96.35	8.73	79.90	5.73	8.83	33.22
N <sub>7</sub> : RDF (25:50:00 NPK kg/ha)	86.93	7.10	70.68	5.28	7.37	31.00
S.Em. ±	2.73	0.31	3.10	0.19	0.15	0.38
C. D. (P = 0.05)	7.92	0.89	9.02	NS	NS	1.11
Interaction (M x N) :						
S.Em. ±	3.85	0.43	4.39	0.27	0.22	0.54
C. D. (P = 0.05)	NS	NS	NS	NS	NS	NS
C.V. %	7.28	9.38	10.16	8.49	4.31	2.87

**Table 2. Economics of kharif cluster bean as influenced by different treatments**

Treatments	Yield (kg/ha)		Gross return (₹/ha)	Total cost (₹/ha)	Net return (₹/ha)	BCR
	Seed	Stover				
Levels of organic manure (M) :						
M <sub>1</sub> : No FYM	691	1475	27135	23941	3194	1.13
M <sub>2</sub> : With FYM (5 t/ha)	808	1636	31552	27201	4351	1.16
S.Em. ±	16.63	39.85				
C. D. (P = 0.05)	48.35	115.85				
Levels of fertilizer application and panchgavya spray (N) :						
N <sub>1</sub> : 50% RDF + panchgavya spray @ 3% at branching + flowering	698 <sup>cd</sup>	1481 <sup>ab</sup>	27392	24260	3132	1.13
N <sub>2</sub> : 50% RDF + panchgavya spray @ 6% at branching + flowering	659 <sup>d</sup>	1439 <sup>b</sup>	25943	25010	933	1.04
N <sub>3</sub> : 75% RDF + panchgavya spray @ 3% at branching + flowering	768 <sup>bc</sup>	1580 <sup>ab</sup>	30040	25220	4820	1.19
N <sub>4</sub> : 75% RDF + panchgavya spray @ 6% at branching + flowering	727 <sup>cd</sup>	1527 <sup>ab</sup>	28499	25970	2529	1.10
N <sub>5</sub> : 100% RDF + panchgavya spray @ 3% at branching + flowering	879 <sup>a</sup>	1699 <sup>a</sup>	34163	26180	7983	1.30
N <sub>6</sub> : 100% RDF + panchgavya spray @ 6% at branching + flowering	851 <sup>ab</sup>	1699 <sup>a</sup>	33183	26930	6253	1.23
N <sub>7</sub> : RDF (25:50:00 NPK kg/ha)	664 <sup>d</sup>	1464 <sup>ab</sup>	26168	25430	738	1.03
S.Em. ±	31.12	74.56				
Interaction (M x N) :						
SEm +/-	44.00	105.44				
CV (%)	10.17	11.74				

Selling price of produce : Seed : ₹ 35/kg and Stover : ₹ 2/kg.

pseudomonas that play an important role in stimulates of plant growth by secreting IAA and GA (Kumar *et al.* 2011).

Yield attributes *viz.*, number of pod per plant and 1000-seed weight and seed and stover yields recorded significantly the higher values with application of 100 % RDF with panchgavya spray @3% at branching and flowering. This treatments increased number of pods/plant by 17.00 %, 1000-seed weight by 8.45 %, seed yield by 32.38 % and stover yield by 16.05 % over RDF, However, this treatment was at par with application of 100 % RDF with panchgavya spray @6% at branching and flowering. Length of pod and number of seeds per pod remained unaffected.

**Economic:** The net return and benefit:cost ratio of 1:16 were also the higher with 5 t/ha. Application of 100 % RDF with panchgavya spray @3% at branching + flowering was more economical with higher net return as well as B;C ratio rather than their lower net return and BCR. Combined FYM and application of 100% RDF with panchgavya spray @3% at branching + flowering recorded the higher net return and BCR. The trend in economic return is mainly owing to the treatment effects on the seed and stover yields. It could be concluded that application of FYM along with 100 % RDF + panchgavya spray@ 3 % at branching + flowering improved yield and net profit in clusterbean under North Gujarat agro climatic condition.

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