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# Impact of biopesticides as seed treatment and foliar spray on the growth parameter of soybean (*Glycine max* (L) Merrill) and gram (*Cicer arietinum* L)

Vipendra Parmar, SN Singh and GP Tiwari

### Abstract

Inherent hazardous effects involved in conventional chemical management in agriculture give rise to several ecofriendly innovative approaches. Hazardless of the chemical use, farmers tend towards organic farming. It is well known that organic products contains several nutrients like NPK and micronutrient, amino acid, vitamins and growth regulators like Auxin, Gibberellin which affect the growth of Plants. In Present study Six Bio-pesticides viz. Bio-enhancer, Butter milk, Panchagavya, Beejamrite, Cow urine, and Vermi wash were undertaken to assess their effect as seed treatment and spray at different doses on growth parameters of soybean and chickpea. All bio pesticide as seed dressers exhibited higher germination per cent, chlorophyll content index, vigour index (%), vigour in dry mass, dry weight over control. Among bio pesticides seed treatment with cow urine at 1:10 concentration gave maximum plant height, dry weight and vigour index mass of soybean and chickpea. Treatment cow urine and bio enhancer was found superior and increased chlorophyll content index whereas treatment cow urine and Panchagavya, exhibited higher vigour index per cent. So for as spray, all pesticide as crude form reduced the plant height over control but at 1:10 concentration increased the plant height. Among the bio pesticides, crude cow urine and Panchagavya as crude and 1:10 concentrations were found phytotoxic in chickpea and soybean. However spraying of cow urine at 1:10 concentration exhibited highest plant height, chlorophyll content index, fresh weight and dry weight followed by butter milk (1: 10) and Beejamrite (1: 20) over other treatments and control.

**Keywords:** bio-pesticides, chickpea, growth parameter, soybean

### Introduction

Chickpea is the third most important legume crop and India is the largest producer contributing to 65% of world's chickpea production with an area of 82.18 Lakh ha with a production of 77.02 Lakh tones and productivity of 937 kg per ha (FAO STAT 2014). Among major chickpea growing states, Madhya Pradesh ranks first in area 29.04 Lakh ha with a production of 32.90 Lakh tones and productivity of 1133 kg per ha. Chickpea seeds contain on an average 23% protein, 64% total carbohydrates (47% starch, 6% soluble sugar), 5% fat, 6% crude fiber and 3% ash. Besides these, it also improves the soil fertility due to its nitrogen fixing ability (Maiti, 2001) [8].

Soybean [*Glycine max* (L.) Merrill] was domesticated by farmers in the eastern half of Northern China and recognized as an oil seed crop containing several useful nutrients including protein, carbohydrate, vitamins and minerals. In India, soybean covers an area of 110.656 Lakh ha with a production of 86.42 Lakh tons and a productivity of 781 kg per ha (SOPA, 2015). Madhya Pradesh ranks first in area of 56.06 Lakh hect. with production of 44.00 lakh ton.

The ecological and economic problems of pest and pesticides in agriculture gave rise to several eco-friendly innovative approaches. The hazardous effects involved in conventional chemical management coupled with the inclination of farmers towards organic farming, use of FYM, green manuring, neem oil, botanical and animal by products such as cow urine and butter milk as described in Vedas, Arthshastra, Agnipuran, Surapala etc (Swaminathan and Nandha kumar, 2011 for plant protection has gaining importance. Several workers have reported enhanced seed germination and plant vigour on application of bio-pesticides viz. Panchagavya (Natarajan, 2002; Vennila *et al.*, 2008 and Tharmaraj *et al.*, 2011) [10, 17, 15],

Vermi wash (Mujeera and Malathy, 2014 and Jadhav *et al.*, 2015) [9, 6], Vermi compost (Eswaranand Mariselvi, 2016) [4], Brahmastra (Dhapke *et al.*, 2013) [3] and cow urine (Shwetha and Hegde, 2012) [12]. Raghavendra *et al.*, (2014) [11] worked on Panchagavya reported that it contains several nutrients- like NPK and micronutrients, various amino acids, vitamins and growth regulators such as Auxin, Gibberellins and also beneficial micro-organisms like *Pseudomonas*, *Azotobacter* etc. Present study was undertaken with a view to find out the effect of bio pesticides on growth parameters of soybean and gram, results are embodied here in.

### Materials and Methods

Six Bio-pesticides viz. Bio-enhancer, Butter milk, Panchagavya, Beejamrite, Cow urine, and Vermi wash were used to find out their effectiveness in plant as growth promoter. Seeds of Soybean JS-95-60 and Gram JG -315 were used for this study. Counted number of seeds treated with recommended dose of bio-pesticides (1:10) was sown in earthen pots filled with sterilized soil and maintaining three replications with one control without any treatment. Data on germination percentage was recorded after 10 days and 30 days of sowing. The plant height (cm), dry weight, fresh weight (g/plant), vigour index mass and vigour index percentage were calculated as described by Abdul Baki and Anderson (1973) [1];

$$\text{Germination (\%)} = \frac{\text{Total number of seed germinated}}{\text{Total number of seed sown}} \times 100$$

Vigour index (%) = Germination × Seedling length on the day of final count.

Vigour index mass = Germination percentage × seedling dry weight.

### Chlorophyll Content Index (CCI)

For foliar application, seeds were sown in field and after 15 days of germination three doses of bio pesticides i.e. crude, 1:10 and 1:20 were sprayed on plants of Gram JG -315 and soybean JS 95-60. Observation on the Chlorophyll index in the 4<sup>th</sup> leaf of four weeks old soybean plant was determined at an interval of 15-30 days. The chlorophyll index determined by using optical instrument called chlorophyll meter (Measure by SPAD-502 meter).

### Plant height, fresh and dry weight

Observations were recorded on the 10<sup>th</sup> day after sowing. The 30 and 60 days old seedling were carefully uprooted for measuring the height, fresh weight and dry weight. After measuring length and fresh weight, the seedling were placed between blotting paper and kept at 45°C for 2 - 3 days in an oven for drying. The dry weight was recorded in an electronic balance.

### Results and Discussion

Effect of bio-pesticide as seed treatment on germination percentage and growth parameters of soybean and Chickpea *in vitro*.

#### (a) On soybean

The soybean seeds were treated with recommended dose of each bio-pesticide separately and maintained the suitable control without any treatment. Data presented in Table-1 showed that germination percentage varied from 72 to 88 per cent with all the treatment as compared to 68 per cent with control (untreated). Maximum germination of 88.00 per cent was recorded with Cow urine at 1:10 dose followed by Panchagavya (80%), butter milk (76%) and Vermi wash (76%) against 68 per cent in control. Plant heights were recorded after 15 and 30 days of germination. Among all the treatment at 15 days cow urine exhibited maximum plant height of 17.6 cm, followed by Vermi wash (15.1 cm) as compared to 14.7 cm in control. Treatment cow urine was also found statistically significant over control. Similar results were also observed at 30 days plant.

Effect of bio pesticides on fresh and dry weight of plant at 30 days was observed and found that all treatment enhanced the fresh and dry weight and were significantly superior over control. The maximum fresh and dry weight of plant were recorded 1.127 g and 0.182 g with seed treatment of cow urine as compared to 0.761 and 0.114 g in control respectively. However F:D ratio of 1:0.17 exhibited with treatment. Butter milk followed by cow urine. Treatments cow urine, Vermi wash and Bio enhancer were found equally effective as cow urine. Data presented in Table – 2 clearly revealed that all the treatment had higher chlorophyll content index (CCI) as compared to control in 15 DAS and 30 DAS. After 15 DAS it ranged from 22.2 to 25.2 and 30 DAS 32.0 to 35.8 as compared to 21.9 and 31.4 in control respectively. In both the cases the highest chlorophyll content index (CCI) was recorded with Cow urine. Other treatments were found almost at par with each other.

Vigour index per cent recorded after 15 DAS indicated that among treatment it varied from 1087.2 to 1738.8 as compared to 999.6 with control Maximum vigour index per cent 1548.8 was recorded with Cow urine. Similarly vigour index percent at 30 DAS ranged from 2145.6 to 3551.2 as compared to 2019.6 with control (untreated). Highest vigour index per cent of 3194.4 was recorded with Cow urine and minimum of 2145.6 recorded with Bio-enhancer. Vigour index mass varied from 9.43 to 17.66 which was higher as compared to control (untreated). Minimum vigour index mass of 9.43 was recorded with Beejamrit and followed by Panchagavya and Butter milk respectively. Highest vigour index mass 16.01 was recorded with Cow urine against 7.752 in control.

Over all Seed treatment with cow urine at 1:10 has been found significantly effective as plant height, chlorophyll content index, vigour and dry weight increased as compared to control, followed by Panchagavya, Butter milk and Beejamrit and Bio enhancer in soybean. The present results are in agreement with the finding reported by several workers (Jadhav *et al.*, 2015 [6], Jaybhaye and Bhalerao, 2015 and Eswarman and Mariselvi, 2016 [4] by vermin wash, Chandha *et al.*, 2012 by Beejamrit, Varma *et al.* 2008 and Shwetha and Hegde, 2012 [12], and Dhapke *et al.*, 2013 [3] by Panchagavya) that bio pesticides enhanced the seed germination, height, and growth parameter of the plants.

**Table 1:** Effect of seed treatment with bio pesticides on germination percentage and growth parameters of soybean cv JS 95-60

Treatment	Conc.	Germ. (%)	Plant height (cm) after		Fresh wt./plant (g)	Dry wt./plant (g)	F:D ratio
			15 DAS	30 DAS			
T1 Bio-enhancer	1:10	72.0	14.8	29.8	1.063	0.170	1:0.16
T2 Butter milk	1:10	76.0	14.8	30.0	1.000	0.168	1:0.17
T3 Panchagavya	1:10	80.0	15.0	30.3	1.043	0.145	1:0.14

T4 Beejamrit	1:10	72.0	15.1	32.2	1.041	0.131	1:0.13
T5 Cow urine	1:10	88.0	17.6	36.3	1.127	0.182	1:0.16
T6 Vermi wash	1:10	76.0	15.4	33.0	1.051	0.170	1:0.16
Control	-	68.0	14.7	29.7	0.761	0.114	1:0.14
SE(m) $\pm$ 1			0.186	0.336	0.008	0.241	-
CD at 5 %			1.615	1.213	0.026	-	-

DAS = Days after sowing

**Table 2:** Effect of seed treatment with bio pesticides on germination percentage, chlorophyll content index (CCI) and growth parameters of soybean cv JS 95-60

Treatment	Germ (%)	Chlorophyll Content Index (CCI) after		Vigour index (%)		Vigour index mass
		15 DAS	30 DAS	15 DAS	30 DAS	
T1 Bio-enhancer	72.0	23.8	32.5	1065.6	2145.6	12.24
T2 Butter milk	76.0	23.3	32.0	1124.8	2280.0	12.76
T3 Panchagavya	80.0	24.4	33.3	1200.0	2424.0	11.60
T4 Beejamrit	72.0	22.2	32.2	1087.2	2318.4	9.43
T5 Cow urine	88.0	25.2	35.8	1548.8	3194.4	16.01
T6 Vermi wash	76.0	22.5	32.7	1170.4	2508.0	12.92
Control	68.0	21.9	31.4	999.6	2019.6	7.752

DAS = Days after sowing

### (b) On chickpea

Result presented in Table- 3 revealed that all seed treatments except Beejamrite significantly increased the germination percentage as compare to control. Among all the treatments minimum germination of 88.00 per cent was observed with Beejamrit followed by 92.00 with Butter milk and Vermi wash whereas 100 per cent was recorded with two treatments i.e. Panchgavya (1:10) and Cow urine (1:10). Plant height recorded after 15 DAS indicated that significant increase in height was recorded with Butter milk, Panchgavya and Cow urine. Maximum of 14.1 cm was recorded with Panchgavya treatments.

Plant height recorded at 30 DAS indicated that with only four treatments i.e. Bio-enhancer, Panchgavya, and Cow urine height increased significantly. Maximum Height of 29.3 cm was recorded with Cow urine treatments.

Fresh weight recorded among the treatments varied from 1.109 to 1.563 g/plant as compared to 1.08 g/plant with control (untreated). Effect of Butter milk and Vermi wash was found at par with control. Maximum fresh weight of 1.542 g/plant was recorded with and Cow urine treatments. So for as dry weight Butter milk and Vermi wash were found at par with control whereas, other treatments significantly increased dry weight with maximum dry weight of 0.169 g/plant with Cow urine. Fresh weight and dry weight ratio (F:D) ranged from 1:0.10 to 1:0.12. Highest ratio of 1:0.12 was recorded with Vermi wash and Butter milk whereas Bio-enhancer, Panchgavya and Cow urine gave minimum fresh weight and dry weight ratio 1:0.10 as compared to control (1:0.11).

The data presented in Table- 4 revealed that, all treatments increased chlorophyll content index (CCI) at both stages i.e.

15 DAS and 30 DAS. After 15 DAS highest chlorophyll content index (CCI) of 27.7 and 26.9 was recorded with Cow urine and Beejamrite. Minimum of 22.3 was recorded with Panchgavya. After 30 DAS maximum of chlorophyll content index (CCI) of 36.7 and 34.4 was observed with Cow urine and Bio-enhancer against 32.1 in control.

Vigour index per cent at 15 days & 30 days was significantly enhanced with all treatments as compared to control. It varied from 1073.8 to 1460 percent at 30 days. Maximum vigour index at 15 days of 1410 with Panchgavya was recorded, followed by 1400, 1324, 1159 and 1131.6 percent with cow urine, Bio enhancer, Butter milk and Vermi wash respectively. Data on 30 DAS showed variation of 2336.8 to 2930 among treatment as compared to 2287.6 with control. Maximum vigour index of 2930 and 2900 at 30 days was recorded with Cow urine and Panchgavya. Vigour index mass among treatment varied from 11.51 to 18.91 as compared to 10.11 in control. Treatment cow urine and Panchgavya exhibited maximum vigour index mass of 16.91 and 16.51 respectively. However in chickpea cow urine, Butter milk, Panchgavya, and Bio enhancer were found significantly effective in increasing the plant height, germination (%) fresh and dry weight, Chlorophyll content index over control. Although cow urine and Panchgavya, increased vigour index in chickpea. The present results are similar with the findings reported by Jadhav *et al*, 2015 <sup>[6]</sup>, Jaybhaye and Bhalerao, 2015 and Eswarman and Mariselvi, 2016 <sup>[4]</sup> by vermin wash, Chandha *et al*, 2012 by Beejamarit, Varma *et al* 2008 and Shwetha and Hegde, 2012 <sup>[12]</sup>, and Dhapke *et al*, 2013 <sup>[3]</sup> by Panchgavya that bio pesticides enhanced the seed germination, height, and growth parameter of the plants.

**Table 3:** Effect of seed treatment with bio pesticides on germination percentage and some growth parameters of Chickpea cv JG 315

Treatment	Conc.	Germ (%)	Plant height (cm) after		Fresh wt./plant (g)	Dry wt./plant (g)	F:D ratio
			15 DAS	30 DAS			
T1 Bio-enhancer	1:10	96.0	13.8	28.5	1.435	0.154	1:0.10
T2 Butter milk	1:10	92.0	12.6	25.4	1.139	0.126	1:0.11
T3 Panchagavya	1:10	100.0	14.1	29.0	1.553	0.165	1:0.10
T4 Beejamrit	1:10	88.0	12.2	27.7	1.187	0.143	1:0.12
T5 Cow urine	1:10	100.0	14.0	29.3	1.542	0.169	1:0.10
T6 Vermi wash	1:10	92.0	12.3	27.3	1.109	0.134	1:0.12
Control	UT	84.0	12.0	26.6	1.08	0.121	1:0.11
SE(m) $\pm$ 1			0.241	0.433	0.027	0.004	-
CD at 5 %			0.797	1.432	0.088	0.014	-

DAS = Days after sowing

**Table 4:** Effect of seed treatment with bio-pesticides on germination percentage, chlorophyll content index (CCI) and growth parameters of Chickpea c v JG 315

Treatment	Germ (%)	Chlorophyll content index (CCI) after		Vigour index (%)		Vigour index mass
		15 DAS	30 DAS	15 DAS	30 DAS	
T1 Bio-enhancer	96.0	26.4	34.4	1324.8	2736	14.71
T2 Butter milk	92.0	25.2	32.3	1159.2	2336.8	11.51
T3 Panchagvyva	100.0	22.3	31.9	1410	2900	16.51
T4 Beejamrit	88.0	26.9	33.4	1073.6	2437.6	12.51
T5 Cow urine	100.0	27.7	36.7	1400	2930	16.91
T6 Vermi wash	92.0	24.8	32.6	1131.6	2511.6	12.31
Control	84.0	23.0	32.1	1008	2287.4	10.11

DAS = Days after sowing

### 3.2 Foliar spray of bio-pesticides on chlorophyll content index (CCI) and growth parameters of soybean and chickpea

Three doses of bio-pesticides were sprayed and assessed on 15 day's old seedlings and their effect on plant growth parameters of soybean and on Chickpea was also estimated after 15 and 30 days of spraying.

#### (a) Effect on soybean

The data presented in Table- 5 indicated that all bio pesticides were found effective and enhanced the plant height over control. Similarly different doses of bio pesticides varied and dose 1:10 exhibited maximum plant height as compared to crude and 1:20 dose.

Crude application of Bio enhancer, Panchagvyva, Beejamrite, cow urine and Vermi wash reduced the plant height whereas treatment crude butter milk increased the plant height as compared to others and control. Chlorophyll content index recorded after 15 days of spraying ranged from of 27.94 to 46.72. Minimum of 27.94 and 31.24 was recorded with Vermi wash (crude and 1:20) respectively. Maximum of 46.12 and 42.79 was recorded with Cow urine 1:10 and Butter milk crude respectively. However Chlorophyll content index (CCI) recorded after 30 days of spraying ranged from 41.23 to

49.13. All treatments had higher Chlorophyll content index (CCI) except Butter milk 1:10 and Vermi wash 1:20 as compared to 41.20 control (untreated). Phytotoxicity was also observed with treatment Panchagvyva (1:10) and Cow urine crude on plants.

Data on fresh weight/plant revealed that maximum treatments have no significant difference with control (25.16 g/plant). Five treatments i.e. Bio-enhancer 1:10, Beejamrit 1:10, Cow urine 1:10, Vermi wash 1:10 and Carbendazim 0.15 per cent exhibited significant Increase in fresh weight. Maximum fresh weight of 34.12 and 31.40 was recorded with Cow urine 1:10 and Beejamrite 1:10. Reduction in fresh weight was recorded with Bio-enhancer, Beejamrite and Vermi wash crude. Data on dry weight/plant exhibited variation of 4.040 to 6.880 g/plant as compared to 4.130 g/plant with control. Maximum dry weight of 6.880 and 6.720 g/plant was recorded with Butter milk (1:10) and Cow urine (1:10) and Beejamrit (1:20) which were found at par with control. Fresh weight and dry weight ratio (F:D) varied from 1:0.17 to 1:0.28 among treatment as compared to 1:0.17 with control. Bio-enhancer (1:10) and Beejamrit (1:10) were at par with control. However highest Fresh weight and dry weight ratio (F:D) of 1:0.28 and 1:0.25 was recorded with Butter milk 1:10 and crude respectively.

**Table 5:** Effect of foliar spray of bio-pesticides on chlorophyll content index (CCI) and some growth parameters of soybean cv JS 95-60.

Treatment	Conc. (ppm)	Plant height (cm) after		Chlorophyll (CCI) after		Fresh wt./ plant (g)	Dry wt./ plant (g)	F:D ratio
		15 DASp	30 DASp	15 DASp	30 DASp			
T1 Bio-enhancer	Crude	26.39	32.44	43.42	22.140	5.180	1:0.23	
	1:10	32.14	35.3	44.87	30.950	5.150	1:0.17	
	1:20	25.4	37.55	45.21	25.400	4.450	1:0.18	
T2 Butter milk	Crude	30.27	42.79	46.18	20.100	5.060	1:0.25	
	1:10	32.4	35.11	41.23	24.110	6.880	1:0.28	
	1:20	31.94	38.55	43.28	23.010	5.150	1:0.22	
T3 Panchagvyva	Crude	16.81	-	-	-	-	-	
	1:10	31.94	-	-	-	-	-	
	1:20	30.25	40.25	44.48	26.120	4.640	1:0.18	
T4 Beejamrit	Crude	25.12	35.27	41.97	23.150	4.260	1:0.18	
	1:10	30	37.41	42.1	31.400	5.200	1:0.17	
	1:20	29.69	31.94	43.32	26.450	4.560	1:0.18	
T5 Cow urine	Crude	17.51	-	-	-	-	-	
	1:10	36.42	46.12	49.13	34.120	6.720	1:0.20	
	1:20	32.21	39.94	48.32	26.880	5.480	1:0.20	
T6 Vermi wash	Crude	25.33	31.24	42.23	22.100	4.040	1:0.18	
	1:10	27.39	33.46	43.81	28.150	5.710	1:0.20	
	1:20	26.01	27.94	41.23	25.010	5.100	1:0.20	
Control	UT	26.18	26.46	41.2	25.160	4.130	1:0.17	
SE(m) ±1		0.398			0.559	0.254		
CD at 5 %		1.144			1.605	0.729		

DASp= Day after spraying, - = phytotoxic effect

#### (b) Effect on chickpea

The data presented in Table 6 indicated that after 15 days of

spraying with Panchagvyva crude, the height of plant significantly reduced 17.90 cm as compared to 24.0 cm in

control. Though plant height was significantly increased in some treatment and maximum plant height of 36.42 cm was recorded with Cow urine 1:10. Effectivity of different doses of bio-pesticides also varied significantly and dose 1:10 was found most suitable and gave highest plant height in all treatments whereas crude cow urine and Panchgavya (1:10) showed phytotoxicity on plant. Chlorophyll content index (CCI) recorded after 15 days of spraying ranged from 33.41 to 47.41. Treatment Bio enhancer Beejamrite, and Cow urine at 1:10 dose exhibited significantly higher chlorophyll content index against control. Maximum of 47.41 was recorded with Cow urine (1:10) as compared to all treatments and control (39.52).

Chlorophyll content index (CCI) recorded after 30 days of spraying ranged from 43.02 to 59.80. All treatments significantly increased the Chlorophyll content index (CCI) and maximum of 59.80 was found with cow urine at the 1:10 dose, followed by Beejamrit (51.01), Vermi Wash (49.0), Bio enhancer (48.88), Butter milk (48.20), against 45.02 in control.

Data on fresh weight/plant revealed that maximum treatments have no significant difference with control. Three treatments i.e. Bio-enhancer (1:10), Beejamrit 1:10 and Cow urine 1:10, significantly increased fresh weight. Maximum fresh weight of 34.15 g/plant was recorded with cow urine (1:10). Reduction in fresh weight was also recorded with Bio-enhancer, Beejamrite and Vermi wash crude. Data on dry weight/plant exhibited variation of 4.400 to 7.270 g/plant as compared to 4.00 g/plant with control. Maximum dry weight of 7.270 and 6.808 g/plant was recorded with Butter Cow urine (1:10) and follow by Butter milk, Beejamrite and Bio-

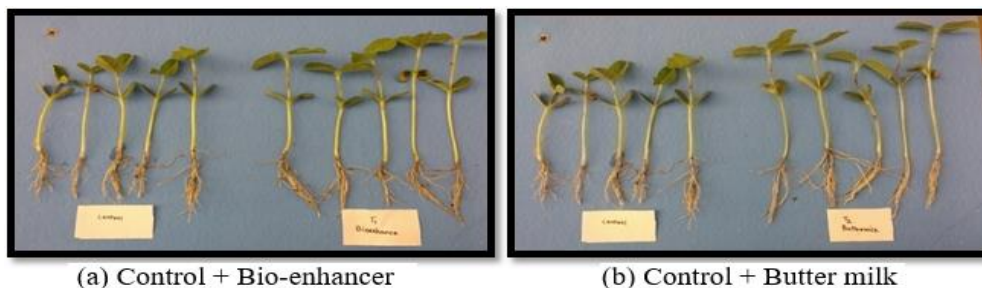
enhancer but these were at par. Fresh weight and dry weight ratio (F:D) ranged from 1:0.17 to 1:0.24 among treatment as compared to 1:0.14 with control. With all treatments significant increased Fresh weight and dry weight ratio (F:D) was found as compared to control (1:0.14). Highest Fresh weight and dry weight ratio (F:D) of 1:0.24 and 1:0.23 was recorded with bio- enhancer (crude) Butter milk (crude and 1:10) and Cow urine (1:20) respectively. Fresh and dry weight exhibited with Butter Milk and Cow urine followed by Beejamrite and Bio enhancer as compared to control. Similar results of bio pesticide spray on growth parameter had also been reported by Vennila *et al*, 2008 [17] Raghavendra *et al*, 2014 [11] Jadhav *et al* 2015 [6] and Jaybhave and Bhalerao, 2015 by spraying of vedic product like Panchagavya, Varmi wash and other significantly increased the plant height, vegetative growth and dry matters productive in okra, tomato and water melon.

However Crude application of cow urine, Bio enhancer, Panchgavya, Beejamrite and Vermi wash adversely affected the growth of plant and other parameters of soybean and chickpea, whereas crude butter milk enhanced the plant height and growth parameter, Among the concentration of Bio pesticides at 1:10 concentration exhibited maximum plant growth as compared to crude and 1:20 dose. Maximum chlorophyll content index (49.13) was recorded with cow urine 1:10 treatment as compared to other treatment and control (.41.2). Phytotoxicity was also recorded with Panchagavya, at crude and 1:10 dose and cow urine at crude on plant. Similarly phytotoxic effect of cow urine had also been reported in paddy by Wani and Kurucheve (2014) [18].

**Table 6:** Effect of foliar spray of bio pesticides on chlorophyll content index (CCI) and some growth parameters of Chickpea c v JG 315

Treatment	Conc.	Plant height (cm) after			Chlorophyll (CCI) after		Fresh wt./ plant (g)	Dry wt./ plant (g)	F:D ratio
		15 DASp		30 DASp	15 DASp	30 DASp			
T1 Bio-enhancer	Crude	28.4	44.44	46.20	24.182	5.810	1:0.24		
	1:10	30.2	41.02	48.88	32.850	6.015	1:0.18		
	1:20	29	42.00	46.24	30.342	5.540	1:0.18		
T2 Butter milk	Crude	27.9	36.71	47.79	22.414	5.600	1:0.24		
	1:10	30.8	37.00	48.20	28.921	6.808	1:0.23		
	1:20	28.2	40.52	42.00	25.010	5.510	1:0.22		
T3 Panchagvyva	Crude	17.9	-	-	-	-	-		
	1:10	21	-	-	-	-	-		
	1:20	25.8	41.41	46.02	27.510	5.460	1:0.20		
T4 Beejamrit	Crude	27.5	42.97	48.07	26.160	5.620	1:0.21		
	1:10	27.9	44.12	51.01	32.000	6.200	1:0.19		
	1:20	27.9	40.21	44.08	27.021	5.650	1:0.21		
T5 Cow urine	Crude	19.4	-	-	-	-	-		
	1:10	32.3	47.41	59.80	34.150	7.270	1:0.21		
	1:20	28.4	41.58	47.00	25.000	5.840	1:0.23		
T6 Vermi wash	Crude	24.6	33.41	47.28	24.000	4.400	1:0.18		
	1:10	30.1	39.92	49	29.500	5.170	1:0.17		
	1:20	25.4	36.42	43.02	26.230	5.100	1:0.19		
Control	UT	24	39.52	45.02	27.020	4.000	1:0.14		
SE(m) ±1		1.179			0.955	1.970			
CD at 5 %		3.381			2.741	0.687			

DASp= Day after spraying, - = phytotoxic effect



(a) Control + Bio-enhancer

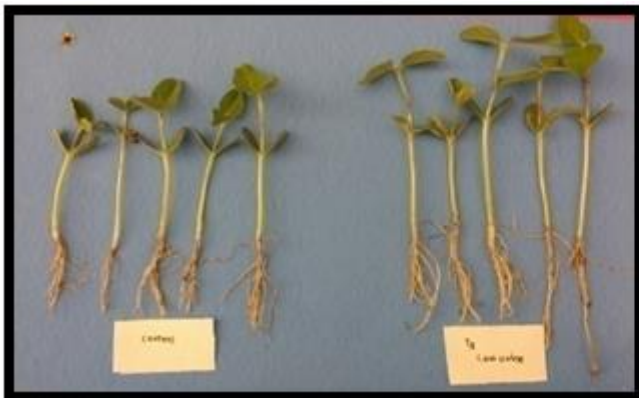
(b) Control + Butter milk



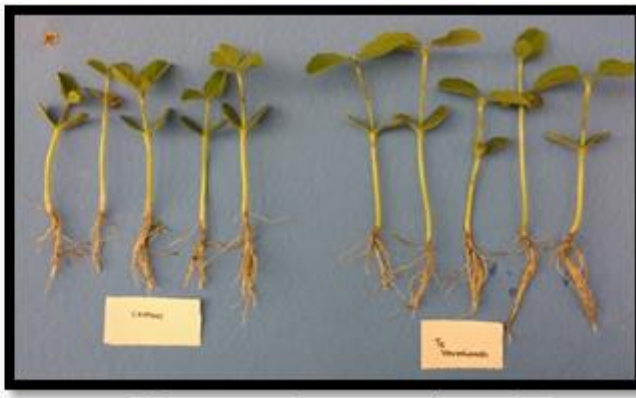
(c) Control + Panchgavya



(d) Control + Beejamrit



(e) Control + Cow urine



(f) Control + Vermicompost wash

**Plate 1:** Showing effect of seed treatment with bio-pesticides on seedling growth of soybean (15 DAS)



(a) Control + Bio-enhancer



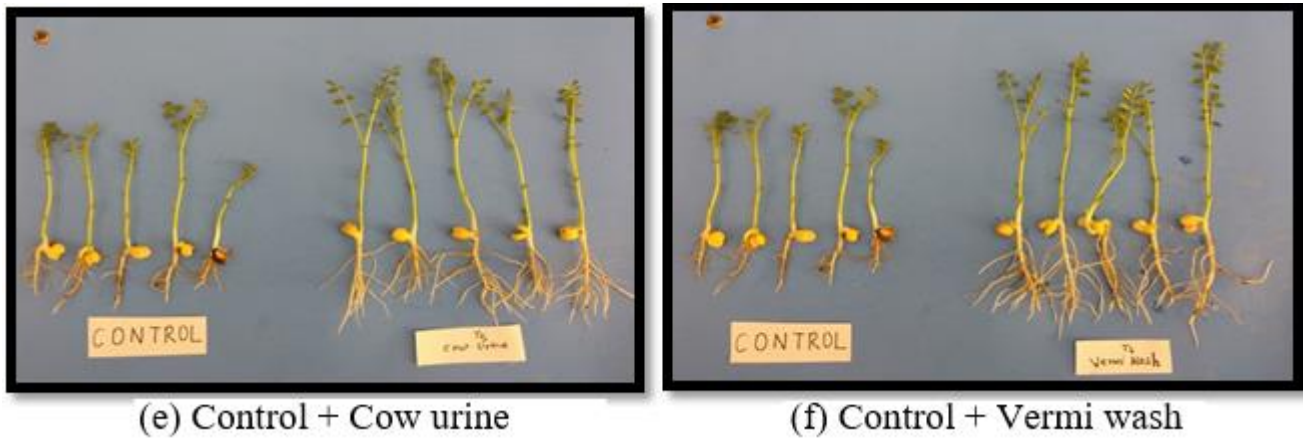
(b) Control + Butter milk



(c) Control + Panchgavya



(d) Control + Beejamrit



**Plate 2:** Showing effect of seed treatment with bio-pesticides on seedling growth of chickpea (15 DAS)

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