Final Report
On

Evaluation of different organic products in moong (green gram) crop

Summer
2017 and 2018

Submitted to

Pro G Agro Private Limited,
GIDC – Savli,
Vadodara, Gujarat

Submitted by

DEPARTMENT OF AGRONOMY
B. A. COLLEGE OF AGRICULTURE
ANAND AGRICULTURAL UNIVERSITY
ANAND - 388 110

Evaluation of different organic products in summer moong (green gram) crop

1.	Title of the scheme	Evaluation of different organic products in summer moong (green gram) crop
2.	Location	Department of Agronomy B. A. College of Agriculture Anand Agricultural University, Anand
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	b) Name and address of the Unit Head	Principal B. A. College of Agriculture Anand Agricultural University, Anand
	c) Actual location where the work was carried out	Agronomy Farm B. A. College of Agriculture Anand Agricultural University, Anand
3.	Financing Agency	**Pro G Agro Private Limited,** **GIDC – Savali, Vadodara, Gujarat**
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INTRODUCTION

Pulses occupy a unique position in cropping system as a main, catch, cover, green manure and as intercrop. Pulses play an important role in the Indian diet, constituting one of the most effective sources of protein for vegetarian. As per recommendation of World Health Organization (WHO) minimum requirement of pulses is 80 g/capita/day. Thus, it becomes essential to increase the production of pulses so that protein need of increasing population can be fulfilled.

India shares about 41.76 % and 22.22 % of the total area and production of pulses, respectively, in the world (year 2014). In India, total cultivated area of pulses is 25.26 million hectares with total production of 16.47 million tonnes, with average productivity of 728 kg ha^{-1} (Agricultural Research Data Book, 2017).

Among the pulses, greengram is one of the most important and extensively cultivated pulse crops. Greengram, commonly known as "mung" or "mungbean", is recognized as an excellent source of protein. It also plays an important role in maintaining and improving the soil fertility by atmospheric nitrogen fixation through root nodules/ quantifies 40-60 kg N ha^{-1}.

The cultivation of greengram in the Gujarat state is in 2.09 lakh hectares with 1.14 lakh tonnes production with average productivity of 546 kg ha^{-1}. In Gujarat, yield of greengram is low as its cultivation is mainly confined under rainfed conditions and in poor textured soil.

Nutrient application is essentially required to improve growth and yield of greengram. Greengram is highly responsive to nutrients.

Further, present days, a lot of emphasis is being given by Government in identifying organic input responsive crops in light of organic agriculture. Keeping these facts in view, recommended dose of fertilizer along with organic source of nutrients was applied to minimize the chemical loads besides improving soil physical and biological properties of soil.

The company prepared different formulation of organic products like vanvruddhi and pro gold for soil and foliar application.

Therefore, the present investigation was undertaken to find out the effects of organic sources of nutrients along with recommended dose of fertilizer on yield attributes and yield of greengram under following objectives.

Objective

- To study the effect of different organic products on the growth and yield attributes of green gram along with recommended dose of fertilizers
- To study the effect of different organic products on the yield and quality of green gram along with recommended dose of fertilizers
- To study the effect of different organic products on soil fertility

EXPERIMENTAL DETAILS

Experimental Site: College Agronomy farm,
Department of Agronomy, B.A. College of Agriculture,
Anand Agricultural University, Anand-388 110

Crop and Variety: Greengram, Variety: GAM-5

Sr. No.	Experimental details		Trial description
1.	Design	:	Randomized Block Design
2.	Treatments	:	10
3.	Replications	:	4
4.	Spacing between rows	:	30 cm
5.	Spacing between plants	:	10 cm
6.	Plot size	:	Gross Plot : 3.60 m x 5.0 m
			Net Plot : 2.40 m x 4.0 m
7.	Seed rate	:	20 kg ha^{-1}
8.	Method of sowing	:	Drilling (Line sowing)
9.	Fertilizer	:	As per treatments

Details of Treatment

Tr. No.	Treatment	Application	Dosage ha^{-1}
1	Vanvruddhi IBNM	At the time of land preparation	12.5 kg (12.5 kg mixed in 500 litre water fermented for 4 - 5 days)
2	Vanvruddhi Soil	Basal Dose	12.5 kg with RDF
3	Vanvruddhi Granules	Top Dressing at 30 DAS	20 kg with RDF
4	Vanvruddhi Soil	Basal Dose	12.5 kg + 50 % RDF
5	Vanvruddhi Granules	Top Dressing at 30 DAS	20 kg + 50 % RDF
6	Cow Urine + Vanvruddhi Wettable Powder	25 DAS	1250 g mixed with 12.5 litre Cow Urine
7	Pro-G Gold	35 DAS	625 ml
8	NOL + IBPM + Cow Urine	50 DAS	(1000 ml + 250 ml + 12.5 litre)
9	RDF along with bio-fertilizers	Basal Dose	20-40-00 kg NPK ha^{-1} and 5 ml kg^{-1} as seed treatment
10	RDF	Basal Dose	20-40-00 kg NPK ha^{-1}

RDF -20-40-00 kg NPK ha^{-1}

Raising the crop

Green gram crop was raised with all recommended agronomical practices.

Duration of the project

Two years: Summer 2017 and Summer 2018

Plant Protection measure during growing period

All control measure had been taken to protect the crop from sucking pest by using recommended insecticide.

Field operations:

Sr. No.	Operation	Date	
		2017	2018
i.	Sowing	15.03.2017	21.02.2018
ii.	No. of irrigations	06	07
iii.	No. of weeding and Interculturing	At 20 and 45 DAS	At 20 and 45 DAS
iv.	Plant protection measures	As and when required	As and when required
v.	Harvesting(picking)	20.05.2017 and 30.05.2017	30.04.2018 and 15.05.2018
vi.	Threshing	23.05.2017 and 31.05.2017	20.05.2018

Initial soil status:

Parameters	Value
pH	8.19
EC (1:25) dSm^{-1}	0.25
Organic carbon (%)	0.35
Available P_2O_5 (kg ha^{-1})	29.56
Available K_2O (kg ha^{-1})	230

RESULT OF THE EXPERIMENT (SUMMER 2017 AND SUMMER 2018)

PLANT POPULATION

Data on plant population per plot recorded at 15 days after sowing of crop and at harvest as influenced by different treatments during the years 2017, 2018 and in pooled analysis are presented in Tables 1 and 2.

Table 1: Effect of various treatments on plant population of greengram at 30 DAS

Treatment	Plant population (no. plot^{-1}) at 30 DAS		
	2017	2018	Pooled
T_1 - Vanvruddhi IBNM@ 12.5 kg ha^{-1}	259	248	254
T_2 -Vanvruddhi soil @ 12.5 kg ha^{-1} along with 100 % RDF	239	225	232
T_3 - Vanvruddhi Granules@ 20 kg ha^{-1} along with 100 % RDF	266	252	259
T_4 - Vanvruddhi soil @ 12.5 kg ha^{-1} along with 50 % RDF	270	262	266
T_5 - Vanvruddhi Granules@ 20 kg ha^{-1} along with 50 % RDF	255	248	251
T_6- Cow Urine + Vanvruddhi Wettable Powder (1250 g mixed with 12.5 l Cow Urine)	241	229	235
T_7 - Pro-G Gold@ 625 ml ha^{-1}	266	280	273
T_8 - NOL + IBPM + Cow Urine (1000 ml + 250 ml + 12.5 l)	247	234	240
T_9 - RDF along with bio-fertilizers (20-40-00 kg NPK ha^{-1} + 5 ml/kg)	221	215	218
T_{10} - RDF Only (20-40-00 kg NPK ha^{-1})	248	237	243
S.Em.±	19.18	16.83	11.90
C.D. (P=0.05)	NS	NS	NS
C.V.%	15.27	13.86	14.61

Table 2: Effect of various treatments on plant population of greengram at harvest

Treatment	Plant population (no. plot^{-1}) at harvest		
	2017	2018	Pooled
T_1 - Vanvruddhi IBNM@ 12.5 kg ha^{-1}	251	243	247
T_2 -Vanvruddhi soil @ 12.5 kg ha^{-1} along with 100 % RDF	230	223	227
T_3 - Vanvruddhi Granules@ 20 kg ha^{-1} along with 100 % RDF	263	247	255
T_4 - Vanvruddhi soil @ 12.5 kg ha^{-1} along with 50 % RDF	270	255	263
T_5 - Vanvruddhi Granules@ 20 kg ha^{-1} along with 50 % RDF	252	236	244
T_6- Cow Urine + Vanvruddhi Wettable Powder (1250 g mixed with 12.5 l Cow Urine)	237	223	230
T_7 - Pro-G Gold@ 625 ml ha^{-1}	266	271	268
T_8 - NOL + IBPM + Cow Urine (1000 ml + 250 ml + 12.5 l)	237	220	228
T_9 - RDF along with bio-fertilizers (20-40-00 kg NPK ha^{-1} + 5 ml/kg)	220	207	213
T_{10} - RDF Only (20-40-00 kg NPK ha^{-1})	237	222	230
S.Em.±	16.37	14.51	10.21
C.D. (P=0.05)	NS	NS	NS
C.V.%	13.29	12.36	12.86

Results presented in Table 1 and 2 revealed that plant population of greengram recorded at 30 DAS and at harvest during the year 2017 and 2018 as well as in pooled was not influenced significantly due to different treatments.

This indicates a uniform plant population observed under all the treatments in both the years.

PLANT HEIGHT

Data on plant height recorded at 30 and 60 days after sowing of crop and at harvest as influenced by different treatments during the years 2017, 2018 and in pooled analysis are presented in Tables 3, 4 and 5.

30 DAS

Table 3: Effect of various treatments on plant height at 30 DAS

Treatment	Plant height (cm) at 30 DAS		
	2017	2018	Pooled
T_1 - Vanvruddhi IBNM@ 12.5 kg ha^{-1}	15.37	16.87	16.12
T_2 - Vanvruddhi soil @ 12.5 kg ha^{-1} along with 100 % RDF	16.51	17.26	16.87
T_3 - Vanvruddhi Granules@ 20 kg ha^{-1} along with 100 % RDF	17.81	19.07	18.44
T_4 - Vanvruddhi soil @ 12.5 kg ha^{-1} along with 50 % RDF	17.13	19.89	18.51
T_5 - Vanvruddhi Granules@ 20 kg ha^{-1} along with 50 % RDF	18.87	18.62	18.74
T_6 - Cow Urine + Vanvruddhi Wettable Powder (1250 g mixed with 12.5 l Cow Urine)	14.58	15.16	14.87
T_7 - Pro-G Gold@ 625 ml ha^{-1}	17.05	18.00	17.53
T_8 - NOL + IBPM + Cow Urine (1000 ml + 250 ml + 12.5 l)	14.76	14.30	14.53
T_9 - RDF along with bio-fertilizers (20-40-00 kg NPK ha^{-1} + 5 ml/kg)	20.23	20.88	20.55
T_{10} - RDF Only (20-40-00 kg NPK ha^{-1})	17.61	17.97	17.79
S. Em. ±	01.06	01.03	00.70
C.D. (P=0.05)	03.07	02.98	01.99
C.V.%	12.45	11.55	09.91

Plant height measured at 30 DAS was significantly influenced due to different treatments during the year 2017 and 2018 as well as in pooled analysis.

Treatment T_9 (RDF along with bio-fertilizers) recorded significantly higher plant height (20.23 cm, 20.88 cm) in both the years and in pooled analysis (20.55 cm) and remained at par with treatments T_5 (Vanvruddhi Granules@ 20 kg ha^{-1} alongwith 50 % RDF, 18.87 cm), T_3 (Vanvruddhi Granules@ 20 kgha^{-1}alongwith

100 % RDF, 17.81 cm) and T_{10} (Recommended dose of fertilizer, 17.61 cm) during the year 2017. In year 2018, treatment T_9 was at par with treatments of T_3, T_4, T_5, T_7 and T_{10}. In pooled results treatment T_9 (RDF along with bio-fertilizers) was at par with treatment T_5 (Vanvruddhi Granules@ 20 kg ha^{-1} alongwith 50 % RDF).

60 DAS

Table 4: Effect of various treatments on plant height at 60 DAS

Treatment	Plant height (cm) at 60 DAS		
	2017	2018	Pooled
T_1 - Vanvruddhi IBNM@ 12.5 kg ha^{-1}	41.71	43.07	42.39
T_2 - Vanvruddhi soil @ 12.5 kg ha^{-1} along with 100 % RDF	40.02	39.78	39.90
T_3 - Vanvruddhi Granules@ 20 kg ha^{-1} along with 100 % RDF	49.23	52.49	50.86
T_4 - Vanvruddhi soil @ 12.5 kg ha^{-1} along with 50 % RDF	44.48	46.55	45.51
T_5 - Vanvruddhi Granules@ 20 kg ha^{-1} along with 50 % RDF	46.39	47.65	47.02
T_6 - Cow Urine + Vanvruddhi Wettable Powder (1250 g mixed with 12.5 l Cow Urine)	38.86	39.62	39.24
T_7 - Pro-G Gold@ 625 ml ha^{-1}	43.75	44.62	44.18
T_8 - NOL + IBPM + Cow Urine (1000 ml + 250 ml + 12.5 l)	37.80	38.77	38.29
T_9 - RDF along with bio-fertilizers (20-40-00 kg NPK ha^{-1} + 5 ml/kg)	46.63	47.33	46.98
T_{10} - RDF Only (20-40-00 kg NPK ha^{-1})	45.00	45.37	45.18
S. Em. ±	02.23	02.12	01.44
C.D. (P=0.05)	06.48	06.16	04.06
C.V.%	10.29	09.53	09.91

During the year 2017(Table 4), treatment T_3 (Vanvruddhi Granules@ 20 kg ha^{-1} alongwith 100 % RDF) gave significantly higher plant height (49.23 cm), which was at par with treatments T_9 (RDF along with bio-fertilizers, 46.63 cm), T_5 (Vanvruddhi Granules @ 20 kgha^{-1} alongwith 50 % RDF, 46.39 cm), T_{10} (Recommended dose of fertilizer, 45.00 cm), T_4 (Vanvruddhi soil @ 12.5 kg ha^{-1} along with 50 % RDF, 44.48 cm) and T_7 (Pro-G Gold @ 625 ml ha^{-1}, 43.75 cm) at 60 DAS.

Treatment T_3 (Vanvruddhi Granules @ 20 kg ha^{-1} alongwith 100 % RDF) gave significantly higher plant height (52.49 cm), which was at par with treatments T_9 (RDF along with bio-fertilizers, 47.33 cm), T_5 (Vanvruddhi Granules@ 20 kgha^{-1} alongwith 50 % RDF, 47.65 cm) and T_4 (Vanvruddhi soil @ 12.5 kg ha^{-1} along with 50 % RDF, 46.55 cm) at 60 DAS during the year 2018.

In pooled results, treatment T_3 (Vanvruddhi Granules@ 20 kg ha^{-1} alongwith 100 % RDF) recorded significantly higher plant height (50.86 cm), which was at par with treatments T_9 (RDF along with bio-fertilizers, 46.98 cm) and T_5 (Vanvruddhi Granules@ 20 kg ha^{-1} alongwith 50 % RDF, 47.02 cm) at 60 DAS during the year 2018.

At harvest

At harvest, treatment T_3 (Vanvruddhi Granules@ 20 kg ha^{-1} alongwith 100 % RDF) gave significantly higher plant height of 62.72, 63.23 and 62.97 cm during the year 2017, 2018 and in pooled results, respectively. However, it was at par with treatments T_4 (Vanvruddhi soil @ 12.5 kg ha^{-1} along with 50 % RDF), T_5 (Vanvruddhi Granules@ 20 kg ha^{-1} alongwith 50 % RDF) and T_{10} (Recommended dose of fertilizer) during both the years and pooled results (Table 5).

Table 5: Effect of various treatments on plant height at harvest

Treatment	Plant height (cm) at harvest		
	2017	2018	Pooled
T_1 - Vanvruddhi IBNM@ 12.5 kg ha^{-1}	49.11	50.22	49.66
T_2 - Vanvruddhi soil @ 12.5 kg ha^{-1} along with 100 % RDF	54.62	53.83	54.23
T_3 - Vanvruddhi Granules@ 20 kg ha^{-1} along with 100 % RDF	62.72	63.23	62.97
T_4 - Vanvruddhi soil @ 12.5 kg ha^{-1} along with 50 % RDF	58.53	59.54	59.03
T_5 - Vanvruddhi Granules@ 20 kg ha^{-1} along with 50 % RDF	58.88	58.29	58.58
T_6 - Cow Urine + Vanvruddhi Wettable Powder (1250 g mixed with 12.5 l Cow Urine)	47.39	47.70	47.54
T_7 - Pro-G Gold@ 625 ml ha^{-1}	51.61	52.02	51.81
T_8 - NOL + IBPM + Cow Urine (1000 ml + 250 ml + 12.5 l)	45.83	44.39	45.10
T_9 - RDF along with bio-fertilizers (20-40-00 kg NPK ha^{-1} + 5 ml/kg)	55.70	52.18	53.94
T_{10} - RDF Only (20-40-00 kg NPK ha^{-1})	56.47	57.78	57.13
S. Em. ±	03.50	03.15	02.20
C.D. (P=0.05)	10.15	09.14	06.21
C.V.%	12.94	11.68	12.33

NUMBER OF BRANCHES

Data on number of branches per plant recorded at 30 and 60 days after sowing of crop and at harvest as influenced by different treatments during the years 2017, 2018 and in pooled analysis are presented in Tables 6, 7 and 8.

30 DAS

Table 6: Effect of various treatments on no. of branches plant^{-1} at 30 DAS

Treatment	No. of branches plant^{-1} at 30 DAS		
	2017	2018	Pooled
T_1 - Vanvruddhi IBNM@ 12.5 kg ha^{-1}	1.65	1.83	1.74
T_2 - Vanvruddhi soil @ 12.5 kg ha^{-1} along with 100 % RDF	1.64	1.82	1.73
T_3 - Vanvruddhi Granules@ 20 kg ha^{-1} along with 100 % RDF	1.65	1.83	1.74
T_4 - Vanvruddhi soil @ 12.5 kg ha^{-1} along with 50 % RDF	1.65	1.83	1.74
T_5 - Vanvruddhi Granules@ 20 kg ha^{-1} along with 50 % RDF	1.65	1.83	1.74
T_6 - Cow Urine + Vanvruddhi Wettable Powder (1250 g mixed with 12.5 l Cow Urine)	1.66	1.84	1.75
T_7 - Pro-G Gold@ 625 ml ha^{-1}	1.65	1.83	1.73
T_8 - NOL + IBPM + Cow Urine (1000 ml + 250 ml + 12.5 l)	1.63	1.81	1.72
T_9 - RDF along with bio-fertilizers (20-40-00 kg NPK ha^{-1} + 5 ml/kg)	1.64	1.82	1.73
T_{10} - RDF Only (20-40-00 kg NPK ha^{-1})	1.66	1.84	1.75
S. Em. ±	0.04	0.05	0.03
C.D. (P=0.05)	NS	NS	NS
C.V.%	5.44	5.59	5.53

No. of branches per plant recorded at 30 and 60 DAS as well as at harvest were not influenced significantly due to different treatments during the year 2017 and 2018 as well as in pooled analysis.

60 DAS

Table 7: Effect of various treatments on no. of branches plant^{-1} at 60 DAS

Treatment	No. of branches plant^{-1} at 60 DAS		
	2017	2018	Pooled
T_1 - Vanvruddhi IBNM@ 12.5 kg ha^{-1}	2.50	2.63	2.56
T_2 - Vanvruddhi soil @ 12.5 kg ha^{-1} along with 100 % RDF	2.49	2.62	2.56
T_3 - Vanvruddhi Granules@ 20 kg ha^{-1} along with 100 % RDF	2.50	2.63	2.56
T_4 - Vanvruddhi soil @ 12.5 kg ha^{-1} along with 50 % RDF	2.50	2.63	2.57
T_5 - Vanvruddhi Granules@ 20 kg ha^{-1} along with 50 % RDF	2.54	2.67	2.60
T_6 - Cow Urine + Vanvruddhi Wettable Powder (1250 g mixed with 12.5 l Cow Urine)	2.51	2.64	2.58
T_7 - Pro-G Gold@ 625 ml ha^{-1}	2.49	2.62	2.56
T_8 - NOL + IBPM + Cow Urine (1000 ml + 250 ml + 12.5 l)	2.48	2.61	2.55
T_9 - RDF along with bio-fertilizers (20-40-00 kg NPK ha^{-1} + 5 ml/kg)	2.49	2.62	2.56
T_{10} - RDF Only (20-40-00 kg NPK ha^{-1})	2.51	2.64	2.58
S. Em. ±	0.05	0.06	0.04
C.D. (P=0.05)	NS	NS	NS
C.V.%	4.26	4.85	4.58

Table 8: Effect of various treatments on no. of branches plant^{-1} at harvest

Treatment	No. of branches plant^{-1} at harvest		
	2017	2018	Pooled
T_1 - Vanvruddhi IBNM@ 12.5 kg ha^{-1}	2.70	3.15	2.92
T_2 - Vanvruddhi soil @ 12.5 kg ha^{-1} along with 100 % RDF	2.69	3.14	2.92
T_3 - Vanvruddhi Granules@ 20 kg ha^{-1} along with 100 % RDF	2.70	3.15	2.92
T_4 - Vanvruddhi soil @ 12.5 kg ha^{-1} along with 50 % RDF	2.70	3.15	2.93
T_5 - Vanvruddhi Granules@ 20 kg ha^{-1} along with 50 % RDF	2.74	3.19	2.66
T_6 - Cow Urine + Vanvruddhi Wettable Powder (1250 g mixed with 12.5 l Cow Urine)	2.71	3.16	2.94
T_7 - Pro-G Gold@ 625 ml ha^{-1}	2.69	3.14	2.92
T_8 - NOL + IBPM + Cow Urine (1000 ml + 250 ml + 12.5 l)	2.68	3.13	2.91
T_9 - RDF along with bio-fertilizers (20-40-00 kg NPK ha^{-1} + 5 ml/kg)	2.69	3.14	2.91
T_{10} - RDF Only (20-40-00 kg NPK ha^{-1})	2.71	3.16	2.94
S. Em. ±	0.05	0.07	0.04
C.D. (P=0.05)	NS	NS	NS
C.V.%	3.95	4.38	4.28

NUMBER OF PODS

Number of pods per plant as influenced by different treatments during the years 2017, 2018 and in pooled analysis are presented in Tables 9 indicated that different treatments have significant influence on number of pods per plant during the year 2017, 2018 and in pooled analysis.

Table 9: Effect of various treatments on number of pods plant^{-1} of greengram

Treatment	Number of pods plant^{-1}		
	2017	2018	Pooled
T_1 - Vanvruddhi IBNM@ 12.5 kg ha^{-1}	21.36	24.87	23.11
T_2 - Vanvruddhi soil @ 12.5 kg ha^{-1} along with 100 % RDF	20.97	24.73	22.85
T_3 - Vanvruddhi Granules@ 20 kg ha^{-1} along with 100 % RDF	24.50	25.26	24.88
T_4 - Vanvruddhi soil @ 12.5 kg ha^{-1} along with 50 % RDF	21.94	22.30	22.12
T_5 - Vanvruddhi Granules@ 20 kg ha^{-1} along with 50 % RDF	28.16	28.85	28.51
T_6 - Cow Urine + Vanvruddhi Wettable Powder (1250 g mixed with 12.5 l Cow Urine)	20.66	22.02	21.34
T_7 - Pro-G Gold@ 625 ml ha^{-1}	21.60	22.26	21.93
T_8 - NOL + IBPM + Cow Urine (1000 ml + 250 ml + 12.5 l)	20.33	21.19	20.76
T_9 - RDF along with bio-fertilizers (20-40-00 kg NPK ha^{-1} + 5 ml/kg)	22.43	23.23	22.83
T_{10} - RDF Only (20-40-00 kg NPK ha^{-1})	22.24	22.00	22.12
S. Em. ±	01.31	01.24	00.87
C.D. (P=0.05)	03.81	03.59	02.46
C.V.%	11.72	10.45	11.07

Treatment T_5 (Vanvruddhi Granules@ 20 kg ha^{-1} alongwith 50 % RDF) gave significantly higher or more number of pods $plant^{-1}$ during both the years as well as in pooled results, which was at par with treatment T_3 (Vanvruddhi Granules@ 20 kg ha^{-1} alongwith 100 % RDF) during individual year.

NUMBER OF SEEDS POD^{-1}

Number of seeds per pod as influenced by different treatments during the years 2017, 2018 and in pooled analysis are presented in Tables 10 indicated that different treatments have significant influence on number of seeds per pod during the year 2017 and in pooled analysis.

Table 10 : Effect of various treatments on number of seeds pod^{-1} of greengram

Treatment	Number of seeds pod^{-1}		
	2017	2018	Pooled
T_1 - Vanvruddhi IBNM@ 12.5 kg ha^{-1}	11.61	12.87	12.24
T_2 - Vanvruddhi soil @ 12.5 kg ha^{-1} along with 100 % RDF	11.56	12.83	12.19
T_3 - Vanvruddhi Granules@ 20 kg ha^{-1} along with 100 % RDF	11.84	13.10	12.47
T_4 - Vanvruddhi soil @ 12.5 kg ha^{-1} along with 50 % RDF	12.23	13.49	12.86
T_5 - Vanvruddhi Granules@ 20 kg ha^{-1} along with 50 % RDF	13.08	14.35	13.72
T_6 - Cow Urine + Vanvruddhi Wettable Powder (1250 g mixed with 12.5 l Cow Urine)	11.87	13.14	12.51
T_7 - Pro-G Gold@ 625 ml ha^{-1}	11.60	12.87	12.23
T_8 - NOL + IBPM + Cow Urine (1000 ml + 250 ml + 12.5 l)	10.66	11.93	11.30
T_9 - RDF along with bio-fertilizers (20-40-00 kg NPK ha^{-1} + 5 ml/kg)	11.29	12.55	11.92
T_{10} - RDF Only (20-40-00 kg NPK ha^{-1})	13.07	14.30	13.70
S. Em. ±	0.47	0.64	0.37
C.D. (P=0.05)	1.37	NS	1.04
C.V.%	7.94	9.75	8.99

Treatment T_5 (Vanvruddhi Granules@ 20 kg ha^{-1} alongwith 50 % RDF) gave significantly higher number of seeds $pods^{-1}$ (13.08) during the year 2017 as well as in pooled results (13.72), which was at par with treatments of T_3, T_4, T_6 and T_{10} during the year 2017 and treatments of T_4 and T_{10} in pooled analysis.

SEED INDEX

Seed index (100 seed weight) as influenced by different treatments during the years 2017, 2018 and in pooled results are presented in Tables 11 indicated that different treatments have significant influence on seed index during the year 2018 and in pooled results.

Table 11: Effect of various treatments on seed index of greengram

Treatment	100- seed weight (g)		
	2017	2018	Pooled
T_1 - Vanvruddhi IBNM@ 12.5 kg ha^{-1}	6.51	6.27	6.39
T_2 - Vanvruddhi soil @ 12.5 kg ha^{-1} along with 100 % RDF	6.52	6.37	6.44
T_3 - Vanvruddhi Granules@ 20 kg ha^{-1} along with 100 % RDF	6.69	6.81	6.75
T_4 - Vanvruddhi soil @ 12.5 kg ha^{-1} along with 50 % RDF	6.60	6.95	6.78
T_5 - Vanvruddhi Granules@ 20 kg ha^{-1} along with 50 % RDF	6.96	7.11	7.04
T_6 - Cow Urine + Vanvruddhi Wettable Powder (1250 g mixed with 12.5 l Cow Urine)	6.47	6.37	6.42
T_7 - Pro-G Gold@ 625 ml ha^{-1}	6.52	6.74	6.63
T_8 - NOL + IBPM + Cow Urine (1000 ml + 250 ml + 12.5 l)	6.41	6.58	6.50
T_9 - RDF along with bio-fertilizers (20-40-00 kg NPK ha^{-1} + 5 ml/kg)	6.64	6.71	6.68
T_{10} - RDF Only (20-40-00 kg NPK ha^{-1})	6.59	6.76	6.67
S. Em. ±	0.15	0.12	0.09
C.D. (P=0.05)	NS	0.34	0.27
C.V.%	4.49	3.55	4.04

Significantly higher seed index (7.11 g, 7.04 g) was recorded in treatment T_5 (Vanvruddhi Granules@ 20 kg ha^{-1} alongwith 50 % RDF) during the year 2018 as well as in pooled results, which was at par with treatment T_3 (Vanvruddhi Granules@ 20 kg ha^{-1} alongwith 100 % RDF) and T_4 (Vanvruddhi soil @ 12.5 kg ha^{-1} along with 50 % RDF) during the year 2018 except pooled analysis. Non significant influence of treatments on seed index was observed during the first year 2017.

SEED YIELD

Results presented in Table 12 revealed that seed yield of green gram was affected significantly due to different treatments during the year 2017, 2018 and in pooled analysis.

Table 12: Effect of various treatments on seed yield of greengram

Treatment	Seed yield (kg ha^{-1})		
	2017	2018	Pooled
T_1 - Vanvruddhi IBNM@ 12.5 kg ha^{-1}	930	893	912
T_2 - Vanvruddhi soil @ 12.5 kg ha^{-1} along with 100 % RDF	944	986	965
T_3 - Vanvruddhi Granules@ 20 kg ha^{-1} along with 100 % RDF	1047	1012	1029
T_4 - Vanvruddhi soil @ 12.5 kg ha^{-1} along with 50 % RDF	999	1054	1026
T_5 - Vanvruddhi Granules@ 20 kg ha^{-1} along with 50 % RDF	1136	1143	1139
T_6 - Cow Urine + Vanvruddhi Wettable Powder (1250 g mixed with 12.5 l Cow Urine)	913	974	944
T_7 - Pro-G Gold@ 625 ml ha^{-1}	973	986	979
T_8 - NOL + IBPM + Cow Urine (1000 ml + 250 ml + 12.5 l)	788	925	857
T_9 - RDF along with bio-fertilizers (20-40-00 kg NPK ha^{-1} + 5 ml/kg)	1020	1060	1040
T_{10} - RDF Only (20-40-00 kg NPK ha^{-1})	992	1006	999
S. Em. ±	55	43	34
C.D. (P=0.05)	158	126	95
C.V.%	11.19	8.66	9.97

Treatment T_5 (Vanvruddhi Granules@ 20 kg ha^{-1} alongwith 50 % RDF) gave significantly higher seed yield of 1136 and 1143 kg ha^{-1} during the year 2017 and 2018, respectively, which was at par with treatment T_3 (Vanvruddhi Granules@ 20 kg ha^{-1} alongwith 100 % RDF), T_4 (Vanvruddhi soil @ 12.5 kg ha^{-1} along with 50 % RDF), T_9 (RDF along with biofertilizers) and T_{10} (Recommended dose of fertilizer) except T_3 and T_{10} during year 2018.

In pooled analysis, treatment (Vanvruddhi Granules@ 20 kg ha^{-1} alongwith 50 % RDF) gave significantly the highest seed yield of 1139 kg ha^{-1} and it was followed by treatment T_9 (RDF along with biofertilizers). Treatment of only chemical fertilizer, T_{10} (Recommended dose of fertilizer) was at par with all most all the treatments except T_5.

In the treatments of only organic application without chemical fertilizer, treatment T_7 (Pro-G Gold@ 625 ml ha^{-1}) recorded 979 kg ha^{-1} seed yield of greengram and remained at par with treatments of T_6 (Cow Urine + Vanvruddhi Wettable Powder, 1250 g mixed with 12.5 l Cow Urine) and T_1 (Vanvruddhi IBNM@ 12.5 kg ha^{-1}).

HAULM YIELD

Result presented in Table 13 revealed that haulm yield of green gram was affected significantly due to different treatments during the year 2018 and in pooled analysis only. Non significant influence of treatments observed for haulm yield during the year 2017.

Treatment T_5 (Vanvruddhi Granules@ 20 kg ha^{-1} alongwith 50 % RDF) gave significantly higher haulm yield of 1861 kg ha^{-1} during the year 2018, which was at par with treatment T_3 (Vanvruddhi Granules@ 20 kg ha^{-1} alongwith 100 % RDF), T_4 (Vanvruddhi soil @ 12.5 kg ha^{-1} along with 50 % RDF), T_7 (Pro-G Gold@ 625 ml ha^{-1}), T_9 (RDF along with biofertilizers) and T_{10} (Recommended dose of fertilizer).

In pooled analysis, treatment T_5 (Vanvruddhi Granules@ 20 kg ha^{-1} alongwith 50 % RDF) gave significantly higher seed yield of 1865 kg ha^{-1} and remained at par with the treatments T_3 (Vanvruddhi Granules@ 20 kg ha^{-1}

alongwith 100 % RDF), T_4 (Vanvruddhi soil @ 12.5 kg ha^{-1} along with 50 % RDF) and T_9 (RDF along with biofertilizers).

Table 13: Effect of various treatments on haulm yield of greengram

Treatment	Haulm yield (kg ha^{-1})		
	2017	2018	Pooled
T_1 - Vanvruddhi IBNM@ 12.5 kg ha^{-1}	1521	1279	1400
T_2 - Vanvruddhi soil @ 12.5 kg ha^{-1} along with 100 % RDF	1581	1577	1579
T_3 - Vanvruddhi Granules@ 20 kg ha^{-1} along with 100 % RDF	1749	1647	1698
T_4 - Vanvruddhi soil @ 12.5 kg ha^{-1} along with 50 % RDF	1699	1716	1707
T_5 - Vanvruddhi Granules@ 20 kg ha^{-1} along with 50 % RDF	1869	1861	1865
T_6 - Cow Urine + Vanvruddhi Wettable Powder (1250 g mixed with 12.5 l Cow Urine)	1481	1586	1534
T_7 - Pro-G Gold@ 625 ml ha^{-1}	1678	1605	1641
T_8 - NOL + IBPM + Cow Urine (1000 ml + 250 ml + 12.5 l)	1452	1506	1479
T_9 - RDF along with bio-fertilizers (20-40-00 kg NPK ha^{-1} + 5 ml/kg)	1786	1726	1756
T_{10} - RDF Only (20-40-00 kg NPK ha^{-1})	1585	1637	1611
S. Em. ±	119	93	72
C.D. (P=0.05)	NS	271	205
C.V.%	14.50	11.55	13.13

HARVEST INDEX

Non significant influence of different treatments was observed for harvest index (%) of green gram during both the year as well as in pooled analysis (Table 14).

Table 14: Effect of various treatments on harvest index

Treatment	Harvest Index (%)		
	2017	2018	Pooled
T_1 - Vanvruddhi IBNM@ 12.5 kg ha^{-1}	38.06	41.46	39.76
T_2 - Vanvruddhi soil @ 12.5 kg ha^{-1} along with 100 % RDF	37.48	38.76	38.12
T_3 - Vanvruddhi Granules@ 20 kg ha^{-1} along with 100 % RDF	37.55	38.05	37.81
T_4 - Vanvruddhi soil @ 12.5 kg ha^{-1} along with 50 % RDF	37.05	38.06	37.55
T_5 - Vanvruddhi Granules@ 20 kg ha^{-1} along with 50 % RDF	37.86	38.05	37.96
T_6 - Cow Urine + Vanvruddhi Wettable Powder (1250 g mixed with 12.5 l Cow Urine)	38.15	38.07	38.11
T_7 - Pro-G Gold@ 625 ml ha^{-1}	36.85	38.08	37.47
T_8 - NOL + IBPM + Cow Urine (1000 ml + 250 ml + 12.5 l)	35.50	38.07	36.78
T_9 - RDF along with bio-fertilizers (20-40-00 kg NPK ha^{-1} + 5 ml/kg)	36.61	38.08	37.35
T_{10} - RDF Only (20-40-00 kg NPK ha^{-1})	38.80	38.11	38.45
S. Em. ±	2.19	1.09	1.16
C.D. (P=0.05)	NS	NS	NS
C.V.%	11.70	5.69	9.12

PROTEIN CONTENT IN SEED

Protein content in seed is presented in Table 15 revealed that no significant influence of different treatments was observed for protein content in seed.

Table 15: Effect of various treatments on protein content in seed of greengram

Treatment	Seed Protein Content (%)
T_1 - Vanvruddhi IBNM@ 12.5 kg ha^{-1}	19.39
T_2 - Vanvruddhi soil @ 12.5 kg ha^{-1} along with 100 % RDF	21.34
T_3 - Vanvruddhi Granules@ 20 kg ha^{-1} along with 100 % RDF	20.64
T_4 - Vanvruddhi soil @ 12.5 kg ha^{-1} along with 50 % RDF	18.42
T_5 - Vanvruddhi Granules@ 20 kg ha^{-1} along with 50 % RDF	19.64
T_6 - Cow Urine + Vanvruddhi Wettable Powder (1250 g mixed with 12.5 l Cow Urine)	20.39
T_7 - Pro-G Gold@ 625 ml ha^{-1}	21.25
T_8 - NOL + IBPM + Cow Urine (1000 ml + 250 ml + 12.5 l)	20.00
T_9 - RDF along with bio-fertilizers (20-40-00 kg NPK ha^{-1} + 5 ml/kg)	19.55
T_{10} - RDF Only (20-40-00 kg NPK ha^{-1})	20.13
S. Em. ±	0.73
C.D. (P=0.05)	NS
C.V.%	7.23

SOIL STATUS AFTER HARVEST OF GREEN GRAM

The results of soil available nutrients status viz., organic carbon (%), available P_2O_5 (kg ha^{-1}), available K_2O, EC (dS m^{-1}) and pH after harvest of greengram crop are presented in Table 16.

Table 16: Effect of various treatments on soil fertility after harvest of greengram (after 2 years)

Treatment	EC (1:2.5) dSm^{-1}	pH (1:2.5)	OC (%)	Av. P_2O_5 (kg ha^{-1})	Av. K_2O (kg ha^{-1})
T_1 - Vanvruddhi IBNM@ 12.5 kg ha^{-1}	0.28	8.19	0.58	38	217
T_2 - Vanvruddhi soil @ 12.5 kg ha^{-1} along with 100 % RDF	0.22	8.07	0.43	32	268
T_3 - Vanvruddhi Granules@ 20 kg ha^{-1} along with 100 % RDF	0.24	8.21	0.53	31	260
T_4 - Vanvruddhi soil @ 12.5 kg ha^{-1} along with 50 % RDF	0.30	8.09	0.48	27	225
T_5 - Vanvruddhi Granules@ 20 kg ha^{-1} along with 50 % RDF	0.26	8.19	0.55	35	249
T_6 - Cow Urine + Vanvruddhi Wettable Powder (1250 g mixed with 12.5 l Cow Urine)	0.33	8.14	0.37	44	239
T_7 - Pro-G Gold@ 625 ml ha^{-1}	0.26	8.26	0.51	37	273
T_8 - NOL + IBPM + Cow Urine (1000 ml + 250 ml + 12.5 l)	0.31	8.11	0.44	34	228
T_9 - RDF along with bio-fertilizers (20-40-00 kg NPK ha^{-1} + 5 ml/kg)	0.25	8.09	0.62	32	263
T_{10} - RDF Only (20-40-00 kg NPK ha^{-1})	0.27	8.36	0.44	37	230
S. Em. ±	0.01	0.17	0.01	0.93	3.86
C.D. (P=0.05)	0.02	NS	0.03	2.70	11.20
C.V.%	5.53	4.20	3.81	5.36	3.15

The soil pH was unaffected due to different treatments. Treatment T_6 (Cow Urine + Vanvruddhi Wettable Powder, 1250 g mixed with 12.5 l Cow Urine) recorded significantly higher value of EC and it was at par with treatment T_8 (NOL + IBPM + Cow Urine, 1000 ml + 250 ml + 12.5 l).

The highest soil organic carbon (%) was observed in the treatment T_9 (RDF along with bio-fertilizers, 20-40-00 kg NPK ha^{-1} + 5 ml kg^{-1}) followed by treatment T_1 (Vanvruddhi IBNM@ 12.5 kg ha^{-1}). Significantly the highest available P_2O_5 was recorded in the treatment T_8 (Cow Urine + Vanvruddhi Wettable Powder, 1250 g mixed with 12.5 l Cow Urine) followed by treatment T_1 (Vanvruddhi IBNM@ 12.5 kg ha^{-1}). Treatment T_7 recorded significantly higher available K_2O and remained at par with the treatments of T_2 and T_9.

SUMMARY

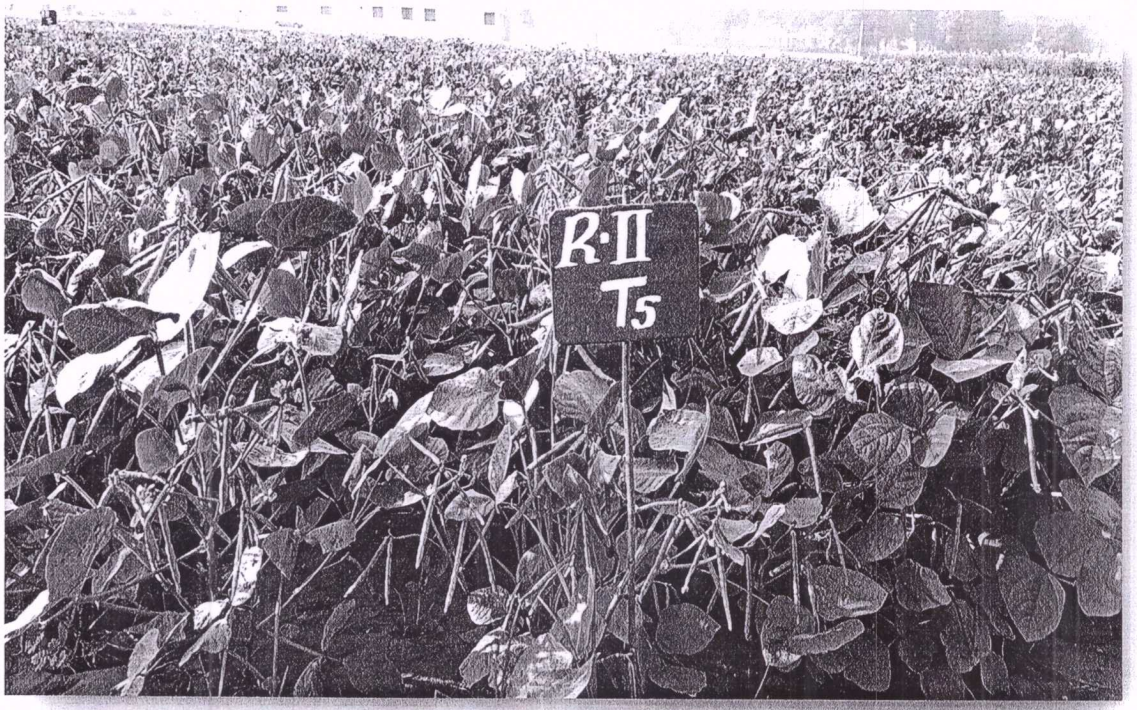
Experiment was conducted at Agronomy Farm, B. A. College of Agriculture, Anand Agricultural University, Anand, during summer 2017 and 2018 to study the effect of different organic products on the growth, yield attributes and yield as well as quality of green gram along with recommended dose of fertilizers.

On the basis of the two years data from experiments it was found that treatment T_5 (Vanvruddhi Granules @ 20 kg ha^{-1} along with 50 % RDF) was more effective in recording higher seed (1139 kg ha^{-1}) and haulm (1865 kg ha^{-1}) yields of green gram. In the treatments of only organic application without chemical fertilizer, treatment T_7 (Pro-G Gold@ 625 ml ha^{-1}) recorded 979 kg ha^{-1} seed yield of greengram and remained at par with treatment of T_6 (Cow Urine + Vanvruddhi Wettable Powder, 1250 g mixed with 12.5 l Cow Urine) and T_1 (Vanvruddhi IBNM@ 12.5). Moreover, treatment T_{10} (Recommended dose of fertilizer, 20-40-00 kg ha^{-1}) is as good as treatments of T_1, T_2, T_3, T_4, T_6, T_7, and T_9 as it remained at par with this treatments.

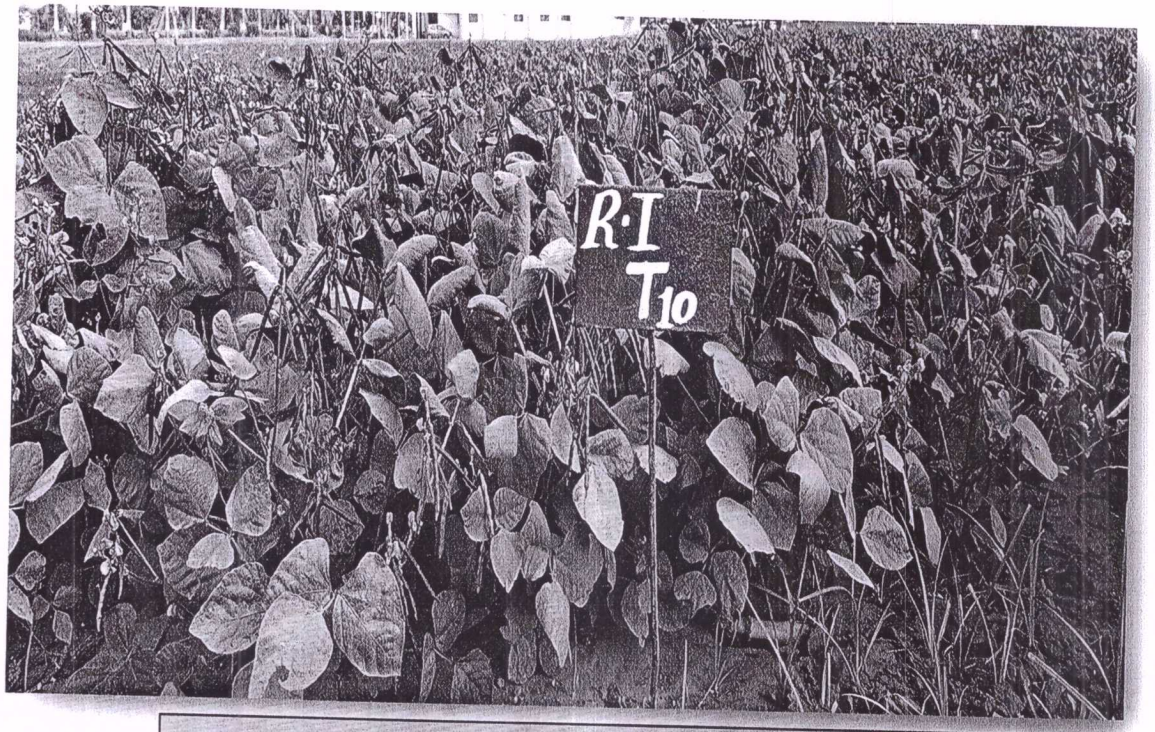
Most of the treatments are compatible to each other in recording yields and no wide differences observed. As far as quality is concerned, protein content in green gram seed is not affected significantly by different treatments. This indicated that all the treatments were equally effective.

As far as soil fertility status is concerned, the highest soil organic carbon (%) was observed in the treatment T_9 (RDF along with bio-fertilizers, 20-40-00 kg NPK ha^{-1} + 5 ml kg^{-1}) followed by treatment T_1 (Vanvruddhi IBNM@ 12.5 kg ha^{-1}). Significantly the highest available P_2O_5 was recorded in the treatment T_8 (Cow Urine + Vanvruddhi Wettable Powder, 1250 g mixed with 12.5 l Cow Urine) followed by treatment T_1 (Vanvruddhi IBNM @ 12.5 kg ha^{-1}). Treatment T_7 recorded significantly higher available K_2O and remained at par with the treatments of T_2 and T_9.

Experimental Field View



T_5 - Vanvruddhi Granules @ 20 kg ha^{-1} along with 50 % RDF



T_{10} - RDF Only (20-40-00 kg NPK ha^{-1})

T_9 - RDF along with bio-fertilizers

T_4 - Vanvruddhi soil @ 12.5 kg ha^{-1} along with 50 % RDF

T_3 - Vanvruddhi Granules @ 20 kg ha^{-1} along with 100 % RDF

CERTIFICATE

This is to certify that the work report containing 29 pages is true and authentic report of the project entitled "Evaluation of different organic products in moong (green gram) crop".

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