

Effect of organic manures on productivity, soil fertility and economics of greengram-sesamum crop rotation under dry farming conditions of North Gujarat

N. I. PATEL¹, C. K. PATEL^{2*}, R.N.SINGH³ AND B. S. PARMAR⁴

Centre for Natural Resources Management,
S. D. Agricultural University, Sardarkrushinagar -385506

Received: 09 July, 2018

Accepted: 17 December, 2019

ABSTRACT

A field experiment was conducted at the All India Co ordinate Research Project for Dry land Agriculture, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar, District Banaskantha (North Gujarat) during *kharif* seasons from 2007 to 2015 to study the effect of organic manures on productivity, soil fertility and economics of greengram-sesamum crop rotation under dry farming conditions of North Gujarat. The soil of experimental plot was loamy sand in texture, low in organic carbon and available nitrogen, medium in available phosphorous and high in available potash. Four treatments viz., T₁: Control (No fertilizer), T₂: RDF through chemical fertilizer, T₃: RDN through F. Y. M. and T₄: RDN through vermicompost were tested in Randomized Block Design with six replications. The results revealed that application of 20 kg N/ha to green gram and 50 kg N/ha to sesamum either through vermicompost or FYM recorded the highest yield and net profit in green gram-sesamum crop rotation as well as improve the soil fertility.

Key words: Greengram, Sesamum, Crop rotation, Vermicompost, FYM

Soil is an important natural resource that provides nutrition and quenches thirst of the plants/vegetation as per its physical, chemical and biological properties.

At present enough food grains (276 million tons) are produced for ensuring food security. Agro-chemicals were extensively used as soil nutrition, growth promoters and for controlling biotic and abiotic stresses. However, wrong crop husbandry and mentality of considering soil as dust bin to pour agro-chemicals indiscriminately for targeting higher yield has resulted in visible impact on the health of soil, environment and human. Bottomed up response of inputs, climate change, infirm soil

health etc are the evident repercussions that have become global concern.

Organic crop production is expected to expand in response to increased demand for organic food. Organic crop production system can bring back the cultivation on sustainable basis without affecting environment. Organic crop production system involves organic manures, oilcakes, green manures, liquid manures, bio-fertilizers etc. agronomic practices, crop rotation, bio-pesticides etc., apart from encouraging natural parasites, predators and parasitoids in the ecosystem. The management of soil organic matter and the rational use of organic inputs such as animal manures, crop residues, green manures, sewage, sludge and food industry waste would be major constraint in sustainable agriculture in forthcoming decades.

^{1,2&4}Associate Research Scientist, AICRPDA, CNRM, SDAU, Sardarkrushinagar and ³Director of Research, SDAU, Sardarkrushinagar *Email: rscnrm@sdau.edu.in

Farm yard manure seems to act directly for increasing the crop yields either by acceleration of respiratory process with increasing cell permeability and hormonal growth action or by combination of all these processes. It supplies nitrogen, phosphorus, potassium and micronutrients like Fe, S, Mo, Zn, etc. in available form to the plants through biological decomposition and improves the physico-chemical properties of soil such as aggregation, aeration, permeability, water holding capacity, slow release of nutrients, increase in cation exchange capacity, stimulation of soil flora and fauna etc. On an average, it contains 0.50, 0.17 and 0.55 per cent of N, P and K, respectively (Gaur, 1991).

Vermicompost is an aerobically degraded organic matter which has undergone chemical disintegration by the enzymatic activity in the guts of worms and also enzymes of the associated microbial population. It contains 0.80 to 1.10 % N, 0.40 to 0.80 % P_2O_5 and 0.80 to 0.98 % K_2O , 10 to 52 ppm Cu, 186.60 ppm Zn, 930.00 ppm Fe and plant growth promoting substances such as NAA, cytokinins, gibberellins, etc. (Giraddi, 2001 and Giraddi et al., 2006). It improves physico-chemical properties of the soil and enhances the microbial activity, crop growth and yield (Vasanthi and Kumaraswamy, 1999).

The green gram-seasamum crop rotation is predominant under dry farming areas of North Gujarat. Nutrient management plays vital role in improving soil fertility and yield potential of crops under organic farming

MATERIALS AND METHODS

A field experiment was conducted at the All India Co ordinate Research Project for Dry land Agriculture, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar, District Banaskantha (North Gujarat) during

kharif seasons from 2007 to 2015 to study the effect of organic manures on productivity, soil fertility and economics of green gram-seasamum crop rotation under dry farming conditions of North Gujarat. The soil of experimental plot was loamy sand in texture, low in organic carbon and available nitrogen, medium in available phosphorous and high in available potash. The experiment was conducted in Randomized block Design with four treatments viz., T_1 : Control (No fertilizer), T_2 : RDF through chemical fertilizer, T_3 : RDN through F. Y. M. and T_4 : RDN through vermicompost, replicated six times. Sesamum and greengram were taken in crop rotation in same experimental plot site. RDN was given through F. Y. M. and vermicompost on the basis of percentage of N content. Two sets of experiment were conducted simultaneously to get the results of both the crops every year. Rain water use efficiency (RWUE, kg/ha.mm) of different treatment was worked out on the basis of pooled seed yield of respective treatments divided by mean rainfall. Economics of different treatment was worked out on the basis of selling price of seed & straw at the time of harvest. Selling price of organic produced seed was 25 per cent prevailing price more than inorganic product. The sesamum variety GT 2 and green gram variety GM 4 were sown in rows at 45 cm apart using 2.5 kg sesamum seed/ha and 20 kg green gram seeds/ha. Other cultural operations and plant protection measures were applied as per recommendation of the region.

RESULTS AND DISCUSSION

Greengram:

Seed yield:

Seed yield of green gram was influenced significantly due to different treatments in individual year as well as in pooled (Table 1).

In the first year (2007) of the experimentation, application of RDF as chemical fertilizer recorded significantly the highest seed yield (703 kg/ha), but in subsequent years the application of recommended dose of nitrogen through vermicompost gave significantly higher seed yield over other treatments, but it was found at par with treatments T_3 (RDN through FYM) and T_2 (RDN through chemical fertilizer) in all the years except 2013, 2014 and 2015 where, it was found at par with treatment T_3 (RDN through FYM) only.

The result of pooled data was also found significant. Among the different treatments, application of RDN through vermicompost (T_4) recorded significantly higher seed yield (582 kg ha⁻¹) as compared to other treatments. However, it remained at par with treatment T_3 (RDN through FYM). The seed yield increased under treatments T_3 and T_4 was to the tune of 39.8 and 46.6 per cent higher over control (T_1) respectively.

The application of RDN in the form of FYM or Vermicompost might be resulted in the formation of more nodules, vigorous root development, better nitrogen fixation and better development of plant growth leading to higher photosynthetic activity and translocation of photosynthates to the sink which in turn resulted in better development of yield attributes and finally higher seed yield. These results are in confirmation with Patil *et al.*, (2012) in chickpea.

Stover yield:

Stover yield of green gram was influenced significantly due to different treatments in individual years as well as in pooled (Table 1).

In the first year (2007) of the experimentation, application of RDF recorded significantly higher stover yield than other treatments but it was found at par with treatments T_4 (RDN through vermicompost) and T_1 (control), while in subsequent years application of

recommended dose of nitrogen applied through vermicompost gave significantly higher yield as compared to other treatments, but it was found at par with treatments T_3 (RDN through FYM) and T_2 (RDN through chemical fertilizer) in all the years except 2013, 2014 and 2015, during these years, it was found at par with treatment T_3 (RDN through FYM).

The results of pooled data presented in Table 1 indicated that different treatments had significant effect on stover yield. Among the different treatments, application of RDN through vermicompost (T_4) recorded significantly higher stover yield (954 kg ha⁻¹) as compared to other treatments. However, it remained at par with treatments T_3 (RDN through FYM) and T_2 (RDN through chemical fertilizer kg ha⁻¹). The stover yield increased under treatment T_4 , T_3 and T_2 were to the tune of 38.9, 31.4 and 27.8 per cent over control (T_1), respectively. Similar findings were also recorded by Shwetha, 2008.

Sesamum:

Seed yield:

Data of seed yield of sesamum presented in Table 2 indicated that different treatments had significant effect on seed yield of sesamum in all the individual years as well as in pooled results. During first year (2007) amongst the treatments, treatment T_2 (RDN through chemical fertilizer) recorded significantly higher seed yield than rest of the treatments, however it remained at par with treatment T_4 (RDN through vermicompost). While in subsequent years during 2008, 2011, 2012 and 2014, treatment T_4 recorded significantly higher seed yield as compare to other treatments, but it remained at par with treatment T_2 in 2008 and, treatment T_3 (RDN through FYM) in 2011 and 2014, while in 2009 and 2010 treatment T_3 (RDN through

FYM) noted significantly higher yield than rest of the treatments however, it remained at par with treatments T_2 (RDN through chemical fertilizers) and T_4 (RDN through vermicompost).

Pooled results were found significant with respect to seed yield of sesamum, application of RDN through vermicompost (T_4) recorded significantly higher seed yield (329 kg/ha) than rest of the treatments but it remained at par with treatments T_3 (305 kg/ha) and T_4 (318 kg/ha) which were found equally effective and found significantly superior over treatment T_1 (Control). Increased in seed yield under treatment T_4 , T_3 and T_2 was to the tune of 43, 32.6 and 38.3 per cent more over control respectively.

Increased seed yield of sesamum by application of organic manures might be due to higher availability of nutrients to plants, besides increased water holding capacity and other physical properties which might have caused increased rate of infiltration. Similar results were also reported by Yadav and Vijayakumari (2003) in chilli and Patil *et al.* (2012) in chickpea.

Rain water use efficiency:

The results indicated that recommended dose of nitrogen applied through vermicompost recorded the highest rain water use efficiency (0.75 kg/ha.mm) of green gram and sesamum (0.49 kg/ha.mm) which were comparatively higher than control treatment.

Soil fertility:

Green gram:

Data of soil fertility status after harvest of green gram crop presented in Table 3 indicated that during 2007 soil available nitrogen and during 2007 and 2008, soil available P_2O_5 and K_2O were found to be non significant, while in subsequent years this values were differed significantly due to different treatments. In case of soil available N, treatment T_4 recorded significantly higher value during all the years except the year 2009, but it remained at par with treatment T_3 (100% RDN through FYM) in 2008,

2014 and 2015, were as in 2010, 2011, 2012 and 2013, it was found at par with treatments T_2 and T_3 .

In case of soil available P_2O_5 , treatment T_4 recorded significantly higher value during 2009, 2010, 2011, 2012 and 2013, than other treatments but it remained at par with treatment T_3 except 2013. While in 2014 and 2015, treatment T_3 recorded significantly higher value of soil available P_2O_5 , however, it was found at par with treatment T_4 .

With regard to soil available K_2O , treatment T_3 recorded significantly higher value over other treatments in all the years except 2015, but it remained at par with treatment T_4 in 2009, 2010 and 2014 and during 2011, 2012 and 2013 it remained at par with treatment T_2 and T_4 , where as in 2015 treatment T_3 and T_4 were found equally effective and found significantly superior over rest of the treatments.

In pooled results, treatment T_4 (100% RDN through vermicompost) recorded significantly higher value of soil available N and P_2O_5 , however it remained at par with treatment T_3 (100% RDN through FYM), in case of soil available K_2O , treatment T_3 and T_4 were found equally effective and found significantly superior over rest of the treatments.

Sesamum:

The data of soil fertility status after harvest of sesamum crop presented in Table 4 showed that during 2007 and 2008, soil available N, P_2O_5 and K_2O , did not differed significantly due to different treatments. While in subsequent years all these parameters of soil fertility differed significantly due to different treatments. Among the treatments Treatment T_2 (100% RDF through chemical fertilizer) registered significantly higher soil available N in the years 2009, 2010 and 2011, but it was found at par with treatments T_3 and T_4 , whereas during 2012, 2013, 2014 and 2015. treatments T_3 and T_4 were found equally effective and found significantly superior over other treatments.

In case of soil available P_2O_5 , treatments T_3 and T_4 were found equally effective and significantly superior over rest of the treatments during the years, 2009, 2014 and 2015, while treatment T_3 was found significantly superior over other treatments in the years 2010 to 2013.

With regards to soil available K_2O , treatment T_3 recorded significantly the maximum value in the year 2009, whereas during the years 2010 to 2013 and 2015, treatments T_3 and T_4 had similar effect and were found significantly superior over other treatments. In 2014, treatment T_3 recorded significantly higher soil available K_2O over other treatments but it remained at par with treatments T_2 and T_4 .

In pooled results, treatment T_4 (RDN through vermicompost) recorded significantly higher value of soil available N, however, it was found at par with treatment T_3 (RDN through FYM). In case of soil available P_2O_5 and K_2O were found significantly higher under treatment T_3 as compared to other treatments, but it remained at par with treatment T_4 (RDN through vermicompost).

After completion of experiment, application dose of nitrogen applied through FYM recorded maximum value of O.C. % followed by vermicompost.

The lowest values of O.C. % were recorded under control and RDF-chemical fertilizers. (Table 6)

Economics:

The results indicated that recommended dose of nitrogen applied through vermicompost to green gram-sesamum crop rotation recorded the highest gross and net income of Rs.98493.0 and 57348/ha, respectively followed by treatment T_3 (RDN through FYM) with gross and net return of Rs.92723 and 56828/ha respectively. Treatments T_4 and T_3 increased 43.9 and 6.6 percent net income respectively than treatments T_1 (control) and T_2 (RDF - chemical). However, the maximum B:C ratio (3.82) was recorded under control treatment (Table 7).

From the results of long term experiment it is concluded that application of 20 kg N/ha to green gram and 50 kg N/ha to sesamum either

through vermicompost or FYM recorded the highest yield and net profit in as well as improve the soil fertility in green gram-sesamum crop rotation on loamy sand soils under dry farming condition in organic farming

REFERENCES

- Gaur, A. C., 1991, Bulky organic manures and crop residues. In : Fertilizers, organic matter recyclable wastes and bio-fertilizers, H.L.S. Tandon, Fertilizer development and consultation Organization, New Delhi pp. 29-35.
- Giraddi, R. S., 2001, Vermitechnology (in Kannada), CAPART, GOI and University of Agriculturall. Science, Dharwad, Karnataka. pp. 1-60.
- Giraddi, R. S., Babalad, H. B. and Chandaragi, D. M., 2006, Vermicompost technology. Technical Bul., and University of Agriculturall. Science and DBT, New Delhi, pp. 1-6.
- Patil, S. V., Halikatti, S. I., Hiremath, S. M., Babalad, H. B., Sreenivasa, M. N., Hebsur, N. S. and Somanagouda, G. 2012, Effect of organics on growth and yield of chickpea (*Cicer arietinum* L.) in vertisols. *Karnataka Journal Agriculture Science*, **25** (3): 326-331.
- Shwetha, B. N., 2008, Effect of nutrient management through the organics in soybean-wheat cropping system. M.Sc. (Agri.) Thesis, Univ. Agric. Sci. Dharwad, Karnataka (India).
- Vasanthi, D. and Kumaraswamy, K., 1999, Effect of vermicompost to improve soil fertility and rice yield in. *Journal Indian Society Soil Science*, **47**: 268-272.
- Yadav, H. and Vijayakumari, B., 2003, Influence of vermicompost with organic and inorganic manures on biometric and yield parameters of chilli (*Capsicum annum* L.). *Crop Research*, **25** (2): 236-243.

Table 1 Effect of different treatments on yield of greengram crop (2007 to 2015)

Treatments	Yield (kg/ha)																				RWUE (kg/ha. mm)
	2007		2008		2009		2010		2011		2012		2013		2014		2015		Pooled		
	Seed	Straw	Seed	Straw	Seed	Straw	Seed	Straw	Seed	Straw	Seed	Straw	Seed	Straw	Seed	Straw	Seed	Straw	Seed	Straw	
T ₁ : Control (No fertilizer)	547	1340	456	1094	333	510	354	679	329	650	348	844	368	905	688	954	148	301	397	687	0.51
T ₂ : RDF through chemical fertilizer	703	1547	600	1370	439	689	483	897	403	782	508	1222	507	1224	839	1142	195	402	520	878	0.67
T ₃ : RDF through F.Y.M.	610	1214	583	1379	460	667	506	876	430	829	525	1261	580	1405	1072	1381	230	492	555	903	0.71
T ₄ : RDF through Vermi compost	621	1366	613	1533	479	735	527	949	449	862	552	1282	604	1458	1151	1413	245	521	582	954	0.75
SEM +	26	53	23	57	18	33	20	44	22	53	20	58	29	55	42	75	10	18	20.0	38.0	
CD (0.05)	79	238	68	172	55	100	60	134	65	159	61	175	89	164	126	227	31	55	58.2	114.8	
Y SEM +																				24.7	47.2
x CD																				69.1	142.5
T (0.05)																					
CV 5 %	10.4	12.1	9.88	10.4	10.5	12.5	10.4	12.81	13.2	16.6	10.2	12.31	13.9	10.7	10.9	15.1	12.3	10.5	11.8	13.7	
Av.Rainfall (mm) & Rain day	670 (41)		580 (25)		391.6 (17)		1191.2 (38)		915.3 (34)		628.2 (22)		1084 (37)		622.9 (24)		931.2 (12)		779.4 (27.8)		

Table 3 Effect of different treatments on soil fertility after harvest of green gram

Treatment Details	Soil available Nitrogen(kg/ha)									
	2007	2008	2009	2010	2011	2012	2013	2014	2015	Pooled
T1: Control	155	149	138	132	144	146	150	155	158	147
T2: 100%RDF (CF)	158	152	159	166	178	169	171	158	167	164
T3: 100% RDN (FYM)	161	165	154	162	174	177	179	181	180	170
T4: 100% RDN (VC)	165	167	158	168	179	176	182	189	187	175
SEM ±	6.3	4.6	2.7	2.7	8.3	2.7	3.9	4.0	4.2	2.2
CD at 5%	NS	13.8	8.2	8.2	24.9	8.2	11.6	13.0	12.7	6.3
YXT										
SEM ±										6.5
CD(0.05)										18.9
CV%	9.7	7.1	4.4	4.3	12.0	4.0	5.6	6.2	6.0	6.1
Initial value	165.8									
Treatment Details	Soil available P ₂ O ₅ (kg/ha)									
	2007	2008	2009	2010	2011	2012	2013	2014	2015	Pooled
T1: Control	42.5	41.9	37.8	34.7	42.9	42.9	41.0	45.1	35.2	40.4
T2: 100%RDF (CF)	45.6	43.6	41.5	44.0	52.2	52.3	50.3	45.0	44.2	46.5
T3: 100% RDN (FYM)	46.6	46.8	46.6	49.2	57.5	57.6	56.6	49.3	48.5	51.0
T4: 100% RDN (VC)	47.2	47.9	48.2	50.8	59.0	58.9	58.3	47.6	47.3	51.7
SEM ±	1.2	1.7	0.7	0.6	1.2	1.2	0.5	0.8	1.2	0.8
CD at 5%	NS	NS	2.1	1.8	3.5	3.5	1.4	2.4	3.5	2.4
YXT										
SEM ±										1.12
CD(0.05)										3.14
CV%	6.7	9.2	3.9	3.3	5.4	5.4	2.2	4.2	6.5	5.8
Initial value	45.8									
Treatment Details	Soil available K ₂ O(kg/ha)									
	2007	2008	2009	2010	2011	2012	2013	2014	2015	Pooled
T1: Control	190	178	178	164	179	180	179	169	177	177
T2: 100%RDF (CF)	202	184	181	192	206	205	207	174	199	194
T3: 100% RDN (FYM)	209	186	202	212	226	226	229	210	217	213
T4: 100% RDN (VC)	212	188	196	205	218	217	219	202	223	209
SEM ±	6.3	7.8	2.8	2.7	8.2	8.2	7.6	4.8	6.4	2.2
CD at 5%	NS	NS	8.3	8.2	24.7	24.7	22.9	14.6	9.1	6.4
YXT										
SEM ±										
CD(0.05)										
CV%	7.6	10.4	3.6	3.4	9.7	9.7	8.9	6.3	7.6	7.9
Initial value	212									

Table 4 Effect of different treatments on soil fertility after harvest of sesamum

Treatment Details	Soil available Nitrogen(kg/ha)									
	2007	2008	2009	2010	2011	2012	2013	2014	2015	Pooled
T1: Control	151	146	137	132	135	143	145	148	150	143.0
T2: 100%RDF (CF)	154	147	167	170	174	160	164	151	157	160.4
T3: 100% RDN (FYM)	158	161	160	163	167	171	176	170	175	166.7
T4: 100% RDN (VC)	161	163	164	169	173	178	183	165	172	169.7
SEM $\pm$	4.1	9.3	2.8	2.8	8.2	3.0	4.5	4.3	6.6	2.4
CD at 5%	NS	NS	8.5	8.4	24.8	9.1	13.5	12.9	19.7	7.0
YXT										
SEM $\pm$										5.6
CD(0.05)										15.5
CV%	6.5	14.7	4.4	4.3	12.5	4.6	6.6	6.6	9.8	8.5
Initial value	167									
Treatment Details	Soil available P ₂ O ₅ (kg/ha)									
	2007	2008	2009	2010	2011	2012	2013	2014	2015	Pooled
T1: Control	41.0	42.5	38.8	38.8	42.4	42.9	43.9	38.2	36.5	40.5
T2: 100%RDF (CF)	42.0	41.8	41.0	43.2	46.9	44.8	45.1	43.0	43.8	43.5
T3: 100% RDN (FYM)	44.0	45.3	46.8	49.1	52.6	51.3	53.1	47.1	52.9	49.1
T4: 100% RDN (VC)	45.2	48.5	47.5	41.9	45.3	48.0	46.4	45.0	51.0	47.0
SEM $\pm$	2.0	2.2	0.7	0.7	1.2	1.1	0.5	1.3	2.0	0.8
CD at 5%	NS	NS	2.0	2.0	3.5	3.2	1.6	3.8	6.0	2.3
YXT										
SEM $\pm$										1.4
CD(0.05)										4.0
CV%	11.3	11.8	3.7	3.8	6.1	5.6	2.7	7.1	10.7	7.7
Initial value	46.8									
Treatment Details	Soil available K ₂ O(kg/ha)									
	2007	2008	2009	2010	2011	2012	2013	2014	2015	Pooled
T1: Control	182	180	179	172	176	174	178	162	157	173
T2: 100%RDF (CF)	184	177	180	184	187	180	183	171	169	180
T3: 100% RDN (FYM)	188	189	210	213	218	214	220	182	185	202
T4: 100% RDN (VC)	186	191	198	205	209	216	215	178	183	198
SEM $\pm$	9.4	7.7	2.7	2.7	6.8	4.7	5.1	4.8	5.0	2.5
CD at 5%	NS	NS	8.2	8.1	20.6	14.2	15.3	14.4	15.1	7.4
YXT										
SEM $\pm$										5.8
CD(0.05)										16.3
CV%	12.5	10.2	3.5	3.4	8.5	5.9	6.3	6.7	7.1	7.6
Initial value	209									

Table 5 Effect of different treatments on soil fertility after harvest of the crops
(Pooled results from 2007 to 2015)

TREATMENTS	Soil nutrients availability(kg/ha)					
	Greengram			Sesamum		
	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O
T1:Control	147	40.4	177	150	40.5	173
T2:RDN through chemical ferti.	164	46.5	194	157	43.5	180
T3:RDF-FYM	170	51.0	213	175	49.1	202
T4:RDF-Vermicompost	175	51.7	209	172	46.5	198
SEM +	2.2	0.8	2.2	6.6	0.8	2.5
CD @ 5%	6.3	2.4	6.4	19.7	2.3	7.4
YXT						
SEM ±	6.5	1.1	6.4	5.6	1.4	5.8
CD (0.05)	18.9	3.1	NS	15.5	4.0	16.3
C.V. %	6.1	5.8	7.9	8.5	7.7	7.6
Initial values	165.8	45.8	212	167	46.8	209

Table 6 Effect of different treatments on organic carbon per cent

TREATMENTS	Organic Carbon (%)			
	Greengram		Sesamum	
	Initial	After completion of crop rotation	Initial	After completion of crop rotation
T1:Control	0.30	0.32	0.29	0.30
T2:RDN through chemical ferti.		0.33		0.32
T3:RDF-FYM		0.55		0.52
T4:RDF-Vermocompost		0.51		0.48

Table 7 Effect of different treatments on yield and economics of greengram -sesamum crop rotation (Pooled data)

Treatments	Yield (kg/ha)			Cost of cultivation (Rs/ha)	Gross income (Rs/ha)	Net Income (Rs/ha)	B : C ratio	RWUE (kg/ha.mm)	
	Greengram		Sesamu m					Gree ngra m	Sesamu m
	Seed	Straw	Seed						
T ₁ : Control (No fertilizer)	397	687	230	14145	54001	39856	3.82	0.51	0.34
T ₂ : RDF through chemical fertilizer	520	878	318	19131	72425	53294	3.79	0.67	0.47
T ₃ : RDF through F.Y.M.	555	903	305	35895	92723	56828	2.58	0.71	0.45
T ₄ : RDF through Vermi compost	582	954	329	41145	98493	57348	2.39	0.75	0.49
Price, Rs/kg	Greengram seed :70 , Stover:3.0, Sesamum seed 105,135, FYM:1.5, V.C.:3.0, Urea:6.0, DAP:24.5,N %: FYM: 0.50, Vemi compoct:0.80								
N %: FYM: 0.50, Vemi compoct: 0.80									