Influence of various sources of nutrients and their combinations on yield attributes and yield of chandrasur (*Lepidium sativum* L.)

ABHAY GUPTA, A.K. TRIPATHI, Y.K. DEWANGAN, R.K. SATYARAJ GURU AND MUKESH PRADHAN

Department of Agronomy, College of Agriculture, I.G.K.V, Raipur (C.G.)
INDIA

Abstract: The field experiment entitled "Influence of various sources of nutrients and their combinations on yield attributes and yield of chandrasur (*Lepidium sativum* L.)" was conducted during the *Rabi* 2018-19 at research cum instructional farm, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh. The soil of the experimental field was clayey in texture and neutral (pH 7.6) in reaction with medium fertility having 0.39 % soil organic carbon, low nitrogen (187.68 kg ha^{-1}), low phosphorous (12.29 kg ha^{-1}) and medium potassium (167.78 kg ha^{-1}) content. The experiment was laid out in randomized block design (RBD) with three replications and ten treatments *viz.* control (T_1), 50 % RDF (T_2), 100% RDF (T_3), FYM@10t ha^{-1}(T_4), FYM@ 5 t ha^{-1}+Vermicompost @1 t ha^{-1}+2 Foliar spray of Cow Urine + Vermi Wash 10% (T_5), 50% RDF+Azotobacter @3kg ha^{-1} + PSB@3kg ha^{-1} (T_6), 50% RDF+Azotobacter @ 3 kg ha^{-1} + PSB @ 3kg ha^{-1} +2 Foliar spray of Cow Urine+Vermi Wash 10% (T_7), 50% RDF + FYM@ 5 t ha^{-1}+ Azotobacter @ 3 kg ha^{-1} (T_8), 50% RDF + Vermicompost @ 1 t ha^{-1} +Azotobacter @ 3 kg ha^{-1} (T_9), 50% RDF+ 2 Foliar spray of N:P: K, 19:19:19, @ 3 kg ha^{-1} (T_{10}) . The test (GA-1) Cvariety of chandrasur was sown as per the treatments with a row to row distance of 30 cm on 5th November, 2018 and harvested on 26th February, 2018. The crop received 12.7 mm rainfall during the study period. The results revealed that among the treatments application 50% RDF with FYM@5 t ha^{-1} and Azotobacter @ 3kg ha^{-1}(T_8) registered significantly highest value of growth parameters *viz.* yield attributing characters like number of silique plant^{-1}(979.70), number of seeds silique^{-1}(1.84), test weight (1.85 g), seed yield (15.27q ha^{-1}), straw yield (18.59 q ha^{-1}), harvest index (45.09 %).. The application of 50% RDF with FYM@5 t ha^{-1} +Azotobacter @ 3kg ha^{-1}(T_8), FYM @10 t ha^{-1} (T_4) and 100 % RDF (T_3) increases the seed yield of chandrasur by 182.25, 153.23 and 142.14%, respectively over the control (T1) treatment. Application 50 % RDF +FYM 5 t ha^{-1}+ Azotobacter @3 kg ha^{-1}(T8) resulted in maximum net returns (₹64243 ha^{-1}), while, the maximum benefit:cost ratio (2.22) was obtained from treatment T3 (100 % RDF). Thus, the present study indicated that application of 50 % RDF combined with FYM @5 t ha^{-1}and Azotobacter @3 kg ha^{-1}as the best treatment to get optimum yield and highest net returns in chandrasur.

Key words: Chandrasur, Nutrient sources, Yield, Economics

1. Introduction

Chandrasur (*Lepidium sativum* L.) famous as garden cress belongs to the family Brassicaceae (Cruciferae). Some scientists say its origin in ethiopia and spread to various parts of the world from there. chandrasur is an annual plant, this is cultivated all over in India but the states producing chandrasur in plenty are U.P., Rajasthan, Gujarat, Maharashtra, M.P. and Chhattisgarh. The seed, leaves and roots are the economic parts of this crop. However, the crop is mainly cultivated for seeds in India. The seeds are known to contain a light yellow coloured oil and alkaloids such as lepidine and is sown after main crop in winter (rabi) season. The seeds of chandrasur are used to manufacture ayurvedic medicines. By and large, this is a crop which requires less inputs and yields more profits (Dubey et al., 2002). Mandal et al. (2008) stated that *Lepidium sativum* L., Dry seed is used as feed additive. Traditional sweets for lactating mothers are prepared from the seeds. Seeds are also used as animal feed to improve the milk production. Cress, grows up to a height of 50-60cm, the basal leaves have long petioles and culinary leaves are pinnate. The inflorescence is a dense raceme. The flowers have white or slightly pink petals, measuring 2 mm. The fruit, a siliqua measures 5-6 x 4mm, elliptical, elate form the upper half and is glabrous. It is an allogamous plant with self-compatible and self- incompatible forms and with various degrees of tolerance to prolonged autogamy. The diploid forms 2n=2x=16 and tetraploid forms 2n=4x=32 exist. (Anon., 1972).

The seeds resemble some of the oil seeds morphologically with the dicotyledon endosperm accounting for 80-85 per cent of the seed matter, whereas, the seed coat and embryo account for 12-17 per cent and 2-3 per cent of seeds respectively. The seed coat is brick red to cream coloured, the endosperm has yellow colour. The seeds contain alkaloids lepidine, glucotropaeolin, besides sinapin, sinapinic acid, mucilaginous matter (5%) and uric acid (0.108g per kg). Seeds also contain Vitamin-C and vitamins of B group. The seeds contain 25.5 per cent of yellowish brown semi-drying oil which has peculiar disagreeable odour. The saturated and unsaturated fatty acids in the oil include palmitic, stearic, oleic and linolenic acids. The unsaponifiable matter contains β-sitosterol and α-tocopherol. Seeds also contain 5.69 per cent moisture, 23.5 per cent protein, 15.9 per cent fat, 5.7 per cent ash, 1.65 percent phosphorus, 0.31 per cent calcium and 0.9 per cent of sulphur. The seed mucilage consists of cellulose (18.3%) and urolic acid containing polysaccharides. Flowering tops and seeds contain an amorphous bitter alkaloid lepidine. Leaves contain 82.3 per cent moisture, 5.85 per cent protein, 1 per cent fat, 8.7 per cent carbohydrates, 2.2 per cent mineral matter, 0.36 per cent calcium and 0.11 per cent phosphorus (George Watt, 1950).

2. Material and Methods

The present investigation entitles “**Influence of various source of nutrients and their combinations on yield attributes and yield of chandrasur (*Lepidium sativum* L.)”** was conducted at near herbal garden, university farm Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.), during the *rabi* season 2018. The natural used and the method employed in the conduct of this experiment is briefly described as follows:

Details of Experiment:

Location of the Experimental site

The present investigation was conducted at near herbal garden, university farm, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.), during *rabi* season of the years 2018.

Geographical Situation

Raipur is situated in the central part of the Chhattisgarh Plains and lies in between 21°.16’ N latitude and 81°.26’ E longitude at an altitude of 289.56 meters above mean sea level.

Agro-Climatic Condition

The experimental site comes under the seventh agro-climatic region of the country *i.e.* Eastern Plateau and hills. The general climate prevailing in the district Raipur, Chhattisgarh is sub-humid to semi-arid with annual rainfall varying from 1200 to 1400 mm. Most of the rainfall is received between the 15th June to 30th September and rest of rainfall occurs during post monsoon and winter season. The maximum temperatures during summer reach as high as 42-46°C and minimum temperatures during winter may go down to 7-9°C. The relative humidity is high during July to October months (96-100%).

Physio –Chemical properties of experimental site

The soil of Raipur belongs to four different orders viz. entisols, vertisols, inceptisols and alfisols. The black clayey soils of the experimental field belong to the order vertisols and is locally known as Kanhar. Kanhar soils are characterized by fine texture, sticky nature, angular blocky structures, low to medium nitrogen, high potassium and low to medium phosphorus status with low organic matter.

Treatment details

T_1	**:**	Control
T_2	**:**	50% RDF
T_3	**:**	100% RDF
T_4	**:**	FYM@10t ha^{-1}
T_5	**:**	FYM@ 5 t ha^{-1}+Vermicompost @1 t ha^{-1}+2 Foliar spray of Urine+Vermi Wash (10%)
T_6	**:**	50%RDF+Azotobacter@3 kg ha^{-1}+ PSB @3 kg ha^{-1}
T_7	**:**	50%RDF+Azotobacter@3 kg ha^{-1}+ PSB@3 kg ha^{-1}+2 Foliar spray of Cow Urine+Vermi Wash (10%)
T_8	**:**	50% RDF + FYM@ 5 t ha^{-1} + Azotobacter@3 kg ha^{-1}
T_9	**:**	50% RDF+Vermicompost@ 1 t ha^{-1} +Azotobacter@3 kg ha^{-1}
T_{10}	**:**	50%RDF+ 2 Foliar spray of N: P: K, 19:19:19, @3 kg ha^{-1}

3. Observations

Growth attributes observations

Growth attributes observations for recording various bio-metric observations, sample consisting of five plants was selected at random from each net plot. Observations on various pre-harvest parameters were made from the sample at different stages of crop growth (at 30, 60, 90 DAS and at harvest) and reported as plant^{-1} basis.

Plant population (number m^{-2})

In order to estimate the plant population m^{2}, plant population was recorded at 20 DAS per square meter and at harvest stage from each plot.

Plant height (cm)

Five randomly selected plants were tagged and the height of the plant was measured by using the meter scale from the plant base to the tip of the top most leaf at 30, 60, 90 DAS and harvest stage.

Numbers of leaves

In each plot, the number of leaves plant^{-1}of five randomly plant was counted separately at 30, 60 and 90 DAS of crop.

Number of primary branches

The branches of five randomly were selected tagged plants & recorded at 30, 60, 90 DAS and at harvest and then average was worked out.

Dry matter accumulation

Five plants were carefully removed from each plot, washed and dried at 60^{o}C in the oven. The dry matter was recorded in gram plant^{-1}at 30, 60, 90 DAS and the harvest stage.

Leaf area (cm^{2})

The leaf area of chandrasur plant were measured under the leaf area meter from samples taken for dry matter accumulation and the mean value converted to leaf area m^{-2}.

Yield attributes observations

Number of Silique plant^{-1}

The observation for silique tagged five randomly plants from each plot at the time of crop maturity were counted and average number of silique plant^{-1} was recorded.

Number of seeds silique^{-1}

The number of seeds for 10 randomly selected siliqua collected from each plot at crop maturity and calculated the average number of seeds siliqua-1.

Test weight (g)

Randomly seed samples were taken from each net plot. 1000 healthy seeds from the produce of each plot were counted then weight was recorded in gram accurately by using an electronic digital balance.

Seed yield q ha^{-1}

After full maturity of crop, plot wise crop were harvested and kept for 5 days in sunlight. And then threshing was done and seed yield per plot was recorded then converted into q ha^{-1}.

Straw yield q ha^{-1}

It was calculates by subtracting the grain yield from total bundle weight or total biomass and converted into q ha^{-1}.

Economics

Cost of cultivation (₹ ha^{-1})

The expenses incurred for all the routine operations from preparatory tillage to harvesting including threshing, cleaning as well as the cost of inputs *viz*. seed, fertilizers, pesticides, irrigation etc. applied to each treatment were calculated on the basis of prevailing market rates and cost of cultivation was worked out and presented as (₹ ha^{-1})

Gross return (₹ ha^{-1})

The gross return in terms of (₹ ha^{-1}) was worked out separately for each treatment converting seed yield and rate of seed on the basis of prevailing prices of market.

Net returns (₹ ha^{-1})

Net return of crop was obtained by deducting cost of cultivation from gross return.

Net return (₹ ha^{-1}) = Gross return (₹ ha^{-1}) – Cost of cultivation (₹ ha^{-1})

B:C Ratio

The B:C ratio was worked out by using the following formula: -

$$\text{B:C Ratio} = \frac{\text{Net return (Rs ha}^{-1}\text{)}}{\text{Cost of cultivation (Rs ha}^{-1}\text{)}}$$

4. Result Discussion

Post-harvest observations

Number of silique plant $^{-1}$

Data pertaining to number of silique plant^{-1} are presented in Table 4.7. The different treatment combinations of nutrients sources showed significant influence on no of silique plant^{-1}. Among all the treatments the highest number of silique plant^{-1} (979.70) was recorded under the 50% RDF + FYM@ 5t ha^{-1}+ Azotobacter (T_8) and it was found at par with the FYM@10t ha^{-1}(T_4) and 100% RDF (T_3) treatments, respectively.

This is due to the fact that the 50% RDF immediate nutrient requirement specially nitrogen. While, FYM@5t ha^{-1}. with its slow releasing effect released the nutrients throughout the cropping period. Azotobacter could also contribute significantly by way of N fixation. The lowest number of silique per plant was noticed under the control (T_1) treatment. Similar result was obtained by Singh *et al.* (2016) and Harisha (2010).

Number of seeds silique^{-1}

Data pertaining to number of seeds per silique as influenced by different sources of nutrients are presented in Table 4.7. The different treatment combinations of Nutrients sources showed significant influence on no of seeds per silique per. The highest number of seeds silique^{-1} (1.84) was noticed under the 50% RDF + FYM@ 5t ha^{-1}+ Azotobacter (T_8) treatment followed by 1.68, and 1.63 in FYM@10t ha^{-1}(T_4) and 100% RDF (T_3) treatment respectively. Whereas, the control (T_1) treatment recorded with the lowest number of seeds silique^{-1}.

The higher number of seeds silique^{-1} recorded in these treatments might be due to higher availability and supply of nutrients at peak periods of nutrients demand, which lead to produce more number of seeds per siliqua. Similar finding was obtained by Singh *et al.* (2016) and Harisha (2010).

Test weight (g)

Data with respect to test weight are presented in Table 4.7. The data revealed that the 50% RDF + FYM@ 5 t ha^{-1}+ Azotobacter (T_8) treatment recorded the highest 1000 seed weight (1.85 g) followed by (1.84 g) and (1.84 g) in FYM@10t ha^{-1}(T_4) and 100% RDF (T_3) treatment, respectively. However, the lowest test weight (1.78) was obtained under the control (T_1) treatment. Similar finding was obtained by Singh *et al.* (2016) and Harisha (2010).

Seed yield

Data pertaining to seed yield are presented in Table 4.8. It was distinct from the data that the different nutrients sources treatment significantly influenced the grain yield. The application of 50% RDF + FYM@ 5 tha^{-1}+ Azotobacter (T_8) treatment proved significantly superior by producing higher seed yield. Among the treatments, the maximum yield (15.27 q ha^{-1}) was recorded under the application of 50% RDF + FYM@ 5 t ha^{-1}+ Azotobacter (T_8) followed by (13.70, 13.10 q $ha^{-}1$) in FYM@10t ha^{-1} (T_4) and 100% RDF (T_3) treatment, respectively. The FYM@10t ha^{-1} (T_4) treatment was at par with the 50% RDF + FYM@ 5 t ha^{-1}+ Azotobacter (T_8) treatment. The lowest seed (5.41 q ha^{-1}) yield was observed under the control (T_1) treatment. These finding were in confirmatory with the finding of Singh *et al.* (2016) and Kumar (2017).

The lowest grain yield in control (T_1) treatment might be indicates that supplementing the nutrients 50 % RDF organic sources like FYM, and soil application with Azotobacter improve physical, chemical and biological properties of soil and also increase the crop yield and yield attributes. lower availability of essential nutrients for reduced the proper growth and development of plant, which reduced the uptake of nutrients resulting in reduced photosynthesis and translocation of carbohydrates from source to sink. The increase in seed yield over the control (T_1) treatment in different sources treatments was attributed to the luxuriant growth of plant due to supply and uptake of nutrients. Similar finding was obtained by Harisha (2010).
Hemalatha (2007) in garden cress and Chauhan *et al.* (1995) in Indian mustard. Beneficial effects of *Azatobacter* and PSB might directly affect the plant growth and sometimes increased seed yield because of nitrogen fixation, solubilization of phosphorus and production of some growth promoting substances which indirectly influenced the soil microflora in rhizosphere (Vancura, 1961).

Straw yield

Data pertaining to straw yield is presented in Table 4.8. The data shows that the highest straw yield (18.59 q ha^{-1}) was obtained under the 50% RDF + FYM@ 5 t ha^{-1} + Azotobacter (T_8) treatment. It was found at par (17.44 and 17.12 q ha^{-1}) with the application of FYM@10ha^{-1} (T_4) and 100% RDF (T_3) treatment, respectively. The lowest straw yield (12.43 q ha^{-1}) was observed under the control (T_1) treatment. This finding were in confirmatory with the finding of Harisha (2010).

Harvest index

The data with reference to harvest index is presented in Table 4.8. It was distinct from the data that the different nutrients sources treatment significantly influenced the Harvest index. The highest harvest index (45.09%) was computed under the application of 50% RDF + FYM@ 5 t ha^{-1}+ Azotobacter (T_8) treatment, which was at par with the FYM@10t ha^{-1} (T_4), 100% RDF (T_3), 50% RDF+ Vermicompost@ 1 t ha^{-1}+Azotobacter (T_9) and FYM@ 5 t ha^{-1} +vermicompost @1 t ha^{-1}+2 Foliar spray of Cow Urine+vermi Wash (10%) (T_5) treatments, respectively. The control (T_1) treatment computed with the lowest harvest index (30.32).

The data indicates that application of 50% RDF, combination with FYM @5t ha^{-1} and biofertilizer (Azotobacter) 3 kg ha^{-1} has shown higher harvest index as compared to rest of the treatments where 100% RDF or FYM applied alone. This is due to the fact that influenced the harvest index significantly. However, higher levels of FYM and biofertilizers (Azotobacter have synergistic effect on plant height, number of primary branches which has resulted in higher dry matter accumulation per plant which is attributed to better photosynthates production, accumulation and translocation to the sink. Similar observations have been made by Hemalatha (2007) in chandrasur.

5. Economics

The economics of chandrasur as influenced by different nutrient sources based upon the prevailing market price of inputs and outputs are given in Table 4.14. It was evident from the data that the highest cost of cultivation was computed under the FYM@ 5 t ha^{-1} +vermicompost @1 t ha^{-1} +2 Foliar spray of Cow Urine+Vermi Wash (10%) (T_5) treatment. The control (T_1) treatment gave minimum cost of cultivation. The maximum gross monetary return (₹93,479 ha^{-1}) was found under the 50% RDF + FYM@ 5 t ha^{-1}+ Azotobacter (T_8) treatment followed by (₹83,944 and ₹80312 ha^{-1}) FYM@10t ha^{-1} (T_4) and 100% RDF (T_3) treatments respectively. The least gross monetary return (₹33704 ha^{-1}) was recorded under the control (T_1) treatment. In case of net monetary return, the maximum net monetary return (₹ 64,243 ha^{-1}) was noted under 50% RDF + FYM@ 5 tha^{-1}+ Azotobacter (T_8) treatment followed by (55405 and50358 ₹ ha^{-1})100% RDF (T_3) and FYM@10t ha^{-1}(T_4) treatment respectively. The minimum net monetary return (₹ 12,317ha^{-1}) was noted under the control (T_1) treatment, which accounts for a net loss of ₹ 44467 ha^{-1}(69.21%) as compare to the 50% RDF + FYM@ 5 t ha^{-1}+ Azotobacter (T_8) treatment.

The highest B:C ratio (2.22) was found under the application of 100% RDF (T_3) treatment followed by (2.17and 1.49) 50% RDF + FYM@ 5 t ha^{-1}+ Azotobacter (T_8) and FYM@10t ha^{-1}(T_4) treatment. The minimum B:C ratio (0.56) was computed under the control (T_1) treatment. The maximum B:C ratio under the application of 100% RDF (T_3) was due to the fact that there was relatively higher net monetary return associated with lower cost of cultivation. This finding were in confirmatory with the finding of Kumar, (2017).

6. Conclusion

The present investigation reveals that, there was an improvement in the growth, yield, quality and net profit in chandrasur crop due to combined application of sources of nutrients. Based on the results of the study it is concluded that application of 50% RDF combined with FYM 5 t ha^{-1}and Azotobacter @3kg/ha (T_8) proved to be the best considering the yield attributes like Number of silique plant^{-1} (979.70), Number of seeds silique^{-1} (1.84), Seed yield (15.27 q ha^{-1}). Net returns (₹ 64,243 ha^{-1}) followed by FYM @10 t ha^{-1} (T4) and 100% RDF (T3).With respect to the benefit:cost ratio application of 100% RDF was found be higher (2.22) followed by the application of 50% RDF combined with FYM 5t ha^{-1}and Azotobacter @3kg ha^{-1} (T_8). Hence, FYM 10t ha^{-1} is also economical to obtain higher net returns in cultivation of garden cress organically under Chhattisgarh condition.

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Table: 1 Effect of different nutrient sources and their combinations on number of silique plant, $^{-1}$ number of seeds slique^{-1}, test weight (g)

	Treatments	No. of silique plant^{-1}	No. of seeds silique^{-1}	Test weight (g)
T1 :	Control	705.53	1.52	1.78
T2 :	50% RDF	747.83	1.51	1.79
T3 :	100% RDF	974.57	1.63	1.84
T4 :	FYM@10 tha^{-1}	977.90	1.68	1.84
T5 :	FYM@tha^{-1}.+vermicompost@1 tha^{-1}+ two foliar spray of cow urine+10%vermi wash	882.20	1.53	1.82
T6 :	50%RDF+ Azotobacter@3kg ha^{-1}+PSB@3kg ha^{-1}	797.60	1.50	1.81
T7 :	50%RDF+Azotobacter@3kgha^{-1}+PSB@3 kg ha^{-1}+2 Foliar spray of cow urine+vermiwash 10%	800.37	1.52	1.81
T8 :	50% RDF+FYM@5 tha^{-1}+ Azotobacter@3kg ha^{-1}	979.70	1.84	1.85
T9 :	50% RDF+vermicompost@1 tha^{-1}Azotobacter@3kg ha^{-1}	884.83	1.53	1.82
T10 :	50%RDF+2 foliar spray of N:P:K,19:19:19, 3 @3kg ha^{-1}	774.37	1.52	1.83
SEm±		**26.71**	**0.05**	**0.06**
CD (0.05)		**79.36**	**0.15**	**0.17**

Table:2 Effect of different nutrient sources and their combinations on seed yield q ha^{-1}, straw yield q ha^{-1}, harvest index

	Treatments	Seed yield (q ha^{1})	Straw yield (q/ha^{1})	Harvest index %
T1 :	Control	5.41	12.43	30.32
T2 :	50% RDF	7.08	13.46	34.38
T3 :	100% RDF	13.10	17.12	43.34
T4 :	FYM@10 t ha^{-1}	13.70	17.44	43.99
T5 :	FYM@5 t ha^{-1}vermicompost@1 t ha^{-1}+ two foliar spray of cow urine+10%vermi wash	11.38	16.04	41.51
T6 :	50%RDF+ Azotobacter@3kg ha^{-1} +PSB@3kg ha^{-1}	9.10	15.57	36.89
T7 :	50%RDF+ Azotobacter @3kg ha^{-1}+PSB@3kg ha^{-1}+2 Foliar spray of cow urine+vermiwash 10%	9.55	15.66	37.90
T8 :	50% RDF+FYM@5t ha^{-1}a+ Azotobacter@3kg ha^{-1}	15.27	18.59	45.09
T9 :	50% RDF+vermicompost@1 t ha^{-1}.+ Azotobacter@3kg ha^{-1}	11.51	16.10	41.68
T10:	50%RDF+2 foliar spray of N:P:K,19:19:19, 3@3kg ha^{-1}	7.15	14.69	32.77
	SEm±	**0.56**	**0.58**	**1.34**
	CD (0.05)	**1.66**	**1.71**	**3.97**

Table 4.14 effect of different nutrient sources and their combinations on economics of chandrasur

	Treatments	Cost of cultivation ₹ ha^{-1}	Gross return ₹ ha^{-1}	Net return ₹ ha^{-1}	B:C Ratio
T1 :	Control	21586.00	33703	12117	0.56
T2 :	50% RDF	23246.50	43406	20160	0.86
T3 :	100% RDF	24907.00	80312	55405	2.22
T4 :	FYM@10 t ha^{-1}	33586.00	83944	50358	1.49
T5 :	FYM@5tha^{1}vermicompost@1t ha^{-1}+two foliar spray of cow urine+10%vermi wash	37586.00	69886	32300	0.85
T6 :	50%RDF+Azotobacter@3kg ha^{-1}+PSB@3kg ha^{-1}	23846.00	56157	32311	1.35
T7 :	50%RDF+Azotobacter@3kgha^{-1}+PSB@3kg ha^{-1}+2 Foliar spray of cow urine+vermiwash 10%	28846.00	58866	30040	1.04
T8 :	50% RDF+FYM5 t ha^{-1}+Azotobacter@3kg ha^{-1}	29546.00	93479	64243	2.17
T9 :	50%RDF+vermicompost@1t ha^{1}+Azotobacter@3kg ha^{-1}	28546.00	70670	42124	1.47
T10:	50%RDF+2 foliar spray of N:P:K,19:19:19,3@ kg/ha.	24593.00	44369	19776	0.80