International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
IJCS 2019; 7(6): 294-296

Received: 04-01-2019
Accepted: 06-02-2019

V Sujatha
Agricultural Research Station, Yelamanchili, Andhra Pradesh, India

SVS Gangadhara Rao
Agricultural Research Station, Yelamanchili, Andhra Pradesh, India

Corresponding Author:
V Sujatha
Agricultural Research Station, Yelamanchili, Andhra Pradesh, India

Seed yield and economics of sesame (*Sesamum indicum* L.) as effected by application of organic sources of nutrients in North coastal zone of Andhra Pradesh

V Sujatha and SVS Gangadhara Rao

Abstract
A field experiment was conducted at the Agricultural Research Station, Yellamanchili, Visakhapatnam Dist., Andhra Pradesh during *rabi* season of 2015-16 to study the effect of organic sources of nutrients *viz*., FYM, vermicompost, neemcake and press mud cake on growth, yield and economics of sesame. The experiment was laid out in randomized block design with three replications. The results of the investigation showed that Improved practices *i.e*., 40:20:20 kg NPK/ha (T_2) recorded significantly higher seed yield (532.4 kg/ha) and net monetary returns (2.18) over other treatments. Among the organic manures tested, application of FYM (4 t/ha) + NC (0.4 t/ha) (T_7) recorded significantly higher seed yield 468.6 kg/ha) and B: C ratio (1.46) over rest of the treatments.

Keywords: Organic manures, sesame, seed yield, economics

Introduction
Sesame (*Sesamum indicum* L.) is the oldest indigenous oilseed crop of India. It is grown for its rich source of oil. Sesame seeds contain 45- 55% oil and 25 % protein. Sesame proteins are limited by lysine but rich in tryptophan and methionine. Sesame oil is rich in unsaturated fatty acids, mainly oleic and linoleic acids. In India, sesame is cultivated in 1.75 m ha area with a production of 0.77 million tonnes and productivity of 410 kg ha^{-1}. (Ministry of Agriculture & Farmers welfare, G.O.I, 2018). In Andhra Pradesh, it is grown in an area of 0.64 lakh ha with a production of 0.17 lakh tonnes and productivity of 257 kg ha^{-1} (Agricultural Statistics at a glance, 2016-17).

The productivity of sesamum in Andhra Pradesh is low as compared to India, due to its cultivation in poor fertile soils and poor agronomic management particularly nutrient management. Excessive use of chemical fertilizers in intensive cropping systems leads to deterioration of soil health, decline in soil organic carbon and overall nutrient imbalances. Hence, nutrient management through organics improves the physical, chemical and biological properties of soil besides enhancing crop productivity on sustainable basis. Addition of organic manures *viz*., FYM, vermicompost, neem cake and press mud cake etc. not only supply the essential plant nutrients but also improves the soil structure. Therefore, the present study was undertaken to evaluate different organic sources of nutrients on yield and economics of sesame in North coastal zone of Andhra Pradesh.

Materials and Methods
A field experiment was conducted on sandy loam soils of Agricultural Research Station, Yellamanchili, Visakhapatnam Dist., Andhra Pradesh during *rabi* season of 2015-16. The experiment was laid out in a randomized block design with three replications. The soil of the experimental site was sandy loam in texture, slightly alkaline in reaction (pH 7.6), with 0.20% organic carbon and 188, 20 and 102 kg ha^{-1} of N, P and K, respectively. The experiment consisted of nine treatments *viz*., T_1 - Control (no manures & chemical fertilizers), T_2 - Improved practices (40:20:20 kg NPK/ha), T_3 - FYM @ 8 t/ha, T_4 - Vermicompost @ 2.6 t/ha, T_5 - Neem cake @ 0.8 t/ha, T_6 - Press mud cake @ 2 t/ha, T_7 - FYM (4 t/ha) + NC (0.4 t/ha), T_8 -VC (1.3 t/ha) + NC (0.4 t/ha), T_9 -Press mud cake (1.0 t/ha) + NC (0.4 t/ha). Sesame cv. YLM-66 was sown @ 5 Kg seeds/ha in rows of 30 cm apart.

Thinning of overcrowded plants and gap filling was done 7 days after sowing maintaining the plant to plant distance in the row at 10 cm. Well decomposed FYM, vermicompost, neemcake and press mud cake with 0.5%, 1.5%, 5.0% and 2.1% N, respectively was used as organic sources of nutrients. The required quantities of organic manures were incorporated (10 days before sowing of the crop) in the soil based on the N- equivalent basis. In the treatment T_1, recommended doses of 40 kg N + 20 kg P_2O_5 + 20 kg K_2O/ha in the form of urea (46% N), single super phosphate (16% P_2O_5) and murate of potash (60% K_20) were applied to the sesame crop. Half of the total nitrogen was applied at the time of sowing and rest of nitrogen was top dressed at 30 days after sowing. Full dose of P_2O_5 and K_2O was given at the time of sowing. Recommended agronomic practices and plant protection measures were followed to maintain a healthy crop. The data on growth, yield attributes and seed yield were recorded at the time of harvest. The economic analysis of the treatments was also made on the basis of mean seed yield. The Data was subjected to statistical analysis.

Results and Discussion

Growth

Plant height, number of branches, number of capsules and seed yield at maturity was significantly influenced by application of organic manures (Table1). Application of 40-20-20 Kg NPK/ha -Improved practices (T_1) recorded significantly taller plants (96.3 cm) over all other treatments. Among the different organic manures tested, application of FYM (4 t/ha) + NC (0.4 t/ha) (T_7) recorded significantly higher plant height (87.1 cm) over rest of the organic treatments.

The higher plant height in T_1 *i.e.* Improved practices (40-20-20 Kg NPK/ha) might be due to the quick release and increased availability of nutrients as compared to organic sources of nutrients. Whereas, increase in plant height in FYM (4 t/ha) + NC (0.4 t/ha) (T_7) treated plot might be due to its higher content of N which was readily available to crops. These results are in agreement with the findings of Duhoon S.S *et al*. (2004) [3].

Significantly lower plant height (56.5 cm) was recorded with control (T_1).

Significantly maximum number of branches plant^{-1} (4.97) was observed with the adoption of Improved practices *i.e*., 40-20-20 Kg NPK/ha (T_1). The chemical fertilisers are readily soluble in water and therefore readily available to plants. Among the organic sources tested, application of FYM (4 t/ha) + NC (0.4 t/ha) (T_7) recorded significantly higher number of branches plant^{-1} (4.55) over all other organics. This might be due to higher nitrogen content coupled with quick release of nutrients to synchrony with the crop demand. The results are in conformity with the findings of Deshmukh M R and Duhoon S S (2008) [1].

Significantly lower number of branches plant^{-1} (3.04) was recorded with control (T_1).

Significantly highest number of capsules per plant (93.4) was observed with the adoption of Improved practices *i.e*., 40-20-20 Kg NPK/ha (T_1). This might be due to faster mineralization of nutrients as compared to organic sources of nutrients. Among the organic sources tested, application of FYM (4 t/ha) + NC (0.4 t/ha) (T_7) recorded significantly higher number of capsules per plant (84.2) over rest of the organic sources of nutrients. This might be associated with continuous slow release of nutrients at critical stages of crop growth period. Similar results were also obtained by Takar SS *et al*. (2017) [10].

The lowest number of capsules per plant (54.2) was recorded with control (T_1).

Seed Yield

Significantly higher seed yield of 532.4 kg ha^{-1} was obtained with the application of Improved practices *i.e.* 40-20-20 kg NPK ha^{-1} over rest of the treatments. Thus, an increased availability of nutrients might have increased all the growth and yield attributing characters which finally contributed to increase the seed yield compared to organic sources of nutrients.

Among the organic nutrient sources tested, highest seed yield of 468.6 kg ha^{-1} was obtained with the application of FYM (4 t/ha) + NC (0.4 t/ha) (T_7) might be due to the addition of secondary and micronutrients along with the major nutrients might have increased the nutrient absorption capacity which intern reflected in seed yield of sesame. Similar results were also reported by Kapil Ahirwar *et al*. (2017) [6].

Control treatment (T_1) recorded the lowest seed yield (164.3 kg/ha).

Economics

The data regarding Economics and B: C ratio of sesame are presented in Table 2. The highest gross returns (Rs.42592 ha^{-1}) was obtained with the application of Improved practices *i.e*., 40-20-20 kg NPK ha^{-1} closely followed by T_7 *i.e*., FYM (4 t/ha) + NC (0.4 t/ha) (Rs.37488 ha^{-1}). The highest net returns and B: C ratio (Rs.29202 ha^{-1} and 2.18 respectively) were obtained from treatment T_2 *i.e*., Improved practices (40:20:20 kg NPK ha^{-1}) and it was followed by T_7 *i.e*., FYM (4 t/ha) + NC (0.4 t/ha) with net returns of Rs. 22238 ha^{-1} and B: C ratio of 1.46 respectively. These results are in accordance with the findings of Kamlesh Choudhary *et al*. (2017) [5].

Table 1: Effect of organic sources of nutrients on growth, yield attributes and yield of sesame.

Treatments	Plant height (cm)	No. of branches Plant^{-1}	No. of capsules Plant^{-1}	Seed yield (kg ha^{-1})
T_1 – Control (no manures & chemical fertilizers)	56.5	3.04	54.2	164.3
T_2 - Improved practices (40:20:20 kg NPK/ha)	96.3	4.97	93.4	532.4
T_3 - FYM @ 8 t/ha	76.6	4.06	74.3	359.1
T_4 - Vermicompost @ 2.6 t/ha	66.4	3.46	62.8	229.2
T_5 - Neem cake @ 0.8 t/ha	74.7	3.87	71.5	325.7
T_6 - Press mud cake @ 2 t/ha	70.0	3.91	68.6	310.3
T_7 - FYM (4 t/ha) + NC (0.4 t/ha)	87.1	4.55	84.2	468.6
T_8 –VC (1.3 t/ha) + NC (0.4 t/ha)	68.3	3.48	65.7	252.8
T_9 –Press mud cake (1.0 t/ha) + NC (0.4 t/ha)	78.2	4.12	76.1	374.5
S.Em ±	2.86	0.16	2.57	20.62
CD (P = 0.05)	8.57	0.41	7.71	61.83
CV%	6.6	7.2	6.2	10.7

Table 1: Effect of organic sources of nutrients on Economics and B:C ratio of sesame.

Treatments	Gross returns (Rs ha^{-1})	Cost of cultivation (Rs ha^{-1})	Net returns (Rs ha^{-1})	B:C Ratio
T_1 – Control (no manures & chemical fertilizers)	13144	10150	2994	0.29
T_2 - Improved practices (40:20:20 kg NPK/ha)	42592	13390	29202	2.18
T_3 - FYM @ 8 t/ha	28728	11950	16778	1.40
T_4 - Vermicompost @ 2.6 t/ha	18336	30950	-12614	-0.41
T_5 - Neem cake @ 0.8 t/ha	26056	18550	7506	0.40
T_6 - Press mud cake @ 2 t/ha	24824	10400	14424	1.39
T_7 - FYM (4 t/ha) + NC (0.4 t/ha)	37488	15250	22238	1.46
T_8 –VC (1.3 t/ha) + NC (0.4 t/ha)	20224	24450	-4226	-0.17
T_9 –Press mud cake (1.0 t/ha) + NC (0.4 t/ha)	29960	14850	15110	1.02

Conclusion

Imbalanced/ excessive use of chemical fertilisers has led to several problems *viz*., soil degradation, decline in productivity, pollution hazards etc. In this context, Application of nutrients through organic sources have several benefits in terms of building up of soil organic matter, improving soil physical, chemical and biological properties compared to sole application of recommended chemical fertilisers.

From the present study, it can be concluded that application of FYM (4 t/ha) + NC (0.4 t/ha) (T_7) is the best organic nutrient source for getting higher seed yield and profitability in sesame in order to sustain the production under changing climate in north coastal zone of Andhra Pradesh.

References

1. Deshmukh MR, Duhoon SS. Effect of organic inputs on sesame (*Sesamurn indicum* L.) under rainfed situation in Kymore plateau zone of Madhya Pradesh. Journal of Maharashtra Agricultural Universities. 2008; 33(3):323-324.
2. Duhoon SS, Jain HC, Deshmukh MR, Goswami U. Integrated nutrient management in *kharif* sesame (*Sesamum indicum* L.). Journal of Oilseeds Research. 2001; 18(1):81-84.
3. Duhoon SS, Jyotishi A, Deshmukh MR, Singh NB. Optimization of sesame (*Sesamum indicum* L.) production through bio/natural inputs, 2004. http://www.cropscience.au/res.
4. Gayatri Sahu, Nitin Chatterjee, Manisanker Bera, Goutam Kumar Ghosh, Suchhanda Mondal, Biswas PK *et al*. Integrated Nutrient Management in sesame (*Sesamum Indicum*) in red and lateritic soils of West Bengal. International Journal of Plant, Animal and Environmental Sciences. 2017; 7(1):137-146.
5. Kamlesh Choudhary, Shree Ram Sharma, Ramswaroop Jat and Vijay Kumar Didal. Effect of organic manures and mineral nutrients on quality parameters and economics of sesame (*Sesamum indicum* L.). Journal of Pharmacognosy and Phytochemistry. 2017; 6(3):263-265.
6. Kapil Ahirwar, Susmita Panda, Alok Jyotishi. Optimisation of Sesame (*Sesamum indicum* L.) Production through Integrated Nutrient Management. International Journal of Current Microbiology and Applied Sciences. 2017; 6(11):1701-1707.
7. Kulkarni NS, Jadhav YR, Patil MJ. Effect of Integrated nitrogen management on nutrient content, uptake, quality and yield of summer sesamum (*Sesamum indicum* L.). International Journal of Chemical Studies. 2019; 7(3):4165-4169.
8. Prasanna Kumara BH, Chittapur BM, Hiremath SM, Malligwad LH, Nadaf HL, Koti RV. Effect of organics, natural mineral nutrition and phosphate solubilizing bacteria on sesame (*Sesamum indicum* L.) yield and quality during *kharif* season. Karnataka Journal of Agricultural Sciences. 2014; 27(3):340-342.
9. Snehangshu Sekhar Nayek, Koushik Brahmachari, Md. Riton Chowdhury. Integrated approach in nutrient management of sesame with special reference to its yield, quality and nutrient uptake. The Bioscan. 2014; 9(1):101-105.
10. Takar SS, Giriraj Jat, Bijarnia AL, Ashish Shivran, Yadav HL. Effect of Integrated nitrogen management through organic resources on yield, nutrient content and uptake of summer sesame (*Sesamum indicum* L.). International Journal of Chemical Studies. 2017; 5(4):1130-1133.
11. Vani KP, Bhanu Rekha K, Divya G, Nalini N. Performance of summer sesamum (*Sesamum indicum* L.) under Integrated nutrient management. Journal of Pharmacognosy and Phytochemistry. 2017; 6(5):1308-1310.