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Performance of summer sesamum (*Sesamum indicum* L.) under integrated nutrient management

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Abstract

A field experiment was carried out during summer, 2013 to find the effect of integrated nutrient management and foliar spray of humic and fulvic substances on sesamum at student farm, college of Agriculture, Rajendranagar, Hyderabad. Results of investigation revealed that application of Recommended dose of nitrogen (60 Kg/ha) had resulted in higher growth attributes and yield of sesamum which was at par with 100% RDN+1% foliar spray of Humic acid and 100 % RDN +1% foliar spray of Fulvic acid and followed by 75 % RDN + 25% N through Vermicompost.

Keywords: RDN, Humic acid, Fulvic acid, Vermicompost, Growth, Yield.

1. Introduction

Sesame (*Sesamum indicum* L.) is one of the most ancient edible oil seed crop of India and is called as “Queen of oil seeds” because of its good oil quality. Sesamum oil is useful for dry cough, asthma diseases of lungs, burning sensation, diseases of the ear and eyes. Recently omega-6 fatty acid desaturase also got from sesamum which is helpful for heart patients. (Jin *et al.*, 2001) [2]. It is mainly cultivated during rainy season in poor fertile soils with less attention and less use of required agro-inputs particularly manures and fertilizers. Therefore its productivity is very low in the country. Sesamum responds very well to application of high doses of manures and fertilizers in almost all growing areas of the country. But adequate and effective nutrient management is not scientifically worked out for achieving higher productivity. In India it is grown in an area of 1.95 m ha with a production of 0.85 m tonnes and productivity of 436 kg/ha (Ministry of Agriculture & Farmers welfare, G.O.I, 2016) [3]. The average yields are low compared to which could be attributed to various constraints and most important one amongst them is the cultivation of the crop marginal soils with imbalanced and nutrient management involving less or no organic manure addition.

Prolonged use of chemical fertilizers alone in intensive cropping systems leads to unfavourable soil nutrient status, harmful effects on soil physico-chemical and biological properties. Hence to improve upon the productivity on sustainable basis, integrated nutrient management approach needs to be emphasised wherein combined use of organic, chemical and biological sources of plant nutrients are used in judicious and efficient manner.

Low productivity may be ascribed to lack of HYV, gap in adopting crop management technology, nutrient stress and also vagaries of monsoon during *Kharif* coupled with pest and diseases. Hence summer sesame has recently been introduced in vast areas in India where ever irrigation facilities are available. However proper and balanced fertilizer schedule is also important among the various technologies for high production of the crop especially nitrogen fertilizers. Keeping the above points in view, the present investigation was initiated to find out the best nutrient management for summer for achieving higher yields apart from sustaining soil health.

2. Material and methods

Field experiment on “effect of integrated nutrient management in summer sesame was conducted in sandy loam during summer season, 2013 at student farm, College of agriculture, Rajendranagar, Professor Jayashankar Telangana State Agricultural University, Hyderabad, India. The soil of the experimental site was low in organic carbon (0.49 %), neutral in reaction (pH 7.5) with electrical conductivity 0.36 ds/m and low in available nitrogen (181.7 Kg/ha), medium in available P₂O₅ (25.7 Kg/ha) and high in available K₂O (321.7 Kg/ha). The experiment consisted of nine treatments T₁ - 100% RDN, T₂- 100% RDN+1% foliar spray-Humic acid, T₃- 100 % RDN +1% foliar spray- Fulvic acid, T₄- 75% RDN+ 25% N through FYM, T₅- 75 % RDN + 25% N through Vermicompost, T₆- 75 % RDN + 25% N through

Poultry manure, T₇- 50% RDN+ 50 % N through FYM, T₈- 50% RDN+ 50 % N through Vermicompost and T₉- 50% RDN + 50 % N through Poultry manure and laid out in Randomized Block Design with three replications, variety swetha was sown on Jan 30th by drilling 5 Kg/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 to distance in the row around 10 cm. Well decomposed organic manures were analysed for the nitrogen content and incorporated treatment wise, 15 days before sowing the crop. A uniform dose of P and K (20 and 20 kg/ha) was applied basally, while N (60 kg ha⁻¹) was applied in the splits (basal, branching and flowering). Humic acid and Fulvic acid @ 1 % was sprayed at flowering and pod forming stage. The observations on growth parameters (plant height, dry matter production and leaf area index and number of branches) and yield were recorded at harvesting time.

3. Results and discussion

Growth attributes

Application of 100 % RDN significantly increased the plant height, dry matter production, leaf area index and no. of branches per plant which was an par with 100% RDN+1% foliar spray of Humic acid and 100% RDN +1% foliar spray of Fulvic acid followed by 75 % RDN + 25% N through Vermicompost (Table 1). Nitrogen promotes the vegetative growth thus, leading to significant increase in plant height. Nitrogen application under these treatments had lead to effective absorption and translocation of nutrients and resulted in production of more number of new nodes. The enhanced mestamatic activity and consequent vertical extension of

growth due to consistent availability of nutrients increased the branching. Better translocation of photosynthates from source to sink due to adequate supply of nutrients to the crop led to improvement of growth characteristics. The results were in conformity with Patel (2007) [4] and Duary and Mandal (2006) [1].

Yield

The seed yield significantly with 100 % RDN (714.55 kg/ha) is on par with 100% RDN+1% foliar spray of Humic acid (710.27 kg/ha) and 100% RDN +1% foliar spray- of Fulvic acid (704.77 kg /ha) and followed by 75 % RDN + 25% N through Vermicompost (619.88 Kg/ha) (Table 2). The increase in seed yield with enhanced N application could be ascribed to increases the activity of cytokinin in plant which leads to the increased cell-division and elongation which leads to better plant growth, dry-matter production and higher photosynthesis. This was further supported by the fact that soil of the experimental field was low in nitrogen (181.7 kg ha⁻¹). Thus, an increase in nitrogen supply might have increased all the growth parameters, yield attributing characters which ultimately contributed to increase in yields. The results are in accordance with Sarkar and Saha (2006) [5].

4. Conclusion

By the above study it can be concluded that the application of 100% RDF and 100% RDF + 1% foliar spray of Humic acid and 100% RDN +1% foliar spray of Fulvic acid favourably increased growth and yield of summer sesame during under irrigated condition.

Table 1: Growth parameters of summer sesame as influenced by organic and inorganic fertilizers

Treatments	Plant height (cm)	Dry matter production (kg/ha)	Leaf area index
T ₁ - 100% RDN	111.80	2123.87	0.34
T ₂ - 100% RDN+1% foliar spray- Humic acid	110.43	2089.10	0.32
T ₃ -100% RDN +1% foliar spray- Fulvic acid	107.07	2015.60	0.30
T ₄ -75% RDN+ 25% N through FYM	87.67	1629.02	0.16
T ₅ - 75 % RDN + 25% N through Vermicompost	100.27	1891.53	0.22
T ₆ -75 % RDN + 25% N through Poultry manure	94.50	1764.55	0.19
T ₇ -50% RDN+ 50 % N through FYM	69.60	1242.67	0.05
T ₈ - 50% RDN+ 50 % N through Vermicompost	81.33	1508.66	0.12
T ₉ - 50% RDN+ 50 % N through Poultry manure	75.45	1373.05	0.09
SEm±	2.30	40.52	0.01
CD (P %0.05)	5.64	115.48	0.024

Table 2: Yield of summer sesame as influenced by organic and inorganic fertilizers

Treatments	No. of branches /Plant	Seed yield (Kg/ha)
T ₁ - 100% RDN	5.93	714.55
T ₂ - 100% RDN+1% foliar spray- Humic acid	5.50	710.27
T ₃ -100% RDN +1% foliar spray- Fulvic acid	5.20	704.77
T ₄ -75% RDN+ 25% N through FYM	4.07	506.27
T ₅ - 75 % RDN + 25% N through Vermicompost	4.80	619.88
T ₆ -75 % RDN + 25% N through Poultry manure	4.43	567.63
T ₇ -50% RDN+ 50 % N through FYM	3.00	343.23
T ₈ - 50% RDN+ 50 % N through Vermicompost	3.80	449.39
T ₉ - 50% RDN+ 50 % N through Poultry manure	3.43	394.87
SEm±	0.2	17.17
CD (P %0.05)	0.47	48.17

5. References

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