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Effect of integrated nutrient management on yield attributes and quality of summer sesamum

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Abstract
A field study aimed to evolve efficient integrated nutrient management for improving yield and quality of summer sesamum was conducted on sandy loam soil during summer season of 2013. The experiment was laid out in randomized block design replicated thrice with nine treatments of organic and inorganic fertilizers. The relative performances of all the integrated nutrient management practices in terms of yield attributes, yield, oil content and oil yield were assessed. Application of 100% RDN gave the highest yield attributes and was at par with 100% RDN+1% foliar spray of Humic acid, 100 % RDN +1% foliar spray- Fulvic acid and followed by 75 % RDN + 25% N through Vermicompost. Significantly higher seed and oil yield was observed with 100% RDN which was at par with 100% RDN+1% foliar spray of Humic acid.

Keywords: sesamum, yield attributes, quality, RDN, integrated nutrient management.

Introduction
Sesame (*Sesamum indicum* L.) belongs to the family Pedaliaceae is one of the important oil crops and widely grown in different parts of the world. Sesame oil is considered to be of high quality oil and is often referred to as the "queen" of vegetable oil. This is due to its stability and high keeping quality as well as resistance to rancidity. Sesamum seeds are rich source of food food, nutrition, edible oil (42-52 %), health care and bio-medicine. Sesamum is used in manufacture of soap and paints, pyrethrum insecticidal industry, preparation of tonic for the hair (Shaikh *et al*., 2010) [8].Since the crop has fewer problems of pest and diseases in summer condition, it can be very well harvested. Sesame had more preference from farmers because of low input required and high price of produce. Now-a-days, there are tremendous possibilities to extend the area under summer sesame cultivation (De *et al*., 2013) [1].

The low productivity has been attributed to the imbalanced nutritional status of plant particularly, the inadequate use of nutrients is an important factor limiting the full expression of sesamum yield potential. It should be kept in mind that qualitative aspects of the agricultural produces is the prime factor for achieving a very strong position with our agricultural commodities in the global market. So, higher quality of the produces should be confirmed along with productivity improvement of the crops without hampering the sustainability. Integrated use of organic manures and mineral fertilizers helps in maintaining stability in crop production, besides improving soil physical conditions (Muthuswamy *et al*., 1990) [3]. Looking to the need of optimizing a fresh integration of chemical fertilizers to organic manures for achieving maximum yield and quality has been investigated.

Materials and methods
This field study was carried out during summer season of 2013 at student farm, College of Agriculture, Rajendranagar, Professor Jayashankar Telangana State Agricultural University, Hyderabad, India. The soil of experimental site is sandy loam, characterized by low 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 P_2O_5 (25.7 Kg/ha) and high in available K_2O (321.7 Kg/ha). The trail was conducted in randomized block design with three replications. The nine treatments are T_1 - 100% RDN, T_2- 100% RDN+1% foliar spray- Humic acid, T_3- 100 % RDN +1% foliar spray- Fulvic acid, T_4- 75% RDN+ 25% N through FYM, T_5- 75 % RDN + 25% N through Vermicompost, T_6- 75 % RDN + 25% N through Poultry manure, T_7- 50% RDN+ 50 % N through FYM, T_8- 50% RDN+ 50 % N through Vermicompost and T_9- 50% RDN + 50 % N through Poultry manure.

The experimental crop was sown @ 5 kg ha^{-1} at spacing of 30 x 10 cm on Jan 30th. 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).At harvest, the seed yield of five observational plants was recorded and from this per plant, seed weight was calculated. The plants from net plot were separately harvested and the seed yields were recorded.

Results and discussion

Yield attributes

The data depicted in the table 1 showed significant variation in case of no. of capsules plant^{-1} and no. of seeds capsule^{-1}. Significantly higher no. of capsules plant^{-1} and no. of seeds capsule^{-1} were recorded with 100% RDN and was at par with 100% RDN+1% foliar spray of humic acid followed by 100% RDN +1% foliar spray of fulvic acid. Among the combined organic and inorganic sources 75 % RDN + 25% N through Vermicompost recorded highest no. of capsules plant^{-1} and no. of seeds capsule^{-1} compared to other treatments. The desired quantity of nutrients, which resulted in production of superior growth parameters due to greater dry matter production, which ultimately attributed to produce superior yield attributes. It may be attributed to more availability of nitrogen resulting in enhanced vegetative growth, leading to improved fruiting. These results are in line with the findings of Subramanian *et al*. (1979) [6], Preeti (2010) [5] and Nayek *et al* (2014) [4].

Seed yield (kg ha^{-1})

The seed yield was found to be significantly varied with different sources of organic and inorganic fertilizers. The highest seed yield was recorded with 100% RDN which was on 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. Supply of additional nutrients to the crops, which might increase the number of capsules plant^{-1}, seeds capsule^{-1} of crop and ultimately the yield of sesamum. This result is in agreement with the findings of Singaravel and Govindasamy (1998) [7] and Thanki *et al.* (2004) [9].

Table 1: Yield parameters of summer sesamum as influenced by organic and inorganic fertilizers

Treatments	No. of capsules plant^{-1}	No. of seeds capsule^{-1}	Seed yield (kg ha^{-1})
T_1- 100% RDN	65.37	57.63	714.55
T_2- 100% RDN+1% foliar spray- Humic acid	62.43	52.80	710.27
T3-100% RDN +1% foliar spray- Fulvic acid	59.60	51.67	704.77
T4-75% RDN+ 25% N through FYM	36.47	34.37	506.27
T5- 75 % RDN + 25% N through Vermicompost	50.33	45.30	619.88
T6-75 % RDN + 25% N through Poultry manure	42.57	40.13	567.63
T7-50% RDN+ 50 % N through FYM	20.07	20.80	343.23
T8- 50% RDN+ 50 % N through Vermicompost	30.88	29.73	449.39
T9- 50% RDN+ 50 % N through Poultry manure	25.77	25.27	394.87
SEm±	2.04	1.43	17.17
CD (P %0.05)	5.01	4.25	48.17

Quality parameters

Data regarding Oil content (%) and oil yield (kg ha^{-1}) is presented in table 2. Oil content was not found to be significantly influenced by different sources of organic and inorganic fertilizers. Whereas, oil yield was found to be significantly higher with application of 100% RDN which was at par with100% 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. This increase in oil yield may be due to the fact that better availability of all the nutrients to the sesame plants through both organic and inorganic sources resulting high oil production in the seeds. This result supports the observations of Singaravel and Govindasamy (1998) [7] and Mandal and Pramanik (1996) [2].

Table 2: Oil content (%) and Oil yield (kg ha^{-1}) of summer sesamum as influenced by organic and inorganic fertilizers

Treatments	Oil content (%)	Oil yield (kg ha^{-1})
T_1- 100% RDN	49.70	355.16
T_2- 100% RDN+1% foliar spray- Humic acid	49.57	352.08
T3-100% RDN +1% foliar spray- Fulvic acid	49.33	347.58
T4-75% RDN+ 25% N through FYM	48.22	243.89
T5- 75 % RDN + 25% N through Vermicompost	48.67	295.74
T6-75 % RDN + 25% N through Poultry manure	48.50	274.63
T7-50% RDN+ 50 % N through FYM	47.12	161.33
T8- 50% RDN+ 50 % N through Vermicompost	47.89	215.20
T9- 50% RDN+ 50 % N through Poultry manure	47.64	187.52
SEm±	1.89	8.23
CD (P %0.05)	NS	20.13

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