Research Note

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EFFECT OF LIQUID BIOFERTILIZERS ON PRODUCTIVITY OF SESAME (*Sesamum indicum* L.)

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ABSTRACT

A field experiment was carried out during summer, 2024 on sandy loam soils of dryland farm, S.V. Agricultural College, Tirupati, to study the Effect of liquid biofertilizers on productivity of sesame (*Sesamum indicum* L.)". The present experiment was laid out in a randomized block design and replicated thrice. Application of liquid biofertilizers resulted in significant effects on yield components viz., number of branches plant^{-1}, number of capsules plant^{-1}, number of seeds capsule^{-1}, seed yield and stalk yield of sesame. Among the different treatments tried, significantly higher stature of yield attributes and yield were recorded with the 100 % RDF + seed treatment + soil application of liquid biofertilizers (T_5). The lowest values of yield attributes and yield were obtained with absolute control (T_1).

KEYWORDS: Sesame, Seed treatment, Soil application, Liquid biofertilizers.

INTRODUCTION

Sesame (*Sesamum indicum* L.) is one of the most important oilseed crops next to groundnut, rapeseed and mustard in India. Sesame is popularly known as "Queen of oilseed crops" due to its excellent keeping quality of the oil, flavour and taste. Sesame oil contains two antioxidants, such as *sesamin* and *sesamol.* Sesame seeds contain 50-60 % oil, 18-25 % protein, 14-16 % carbohydrates and 5-7 % minerals. Sesame is the first alternative to mother's milk, particularly in milk allergy cases. Due to its anticholesterol properties, sesame oil is extremely beneficial for cardiac problems. However, the productivity of sesame is very low compared to the potential yield owing to lack of suitable crop management practices. The potential yield of any crop could be realized only when backed up with good agronomic management practices. Among the different agronomic management practices, nutrient management is crucial in sesame cultivation as it directly impacts the plants growth and yield. The use of organic manures is limited by the huge quantities needed to meet crop nutritional needs in view of its low nutrient content, the use of chemical fertilizers is limited by residual effects, cost and scarcity. Thus, supplementary application of biofertilizers either through seed treatment or soil application is recommended for improving soil productivity, biological, physical and chemical properties of soil and to get agricultural products with good quality which are free of pollutants. Biofertilizers improves the soil nutrient availability, leading to better nutrient uptake by plants. Among the biofertilizers, liquid bio-fertilizers of high-quality hold great promise in agriculture due to advantages over traditional carrier-based bio-fertilizers with longer shelf life, better nodulation and cost savings on carrier material.

MATERIAL AND METHODS

The experiment was conducted during summer, 2024 in field No. 138 of Dryland farm of S.V. Agricultural College, Tirupati campus of Acharya N.G. Ranga Agricultural University. The soil was sandy loam in texture, neutral in soil reaction, low in organic carbon and available nitrogen, medium in available potassium and available phosphorus. The experiment was laid out in RBD and replicated thrice. The treatments consist of absolute control (T_1), 100% RDF (T_2), 100 % RDF + seed treatment with liquid biofertilizers (T_3), 100 % RDF + soil application of liquid biofertilizers (T_4), 100 % RDF + seed treatment + soil application of liquid biofertilizers (T_5), 75 % RDF + seed treatment with liquid biofertilizers (T_6), 75 % RDF + soil application of liquid biofertilizers (T_7), 75 % RDF + seed treatment + soil application of liquid biofertilizers (T_8). The variety YLM-66 (Sarada) was sown on 10-01-2024 and recommended dose of the fertilizer applied was 50-25-25 N-P_2O_5-K_2O kg ha^{-1}. Seed treatment with liquid

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Table 1. Yield attributes and yield of sesame as influenced by different levels of fertilizers and liquid biofertilizers

Treatments	Number of branches plant^{-1}	Number of capsules plant^{-1}	Number of seeds capsule^{-1}	Test weight (g)	Seed yield (kg ha $^{-1}$)	Stalk yield (kg ha $^{-1}$)
T_1 : Absolute control	1.8	25	34	2.35	380	710
T_2 : 100% RDF	3.2	45	55	2.51	747	1520
T_3 : 100% RDF + Seed treatment with liquid biofertilizers	3.4	47	58	2.53	793	1583
T_4 : 100% RDF + Soil application of liquid biofertilizers	3.5	48	60	2.56	830	1660
T_5 : 100% RDF + Seed treatment + Soil application of liquid biofertilizers	4.0	53	68	2.62	945	1890
T_6 : 75 % RDF + Seed treatment with liquid biofertilizers	2.3	32	42	2.44	550	1130
T_7 : 75 % RDF + Soil application of liquid biofertilizers	2.4	34	44	2.48	610	1239
T_8 : 75 % RDF + Seed treatment + Soil application of liquid biofertilizers	2.9	42	51	2.48	700	1418
SEm±	0.15	1.3	1.9	0.05	28.8	52.4
CD (P=0.05)	0.4	4	6	NS	87	159

biofertizers *viz*., *Azospirillum*, PSB and KSB was done by mixing 10 ml of each bio inoculant with 1 kg of seed and dried for 10-15 min under shade before sowing, then the seeds were sown keeping the distance of 30 cm row to row and seed to seed at a distance of 15 cm. Soil application of liquid biofertilizers *viz*., *Azospirillum*, PSB and KSB was done by mixing these bioinoculants each @ 1250 ml ha^{-1} with 500 kg of well decomposed FYM and applied as basal at 24 hrs before sowing. The data collected on various growth parameters were statistically analysed using the randomized block design method by Panse and Sukhatme (1985).

RESULTS AND DISCUSSION

Yield attributes

Significantly higher values of all yield attributes of sesame *viz*., number of branches $plant^{-1}$, number of capsules $plant^{-1}$, number of seeds $capsule^{-1}$ were recorded with application of 100 % RDF + seed treatment + soil application of liquid biofertilizers(T_5). It was followed by application of 100 % RDF + soil application of liquid biofertilizers(T_4), application of 100 % RDF + seed treatment with liquid biofertilizers(T_3) and application of 100 % RDF(T_2) in the order of descent with no significant disparity between them. However, the later treatment (T_2) was in turn at par with application of 75 % RDF + seed treatment + soil application of liquid biofertizers(T_8). Application of 75 % RDF + soil application of liquid biofertilizers(T_7) was the next best, but at par with the application of 75 % RDF + seed treatment with liquid biofertilizers (T_6) which were in turn statistically superior over the absolute control(T_1) that registered the lower values. This might be owed to the balanced nutrition to the crop and improved physical, chemical and biological properties of soil with the administration of liquid fertilizers trough seed treatment and soil application along with the provision of inorganic fertilizers which in turn maintained the nutrient supply throughout the plant growth stages that facilitated increased cell division and cell elongation there by enhanced vegetative growth ultimately increased the number of branches $plant^{-1}$, number of capsules $plant^{-1}$ and number of seeds $capsule^{-1}$. These findings are similar to those of Patel *et al*., (2023), Rathod *et al*., (2024), Parmar *et al*., (2020) and Samant (2020).

Seed and stalk yield

The highest seed and stalk yield of sesame were registered with application of 100 % RDF + seed treatment + soil application of liquid biofertilizers(T_5). The next best treatments in recording higher yield were application of 100 % RDF + soil application of liquid biofertilizers(T_4), application of 100 % RDF + seed treatment with liquid biofertilizers (T_3) and application of 100 % RDF (T_2) in the order of descent with no significant disparity between them. However, comparable yields were obtained from 100 % RDF (T_2) and 75 % RDF + seed treatment + soil application of liquid biofertilizers(T_8). It shows the yield advantage with the application of liquid biofertilizers by partial substitution of inorganic fertilizers. Application of 75 % RDF + soil application of liquid biofertilizers(T_7) and application of 75 % RDF + seed treatment with liquid biofertilizers (T_6) were comparable with one another and both of them were significantly superior over the absolute control(T_1). The lowest yield was associated with the absolute control(T_1). It might be attributed to the combined application of inorganic fertilizers and liquid biofertilizers that increased availability of nitrogen, phosphorus and potassium in the root zone through atmospheric nitrogen fixation by *Azospirillum* and solubilization of unavailable phosphates and potassium by PSB and KSB respectively which in turn resulted in the better nutrient uptake and accelerated photosynthetic rate, adequate biomass production that further facilitated the efficient translocation of photosynthates from source to sink there by increasing the sink capacity resulting in the improved yield attributes and ultimately increased the yield of sesame. These results are supported by Sahoo *et al*. (2010), Lakhran *et al*. (2015), Aglawe *et al*. (2021), Shaik *et al*. (2010) and Gabhane *et al.* (2018).

The present study indicated that among the nutrient management practices, tried application of 100% RDF (50:25:25 N, P_2O_5, K_2O) + seed treatment + soil application of liquid biofertilizers (*Azospirillum*, PSB and KSB) recorded higher yield attributes and yield in sesame.

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