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Yield of summer sesamum (*Sesamum indicum* L.) as influenced by integrated nutrient management

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ABSTRACT

A field experiment to study the effect of integrated nutrient management on yield of summer sesamum was conducted at Post Graduate Institute Instructional Farm, Mahatma Phule Krishi Vidyapeeth, Rahuri during summer, 2007. The seed weight per plant, seed and straw yields and grain to straw ratio were favourably influenced due to application of RDF+5 t FYM / ha +5 t vermicompost/ ha+ seed treatment of Azospirillum and PSB followed by the application of 75 % RDF + 5 t FYM/ha + 5t vermicompost/ ha + seed treatment of Azospirillum and PSB and it was significantly superior over all other treatments.

Key words : Integrated nutrient management, Yield, Sesamum

INTRODUCTION

Sesamum is probably the most ancient oilseed known and used by man and is the second most important oilseed crop next to groundnut. Due to presence of potent antioxidants, sesamum seeds are called as "the seeds of immortality". The area under sesamum in India was 1.77 million ha with the production of 0.80 million tonnes having productivity of 45.3 kg / ha during 2004-05 (Anonymous, 2006). 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. 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).

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. This results in low production of oil without fulfilling the requirement of our country, which has led to high prices, unavailability of oils and their adulteration. By approaching modern crop production technology stresses the need for integrated nutrient management which embraces a combination of organic manure with inorganic fertilizers for providing better nutrients to the crop plants and maintaining soil fertility.

MATERIALS AND METHODS

The present investigation was carried out at Post Graduate Institutional Farm, Mahatma Phule Krishi Vidyapeeth, Rahuri during summer, 2007. The experiment was laid out in a randomized block design with three replications and ten treatments. The different treatments comprised of T_1- absolute control, T_2- 100 % (60:40:20 NPK kg/ha) recommended dose of fertilizer (RDF), T_3- 75 % N (urea) + 25 % N (FYM) + recommended P_2O_5 and K_2O, T_4 - 50 % N (urea) + 50 % N (FYM) + recommended P_2O_5 and K_2O, T_5-75 % N (urea) + 25 % N (vermicompost) + recommended P_2O_5 and K_2O, T_6- 50 N (urea) + 50 N (vermicompost) + recommended P_2O_5 and K_2O, T_7= 75 % (urea) + seed treatment of *Azospirillum* and PSB + Recommended P_2O_5 and K_2O, T_8 – 50 % N (urea) + seed treatment of *Azospirillum* and PSB + recommended P_2O_5 and K_2O, T_9- RDF + 5 t FYM/ha + 5 t vermicompost/ha + seed treatment of *Azospirillum* and PSB, T_{10}- 75 % RDF + 5t FYM/ha + 5 t vermicompost/ha + seed treatment of Azospirillum and PSB. The gross and net plot sizes were 4.5 x 4.0 m and 3.6 x 3.6 m, respectively. The soil of the experimental field was clayey in texture with low in available nitrogen (237.67 kg ha), medium in available phosphorus (22.18 kg/ha) and high in available potassium (27.52 kg/ha). The soil was moderately alkaline in reaction (pH 8.3). The experimental crop was sown by dibbling at 45 x 10 cm spacing on 12th March, 2007 and harvested on 6th June, 2007.

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 and straw yields were recorded on hectare basis.

RESULTS AND DISCUSSION

The data regarding seed weight of sesamum per plant (g), seed yield per ha (q), straw yield (q/ha) and grain to straw ratio are presented in Table 1.

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Table 1 revealed that application of RDF + 5 t FYM/ ha + 5 t vermicompost/ha + seed treatment of Azospirillum and PSB recorded the highest seed weight per plant (7.07) and it was significantly superior over all other treatments followed by the application of 75 % RDF + 5 t FYM/ha + 5 t vermicompost/ha + seed treatment of Azospirillum and PSB recorded higher seed weight per plant (6.85 g) and it was significantly superior to other treatments except application of RDF + 5 t FYM /ha + 5 t vermicompost / ha + seed treatment of Azospirillum and PSB fallowed by RDF (5.57 g). The lowest seed yield per plant was observed with the control (2.68 g).

The data on seed yield per ha revealed that the application of RDF + 5 t FYM/ha + 5 t vermicompost/ha + seed treatment of Azosprillum and PSB recorded the highest seed yield per ha (15.19 q/ha) followed by the application of 75 % RDF + 5 t FYM/ha + 5 t vermicompost/ha + seed treatment of *Azospirillum* and PSB recorded higher seed yield (14.63 q/ha) and it was significantly superior to most of the treatments except the application of RDF + 5t FYM/ha + 5 t vermicompost/ ha + seed treatment of Azospirillum and PSB. The lowest seed yield was observed with the control (5.77q/ha).

The highest seed yield obtained with the application of RDF + 5 t FYM/ha + 5 t vermicompost/ha + seed treatment of Azospirillum and PSB might be due to higher supply of nutrient through organic and inorganic sources which influenced favourably for increased seed yield. This finding corroborate the findings of (Tiwari *et al.*, 1995, Palaniappan *et al.*, 1999, Singh *et al.*, 2001 and Duhoon *et al.*, 2004).

Straw yield :

The data regarding straw yield (q/ha) are presented in the Table 1. The application of RDF + 5 t FYM/ha + 5 t vermicompost/ha + seed treatment of Azospirillum and PSB recorded the highest straw yield (33.86 q/ha) followed by the application of 75 % RDF + 5 t FYM/ha + vermicompost / ha + seed treatment of Azospirillum and PSB having higher straw yield (31.74 q/ha) followed by the application of RDF (25.09 q/ha) and it was significantly superior to most of the treatments. The lowest straw yield (9.06 q/ha) was recorded with the control (Table 1).

The highest straw yield obtained with the application of RDF + 5t FYM/ha + 5 t vermicompost/ha + seed treatment of *Azospirillum* and PSB might be due to higher supply of nutrient through organic and inorganic sources which influenced favourably for increased straw yield. Similar results were observed by Ghosh (2000) and Sujathamma *et al*. (2003).

Grain to straw ratio :

The data on grain to straw ratio are presented in Table 1. The application of RDF + 5t FYM/ha + 5 t vermicompost/ha + seed treatment of Azospirillum and PSB recorded the minimum grain to straw ratio (0.45) indicating efficiency of producing more seed with available straw and was significantly superior to most of the treatments. However, it was at par with the application of 75 % RDF + 5 t FYM/ha + 5 t vermicompost/ha + seed treatment of Azospirillum and PSB (0.46) and RDF application (0.48).

Table 1 : Mean sesamum seed weight per plant (g), per ha (q), straw yield (q/ha) and grain to straw ratio as affected by different treatments

Treatments		Seed weight (g/ plant)	Seed yield (q/ha)	Straw yield (q/ha)	Grain to straw ratio
T_1	Control	2.68	5.77	9.06	0.64
T_2	60:40:20 NPK (RDF)	5.57	11.95	25.09	0.48
T_3	75 % N (urea) + 25 % N (FYM)	5.43	11.69	23.62	0.50
T_4	50 % N (urea) + 50 % N (FYM)	4.9	9.19	15.99	0.57
T_5	75 % N (urea) + 25 % N (Vermi.C.)	4.29	9.47	18.46	0.51
T_6	50 % N (urea) + 50 % N (Vermi.C.)	3.98	8.61	14.63	0.59
T_7	75 % N (urea) + Seed tr. Azo. and PSB	4.33	9.30	17.02	0.55
T_8	50 % N (urea) + Seed tr. Azo. and PSB	3.21	6.87	11.47	0.60
T_9	RDF+ 5 t FYM/ha + 5 t Vermi.C/ha + Seed tr. Azo and PSB	7.07	15.19	33.86	0.45
T_{10}	75 % RDF + 5 t FYM/ha + 5 t Vermi.C/ha + Seed tr. Azo and PSB	6.85	14.63	31.74	0.46
S.E. ±		0.06	0.13	0.25	0.09
C.D. (P=0.05)		0.19	0.39	0.74	0.30
General mean		4.78	10.27	20.10	0.54

A dose of P_2O_5 and K_2O was applied uniformly from 2 to 9 treatments

RDF = Recommended dose of fertilizer (kg/ha) PSB = Phosphate solubilizing bacteria

The highest grain to straw ratio was recorded in case of control (0.64) indicating less efficiency of producing more seed with available straw and it was at par with the application of 50 % N (urea) + seed treatment of Azospirillum and PSB + recommended P_2O_5 and K_2O (0.60) followed by application of 50 % N (urea) + 50 % N (vermicompost) + recommended P_2O_5 and K_2O (0.59) and treatment of 50 % N (urea) + 50 % N (FYM) + recommended P_2O_5 and K_2O (0.57). Application of nutrients through organic and inorganic sources favourably influenced the growth and yield contributing characters and seed yield which resulted in more grain with unit weight of straw which in turn more grain to straw ratio. Similar results are also reported by Ahmad *et al*. (2000) and Sujathamma *et al*.(2003).

Conclusion:

The data revealed that the application of RDF + 5t FYM/ha + 5 t vermicompost/ha + seed treatment of Azospirillum and PSB favorably influenced seed yield / plant/ha and grain to straw ratio. It is, therefore, suggested to apply RDF + 5t FYM/ha + 5 t vermicompost/ha + seed treatment of Azospirillum and PSB to sesamum crop during summer season under irrigated condition.

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