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Original Research Article

Response of Sesame Varieties under the Influence of Different Level of Nitrogen and Phosphorus

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A B S T R A C T

A field study to evaluate the "Response of sesame (*Sesamum indicum* L.) varieties under the influence of different level of nitrogen and phosphorus'' was carried out at Agricultural Research Sub Station, Samdari, Barmer during Kharif 2019. The experiment was laid out in a three replicated in split plot design, having net plot size 3.6 × 4 m (14.4 m^2). The treatments comprised five varieties viz., RT 127, RT 346, RT 351, TKG 22 and GT 10 were sown in sub plots., and three doses of NP i.e., 75% of Recommended Dose of Fertilizers (RDF) NP @ (30 kg h^{-1} and 18.75 kg h^{-1}), 100% RDF NP (40 kg h^{-1} and 25 kg h^{-1}) and 125% RDF NP (50 kg h^{-1} and 31.25 kg h^{-1}) were applied in main plots. The analysis of variance suggested that all the doses of NP affected growth and yield of sesame varieties. In the case of fertilizer doses, NP @ 125% RDF NP (50 kg h^{-1} and 31.25 kg h^{-1}) produced maximum plant stand (1.27 lakh ha^{-1}), branches $plant^{-1}$ (3.1), capsules $plant^{-1}$ (42.5), seed yield (224.2kg ha^{-1}) and whereas 100% RDF NP (40 kg h^{-1} and 25 kg h^{-1}) recorded maximum plant height (91.6 cm) and test weight (3.33 g). Among sesame varieties, TKG 22 recorded non-significantly maximum plant height (92.7 cm); branches $plant^{-1}$ (3.0), test weight (3.33 g), whereas GT10 and RT 127 observed highest plant stands (1.37 lakh ha^{-1} and 1.37 lakh ha^{-1}). While maximum capsules $plant^{-1}$ was observed by RT 346 (38.3) and maximum seed yield recorded with RT 351 (215.2 kg ha^{-1}).

Keywords

Sesame influence different nitrogen phosphorus

Introduction

Sesame (*Sesamum indicum* L.), which is variously known as sesamum, til, simsim, benised, gingelly, gergelim etc. and one of the most important oilseeds crops, extensively grown in India. Sesame plays an important role in agricultural and industrial economics of our country. Sesame stand next to groundnut so far as the production of edible oil is concerned. Sesame was cultivated on an area of 17.78 lakh ha with production of 8.11 lakh tonnes and productivity of 456 kg/ ha during 2014-15 (Anonymous, 2016). Sesame "The queen of the oilseed crops" by virtue of the excellent quality of the oil, flavour, taste and softness. Its oil content generally varies from 46 to 52%. Nutrient management is an old concept in traditional agriculture because of low nutrient turn over in soil plant system (Meelu and Singh 1991).

India is the world leader with the largest area, maximum production and highest export of sesame seed. Gujarat, Rajasthan, Uttar

Pradesh, Madhya Pradesh, Maharashtra, Andhra Pradesh, Orissa, Tamil Naidu, West Bengal and Karnataka are major sesame growing states of the country. The low productivity trend during the past decade as compared to increased productivity during present decades reflects the contribution of research efforts in terms of development of drought, disease and pest tolerant and higher yielding varieties adopted by the farmers. But still national productivity level is low (413 kg/ha) as compared to world average yield (535 kg/ha) (Anonymous 2007). There are several constraints, which need immediate attention of the planners and research managers. Major bottleneck of low productivity is that sesame is mainly grown in the kharif season under vagaries of monsoon, which is further aggravated by several pests and diseases.

Nitrogen and phosphorus are essential nutrients required by the plants for their growth and vigour. Nitrogen is considered as an essential element of bio-molecules such as amino acids, proteins, nucleic acids, phytohormones and a number of enzymes and coenzymes. N strongly stimulates growth, expansion of the crop canopy and interception of solar radiation (Eckert, 2010). Similarly, phosphorus is an essential nutrient both as a part of several key plant structure compounds and as catalysis in the conversion of numerous key flower formation and seed production, more uniform and earlier crop maturity, improvements in crop quality, and increased resistance to plant diseases (Eckert, 2010). The nutrient applied is not readily available to the plants due to soil salinity; a sufficient quantity is leached or fixed in the soil. Balanced application of fertilizer like nitrogen and phosphorus play vital role in enhancing the yield of sesame, while indiscriminate use of these nutrients causes several problems like insect pests which causes considerable loss to the crop yield (Bill, 2010). Sesame production can be increased by developing high yielding varieties having high degree of tolerance against biotic and abiotic stresses. The present study was undertaken to find out performance of different sesame genotypes under different fertility levels.

Materials and Methods

The experiment was conducted during kharif season of 2019 on sandy soil of pH 8.30, EC (0.15 d.s./metre), low phosphorus (10.08 kg ha^{-1}) and medium potassium content (202 kg ha^{-1}). The experiment was conducted at research farm of Agricultural Research Sub Station, samdari, Barmer in split plot design with 3 replications. Five sesame verities viz., RT 127, RT 346, RT 351, TKG 22 and GT 10 were sown in sub plots. Three fertility levels *viz*., 75% of Recommended Dose of Fertilizers (75% RDF) $N:P_2O_5$ = 30:18.75, (100% RDF) $N:P_2O_5$ = 40:25 and (125% RDF) $N:P_2O_5$ = 50:31.25 were taken in main plots. The row to row spacing of 45 cm and plant to plant spacing of 10 cm were kept by thinning of plants. The crop was sown on 30-07-2019 and harvested on 27-10-2019.

Results and Discussion

Nutrient deficiency and imbalanced fertilizers use are one of the important factors for low yield of sesame. Nitrogen is essential element of bio-molecules such as amino acids, proteins, nucleic acids and enzymes. It stimulates growth, expansion of the crop canopy and interception of solar radiation (Bill, 2010). Phosphorus is an essential nutrient both as a part of several key plant structure compounds and stimulates root development, increase stem strength; improve flower formation and seed production, more uniform and earlier crop maturity. The results of present study Table 1 showed that different levels of nitrogen and phosphorus affected

almost all the growth and yield attributes of sesame varieties, particularly seed yield. In case of fertilizer, the 125 % RDF recorded significantly maximum branches plant^{-1} (3.1), Capsules plant^{-1} (42.5) and seed yield (224.2 kg ha-^{1}) while the 125 % RDF recorded non-significantly maximum plant stand (1.27 lakh ha^{-1}). The plant height (91.6 cm) and test weight (3.33 g) recorded non-significantly maximum under the 100 % RDF, whereas minimum growth and yield parameters were noted in 75% RDF. Among all the varieties, TKG 22 recorded non-significantly maximum plant height (92.7 cm); branches plant^{-1} (3.0), test weight (3.33 g), whereas GT10 and RT 127 observed highest plant stands (1.37 lakh ha^{-1} and 1.37 lakh ha^{-1}) it was followed by RT 351(1.23 lakh ha^{-1}).

While maximum capsules plant^{-1} was observed by RT 346 (38.3) it was followed by RT 351 (35.7). Maximum seed yield recorded with RT 351 (215.2 kg ha^{-1}) it was followed by RT 127 (194.9 kg ha^{-1})

Table.1 Performance of growth and yield component of sesame varieties and fertilizer levels

Treatments	Plant stand (lakh / ha)	Plant height (cm)	Branches /plant	Capsules /plant	Test weight (g)	Seed Yield (kg/ha)
Fertility Level						
75% RDF	1.25	86.7	2.6	30.6	3.30	157.9
100% RDF	1.24	91.6	2.6	34.4	3.33	184.7
125% RDF	1.27	90.0	3.1	42.5	3.23	224.2
$SE_{m\pm}$	0.03	3.8	0.1	1.5	0.05	10.3
CD at (5%)	NS	NS	0.3	6.0	NS	41.4
CV (%)	3.12	6.0	4.2	5.9	2.07	7.7
Varieties						
RT 127	1.37	92.6	2.8	35.1	3.22	194.9
RT 346	1.18	88.3	2.6	38.3	3.30	175.5
RT 351	1.23	90.4	2.6	35.7	3.31	215.2
TKG 22	1.20	92.7	3.0	34.9	3.33	164.7
GT 10	1.37	83.0	2.7	35.3	3.27	194.3
$SE_{m\pm}$	0.05	5.2	0.22	2.4	0.08	13.9
CD at (5%)	NS	NS	NS	NS	NS	NS
CV (%)	5.04	8.2	11.4	9.5	3.23	10.4

The increase in seed yield with nitrogen and phosphorus (NP) application was mainly due to higher number of capsules plant^{-1}, number of seeds capsule^{-1} and 1000 seed weight. The higher grain yield might be due to higher photosynthetic activity as compared to under dose fertilize treatment and also due to better root growth and development resulting in more nutrient uptake and higher dry matter accumulation/plant and subsequent translocation to developing panicle (Bill, 2010). Yield and yield components were also influenced significantly by NP application (Sharar *et al.*, 2000). The increase in seed yield with NP application was mainly due to higher number of capsules plant^{-1}, number of seeds capsule^{-1} and 1000 seed weight. The results are also in agreement with the findings of (Umar *et al.*, 2012) who revealed that interaction of nitrogen level and phosphorus

produced highest values for number of leaves, number of primary branches, shoot dry matter, capsule yield and seed yield plant^{-1} of sesame (Umar *et al.*, 2012). Similar findings were also reported by (Saleem *et al.*, 2012) who suggested that highest application rate of fertilizer proved to be statistically best with respect to all growth, yield and quality attributes of sesame cultivars (Saleem *et al.*, 2012).

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