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Evaluation of nitrogen levels and plant remains effects on yield and some yield components of sesame

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ABSTRACT

This research was conducted to evaluation of plant remains effects and different doses of nitrogen on the yield and some yield components of sesame. Design of this experiment was Split plot in a randomized complete block with three replications. The main plot included plant remains of wheat and subplot included four levels of nitrogen (0, 30, 60, 90 kg per ha).According to the results, plant remains improved seed yield of sesame and 256 g/m2 was obtained by plant remains treatment. Some features of sesame increased with increasing levels of nitrogen so that the 90 kg per hectare of fertilizer showed highest yield (339 g/m2) of sesame. Thus the applications of 90 kg nitrogen and plant remains (malch) are recommended to achieve maximum yield of sesame in Mohr region.

Introduction

Sesame (*Sesamumindicum* L.) is a crop which is widely grown in tropical and subtropical regions of Asia, Africa, South and North America and to some extent in Russia for edible oil and for animal feed purposes (Haruna and Usman, 2005).Addition of N fertilizer enhances root development, which improves the supply of other nutrients and water to the growing parts of the plants, resulting in an increased photosyntheticarea and thereby more dry matter accumulation (Ali etal., 2010).Reports of nutrition studies carried out in the tropics have shown significant increase in plant height, number of branches per plant leaf area index, crop growth rate total dry matter and grain yield per unit area due to nitrogen and phosphorus application (Okpara et al., 2007).An essential element of agricultural sustainability is the effective management of N in the environment (Rao et al., 2005).Haggai (2004) reported an increase in the number of pods from 18 to 44 with the application of 90 kg N ha-1 (from 0 kg N ha-1). Ahmad et al. (2002) reported increase in yield and yield attributes of sesame with the application of 60 kg N ha-1. Similarly, Olowe and Busari (2000) reported a significant increase in grain yield of sesame from 78.72 kg ha-1 at 0 kg N ha-1 to 214.89 kg ha-1 with the application of 60 kg N ha-1. Olowe and Busari (2000) further reported grain yield reduction by 38.6 % with increase in N level to 90 kg ha-1 obtaining a yield of 132.04 kg ha-1. In a similar study Malik et al. (2003) reported a significant increase in seed yield (0.794 t ha-1) with the application of 80 kg N ha-1.

Material and Methods

This experiment was conducted in split plot statistical design with three replications in RCBD. Main factor included plant remains (wheat) and no pant remains, sub factor included: 0, 30, 60 and 90 N (kg ha^{-1}). At the end of study, we calculated Capsule number of branches, Capsule number of main branches and seed number in capsule, Seed yield and Harvest index.

Result and discussion

Capsule number of branches

According to analysis of variance, it was defined that Capsule number of branches affected by plant remains (at 5% statistical level) and nitrogen (at 1% statistical level). Comparison of means showed that after using plant remain; Capsule number of branches was increased by 26% in compare to control. Using of 30, 60 and 90 (kg/ha) Nitrogen increased 2.17, 1.81 and 1.9 fold in compare to control, respectively. According to interaction, highest (9.33) and lowest (2.46) means were observed by plant remain + 30kg/ha and control (without plant remain, without nitrogen), respectively.

Capsule number of main branches

All treatments had significant effects on capsule number of main branches at 1% statistical level. Plant remainsincreased 67% capsule number of main branches. Using of 30, 60 and 90 (kg/ha) Nitrogen increased 2.19, 2.54 and 1.77 fold in compare to control, respectively. Highest (63.13) and lowest (14.3) means were observed by plant remain + 60 kg/ha and control (without plant remain, without nitrogen), respectively.

Seed number in capsule

Treatments didn't show significant effects on seed number in capsule. Seed number in capsule is genetic basically and it doesn't change by environment.

Seed yield

Treatments had significant effects on capsule number of main branches at 1% statistical level. Seed yield was increased (28%) by plant remains in compare to control. Using of 30, 60 and 90 (kg/ha) Nitrogen increased 5, 11 and 29% in compare to control, respectively. Application of 90 (kg/ha) Nitrogen and plant remain showed highest (395 gr/m^2) yield. Abdel Rahman (2008) mentioned that seed yield increased by 44 kg/ha nitrogen in compare to control. These increasing obtained by increasing in yield components and photosynthesis performance.

Harvest index

Among of treatments, Nitrogen had significant effect on harvest index at 5% statistical level. Application of 30, 60 and 90 (kg/ha) Nitrogen increased 16, 19 and 9% in compare to control, respectively. According to our result, plant remain could improve yield and yield components of sesame, other hand, we suggest using of plant remains in culture of sesame in Mohr region.

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Table 1 : Means of square of trait in response to treatments

Source of variation	D.f	Capsule number of branches	Capsule number of main branches	Seed number in capsule	Seed yield	Harvest index
Replication	2	1.58	32.79	31.50	423.64	0.001
FactorA	1	9.13*	1936.81**	3.38	32597.51**	0.011
Error	2	0.65	29.48	42.00	225.76	0.003
FactorB	3	15.11**	948.48**	43.71	6696.09**	0.004*
AB	3	13.08**	293.04**	23.38	3083.51**	0.003*
Error	12	1.15	10.40	15.25	52.03	0.001
CV%		20.30	9.07	7.70	2.40	11.90

Table 2: Comparison of means in response to treatments

		Capsule number of branches		**Capsule number of main branches**		**Seed number in capsule**		**Seed yield**		**Harvest index**	
	Plant remain	6.0	a	44.6	a	49.8	a	330	a	0.30	a
	No remain	4.7	b	26.6	b	50.5	a	257	b	0.26	b
	0	3.1	b	18.9	d	47.5	b	263	d	0.31	a
	30	6.7	a	41.5	b	53.3	a	278	c	0.27	b
	60	5.6	a	48.2	a	51.3	ab	293	b	0.26	b
	90	6.1	a	33.7	c	48.3	ab	340	a	0.29	ab
Plant remain	0	3.7	cd	23.5	e	44.7	b	315	b	0.37	a
	30	9.3	a	56.4	b	52.3	ab	284	c	0.27	b
	60	4.8	bc	63.1	a	52.0	ab	327	b	0.27	b
	90	6.1	b	35.1	c	50.0	ab	395	a	0.29	b
No remain	0	2.5	d	14.3	f	50.3	ab	210	e	0.26	b
	30	4.0	cd	26.6	de	54.3	a	272	cd	0.26	b
	60	6.3	b	33.2	c	50.7	ab	260	d	0.24	b
	90	6.1	b	32.2	cd	46.7	ab	285	c	0.28	b

With increasing in nitrogen levels, yield increased significantly and highest means was observed by 90 kg/ha, therefore we introduce 90 kg/ha nitrogen as best levels.

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