Available online at www.elixirpublishers.com (Elixir International Journal)

Agriculture

Elixir Agriculture 69 (2014) 23450-23452

ISSN: 2229-712X

Evaluation of vermicompost and split nitrogen application on yield and some yield components of sesame

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ARTICLE INFO

Article history:

Received: 29 March 2014;

Received in revised form:

22 April 2014;

Accepted: 22 April 2014;

Keywords

Fertilizer,

Interaction,

Sesame.

ABSTRACT

This study was conducted to evaluation of vermicompost and split nitrogen application on yield and some yield components of sesame. Experimental design was in RCBD with two factors and four replications, first factor included vermicompost with three levels (10, 20 and 30 ton/ha) and second factor included Urea with three levels (30, 60 and 90 kg/ha). Urea was used in two installments, one of them was applied at the 6 to 8 leaf and another 20 days after the first installment. According to our result, we suggest using of 20 ton/ha vermicompost for sesame culture, also using of 90kg/ha nitrogen is best treatment. For combination using, it suggest 30ton/ha vermicompost + 60kh/ha nitrogen for Firouzabad region and sesame.

Introduction

Fertilizers are the major sources of nutrients for crops, alsoorganic matter in soil influences almost all the components of soil linked with crop production (Bhatt et al., 2012).Nitrogen is the most important constituent of plant proteins and is required throughout the crop growth period from vegetative stage to subsequent harvesting. Ramos et al. (1995) found that split nitrogen equally led to higher grain yield in barely. Splitting nitrogen fertilizer to many doses increase efficiency of the fertilizers used by decreasing leaching to a large extent and increased both yield and quality of crops in favor of the highest number of splitting as indicated by Gauer et al. (1992), Patke et al. (2003).Vermicomposting is one such viable technique for augmentation of organic source in soil,also, Application of vermicompost influences the physical, chemical and biological properties of soil,It improves thewater holding capacity of the soil andit possesses vitamins and growth hormones which have a direct role on plant growth. Integrated use of organic N through vermicompost and fertilizer N enhanced the growth andyield attributes of crops (Thirunavukkarasu and Vinoth, 2013). Sharma *et al.* (2007) reported that the N and P uptake by grain and straw increased significantly with increasing levels of nitrogen up to 120 kg ha^{-1} and P uptake by grain and straw increased significantly up to 80 kg ha^{-1}. Rajni Rani and Srivastava (2001) found that supplying one third or one fourth of N as vermicompost increased plant height and yield components of rice. Roy and Singh (2006) reported that highest number of productive tillers, panicle length, filled grain and test weight were recorded with 10 t ha^{-1}vermicompost this was due to microbial stimulation effect of vermicompost and N supplied though gradual mineralization.The aim of this study was to evaluate the effect ofvermicompostwith split application ofnitrogen on yield and some yield components of sesame.

Material and method

At first of experiment, soil and vermicompost were analyzed in laboratory. Table 1 and 2 show them results of soil and vermicompost analysis, respectively.

This experiment was conducted in RCBD design with two factor and four replications, first factor included vermicompost with three levels (10, 20 and 30 ton/ha) and second factor included Urea with three levels (30, 60 and 90 kg/ha). Urea was used in two installments, one at the 6 to 8 leaf and another 20 days after the first installment.

Result and discussion

Branch numbers

According to the analysis of variance, it was founded that vermicompost had significant effects at 1% probability on branch numbers. Highest lowest means was observed by 20 and 30 ton/ha vermicompost, respectively (table 4).

Dry weight ofcapsules

All treatments and interactions had significant effects at 1% statistical probability. Dry weight of capsules increased by 30 ton/ha vermicompost application in compare to 10ton/ha (table 4). Using of 10, 20 and 30 ton/ha vermicompost with 90 kg/ha Urea increased dry weight of capsules about 33, 11 and 46% in compare to 10, 20 and 30 ton/ha vermicompost with 30 kg/ha Urea, respectively (table 4).

Number of capsules per m^2

Interaction of vermicompost and nitrogen showed significant effects at 1% statistical probability on number of capsules. Highest (36.78 per m^2) and lowest (20.16 per m^2) means was obtained by 20 ton/ha vermicompost + 30 kg/ha nitrogen and 10 ton/ha vermicompost + 60 kg/ha nitrogen, respectively (table 4).

Seed yield

This trait affected by all treatments so that, 20 and 30 ton/ha application of vermicompostincreased seed yield 6 and 16% in compare to 10 ton/ha (table 4). Among nitrogen treatments, 60kg/ha showed highest seed yield. 30 ton/ha vermicompost + 60 kg/ha nitrogen and 10 ton/ha vermicompost + 90 kg/ha nitrogen had highest and lowest seed yield (table 4).Abdel Rahman(2008) mentioned that 44 nitrogen application increased seed yield of sesame through increasing in yield components. Garg et al (2006) showed that nitrogen increased yield of sesame by increasing of photosynthesis efficiency.

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Table 1 : Field soil analysis results

			K (ppm)	P (ppm)	Total N%	OC%	S.P	pH	$EC10^3$
Sand%	Silt%	Clay%							
36	44	20	540	35	0.2	2.18	37	7.91	1.06

Table 2 : Vermicompostanalysis results

K (ppm)	P (ppm)	Total N%	OC%	pH	$EC10^3$
6900	952	2.8	29.11	8.63	7.3

Table 3: analysis of variance for traits (means of squares)

		Branch numbers	dry weight of capsules	number of capsules	Seed yield	Harvest index
block	3	0.55	508.97**	5.39**	14.08**	51.60**
vermicompost	2	4.33**	117.26**	0.44	22.38**	121.81**
nitrogen	2	1.32	211.90**	0.26	10.10**	73.59**
Vermicompost*nitrogen	4	1.05	195.33**	2.73**	0.21	60.21**
error	24	0.59	9.16	0.24	0.41	4.26
C.V%		16.96	11.90	9.41	3.60	7.60
** : significant at 1% statistical probability						

Table 4: Comparison of means by Duncan test

		Branch numbers		dry weight of capsules		number of capsules		Seed yield		Harvest index	
	10	3.9	b	23.1	b	24.5	a	16.5	c	28.1	a
Vermicompost (ton/ha)	20	5.1	a	29.0	a	28.5	a	17.6	b	23.6	b
	30	4.6	a	24.3	b	26.7	a	19.2	a	29.8	a
	30	4.9	a	29.5	a	25.6	a	18.1	a	25.2	b
Nitrogen (kg/ha)	60	4.4	a	21.1	c	25.8	a	18.5	a	29.9	a
	90	4.3	a	25.7	b	28.3	a	16.7	b	26.3	b
Vermicompost (ton/ha)	Nitrogen (kg/ha)										
10	30	4.4	a	23.0	cd	20.4	b	17.0	de	27.9	b
	60	4.2	ab	15.5	e	20.2	b	16.9	de	33.3	a
	90	3.2	b	30.8	b	34.3	a	15.5	f	23.0	c
20	30	5.2	a	30.3	b	36.8	a	17.9	cd	23.2	c
	60	4.7	a	29.5	b	29.0	a	18.4	bc	24.7	c
	90	5.5	a	27.1	bc	20.8	b	16.5	e	22.9	c
30	30	5.2	a	35.2	a	21.2	b	19.3	ab	24.6	c
	60	4.2	ab	18.3	e	28.6	a	20.1	a	31.8	a
	90	4.4	a	19.3	de	30.7	a	18.1	c	33.0	a
Means with similar letter haven't significant different at 5% statistical probability											

These results were in line with founded of Jashankarand Wahab (2004) on sesame.

Harvest index

All treatments and interactions had significant effects at 1% statistical probability. 30 ton/ha showed highest harvest index among between vermicompost treatments, also Harvest index increased4 and 18% by 60 and 90kg/ha nitrogen in compare with control. 30ton vermicompost together 90kg/ha nitrogen had highest harvest index. According to our result, we suggest using of 20 ton/ha vermicompost for sesame culture, also using of 90kg/ha nitrogen is best treatment. For combination using, it suggest 30ton/ha vermicompost + 60kh/hanitrogen for Firouzabad region and sesame.

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