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EVALUATING THE EFFECT OF KINETIN APPLICATION ON SESAME CULTIVARS

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Abstract

This study aimed to evaluate the effects of kinetin hormone application on sesame. In this plan, Dashtestan II, Yekta, Halil, Oltan and Darab14 cultivars were planting in mid-July 2015. Kinetin hormone was applied as foliar application 30 days after planting. The results showed that Dashtestan and Halil cultivars were taller than other cultivars during simultaneous spraying kinetin hormone. It was also concluded that the number of leaves on Oltan cultivar was more than other ones during simultaneous spraying kinetin hormone and the leaves of other cultivars was reduced due to simultaneous spraying of kinetin. The results of sesame yield showed that the grain yield in sesame cultivars was not significant changes in kinetin foliar application treatment. But grain yield between cultivars with 0.01% signification levels were different. According to the mean comparison analysis the Dashtestan II and Yekta cultivars by 2.2 and 2.1 t/ha had the highest seed yield respectively. There was also a significant difference in the final height of the plants between kinetin applied and not control plots. Also results showed that there was no significant difference between stem diameter, leaf area index, number of pods per plant, grain yield and harvest index.

Key words*: sesame cultivars, plant hormones, kinetin, yield.*

INTRODUCTION

The great importance of oilseeds is in human nutrition, production and processing as has long been considered. However, some problems in sesame (*Sesamum indicum* L.) production have always been a barrier to achieving high yield. Several studies in order to review practical strategies achieve better production sesame is taken. Sesame is one of the oldest oil plants (Bedigian and Harlan, 1986) and because of the oil quality, protein and antioxidants are widely used in food and medicine (Zhang et al., 1995). This plant is native in Iran and due to its unique characteristics as well as the possibility of a second crop after wheat in arid and semi-arid areas is beneficial (Rezvani Moghaddam et al., 2010). Sesame seed oil is one of the products in the group for having polyunsaturated fatty acids and high stability against oxidative oil, the higher quality and durability and numerous applications in medicine and desirable properties to the development of the crop and thus increase its per capita consumption. According to statistics contained in the PGRO (Center for Research sesame plant genetic resources conservation) of the important plant genetic resources sesame, is in eighth place. For this reason, the Feasibility Study and effective ways to achieve high yield cassava, especially with regard to the climatic conditions of each region has been the focus of attention. One of the factors of farmers in the cultivation of this product can be, as the low value of production per unit area. Besides identifying the best performance figures can help identify performance enhancing strategies for manufacturers to increase the performance of this product. There is a high nutritional properties of sesame seeds, other oil seeds cultivation of these plants to have had little and for cultivation in areas such as agriculture and industrial design advanced equipment for planting operations, and improving the cultivation and harvesting of the product, and harvesting to improve their nutritional properties and grain yield and resistance to pests types are needed. Therefore, future research is needed to develop nutritious and healthy foods based on Sesame been important in the country (Ashaghi et al., 2014). The operation of this plant, like other crops affected by various factors including genotype, sowing date, density, humidity, temperature, light and

soil fertility and growth stimulants are used. According to the study, Bennett et al. (1996) Sesame chemical fertilizers do not show much reaction. There is necessity of finding a suitable replacement for chemical fertilizers in order to enhance the performance necessary for the plant. On the other hand, nutrient management using the excessive application of chemical fertilizers was used. Leading to the destruction of ecosystems, agriculture and human health is compromised. Environmental problems caused by the use of chemical fertilizers and fertilizer production costs; the revision of the methods has necessitated increased food production (Sajjad Nick and Yadvi, 2013).

Having a diverse genetic material appropriate to the climatic conditions of different regions of the country reflects long-standing sesame cultivation in Iran. Sesame's research achievements in product, in both figures include the introduction of Darab 14, Varamin 2822, cute flower several and single branches and also figures Dashtestan II, Yekta, Oltan and Darab I. Sesame research in recent years has continued with more consistency and other recommendations in the cultivation and identification of genotypes adapted to dry conditions of other efforts in the field of research is sesame. Plants have evolved the ability to adapt in response to environmental stimuli have their growth pattern. A proper balance in roots and shoots pattern for proper absorption of food, light and water is very important. Producing organs and tissues in plants by plant stem cells (meristematic cells) continued and complicated by the effects of the different hormones regulated (Muraro et al., 2012).

In fact, growth regulators and plant hormones, which can also be synthesized by plants as well as for synthetic chemistry, are made by professionals. In general, plant hormones into two general categories activator (Auxin, gibberellins and Kinetin) and inhibitors (including Abscisic acid and methyl Jasmonate) are classified. Growth drivers, in processes such as cell division and growth, flowering, fruiting and seed formation, and inhibiting growth companies also play an important role in the field of plant response to environmental stress and other environmental stresses and as well as on growth-inhibiting activity such as stratification, the fall and are active (Giannakoula et al., 2012).

Hormones regulate the physiological processes that synthetic growth regulators, growth and development of crops through increasing its total solid matter, cause; so that research has shown that the use of these hormones lead to improved crop yield (Patel et al., 2015). So far, many reports have stated that the plant hormone growth promoters, it play an important role in the growth of plants and crops yields (Verma and Sen, 2009; Ud-deen, 2010; Mostafa and Abou Al-Hamd, 2012).

Kinetin (kinetins) is a group of plant hormones that stimulate the growth stimulatory effect is more associated with cell division. Many potential applications for use kinetin in agriculture of the late twentieth century (Weaver, 1972) was proposed among which to increase fruit set and modify the size and shape of the grape cultivars of apples were delicious. In soils with high temperature (25°C) Seeds of lettuce may be secondary to sleep but if the seeds are treated with kinetin, the germination increase the influence of "BA" (Benzyladenine) (Fahimi, 2008). So, In this regard, this study aimed to evaluate the effects of kinetin hormone on agronomic characteristics and yield of sesame cultivars.

MATERIALS AND METHODS

The field experiment was done in 2015 and in Tehran Municipality plant research center with longitude 35.7288 and latitude 51.2868 and height of 1270 meters. A split-plot experimental design in randomized complete block design with three replications was selected. To preparation of soil and treatments the land field was prepared for 30 same plots and sown sesame seeds cultivars Dashtestan II, Yekta, Halil, Olten and DarabI as V1 to V5 in main plots and two levels of Kinetin hormone application and control treatment in sub plots (F1 and F2). The kinetin application was sprayed at 1.0 Molar concentration in early flower stage (F2).

Following the establishment of plant the samples were taken from 1st September and repeated in interval of 10 days.

The traits were plant height, main stem diameter, number of leaves, leaf area index LAI, seed yield were measured by using methods of Amri et al. (2010).

Plant height (Borjian and Khaki, 2001) and number of pods per plant also were measured (Matin Far et al., 2012).
Pod number per plant was measured in final ripening stage too (Matin Far et al., 2012).
Grain yield and harvest index were measured too. To data analysis use of the MSTAT-C software and to mean comparison calculate we use of Duncan multiple range tests at 5%.

RESULTS AND DISCUSSIONS

Data analyzed show that the sesame cultivars did not affected in growth characteristics according to results of ANOVA Table. Although, plant height and seed oil content in different cultivars showed significant difference at 1% level and number of leaves per plant cultivars are significant difference in the level of 5%. But in stem diameter and leaf area index we cannot see significant differences among cultivars (Table 1).In another part of data analysis to investigate the interactions between treatments the results showed that plant height, number of leaves per plant and seed oil has a significant effect.

Height of plant

The results presented in Table 1 and Table 2 show that plant height in sesame cultivars is not significant changes by Kinetin application treatment.
But, there are significant differences between cultivars with 0.01 percent validity in height. However, the interactions between treatments are also significant differences at 0.01 of signification level (Table 1).
According to Table 2 data among of cultivars the Dashtestan II with 63.5 cm had maximum plant height and Darab-14 with an average of 47.17 cm had lowest height. Halil had the highest elevation in treatments without spraying kinetin (F1V3), Dashtestan II with kinetin (F2V1) and Olten (F2V4) under kinetin spraying, respectively.
The lowest plant height was in Darab-14 with kinetin foliar application (F2V5 and F2V2) and Olten without spraying (F1V4), respectively.

Table 1. Effect of Kinetin on sesame cultivars characteristics

SOV	DF	MS						
		Plant height	Stem diameter	No. leaves /plant	LAI	No.f pod /plant	Harvest index	Grain yield
Replication	2	114.4 ns	0.01 ns	17.7 ns	0.12 ns	3.33 ns	2.0 ns	3.33 ns
Kinetin (F)	1	3.3 ns	0.2 ns	34.13 ns	2.45 ns	6.53 ns	0.01 ns	6.53 ns
Error1	2	11.2	0.05	6.93	2.30	2.13	4	2.13
Cultivars (V)	4	290.5**	0.01 ns	33.12*	0.34 ns	95.80**	17.16**	95.80**
Interactions (F.V)	4	203.2**	0.04 ns	47.05**	2.79 ns	7.87 ns	24.76**	7.87 ns
Error 2	16	34.5	0.04	8.96	2.07	5.23	1.80	5.23
Coefficient of variation %		10.67	8.86	14.62	30.90	12.00	2.57	23.7

ns, * = non-significant and significant probability level at 5%, respectively

Table 2. Mean comparison of sesame treats

Treatments	Means						
	Plant height	Stem diameter	No. leaves /plant	LAI	No.f pod /plant	Harvest index	Grain yield
F1	54.73a	2.20a	21.53a	4.94a	2.64a	0.57a	1.7a
F2	55.40a	2.05a	19.40a	4.37a	2.69a	0.57a	1.8a
V1	63.50a	2.08a	21.33a	4.74a	2.67ab	0.71a	2.2a
V2	49.00a	2.13a	17.50a	4.71a	2.52b	0.68ab	2.1a
V3	59.83a	2.08a	23.33a	4.90a	2.60ab	0.59b	1.8ab
V4	55.83a	2.17a	21.50a	4.65a	2.75a	0.43bc	1.3b
V5	47.17a	2.15a	18.67a	4.26a	2.78a	0.37c	1.5b
F1V1	61.33 ab	2.13a	22.67 abc	5.69a	2.67a	0.71b	2.0a
F1V2	50.67 bc	2.30a	18.33 bc	4.93a	2.53a	0.61ab	2.0a
F1V3	65.33 a	10.2a	28.00 a	4.19a	2.70a	0.56bc	1.7a
F1V4	46.33 c	2.17a	20.33 bc	4.72a	2.67a	0.42cd	1.2a
F1V5	50.00 bc	2.30a	18.33 bc	5.16a	2.63a	0.49cd	1.8a
F2V1	65.67 a	2.03a	20.00 bc	3.79a	2.67a	0.71b	2.3a
F2V2	47.33 c	1.97a	16.67 c	4.49a	2.50a	0.74a	2.3a
F2V3	54.33 abc	2.07a	18.67 bc	5.61a	2.50a	0.62ab	1.8a
F2V4	65.33 a	2.17a	24.67 ab	4.59a	2.83a	0.44c	1.5a
F2V5	44.33 c	2.00a	17.00 c	3.36a	2.93a	0.24d	1.1a

Means in a column followed by the same letter are not significantly different at P≤0.05. S as sowing dates and F as foliar application treatments F1: control or without spraying with Kinetin hormone and F2: hormone sprayed with Kinetin; sesame cultivars include V1: Dashtestan II, V2: Yekta, V3: Halil, V4: Oltan and V5: Darab14

Stem diameter

The results presented in Tables 1 and 2 show the stem diameter reactions in the sesame cultivars treated via Kinetin that is not a significant difference. This trait also among cultivars and interaction between foliar and figures are not significant differences. The number of leaves per plant in the sesame cultivars and via Kinetin application also, had not significant difference.However, the interaction between foliar and cultivars is a significant difference in the level 0.01. Habibi et al (2015) reported that the use of kinetin had positive effects on morphological parameters like LAI and number of leaf per plant in pumpkin plant species.

Number of leaves per plant

Halil with 23.33 leaves had the highest number of leaves and Yekta by 17.5 leaves had the lowest number of leaves. The highest number of leaves in the Halil cultivar was recorded when they were without spraying of kinetin (F1V3).

Leaf area index

The results presented in Table 1 and 2 show that the leaf area index as one of the traits measured in the cultivars sesame treated via Kinetin had significant difference and this trait also among cultivars and interaction between foliar and cultivars was not meaningful difference. However, the interaction between foliar cultivars is significant differences at 0.01. The Halil by 4.90 LAI and Darab-14 BY 4.26 LAI had the maximum and minimum leaf area index respectively. But in interaction effects the maximum leaf area index was measured in Dashtestan II without kinetin application (F1V1) and minimum LAI treatment Darab 14 by spraying (F2V5) obtained. Alshdad et al (2012) tested 20 micromoles of Kinetin hormones, IAA and GA3 and mix it considers to be tested on corn. Sprayed with hormones, performance, leaf area and photosynthetic pigments had a significant increase, indicating the hormones were high performance.

Pods number per plant

The pods number per plant as one of the target traits measured in the all 5 sesame cultivars that treated via Kinetin but the results showed the treatments had not significant effects. By means of there are no significant differences between cultivars with 0.01% (Table 1). According to table 2, Darab-14 cultivar with 25.17 pods showed the most numbers of pods per plant compare to 17 pods in average. Mardani et al., (2013) reported the positive effect of Kinetin at a concentration of 5.0 mM on the number of embryos in some dicotyledons plants.

Harvest index

Sesame harvest index as important detector of plant change condition and yield was measured for all cultivars in Kinetin and non kinetin application. The results showed that the kinetin effect was not significant effect on HI%, but in this significant difference between cultivars with 0.05% was observed. The interaction effects of treatments also could change the HI% significantly.

In this case the Dashtestan II cultivar with 71% had the highest and Darab 14 by 37% had the lowest harvest index rates.

The highest harvest index in the Yekta treatment by spraying was 74% (F2V2) and the lowest harvest index was in Darab-14 with foliar treatments by24% (F2V5).

Grain yield

The results presented in Tables 1 and 2 showed that the grain yield in sesame cultivars was not significant changes in kinetin foliar application treatment. But grain yield between cultivars with 0.01% signification levels were different. According to the mean comparison analysis the Dashtestan II and Yekta cultivars by 2.2 and 2.1 t/ha had the highest seed yield respectively. The lowest yield was obtained by 1.3 t/ha. Kochaki et al (2014) reported that the application of kinetin can put significant effects on the increase of sesame yield. Esmaeilzadeh and Tafazoli Bandari (2000) reported that the use of kinetin (50 mg) was useful in developing and growth of the Shiraz grapes. They use of kinetin by different concentration and reported increase effects in leaf area index whenever in drought stress conditions. Bahradfar et al. (2015) examined the effect of foliar application of kinetin on safflower (*Carthamus tinctorius* L.) they determined that kinetin hormone treatment plant, number of branches per plant,

number of heads per plant, dry matter accumulation, biological yield, grain yield and oil were increased.

CONCLUSIONS

The results showed the Halil and Dashtestan cultivars and simultaneous spraying of Kinetin hormone has been higher than in the other cultivars. It was also concluded that the number of leaves per plant by spraying were more than control.

It can be concluded that the Kinetin hormones application play different important roles in different plant treats. To improving agronomic characteristics such as number of pod per plant, grain number and seed yield in sesame we need to more study.

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