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INFLUENCE OF FOLIAR APPLICATION AND VARIETY ON SOME CHARACTERISTICS OF SAFFLOWER

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ABSTRACT
Safflower cultivation mainly with the aim of extracting oil and its medicinal properties, Safflower as a native plant of the relative resistance to drought, salinity and cold, can have particular importance for the production of oilseeds. The significance of safflower as oilseed crop has enhanced in recent years, especially with the increasing interest in the output of biofuels. Safflower can play an significance role in providing the needed oil for country. Agriculture of Safflower is growing in the world and it is grown for power mechanization in plenty countries. Zinc (Zn) is an essential trace nutrient for plants, being consisted in many enzymatic reactions and is necessary for their well growth and development. Zinc is also afoul in redacting the protein and carbohydrate metabolism. The field experiment was laid out factorial with randomized complete block design with three replications. Treatments consisted variety (KWH39, RK1, IL111) and foliar application (Mn, Zn, Mn+ Zn, Water spray). Analysis of variance showed that the effect of variety on Plant height was significant. Analysis of variance showed that the effect of foliar application on all characteristics was not significant.

KEYWORDS: Plant height, Biological yield, Grain yield

INTRODUCTION
Supplying food for the growing population of the planet is one of the most important problems. Oilseeds can be in many ways, especially in terms of importance and nutritional value in human nutrition is the most valuable crops, Oilseeds used in human food consumption, the industry and using them to feed meal, attracted the interest of farmers in the cultivation of these plants (Dordas, Sioulas, 2008). Safflower cultivation mainly with the aim of extracting oil and its medicinal properties, Safflower as a native plant of the relative resistance to drought, salinity and cold, can have particular importance for the production of oilseeds (Dordas, Sioulas, 2008). Safflower diversity of the Middle East and the plant is widely grown in the climatic conditions of the area is hot and dry, Long ago the plant to flower because of its use as a food color, has been used, Safflower having desirable characteristics such as resistance to drought and adaptation to arid and semi-arid climate, up is concerned (Beyyavas *et al*., 2011). Safflower native vegetation and valuable of which is grown in the many countries, Safflower (*Carthamus tinctorius* L.) is a vegetative yearlong broad-leaved plant and a member of the Asteraceae family. It is native to parts of Asia, the Middle East and Africa. It was grown mainly for its flowers, which were used in construction dyes for clothing and food, but today, it is grown mainly for its oil. It grows well in both dry land and irrigated areas and is a water stress tolerant plant (Armah-Agyeman et al., 2002). The importance of safflower as oilseed crop has increased in last years, especially with the increasing interest in the yield of biofuels (Dordas, Sioulas, 2008). Safflower can play an important role in providing the needed oil for country. Agricultural of Safflower is growing in the world and it is grown for power mechanization in many countries. In past, the agriculture this plant has been popular in many parts of the world, especially in Middle East, but in past years due to the availability of safflower oil, it is very main. While in the past, mainly safflower yield was in order to take benefit of its pigment in the flowers. At present, the main goal of safflower yield is oil exploitation from its seeds and its oil has is good quality in several usage. Safflower oil has excellent quality because of unsaturated fatty acids (more than 78%), oleic acid and linoleic acid especially. One of the main sake for the low acreage of safflower is low yield and economic yield.

Therefore, the availability of certified seeds with high yield potential and support for purchasing seed oil plants by oil factories can be effective in country's oil needs (Weiss, 2000). To atone for the shortage of oil in the country, it is necessary lots of activities done to increase oil yield that it is possible in two ways: (1) increasing in agricultural area, and (2) increasing product in oil plants per unit area. In spite of that water and soil resources are decrease, it is not possible to develop new land for agriculture of oilseeds and it is not beneficial way economically. Therefore, further work should focus on increasing yield per unit area through breeding and farming projects that yield output per unit area increased (Weiss, 2000). The direct manufacture components of safflower are number of plants per plot, number of heads per plant, number of seeds per head and weight of grains (Gilbert, Tucker, 1967). The relative importance of each yield component is affected by many factors, including genotype, environmental conditions and cultural characteristics. Sowing time and nutrient management are important parameters affecting output and grain components in safflower. Safflower is a highly branched, herbaceous, thistle-like yearly or winter annual, usually with many long sharp spines on the leaves. The plant has a powerful taproot which enables it to progress in dry climates. In India the crop has traditionally been growth in the winter dry season in mixtures with other crops, such as triticum aestivum and sorghum. After germination, the crop maintains a rosette form for some weeks before rapid elongation to complete height. The florets are self-pollinating but seed set can be enhancing by bees or other insects. Safflower is one of humanity's oldest crops, but commonly it has been grown on small plots for the grower's personal use (Gyulai 1996). Not including a large number of little garden plots throughout India and Pakistan harvested for local use (Johnston et al., 2002). Oil has been produced commercially and for export for about 50 years, first as an oil source for the paint industry, now for its edible oil for cooking, margarine and salad oil. Over 60 countries grow safflower, but over mid is produced in India (mainly for the domestic vegetable oil market). Yield in the USA, Mexico, Ethiopia, Argentina and Australia comprises most of the residue.

China has a significant area planted to safflower, but the florets are harvested for use in traditional medicines and the crop is not reported internationally. Safflower oil is used by farmers locally. However, safflower can be a potential oilseed crops for low-rainfall areas (Esendal, E., 2001). Safflower, a strongly tap-rooted annual plant from the family Asteraceae, is native to the Middle East. It is refractory to saline situation (Bassil and Kaffka., 2002) and to water stresses (Bassiri et al., 1977). Safflower is usually agriculture in California in the spring to prevent inordinate herbal growth leading to poor seed output (Kaffka and Kearney., 1998). The number of capitula per plant and the number of filled seeds per plant in safflower were shown to be linearly correlated with each other (Steer and Harrigan., 1986). Kumar . (2009) gather that Cu fluxes and it's interactions with other microelements (Fe, Mn and Zn) was affect the growth and yield of triticum plants Abbas. (2009) found that different Zn levels did not significantly affect plant height, but significantly on spike length, number of spikelets per spike, 1000-grain weight and chaff yield. Habib (2009) reported that Zn and Fe foliar increased seed yield of wheat and its revelant traits compared to control and that out of the studied treatments, the treatment of Fe+Zn+ resulted in the highest seed yield. El-Ghamry . (2009) found that application microelements' (Boron, Molybdenum and zinc) gave the maximum mean values of all investigated yield parameters. Ali (2009) stated that solutions of zinc, boron and zinc plus boron were used as foliar spray, each used at tillering, jointing and boot stage. The effect of microelements on yield and crop performance has been reported by many investigators. Rehm and Albert (2006) reported that, output was higher for the treatments with microelements. In this respect, they reported that, foliar sprays of ferrous sulphate or chelates are found to be more effective and efficient than soil usage in corrective Fe-chlorosis in wheat. Micronutrients spraying led to increasing macro and microelements uptake as a result of improving root growth which consequently led to greater absorbing surface (Abdalla *et al.*, 1992). Zinc (Zn) is an essential trace element for plants, being consisted in many enzymatic reactions and is necessary for their good growth and development. Zinc is also involved in regulating the protein and carbohydrate metabolism (Swietlik, 1999). Zinc availability to plants is reduced in high pH soils. Two main theories are reported to account for high Zn deficiency encounter on calcareous soils. First, the solubility of Zn in these soils to be decreased up to 100 fold per unit increase in pH, and the latter theory which is based on the sorption of this nutrient by calcium carbonate ($CaCO_3$); the carbonate found in such soils forms an irresoluble complex with Zn added as zinc sulfate (Rasouli-Sadeghiani *et al.*, 2002). Zinc shortage is commonly observed in pomegranate orchards of Iran (Taghavi, 2000; Daryashenas and Dehghani, 2006). Zinc uptake rate was faster in mango trees when zinc sulfate was foliar used as compared with its soil use (Bahadur *et al.*, 1998).

MATERIAL AND METHODS

Location of experiment

The experiment was conducted at the zahak which is situated between 31° North latitude and 61° East longitude.

Composite soil sampling

Composite soil sampling was made in the testable area before the imposition of treatments and was analyzed for physical and chemical characteristics.

Field experiment

The field experiment was laid out factorial with randomized complete block design with three replications.

Treatments

Treatments included variety (KWH39, RK1, IL111) and foliar application (Mn, Zn, Mn+ Zn, Water spray)

Data collect

Data collected were subjected to statistical analysis by using a computer program MSTATC. Least Significant Difference test (LSD) at 5 % probability level was applied to compare the differences among treatments` means.

RESULTS AND DISCUSSION

Plant height

Analysis of variance showed that the effect of variety on Plant height was significant (Table 1). The maximum of Plant height of treatments KWH39 was obtained (Table 2). The minimum of Plant height of treatments IL111was obtained (Table 2). Analysis of variance showed that the effect of foliar application on Plant height was not significant (Table 1). The maximum of Plant height of treatments Mn was obtained (Table 2). The minimum of Plant height of treatments water spray was obtained (Table 2).

Biological yield

Analysis of variance showed that the effect of variety on biological yield was not significant (Table 1). The maximum of biological yield of treatments IL111was obtained (Table 2). The minimum of biological yield of treatments KWH39was obtained (Table 2). Analysis of variance showed that the effect of foliar application on biological yield was not significant (Table 1). The maximum of biological yield of treatments Mn was obtained (Table 2). The minimum of biological yield of treatments water spray was obtained (Table 2).

Grain yield

Analysis of variance showed that the effect of variety on grain yield was significant (Table 1). The maximum of grain yield of treatments IL111was obtained (Table 2). The minimum of grain yield of treatments KWH39was obtained (Table 2). Analysis of variance showed that the effect of foliar application on grain yield was not significant (Table 1). The maximum of grain yield of treatments Zn + Mn was obtained (Table 2). The minimum of grain yield of treatments water spray was obtained (Table 2).

Table 1. Anova analysis of the safflower affected by variety and foliar application

S.O.V	df	Plant height	Biological yield	Grain yield
R	2	298.6 ^{ns}	2346163^{ns}	79448^{ns}
variety	2	1678.85**	708455^{ns}	518327**
Error	4	186.8 ^{ns}	359757^{ns}	21930^{ns}
foliar application	3	106.7^{ns}	1320017^{ns}	112472^{ns}
Variety * foliar application	6	47.9^{ns}	148663^{ns}	23988^{ns}
Total error	18	158.6	757517	37009

*, **, ns: significant at p<0.05 and p<0.01 and non-significant, respectively.

Table 2. Comparison of different traits affected by water stress and potassium variety and foliar application

treatment	Plant height	Biological yield	Grain yield
spray			
Water	144	11766.6a	2363.3b
Zn	148.7	12297.2a	2475.3ab
Mn	152.3	12691.7a	2553.2ab
Zn + Mn	147.1	12141.7a	2624.2a
variety			
IL111	134.6b	12366.7	2743.1a
LRK1	152.3a	12362.5	2401.8b
KWH39	157.1a	11943.8	2367b

Any two means not sharing a common letter differ significantly from each other at 5% probability

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