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Evaluation Of Use Fe And Zn Micronutrients Application On Quantitative And Qualitative Traits Of Safflower (Carthamus Tinctorius L.)

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Abstract. In order to evaluate the effects of micronutrients on quantitative and qualitative yield of safflower (Carthamus tinctorius L.), a field experiment was carried out at Research Farm of Agricultural Faculty, saveh University during growing season of 2012-2013. The experiment performed based on RCBD with 3 replications and 2 treatments including: Fe, Zn, B, pair combination of them and control. Foliar application of Fe (as FeSO4) , Zn (as ZnSO4) was used two times, before flowering and after pollination. The results showed significant differences in plant height, seed yield and biological, thousand seed weight and percentages of protein and oil due to application of micronutrients. The maximum seed yield, plant height and thousand seed weight, protein percentage and oil percentage was relevant to Zn-Fe pair combination at micronutrient application. In general, application of micronutrients had positive effects on quantitative and qualitative traits of safflower.

Keywords: Oıl Percentage, Plant Heıght, Seed Yıeld, Micronutrients

1. INTRODUCTION

Safflower (Carthamus tinctorius L.) is an important oilseed crop in arid and semi-arid ancient world, such as India and elsewhere has been growing in the Middle East and Africa(17). Indigenous oilseeds cultivation has spread in the values of earlier years. Wild type distribution across the country reflect its high adaptability to climatic conditions, It is particularly good resistance to drought and salinity stress Inserts(11). Today, in addition to using mineral nutrient Micronutrients is concerned as an important tool for obtaining maximum yield per unit area(7,11). Nutrients micronutrients in addition to increasing the quantity and quality of agricultural products and livestock also have a significant impact on human health(4,22). Micronutrients are required for normal growth of plants, and also participated in the construction of some organelles are involved in many biochemical reactions plant. For example, the element in the production of growth hormone (auxin) and perform photosynthesis, cell division, and iron element involved in chlorophyll formation(20,17). Micronutrients deficiency, especially through the use of the foliar can improve crop yield and yield components(9,11).

The results showed that 4.0% of iron sulfate concentration on 5/0 percent concentration significantly increased seed yield(18). Soil application of zinc and sulfur fertilizers were Increased seed yield and Application of 20 kg, the highest yield per hectare was obtained with 20 kg of sulfur relative to the control was 19.5% higher(8,23). Foliar with zinc and sulfur, nitrogen and phosphorus fertilizers was increased on grain yield, protein and oil seed was significantly(2). Effect of zinc and iron combined with sulfur on growth, yield and oil content of safflower protein was significantly, So that application of 30 kg sulfur per hectare to improve plant height, number of leaves and branches per plant(10,17).

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the quality and quantity of crops and medicinal species was increased(11,12). Research has shown that foliar with copper and zinc, protein and oil yield of rapeseed (Brassica napus L.) to significantly increase(14,6). For sunflower (Helianthus annus L.), have been reported similar results(6,19). In soybean (Glycine max L.) applications has increased the dry matter, pods, seeds per pod, number of seeds per pod and seed weight(8). In wheat (Triticum aestivum L.)increased to zinc intake, dry matter yield and N uptake(3,13). Ramroudi and colleagues (15) also demonstrated that foliar application of micronutrient elements can be helpful in improving the quantitative and qualitative characteristics of plants, such as PP (Plantago ovate Forsk).

So far the importance of micronutrients in improving crop performance and environmental protection, This study aimed to evaluate foliar micronutrient elements iron entrance and compounds combining the qualitative and quantitative were carried out characteristics of safflower.

2. MATERIALS AND METHODS

In order to assess the yield and quality of crop nutrients, In the field of Education and Research University of Saveh was in the sandy loam soil. The place was hot and dry climate plan. Soil chemical and physical properties are given in Table 1.

Experiment, a randomized complete block design with three replications. Treatments include the use of micronutrient elements iron, zinc and iron, and treatment of non-binary compound fertilizer (control). Using the four elements iron levels 0, 30.45, 60 kg and 4 of Zinc to 0, 20, 30, 40 kg ha before flowering and after sunset was the time of pollination.

Land of the experiment in spring plowed to a depth of 30 cm and then drive the grinding and leveling was done in the fall. According to soil test results were before the demarcation of 150 kg triple superphosphate and 100 kg ha of land. Planting was done by hand in mid-November. Each plot has a size of 3 × 5 m to 6 m row spacing of 50 cm and length 5. Grooves with a depth of 5 cm on each Row linearly poured into the groove and After taking into account the distance of 5 cm from emergence to thinning out the rows. Flood irrigation during the growing season were conducted according to the requirements. Fight weeds with mechanical weeding was done twice during the growing season. The farm pests, pollen-eating beetles in the aggregation stage The battle of 2.5 per thousand of dissolved diazinon spraying was done in two stages. A number of plants were chosen from each plot was measured at physiological maturity, plant height, grain yield, biological yield, grain weight, protein content and oil content.

3. RESULTS

The results showed that the effect of micronutrients on plant height, seed weight, protein content, oil content and seed and biological yield were highly significant(table 2). Comparison of means (Table 3) show that the features listed among treatments was significantly different from the control Micronutrients. The highest was plant height and oil content and protein was treated zinc with the iron. The positive effects have been reported of zinc on the production of growth hormones, photosynthesis (17), and increases in wheat grain weight (25). The lowest mean of plant height, seed weight and oil content belonged to the control (Table 3). Iron through increased photosynthetic activity of protein and carbohydrates in plant, its Increased grain weight. In another experiment reported Zinc application increased dry matter production, number of pods per plant, soybean is increasing seeds per pod and 100 seed weight of (5).

Effect of Micronutrients on biological yield and grain protein and oil Dzsd very significant. Comparison showed that the lowest and highest biological and grain yield belonged to the control treatments(11).

The grain yield, yield components (including the number of fertile seeds per plant and seed weight) and changes in each component will cause a change in performance. Iron is the impact of carbohydrates increases on photosynthesis and Because in the end grain of the material can be stored and Can be stated that the use of iron may increase the yield. Micro-nutrients on seed weight and seed yield significant(24). Iron is involved in the activation of photosynthesis Its deficiency causes a severe reduction in photosynthesis which reduces the biological function to the control(1).

Effect of Micronutrients on the oil content compared to the control treatment had the lowest. Most of the oil was treated with a combination of zinc and iron Iron and zinc in subsequent treatments were rated as significantly. Therefore, zinc can increase fat metabolism and the way it affected the oil content. The results of several studies has shown an increased percentage of safflower oil(17,24). Micronutrients are effective in increasing the percentage of sunflower oil(19). Comparison results show effect of increasing the percentage of protein compared to control micronutrient elements are significant. Highest protein percentage was relevant to Zn-Fe pair combination at micronutrient application. The enhancing effect of zinc on the protein, its role in nitrogen metabolism is concerned. Because zinc have plays an important role in protein synthesis and metabolism of carbohydrates (21) Zinc deficiency decrease the enzyme RNA polymerase activity and It reduces the transfer of amino acids, the degradation of RNA, protein synthesis is reduced Which reduces the production of proteins. Effect of Micronutrients with fertilizer was increased significantly grain yield, protein and oil in safflower (2) and cotton (Gossypium hirsutum L) (21). Results show that the use Micronutrients are effective in increasing crop yield and quality.

Table 1. physical and chemical properties of studied soil.

Depth of soil(cm)	Soil texture	K(ppm)	P(ppm)	N(%)	Oc(%)	pH	Ec(dc/m)
0-30	Sandy loam	180	24	0.04	0.41	7.8	1.8

Table 2. analysis of variance

S.O.V	Df	Plant height	Thousand seed weight	Seed yield	Biological seed	Protein(%)	Oil(%)
Replication	3	6.3	0.56	6055.7	533044.1	0.901	8.82
Treatment	3	81.655	4.55	589827**	344523.4**	13851.607**	10.23**
Error	29	1.16	0.55	9704	306198	0.28	5.83
C.V(%)		1.3	0.66	3.14	6.5	1.96	2.53

Table 3. comparison of means.

treatment	Plant height(cm)	Thousand seed weight(g)	Seed yield(kg/ha)	Biological seed(kg/ha)	Protein(%)	Oil(%)
Control	79.88	35.20	1345.71	4019.53	25.42	16.45
Fe	92.41	38.88	1758.33	5374	31.43	18.5
Zn	85.75	36.82	1640.83	4971.66	29.67	18.02
Fe+Zn	98	39.2	1950	6291	35.03	20

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