



EFFECTS OF STAGES AND AMOUNT OF NITROGEN FOLIAR APPLICATION ON YIELD AND YIELD COMPONENTS IN HYBRID ALESTAR SUNFLOWER

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ABSTRACT

The objective of this study was to investigate effects of stages and amount of nitrogen foliar application on yield and yield components in hybrid Alestar sunflower. Sunflower is one of the most important oil-grain in Iran because of high quality of its oil. The experimental design was a factorial in randomized complete blocks with three replications. The factors were concentrations of urea foliar application with 3 levels (a0: control, a1: 3% urea concentration and a2: 5% urea concentration and foliar application stages with 2 levels (b1: 8-10 leaf stage and b2: flowering stage). Number of seeds in head and grain yield were measured after harvest. Research results showed that there was a significant difference in interaction between concentration and foliar application stages of nitrogen on number of seeds in head. Foliar application of urea with 5% concentration in 8-10 leaf stage had increased number of seeds per head compare to control group and other treatments about 45% and 28.27%, respectively. Foliar application of nitrogen with 5% urea concentration was significantly increased grain yield compare to control treatment and urea concentration of 3% about 30.27% and 7.50%, respectively.

Keywords: sunflower, foliar application, concentration, urea, yield.

INTRODUCTION

The main source of fat and oil for human beings are animals and plants. For this reason herbal oils e.g. sunflower (*Helianthus annuus* L.), has a principal role in balance of human feeding fats and decrease of cholesterol content because of its great amounts of unsaturated fatty acids (UFAs) [1]. Providing suitable fertilization for soil by balanced use of chemical fertilizers and the required nutritional elements of the plant is one of the important aspects of agronomic management in order to reach the maximum yield and optimal quality for agronomic crops and to minimize their harmful effects on the environment [2]. The lack of nitrogen (N) is the most important disorder which decreases the sunflower growth and its yield. Shortage of this element decreases the economical and biological yield, and if this condition continues, it can strongly decrease growth rate and consequently photosynthesis rate and 1000-seeds weight. The lack of nitrogen influences on growth rate, head diameter, grain yield, and yield components [3]. The most important effects of nitrogen in sunflower are plants growth, head diameter, and also increase of rod flowers. Previous researchers were demonstrated that using N fertilizer increases the grain yield, oil yield, and percentage of grain protein [4]. Not enough nitrogen element in soil and the lack of moisture in rizosphere leads to increase in blank percentage at the center of sunflower head [5]. The studies have been shown that increase of nitrogen application and amount of irrigation water leads to an increase in economical and biological yield of sunflower [6]. The increase of availability of the plant to nitrogen element and its transfer to the grain increases 1000-seeds weight. In constant, it's proved that adding more than 90 Kg/Ha only causes % 4 increases in grain weight [3]. According to [5]

showed that using N fertilizer increases significantly plants growth, dry matter accumulation, the number of the grains in head and grain yield in sunflower. The objective of this study was to determinate the effects of stages and amount of nitrogen foliar application on yield and yield components in hybrid Alestar sunflower.

MATERIALS AND METHODS

The experiment was carried out in 2010 at research station, faculty of agriculture, Islamic Azad University of Tabriz that is located in longitude of 38° and 3min North, Latitude of 46° and 27min and elevation of 1360 meters above sea levels. The experimental design was a factorial in randomized complete blocks with three replications. The factors were concentrations of urea foliar application with 3 levels (a0: control, a1: 3% urea concentration and a2: 5% urea concentration and foliar application stages with 2 levels (b1: 8-10 leaf stage and b2: flowering stage). Therefore this experiment had 6 treatments and 18 plots. The hybrid under survey in this experiment was Alstar which is an earliness and fairly productive variety. The amount of used fertilizer according to the soil analysis and laboratory recommendation was 75 kg per Ha super phosphate triple and 75 kg per Ha potassium sulphate. Each experimental plot included 3 planting rows by the length of 4 meters. The distance between rows, the seeds on the rows, and the depth of planting were considered 75, 20, and 3 Cm, respectively. The planting was done in May. After planting and locating seedlings, we did the thinning and weeding-out operations in the stage of 2-4 leaf. All of the plots irrigated equally. Treatments were performed related to foliar application of experimental units in one of two stages of 8-10 leaf and/or flowering stage, and prepared



nitrogen solution by the concentration of 3% and 5% urea as needed. After physiological ripeness, harvesting operations done and measured the number of seeds per head and grain yield. Mstatc program was used to testing the normality of the data. Analysis of variance procedures were conducted using SAS statistical procedures [7] and excel softwar was used to drawing the diagrams.

RESULTS AND DISCUSSIONS

The number of seeds per head

According to results obtained from the comparison of the means the interaction between concentration and stages of N foliar application led to a significant difference between treatments. The maximum number of seeds per head was related to foliar application of N with 5% urea concentration in 8-10 leaf stage (a_2b_1) about 919.67 and the least number of seeds per head was related to the control group in 8-10 leaf stage (a_0b_1) about 505.18. Also, foliar application of N with 5% urea concentration in vegetative stage increases number of seeds per head in comparison with control and other treatments about % 45 and % 28.27, respectively. Foliar application of N with 5% urea concentration in 8-10 leaf stage (a_2b_1) in comparison with its foliar application in flowering stage (a_2b_2) reported an increase equal to %12.22 in number of seeds per head (Figure-1). Foliar application of N in critical process of growth by suitable concentration increases absorption of this element in plant which lead to high transport of assimilate materials to grains [8]. Previous researchers [3] demonstrated that optimal rates of N fertilizer develop vegetative growth and yield and yield components such as leaf area index and head diameter that finally lead to increase of the number of seeds in sunflower's head that in the present study higher N concentration (5% urea concentration) due to uptake of N absorption had this effects.

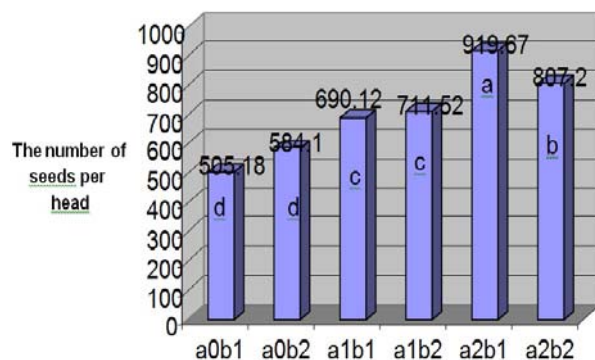


Figure-1. The influence of interaction between concentration and foliar application stage of N on the number of seeds per head. The factors were concentrations of urea foliar application with 3 levels (a0: control, a1: 3% urea concentration and a2: 5% urea concentration and foliar application stages with 2 levels (b1: 8-10 leaf stage and b2: flowering stage).

The grain yield per hectare

The comparison of the means showed that in terms of grain yield per hectare, there was a significant difference between different levels of concentrations of N foliar application. Foliar application of N with 5% urea concentration (a_2) increased grain yield rather than control group (a_0) and urea concentration of 3% (a_1) about 30.27% and 7.50%, respectively. Although there was not a significant difference between different levels of stages of N foliar application but foliar application of N in 8-10 leaf stage in comparison with flowering stage reported an increase equal to 0.8% in grain yield per hectare. (Figure-2). The most important surveyed trait in experiments is the grain yield per hectare because the yield components, finally, leads to this factor. The sunflower yield is influenced by environmental condition, genetic characteristics and farm management. In this case, the optimal yield is obtained by suitable amounts of agricultural inputs and operations [9]. According to [10] stated that using nitrogen leads to significant increase in grain yield but foliar application did not have significant effect on grain yield and there was no significant difference between treatments of nitrogen soil application along with foliar application and nitrogen soil application without foliar application in the respect of grain yield.

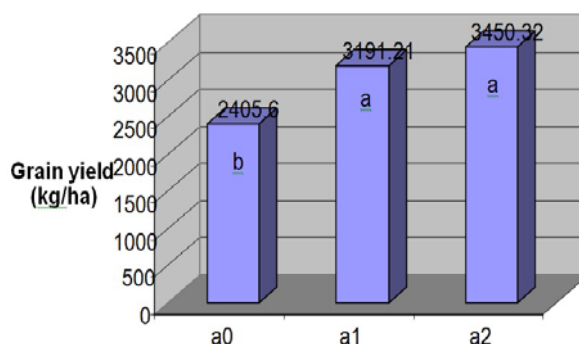


Figure-2. The effects of concentrations of N foliar application on the grain yield. The factors were concentrations of urea foliar application with 3 levels (a0: control, a1: 3% urea concentration and a2: 5% urea concentration and foliar application stages with 2 levels (b1: 8-10 leaf stage and b2: flowering stage).

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