

EFFET OF USING HUMIC, FOLIAR APPLICATION OF COMPOST TEA AND WERMIWASH ON YIELD AND YIELD COMPONENT OF SAFFLOWER *CARTHAMUS TINCTORIUS L.*

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Abstract

The objective of the present study was to determine of effect of humic acid application and different foliar application of vermicompost extract and vermiwash on yield and yield components of safflower under using different levels of humic acid application in soil. A field experiment was conducted at the Vali-e-Asr University of Rafsanjan, Rafsanjan, Iran. The experiment was conducted as factorial based on randomized complete block design. Treatments were included soil application of humic fertilizer (0, 500, 1000 and 1500 kg.ha⁻¹) and foliar spraying of vermiwash 1:10, vermiwash 1:20, compost tea and distilled a water as control. Seeds were hand-sewn with density of 40 plants m⁻² and a depth of 5 cm with row spacing of 50 cm. The plots were irrigated after 70 mm cumulative evaporation from standard evaporation pan class A and irrigation amount was based on soil moisture depletion. Seed yield and number of heads were determined by harvesting 10 plant at random from the four central rows at physiological maturity stage. Seed yield in each plot measured with 14% humidity. Number of seeds per heads was determined by measuring 30 heads at random from 10 randomized harvested plants. Analyses were performed with a personal computer using the MSTATC software. A factorial analysis of variance (ANOVA) was performed for all parameters. Results showed that humic fertilizer significantly affected head number, seed number, 1000 seed weight and seed yield of safflower, however there was no effect on branch number. The highest grain yield (5822.1 kg.ha⁻¹) obtained in 1500 kg humic. Foliar spraying significantly effect on branch number and the highest yield (4858 kg.ha⁻¹) was obtained by spraying of compost tea.

Keywords: FOLIAR APPLICATION; HUMIC; SAFFLOWER; YIELD; YIELD COMPONENT

I. INTRODUCTION

Safflower (*Carthamustinctorius L.*) is an annual oilseed crop which is belongs to Asteraceae (Compositae) family. It is commercially cultivated for its dye, which is extracted from the flowers, and for high quality vegetative oil of that is extracted from the seeds [3]. The direct yield components of safflower are number of plants per plot, number of heads per plant, number of seeds per head and weight of seeds [7]. The relative importance of each yield component is affected by many factors, including genotype, environmental conditions and cultural practices. Nutrient management is one of the critical inputs in achieving high productivity of safflower [4]. Vermicompost and nitrogen availability are important parameters affecting yield and yield components in safflower. The availability of nutrient can be manipulated by adopting suitable package of fertilizer management. Under fairly good nutrient availability conditions, the appropriate fertilizer dose and their time of application may act as major driving force in pushing up the crop yields and increase the fertilizer use efficiency [2]. humic acid have consistently improved seed germination, enhanced seedling growth and development, and increased plant productivity much more than would be possible from the mere conversion of mineral nutrients into more plant-available forms [6]. The objective of the present study was to determine of effect of humic acid application and different foliar application of vermicompost extract and vermiwash on Yield and Components of Safflower (*Carthamustinctorius L.*) under using different levels of humic acid application in soil.

II. MATERIALS AND METHODS

A field experiment was conducted at the Vali-e-Asr University of Rafsanjan, Rafsanjan (latitude 30.23 °N, longitude 56 °E and 1469m asl), Iran. The experiment was conducted as factorial based on randomized complete block design with three replications at one place. Treatments were included soil application of humic fertilizer (0, 500, 1000 and 1500 kg.ha⁻¹) and foliar spraying of vermiwash 1:10, vermiwash 1:20, compost tea and distilled a water as control. Seeds were sowing by hand with density of 40 plants m⁻² and a depth of 5 cm with row

spacing of 50 cm. The plots were irrigated after 70 mm cumulative evaporation from standard evaporation pan class A and irrigation amount was based on soil moisture depletion. There was no effect of flooding or water deficit stress. Determination of agronomic traits of each experimental plot, 10 plants were randomly selected and their morphological characteristics were measured. Seed yield and number of heads were determined by harvesting 10 plant at random from the four central rows at physiological maturity stage. Seed yield in each plot measured with 14% humidity. Number of seeds per heads was determined by measuring 30 heads at random from 10 randomized harvested plants. Analyses were performed with a personal computer using the MSTATC software. A factorial analysis of variance (ANOVA) was performed for all parameters. In addition the Duncan's Multiple Range Test (DMRT) (P = 0.05) was used to conduct mean comparison of treatments and find significant differences among means. And for charts was drawn with Excel software.

III. RESULTS AND DISCUSSION

Number of Heads per Plant (NH/P)

There was a significant difference between foliar spraying on head no. of safflower (Fig. 1). All spraying treatments significantly increased the head no. of safflowers compared with distilled water. N and other elements in Vermicompost play an important role in different metabolic processes in plant. And this may be attributed to improving water absorption and plant nourishing due to nitrogen and elements in Vermicompost. This result was agreement by (Naseri; 2010) who indicated that application of N fertilizer increased number of heads on plant. On the other hand, head no. significantly increased with increasing humic acid application (Fig 2.). This result indicated that using humic acid could improve soil nutrition availability to absorption of nutrition.

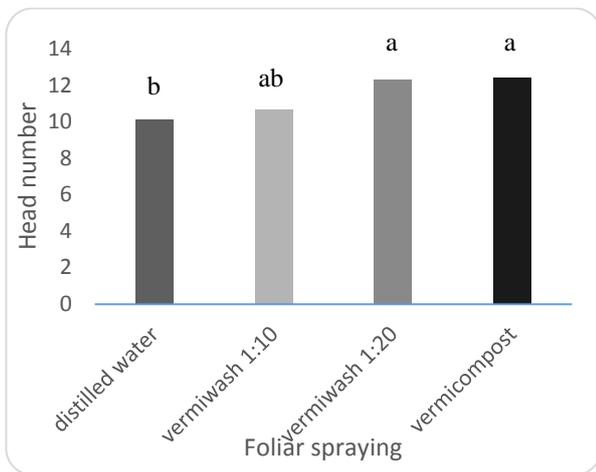


Fig 1. Effect of foliar spraying on head number of safflower

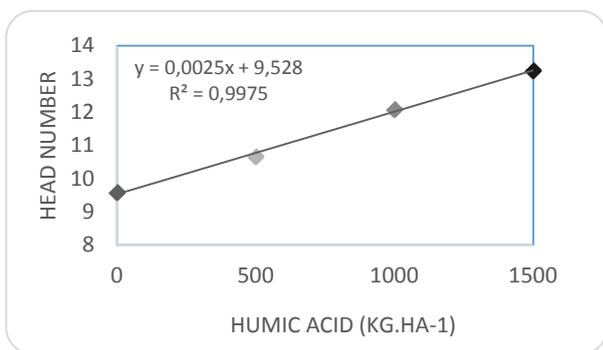


Fig 2. Effect of humic on head number of safflower

Seed number and 100 seed weight.

Seed number and 100 seed weight influenced by using humic acid (fig 3, 4). Similarly to head no. Seed number and 100 seed weight increased with application of humic acid which is probably due to more availability of nutrition element and better soil conditions. As the humic acid has positive effect on heads per plant therefore the Seed number increased. In other word, using humic acid appropriate levels provide better nutrient and water uptake and plant photosynthesis through improving roots expansion.

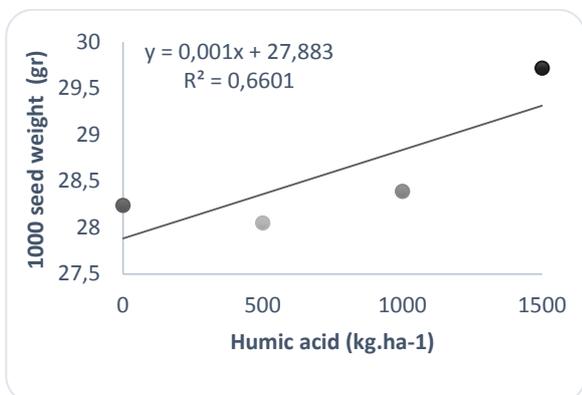


Fig 3. Effect of humic on 1000 seed weight of safflower

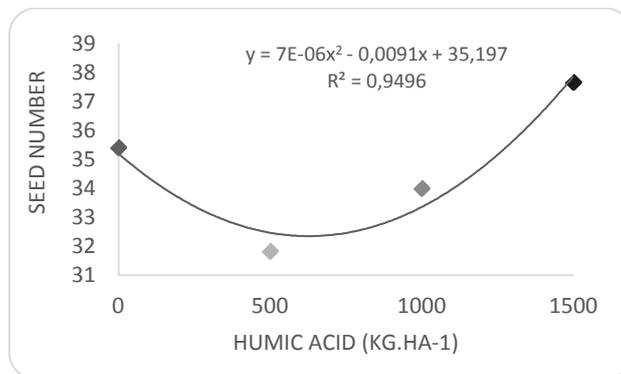


Fig 4. Effect of humic on seed number of safflower

Seed Yield

Analysing seed yield variance showed that there was a significant different between foliar treatments and humic acid application. Seed yield increased with application of vermiwash and vermicompost extraction (Fig. 5, 6). The highest amount of seed yield observed in vermicompost extraction (4856 kg/ha-1) which have no significant difference with vermiwash. It is reported that Vermicompost tended to be higher in nitrates, which is the more plant-available form of nitrogen [9]. Hammermeister et al. (2004) indicated that Vermicomposted manure has higher N availability than conventionally composted manure on a weight basis [1]. The latter study also showed that the supply rate of several humic acids could significantly increase the seed yield of safflower compared with control (Fig 6). Many researchers have found that Vermicompost stimulates further plant growth even when the plants are already receiving optimal nutrition [5, 10]. Vermicompost have consistently improved seed germination, enhanced seedling growth and development, and increased plant productivity much more than would be possible from the more conversion of mineral nutrients into more plant-available forms.

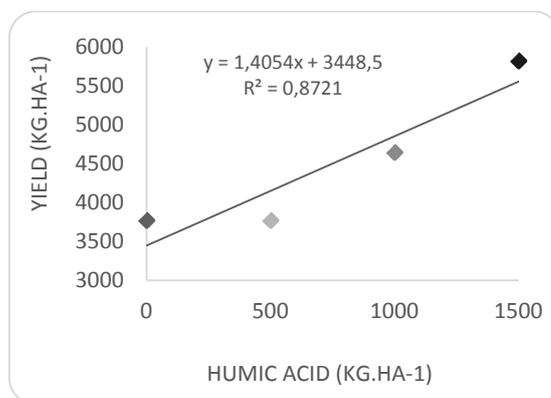


Fig 5. Effect of humic on seed yield of safflower

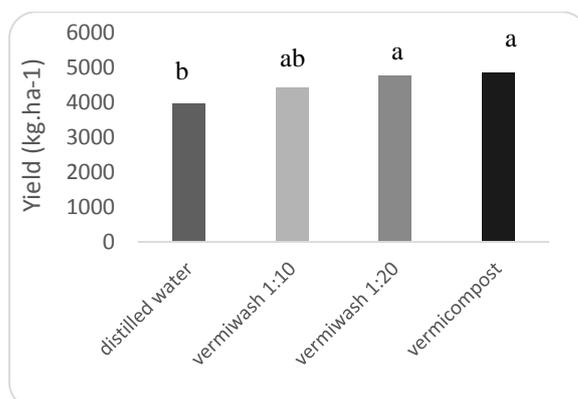


Fig 6. Effect of foliar spraying on seed yield of safflower

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