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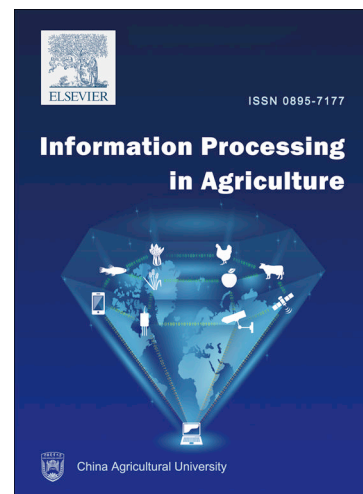
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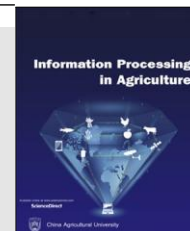
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Response of seed yield and fatty acid compositions for some sunflower genotypes to plant spacing and nitrogen fertilization

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ABSTRACT

A field experiment was conducted at the experiment Farm of Kafr-El-Hamam Research Station, Zagazig, Sharkia Governorate, Agricultural Research Center, Egypt during the two successive summer seasons of 2013 and 2014 to achieve the highest yield and good oil quality of three tested sunflower genotypes. In both seasons, the experiment was conducted by using the split split plot design in randomized complete block design with three replicates arrangement keeping plant spaces (15, 20 and 25 cm apart between hills) in main plots, nitrogen fertilization levels (15, 30 and 45 N fad.⁻¹) in sub plots and sunflower genotypes (Giza 102, Sakha 53 and promising line of L120) in sub sub plots. Yield and quality traits were significantly influenced by plant spaces, nitrogen fertilization levels and cultivars as well as interactions in both seasons and their combined analysis. The wider plant spacing of 25 cm seems to be a good compromise between the highest seed yield fad.⁻¹ and good acid composition of oil. Gradually increasing of nitrogen fertilization level had a positive reflected on yield and desirable acid composition of oil. Sakha 53 was ranked in the first order in stem diameter, head diameter, 100-seed weight, seed weight plant⁻¹, flowered late and hence seed yield fad.⁻¹ as well as seed oil content whereas, Giza 102 characterized with its contained the highest proportion of oleic and linoleic unsaturated fatty acids. The highest values of head diameter, 100-seed weight, seed weight plant⁻¹ and hence seed yield fad.⁻¹ as well as the highest proportion of oleic and linoleic unsaturated fatty acids composition were obtained by grown sunflower cv. Sakha 53 at wider spacing of 25 cm with application of nitrogen fertilization levels of 45 N fad.⁻¹. Correlation and path analyses revealed that 100-seed weight and head diameter had the highest direct and indirect influence on seed weight plant⁻¹, at the same time also, oleic acid content and linoleic acid content had the highest direct and indirect effect influence on seed oil content indicating their importance as selection criteria to improve yield and oil quality of sunflower.

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1. INTRODUCTION

Egypt has been facing acute shortage of edible oil with rapidly growing population, and the country has to supplement the needs for oil to meet the annual requirements by importing. Sunflower (*Helianthus annuus* L.) is considered a good candidate of oilseed crops for bridging the gap between demand and supply of edible oil. Therefore, great emphasis should be given towards an improvement of seed yield and oil quality in sunflower. Consequently, cultivating promising genotypes with high yielding ability and applying favorable agricultural practices as plant spacing and nitrogen fertilization offer a great opportunity to improve seed yield and oil quality of sunflower.

Plant spacing is one of the most important agronomic practices that affect seed production and fatty acids composition of sunflower oils. It has been found to have positive influence on days to 50 % flowering [8]; stem diameter, head diameter, thousand seed weight, seed weight plant⁻¹ and seed yield fad.⁻¹ [9, 19, 17, 28, 6, 26, 15, 8 and 3] as well as oleic and linoleic unsaturated fatty acids composition of oil [15 and 10]. On the other hand, it has been found to have negative

influence on plant height [28 and 15]; seed oil content [11, 15, 10 and 3] as well as palmitic and stearic saturated fatty acids composition of oils [15 and 10].

Fertilization, in general and particularly with nitrogen, is considered as one of the major factors that greatly affect seed yield and oil quality of sunflower [12, 5, 23, 1, 21 and 20]. In this concern, [21] reported that 100 kg N ha⁻¹ was suitable for sunflower and the higher rate 150 kg N ha⁻¹ indicates a negative effect on the oil contents and seed yield. However, [14] reported that 80 kg N ha⁻¹ was sufficient for sunflower fertilization. Also, the response of sunflower to nitrogen fertilizer levels was studied by [6, 2, 8 and 3] reported that nitrogen application markedly enhanced growth and yield but resulted in sharp decrease in seed oil percentage. Moreover, [27] in Bulgaria, showed that the high N rate (180 kg ha⁻¹) decreased the seed oil content and the sum of unsaturated fatty acid (oleic and linoleic) and increased the sum of saturated fatty acid (stearic and palmitic). [24] in Czech Republic, They awarded that the N applicant didn't significantly change the content of fatty acids. [29] in USA, revealed that N application rate and genotype may significantly modify fatty acid composition and oil content of sunflower grown in Mississippi, so

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