RESPONSE OF YIELD AND QUALITY OF TWO GROUNDNUT (*Arachis hypogaea* L.) CULTIVARS TO FOLIAR APPLICATION WITH SOME MICRONUTRIENTS IN NEWLY RECLAIMED SANDY SOIL

By

DEYAA EL-DIN MOHAMED ABDEL-RAHMAN

B.Sc. Agric. Sc. (Agronomy), Assiut University, 2004

M.Sc. Agric. Sc. (Agronomy), Cairo University, 2011

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Approval Sheet

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This thesis for Ph.D. degree has been approved by:

Dr. Mohamed Rizk-Allah Asran Hovny ……
Head Research of field crops, Field Crops Research Institute, Agricultural Research Center

Dr. Mohamed Taher Fayed …….
Prof. Emeritus of Agronomy, Department of Agronomy, Faculty of Agriculture, Ain Shams University

Dr. Olfat Hassan El-Bagoury …….
Prof. Emeritus of Agronomy, Department of Agronomy, Faculty of Agriculture, Ain Shams University

Dr. Ayman Farid Abou-Hadid …….
Prof. Emeritus of Vegetable Crops, Department of Horticulture, Faculty of Agriculture, Ain Shams University

Date of Examination: 30/12 / 2018

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DEYAA EL-DIN MOHAMED ABDEL-RAHMAN

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Under the supervision of:

Dr. Ayman Farid Abou-Hadid

Prof. Emeritus of Vegetable Crops, Department of Horticulture, Faculty of Agriculture, Ain Shams University (Principal Supervisor)

Dr. Olfat Hassan El-Bagoury

Prof. Emeritus of Agronomy, Department of Agronomy, Faculty of Agriculture, Ain Shams University

Dr. Bahaa El-Din Bastawy Mekki

Researcher Prof. Emeritus of Agronomy, Department of Field Crop, Agricultural and Biological Division, National Research Center

ABSTRACT

Deyaa El-Din Mohamed Abdel-Rahman. Response of Yield and Quality of Two Groundnut (*Arachis hypogaea* L.) Cultivars to Foliar Application with Some Micronutrients in Newly Reclaimed Sandy Soil. Unpublished Ph.D. Thesis, Department of Arid Lands, Faculty of Agriculture, Ain Shams University, 2018.

Two field experiments were carried out during two summer successive seasons (2016 and 2017) at the Production and Research Station, National Research Center, El- Nubaria Province, El-Beheira Governorate, Egypt.

This work aimed to investigate the response of two groundnut (Giza 6 and Gregory) cultivars to some micronutrients foliar application (Zinc, Manganese, Boron and their combinations) at two growth samples (75 and 90 days of sowing) (DAS) on yield, yield attributes and chemical characters of seeds under reclaimed sandy soil conditions. The experimental design of this investigation was laid out in split-plots design with four replicates, where cultivars were assigned in the main plots and micronutrients foliar application with Zn, Mn, and B were randomly distributed in the sub-plots.

The results recorded significant differences on most of studied characters i.e. growth, yield and yield attributes affected by cultivars differences and micronutrients foliar spraying treatments. Giza 6 and Gregory cultivars show highly significant differences at 75 and 90 DAS, however, Giza 6 surpassed Gregory cultivar in most of studied characters at the two growth samples except, plant height at 75 DAS. Applying the thrice micronutrient foliar application (Zn+ Mn + B) records the highest values of most studied characters except, number of branches plant^{-1} in both growth samples.The interaction between groundnut cultivars (Giza 6 and Gregory) and micronutrient foliar application showed the highest values of fresh weight plant^{-1} (g) and dry weight plant^{-1} (g) on intervals 75

and 90 DAS**.** On the other side, groundnut cultivars differed on macro and micro nutrients seed content, Giza 6 surpassed over Gregory cultivar in macronutrients (N, P and K % seed content) that recorded a high mean values 4.18, 0.82 and 0.62 % for N, P and K % seed content, respectively, comparing with Gregory cultivarwhich recorded 3.84, 0.73 and 0.53 % for N, P and K % seed content, respectively.

Groundnut cultivars cleared variation for protein and oil seed content %, the mean value of seed protein content by Giza 6 cultivar which recorded 26.0 % surpassed over Gregory cultivar 23.99 %. On contrary, seed oil content of Gregory cultivar records a high mean value 45.92 % comparing with Giza 6 cultivar 42.63 %.

Essential saturated amino acid profile of seed protein indicated that lucine and phenylalanine acids were the major content of essential amino acid in the seed protein content %. The data of interaction between groundnut cultivars and micronutrient foliar application on essential amino acids composition revealed that Giza 6 surpassed over Gregory cultivars in most essential amino acid composition except lysine acid. The highest values of non-essential amino acid profile were observed in aspartic, glutamic and argnine that recorded 4.16, 7.61 and 4.66 mg/g dry weight, respectively. Fatty acids profile illustrated that saturated fatty acids and unsaturated fatty acids affected slightly by micronutrients foliar application treatment and groundnut cultivars.

Generally, this investigation illustrated that Giza 6 cultivar was recorded a higherattitude of most growth, yield and yield attributes as well as chemical seed composition characters by some micronutrients foliar spraying applicationand their combinationsunder reclaimed sandy soils.

Key words: Groundnut, Foliar application, Yield and yield attributes, Amino and fatty acid composition

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INTRODUCTION

The continuous population increase in Egypt exerts severe pressure on natural resources, agricultural production and food supply. Strong food self-sufficiency gap, which Egypt has already been facing for many years, constitutes a persistent challenge to policy makers and agricultural research. With regard to edible oils the self-sufficiency gap is especially pronounced, with around 97% of edible oils being imported nowadays **(FAO, 2017).**

Groundnut (*Arachis hypogaea* L.) is one of the world's principal oilseed crops in the world it is fifth worldwide in vegetable oil production among nine major oilseed crops **(USDA, 2017)**. Although groundnut is widely viewed as an oilseed crop, utilization of peanuts varies greatly from country to country, in Egypt it used primarily for food, sweets, desserts and confectionery industries. Groundnut seeds contain 40 - 50 % fat, 20 - 25 % protein, 10 - 20 % carbohydrate and 5 % fiber. Groundnut seeds are a nutritional source of vitamin E, niacin, thiamin, calcium, phosphorus, magnesium, zinc, iron, riboflavin, thiamine and potassium.Oil seed of groundnuthas more oleic acid, less linoleic acid. Partly because of its fatty acid profile, peanut oil is considered to be premium oil and is desirable for cooking and salad oil. Oleic and linoleic acids make up about 80% of the total fatty acids in peanut oil and are inversely correlated **(White, 2000).**

Micronutrients are essential elements that are used by plants in small quantities. Micronutrients have an important role on activates several enzymes which involve to oxidation reactions, carboxylation, carbohydrates metabolism, phosphorus reactions and citric acid cycle. Micronutrients deficiency are widely in humans, animal and plants, especially in many arid countries, due to high pH, low organic matter, salt stress, continual drought and imponderables application of fertilizers**.**On the other hand**,**foliar application of nutrition is an effective method for correcting deficiencies and overcoming the soil’s inability to transfer

nutrients to the plant. Availability of essential nutrients and trace minerals from the soil may be limited at times by root distribution, soil temperature, soil moisture, nutrient imbalances etc., foliar nutrition helps to maintain a nutrient balance within the plant, which may not occur with soil uptake **(Malakouti, 2008).** Thus the application of micronutrients foliar spraying is frequently recommended, firstly for improving biological, physical and chemical properties of soil and secondary to get high and clean agricultural yield produced free from undesirable high doses of heavy metals and other pollutants.Therefore, this investigation was carried out to improve the groundnut crop by spraying foliar micronutrients for highly productive crop seeds with high quality traits during different growth stages. Especially when grown under newly reclaimed sandy soils conditions.

Objectives:

- Improving seed quantity under reclaimed sandy soil by using zinc, manganese and boron foliar spraying for high yielding production.
- Increase groundnut seed quality by study the effect of foliar application for improving chemical characters content of oil, protein and carbohydrates.
- To study the effect of interaction between micronutrient foliar applicationand some groundnut cultivars.