PERFORMANCE OF SOME SESAME VARIETIES UNDER DIFFERENT LEVELS OF NITROGEN FERTILIZATION

By

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B.Sc. Agric. Sc. (Agronomy), Ain Shams University, 2012

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ABSTRACT

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Two field experiment were conducted during the summer seasons 2013,2014 at the experimental station farm, faculty of agriculture, Ain shams university at shalakan, Kalubia Governorate, Egypt. To study performance of some sesame varieties under different levels of nitrogen fertilization, the experiment consisted of three cultivars (shandweel 3, Giza 32, and Sohag 1) and four levels of nitrogen fertilizer (0, 30, 45 and 60 kg N/ fad) the experiment was laid out in factorial randomized complete block design with four replications.

The results showed that chlorophyll content (SPAD) was increased with increasing nitrogen level from zero to 60 kg N /fad . height of first capsules, plant height at harvest, seed yield , Biological yield were highest at 45 kg N/ fad .

Fruit zone height and 1000 seed weight recorded that maximum value with 30 kg N/ fad. Seed yield and 1000 weight seed gave maximum value with sohag 1.

key words: sesame varieties , Nitrogen fertilization, seed yield, biological yield.

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INTRODUCTION

Sesame is one of the oldest and most important oilseed crops in the world due to its high oil content and quality **(Ashri, 1998)**. Sesame seed is also rich in proteins, vitamins, niacin, minerals and lignans and is popularly used as a food and medical purposes **(Nakimi, 1995)**. In several developing countries, sesame is a crucial and cash edible oilseed crop particularly for smallholders. In Egypt, sesame is a food crop rather than oilseed one being most of its seed production is directly used for manufacture products, but it has low yield potentiality.

Cultivating the appropriate and high yielding variety and supplying with proper addition of N amount regarded the core practices for boosting productivity. Yield of sesame is highly variable depending upon the environmental factors, cultural patterns and cultivars used **(Ali *et al*., 2016)**. Despite the vital role of nitrogen in plant development and metabolism of carbohydrates and protein, neither excess nor paucity of it is useful for crop productivity. Convenient supply of nitrogen is salutary for carbohydrates and protein metabolisms as well ass cell division and enlargement, resulting in more leaf area, crop growth rate, leaf area index and thus improving good seed and dry matter yield **(Ahmad *et al*., 2001a** and **Ahmad *et al*., 2002)**. The noticeable performance of the leaves number to N may have led to increase in photosynthetic activity thereby resulting in the enhancement of morphological traits via produced more branches and simultaneously enhanced pod production and thus increased yield **(Shehu *et al*., 2009)**. Accordingly, soil of low amount of N should be supply additional fertilizer in proper amount to make sure for better

production. Until then, it has not been conclusively defined the required quantity of nitrogen for sesame plant. **Okpara *et al*. (2007)** explained that sesame nurture remained very argumentative for long time, while some researchers are of the opinion that sesame does not require fertilization, others believe that the crop needed to be fertilized. In this situation, **Haruna (2011)** and **Shilpi *et al*. (2012)** reported substantially increased yield with increasing N up to 60 kg ha^{-1}. Excess nitrogen fertilizer application than 60 kg ha^{-1} decreased seed weight per plot **(Shirazy *et al*., 2017)**. N application up to 80 kg ha^{-1} caused a marked increase in leaves number, shoot dry weight and leaf area index **(Umar *et al*. 2012)** as well as seed yield and oil % **(Malik *et al*., 2003)**. However, increasing N from 0 up to 200 kg ha^{-1} showed increases in seed yield $plant^{-1}$ and seed yield ha^{-1} **(EI–Nakhlawy and Shaheen, 2009**).

It was often stated that sesame responds poorly to fertilizer, but it is very difficult to reconcile this statement with the plant performance in fertile and infertile soil in any given area, since it has been observed that the pure stands of sesame in regions where little or no fertilizer is applied have uneven growth **(Weiss, 2000)**.

Choosing the compatible variety with the soil nutritional status is one of the most significant and costless for farmers. Moreover, exploiting genotypic differences in absorption and utilization of N to get better N fertilizer use and to attain higher productivity from soil that is deficient in nitrogen have delivered wide attention. Gaining varieties with high N utilization and with low fertilizer supplies would be appropriate to the

crop production process **(Le Gouis *et al*., 2000)**. Improving nitrogen use efficiency (NUE) represents an important part of crop management for reducing the production costs and eschewing the nitrate pollution of waters, soils and harvests **(Silspoor and Momayezi, 2006)**. Discriminations in NUE among sesame varieties have been recorded **(Umar *et al*., 2012)**.

Taken such points in account, the current study was carried out to evaluate the efficient use of nitrogen of three sesame varieties and determine the economic rate of nitrogen according to productivity.

REVIEW OF LITERATURE

In order to fulfill the objectives of our investigation, the related literature cited will be presented under the following headings:

I. Nitrogen as a crucial element in sesame

II. Effect of nitrogen level on sesame

III. Sesame varietal performance

IV. Interaction between sesame cultivars and N levels

I. Nitrogen as a crucial element in plant

Contrary, over supply of N results excessive vegetative growth, delayed maturity, more susceptible to diseases and insect pests **(Brady, 1999)**. Generally, N deficient plant is small in size and develops slowly since it is unable to synthesize adequate structural materials.

Generally, plant tissues contain more N than other nutrient elements applied as fertilizer, making up to 1-5% of plant total dry matter weight. Nitrogen being the most often growth limiting nutrient is found to be an essential constituent of metabolically active compounds such as amino acids, proteins, co-enzymes, nucleic acids and chlorophyll **(Brady and Weil, 2002)**. Additionally, It mediates the utilization of phosphorus and potassium and other elements in plants. The optimal amounts of these elements in the soil cannot be utilized efficiently, if the N is deficient in plants.

Since sesame is not a poor-land crop, a balanced commercial fertilizer is required at planting time for satisfactory production in soils of low to moderate fertility **(Langham and Wiemer, 2002)**.

Because of plants usually need N in greater amount than other mineral nutrients, nitrogen considered the most important mineral element in crop fertilization programs **(Aziza and El-Ashry, 2009)**.

From its dynamic nature, N acts quickly within the plant, which stimulates vegetative and root growth and development as well as uptake of other nutrients. Nitrogen is the most important essential nutrient in plant nutrition. It is a constituent of a large number of necessary organic compounds such as amino acids, proteins, coenzymes, nucleic acids, ribosomes, chlorophyll, cytochrome and some vitamins **Marschner (1995) and Noorka *et al*. (2009)**.

II. Effect of nitrogen level on sesame

Nitrogen in general stimulates the vegetative growth of plants as a result of increasing photosynthetic activity and this will increase the metabolites required for plant growth in sesame.

Positive effect of N on dry matter production was reported by **Samul (1990)**.

Sinharoy *et al*. (1990) found that application of 30 and 40 kg N ha^{-1} increased the plant height and number of branches $plant^{-1}$.

Basha (1994) found that increasing nitrogen fertilizer level up to 75 kg / fad significantly increased plant height, fruiting zone length, number of branches and capsules/plant, seed weight plant, 1000- seed weight, and seed yield. Moreover, increasing nitrogen fertilizer level up to 75 kg/fad significantly increased oil yield kg/fad while oil percentage was decreased due to increasing N fertilization in sesame.

Bassiem and Anton (1998) observed that yield components were increased by escalating N doses from 71 to 142 Kg/ha, while seed yield/ha was augmented up to 214 Kg /ha. While, low level of N (71 Kg /ha) produced the highest seed oil content %

Fayed *et al* (2000) detected that plant height, height of first capsule, number of capsules/plant, seed weight/plant and seed yield/ha were increased by raising N fertilization from 71 to 142 Kg/ha**.**

Sesame plants responded positively in terms of dry matter yield and seed yield $plant^{-1}$ as well as yield ha^{-1} for application of nitrogen at different rates. According to **Olowe and Busari (2000)**, number of capsules $plant^{-1}$ increased significantly over control with the application of 90 kg N ha^{-1}. Also, significant increase in seed yield of sesame from 78.72 kg ha^{-1} at 0 kg N ha^{-1} to 214.89 kg ha^{-1} at 60 kg N ha^{-1} was gained.

Tiwari *et al* (2000) studied the effect of three N rate, i.e. 15, 30 or 60 kg/ha on sesame and found significant improvement in plant height,