جامعـة الإسكنـدرية
كلية : الزراعة–سابا باشا
قسم : الإنتاج النباتي

استجابة بعض أصناف عباد الشمس للإجهاد المائي والتسميد الحيوي

مقدمة من
مارى عريان ناشد حنين

رسالة علمية

مقدمة لاستيفاء متطلبات منح درجة دكتور الفلسفة في العلوم
الزراعية تخصص (المحاصيل)
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جامعة الأسكندرية
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للحصول على درجة

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لجنة الحكم والمناقشة **موافقون**

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RESPONSE OF SOME SUNFLOWER TO WATER STRESS AND BIOFERTILIZATION

By

MARY ERYAN NASHED HENEN

A Thesis Submitted on Partial Fulfillment of the Requirements Governing the Award of the Degree of

PHILOSOPHY DOCTOR OF AGRICULTURAL SCIENCES

(AGRONOMY)

PLANT PRODUCTION DEPARTMENT

ALEXANDRIA UNIVERSITY

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Chapter one

INTRODUCTION

١. INTRODUCTION

Egypt is suffering from a great shortage in edible oils, so the Egyptian government is pressing hard to close the vast gap between production and consumption of edible oil.

Sunflower (*Helianthus annuus* L) is one of the main oil crops suggested to cover the increasing demand for edible oils in the country due to its adaptability to environmental condition and the high oil content in its seed up to٥٠٪.Furthermore, sunflower oil has high content of unsaturated fatty acids and vitamin E. Moreover, its cake contains ٢٥ – ٣٥ % of protein which is mostly fed to livestock due to its high biological value.

Water stress is one of the sever conditions that affect crop productivity. Water being an integral part of plant, plays a vital role in the maintenance of plant life. The deficiency of water modifies soil-plant water relationship by lowering tissue water potential and impairing metabolic processes, **(Akhtar *et al* ١٩٩٣)**. Currently, water is a primary limiting factor in Egyptian agriculture and it is important to address our efforts to the fundamental issue of increasing crops production while reducing their water consumption especially in the reclaimed lands. This can be achieved through an effective use of modern irrigation techniques.

Sunflower cultivars markedly differ in their growth characteristics and potential yield. Several investigators under Egyptian conditions confirmed this fact.

Nitrogen plays an important role in plant growth and is considered as an indispensable element for several vital functions and needed for maximum yield in most field crops. It is well known that continue use and overuse of chemical fertilizers have caused soil pollution, agricultural and health consequences. Numerous efforts are being exercised everywhere to combat the adverse consequences of chemical farming by using alternative sources, which are environment friendly plant nutrients. In recent years, biofertilizers have emerged as a promising component of integrating nutrient supply system in agriculture. Our whole system depends on many important ways, on tremendous activities and there appear to be a tremendous potential for making use of microorganisms in increasing crop production **(Bloemberg *et al* ٢٠٠٠).** However, chemical fertilizers should applied alongside biofertilizers in suitable combination **(Chowdhury and Mukherjee ٢٠٠٦).** These methods of fertilizers aim to minimize chemical fertilizer application, reduce the production costs as well as environmental pollution which can occur by the excessive use of chemical fertilizers.

This investigation was carried out to study the effect of water intervals and biofertilizers in two sunflower cultivars on vegetative growth and productivity.

Chapter two

REVIEW OF LITERATURE

٢. REVIEW OF LITERATURE

The study of irrigation intervals, sunflower cultivars and biofertilization had received the attention of several workers. The role of each factor and its effect on different aspects of plant growth at vegetative and reproductive stages and seed yield, will be reviewed under the following headings:-

١- Effect of irrigation.
٢- Behavior of sunflower cultivars.
٣- Effect of fertilization.
   ١- Effect of nitrogen.
   ٢- Effect of biofertilizer.

٢-١ Effect of irrigation:

In natural environment, plants are subjected to stresses that adversely influence growth, metabolism and yield. Biotic and a biotic factor affect the growth of higher plants. Among these, drought is a major a biotic factor that limits agricultural crop production. **(Reddy et al ٢٠٠٤)**.

Stress caused by drought does not occur abruptly, but develops slowly and increases in intensity by the time of duration in contrast to majority of other stress factors. **(Larcher ٢٠٠٣).**

Some investigators reported the effect of water stress on sunflower plants.**Deshmukh and Srivastava (١٩٨٢), Rawson and Turner (١٩٨٣) and Kandil (١٩٨٤)** found that increasing irrigation interval reduced sunflower seed yield and seed oil percent.

Unger (١٩٨٢) studied the influence of limited irrigation on sunflower growth, seed yield, oil percentage and quality. He found that, plants irrigated before flowering averaged ١٧ cm taller than those not irrigated between emergence and flowering. The highest seed yield (٢,٤٩ t/ha) was resulted with full irrigation. In addition to that, **Yegappan *et al* (١٩٨٢)** applied three water stress treatments at early, mid and late vegetative stages in sunflower. They found that, final leaf area was reduced in all treatments. At full expansion of leaves, cell frequency had increased, cell number and cell area had decreased. These results help to explain the effects of stress on final leaf area, especially the reduced area of the lower leaves that are most sensitive to water stress. **Prunty (١٩٨٣)** found that ١٠٠٠ seed weight of sunflower was significantly increased by increasing irrigation rates. **Jones (١٩٨٤)** stated that sunflower yield potential was enhanced when soil water content was increased. Furthermore, both quantity and distribution of water had a significant impact on achene and oil yield **(Fereres *et al* ١٩٨٦; Andrich *et al* ١٩٩٦; Krizmanic *et al* ٢٠٠٣; Reddy *et al* ٢٠٠٣ and Iqbal *et al* ٢٠٠٥).**