شبكة المعلومات الجامعية

بسم الله الرحمن الرحيم

شبكة المعلومات الجامعية

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

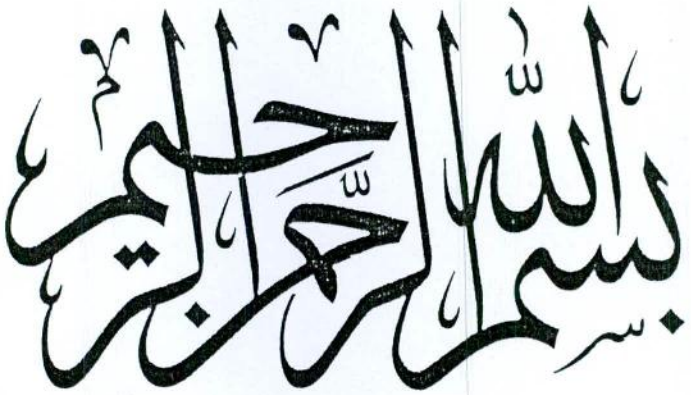
نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

بعض الوثائق الأصلية تالفة

بالرسالة صفحات لم ترد بالأصل


بسم الله الرحمن الرحيم

Alexandria University
Faculty of Agriculture
Saba Basha
Plant Production Dept.

RESPONSE OF SUGAR BEET TO IRRIGATION INTERVALS, SULPHUR APPLICATION AND NITROGEN FERTILIZATION

A THESIS

Submitted on Partial Fulfillment of the Requirements
For the Degree of

DOCTOR OF PHILOSOPHY

IN

AGRICULTURAL SCIENCES

IN

AGRONOMY

BY

MAHER AUD ALAH KHATER

1999

Alexandria University
Faculty of Agriculture
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Presented by

MAHER AUD ALAH KHATER

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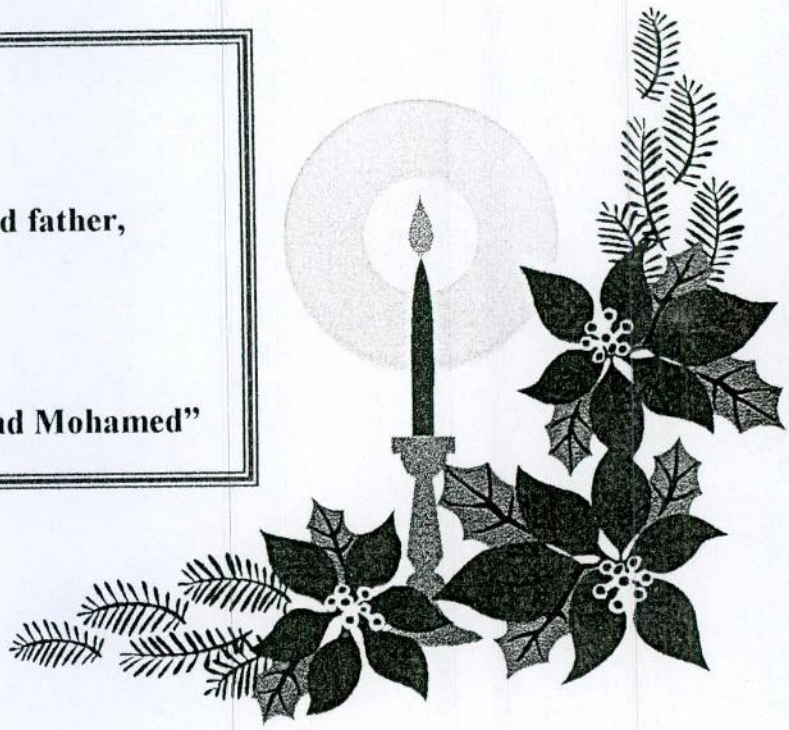
Dedication

To the spirit of my departed father,
my dear mother,
my dear wife,
my dear brother
and my dear children
"Ahmed, Mahmoud and Mohamed"



Acknowledgement

First and foremost, I feel always indebted to God, the most beneficent and merciful.

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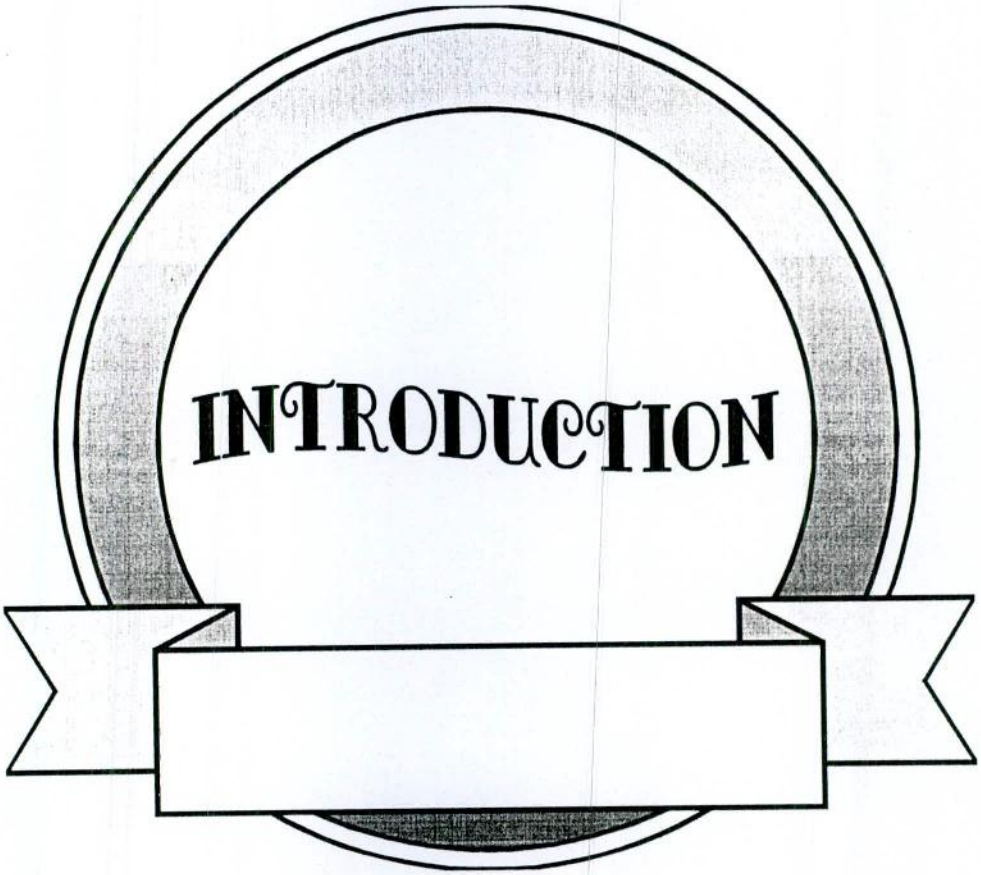
INTRODUCTION

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Sugar beet (*Beta vulgaris*, L.) is the second producing sugar crop after sugar cane. It is a vital crop to man as a source of high energy and as an important source of feed for livestock. About 45 percent of sugar in the world is produced from sugar beet.

Recently, sugar beet has become an important source for sugar in Egypt, because of the shortage in cane sugar. Sugar beet is a winter crop that requires less amount of water than sugar cane and tolerates soil salinity. Therefore, it could be successfully grown in newly reclaimed areas of Northern Delta.

Most of the sugar beet acreages are under irrigation. Preirrigation may be necessary to provide moisture for seed germination to prevent soil crusting, and in many areas to control salinity which may affect establishing of sugar beet stand. Overirrigation at early stages may tend to leach nitrates, wastewater, and enhance seedling diseases. During periods of growth, several light irrigations may be more important than a few heavy ones. As the root system develops, so do moisture demands. At mideseason, sugar beets obtain most of their moisture from the upper 3 feet (0.9 m) of the soil and heavier irrigations are required to supply this moisture. Moderate moisture stress just before harvest tends to increase sugar percentage without limiting sugar yield per acre. The last irrigation may be two to five weeks before harvest.

Nitrogen is considered to be the most important fertilizer for different crops as well as sugar beet. Sugar beet nutrition has been subject

to many studies and yet it is still receiving much attention. Nitrogen has the quickest and most pronounced influence on the growth and physiology of sugar beet (Tabl *et al*., 1986). Average yields of roots, tops and root sugar content increased by increasing the rates of applied nitrogen (Hassanein, 1979). Root/top ratio of sugar beet decreased by increasing nitrogen fertilizer (Cary, 1977). Large amounts of nitrogen are required to ensure adequate top and root growth, but if storage roots are to be high in sucrose concentration, the plants must be deficient in nitrogen prior to harvest to retard the utilization of sucrose for growth and to allow sucrose to accumulate in the storage roots (Johnson *et al*., 1971). Application of the optimum amounts of N-fertilizer are desirable for adequate top and root growth, while maintaining sufficiently high sucrose percentage and purity for profitable sucrose extraction and yield (Hills and Ulrich, 1971). Soils vary widely in their ability to supply nitrogen for plant growth. This nitrogen supplying potential varies with soil type, past fertilization and cropping history as well as rainfall received and the irrigation water applied that affects the extent of nitrogen loss by leaching from soils (Carter *et al*., 1975).

Sulphur plays an important role in increasing the availability of plant nutrient such as P, K, Mg, Fe, Mn and Zn (Hassan and Olsen, 1966). Also, elemental sulphur is oxidized by soil microorganisms to sulphuric acid, which in turn lowers the soil pH, improve soil structure and increases the availability of certain plant nutrients.

The aim of the present work was to study the effect of irrigation intervals, sulphur application and nitrogen fertilization on growth, yield, yield components and quality characters of sugar beet.