EFFECT OF NITROGEN FERTILIZATION ON YIELD AND FRUIT QUALITIES OF AVOCADO TREES

By:

MOHAMED MOHAMED IBRAHIM EL-TANAHY

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APPROVAL SHEET

This thesis for the M. Sc. degree has been approved by :

A. L. El-Tony

A. T. Hegazy.

Zakaria Zidan.

Date : / /1972

University of Ain Shams

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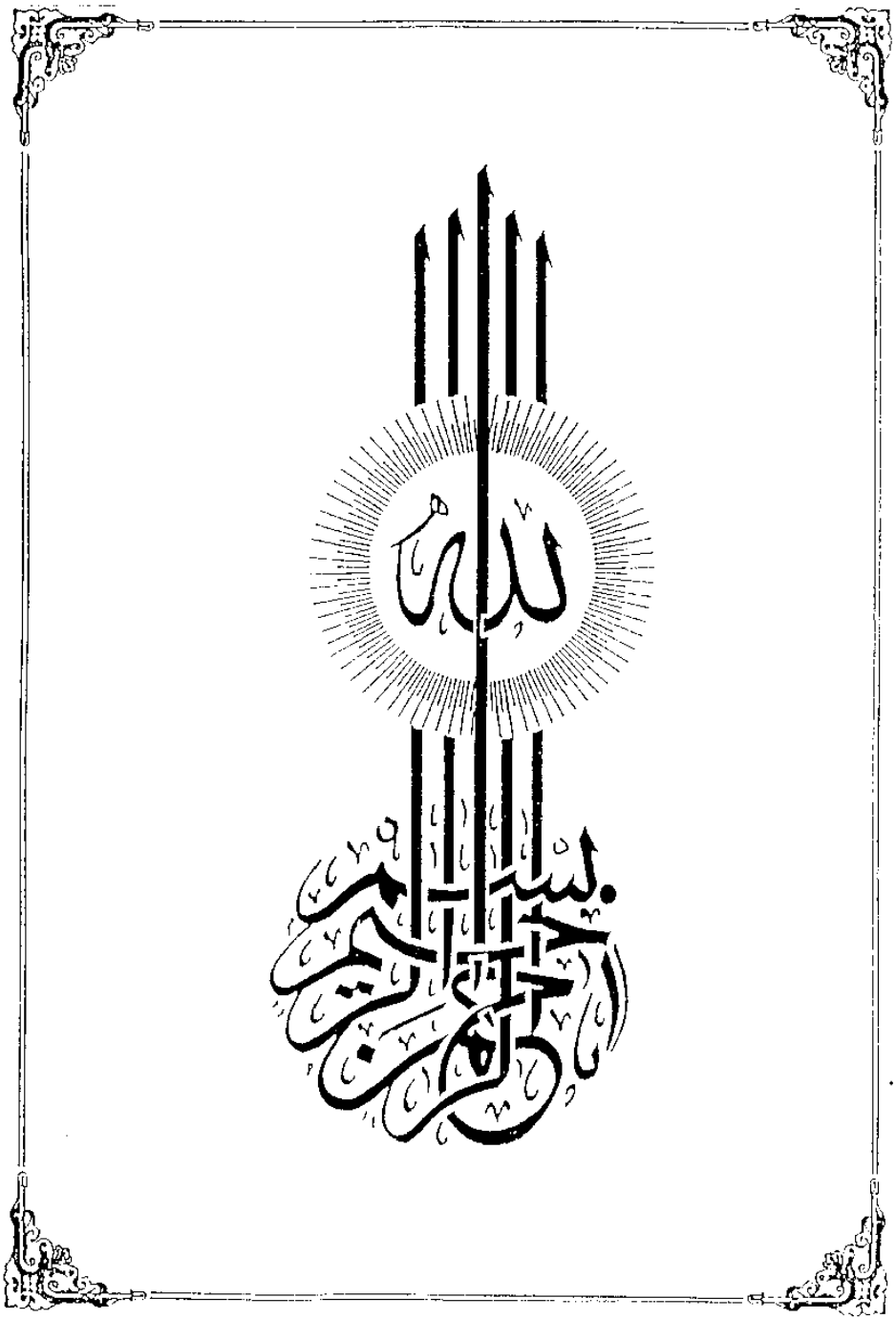

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C O N T E N T S

INTRODUCTION

Avocado (*Persea americana*, Mill) is believed to be native to Mexico and Centeral America, although it is now widely found scattered in small groups in tropical and subtropical regions with favourable soil and climatic conditions. Commercial production is centered in the United States mainly in the states of California and Florida. Outside the United States there are small commercial plantings in many countries including South Africa, Capture Palestein, Australia, Cuba, Argentina, Brazil, Madeira, Jamaica, Martinique, Chile, and Kenya. A high proportion of the avocadoes produced are consumed locally and the fruit is comparatively unknown outside the tropics or subtropics, but in the recent years there has been considerable interest, particularly on the part of African producers, in the prospects of developing export markets in temperate counteries. (Kay 1964).

Avocadoes contain 14 minerals and 9 vitamins. The high mineral content is of particular dietary importance because of the unusually large proportions of iron (28-46 p.p.m.), copper (13-17 p.p.m.) and potassium (1.63-2.21 percent). The oil content ranges between 4 - 20 %, the protein content 0.8 - 1.7 % and carbohydrate ranges 1.5 -

2.0 %. Analysis of three varieties, Fuerte, Hass and Anaheim indicated that avocado may be considered to compare favourably with most fruits and vegetables and certain other fruits as a source of vitamin B_1, riboflavin, and nicotinic acid. The fruit is also considered as a good source of pantothenic acid, vitamin B_6 and folic acid. The bland flavor and smooth texture of the avocado blend well with almost all other foods. It has a distinctive, appetizing flavor. It is generally used in some countries as an appetizer or salad. (Roberts 1955).

In Egypt it is grown in some few scattered areas such as Seds, El Kanater El Khareia, Mallawy and Abo Rawash. There are two varieties, Fuerte variety (Guatemalan X Mexican) is generally regarded as standard of a desirable commercial variety, and Duke variety (Mexican).

Egypt has many advantages concerning exporting avocado pear fruits to European markets and hence much attention has to be paid to increase the acreage and the yield. Studies on improving the qualities of fruit must be considered.

This work was started with the hope of increasing the yield through studies on the effect of nitrogen fertilization on the yield and fruit quality of avocado pear. Studies on the different storage temperatures on keeping qualities of mature fruits.

History :

The first written report to the old world was made by the soldier writer Martin Fernandez de Enciso, who tasted the avocado fruit in Colombia. The avocado remained comparatively unknown outside of the New-world until the latter part of the nineteenth century. During the past 75 - 100 years it has risen from quasiobscurity to become the fourth most important noncitrus tropical fruit crop, only Bananas, pine apples, and mangos exceeding it in acreage or export production. Avocado exports (nonlocal consumption) rank about third in volume.

When the spanish conquistadors overran the Aztec and Ican empires during the early part of sixteenth century, they found the avocado already in extensive home cultivation from Mexico to Peru and as far east as

Venezuela. It was introduced in Jamaica about 1650, Cuba sometime in the seventeenth or early eighteenth centuries, and Hawaii soon after 1800. Importations from Mexico to southern Europe were made around 1600; yet the avocado is still planted on only a limited scale in the Mediterranean countries or any other locality in the eastern Hemisphere where the olive may be grown. The first groves were planted in Florida about 1860 with seeds from Cuba and in California with seeds of mexican avocados in the 1880's and 1890's. Of the numerous seeds and budwood brought back to the United States, the Fuerte variety located in 1911 by Carl Schmidt in the mountainous region south of Mexico city, was the most notable acquisition, as it proved to be perfectly adapted to California climate and soil conditions. Within a few years, it became the backbone of that State's avocado industry, perhpas 80 percent of the fruit produced being this one variety.

Outside of the subtropical regions of the United States, small commercial plantings of avocados have been made in Argentina, starting, about 1920; South Africa, from 1920 - 1930; Hawaii, from 1800 (selected varieties since 1920 - 1930); Jamaica, from 1935, Capture Palastien

from 1924, and Australia and Cuba. In and around the caribbean region, there is an untold number of dooryard plantings. Nearly all of this fruit is consumed on the premises or sold locally. In the area where the coconut will not thrive, such as in the interior or mountainous districts, avocados provide the chief dietary source of fat and oil.

The avocado is a member of the laural family (lauraceae), and divided into three horticultural races- Guatemalan, Mexican, and West Indian, and have the following different names according to its location.

Arabic	: Zebdeia - Avocado
English	: Avocado, Avocado pear (Florida, California, Philippine Islands; Popenoe, Bailey, Wester) Aguacate.
Spanish	: Ahuacate, Aguacate.
Dutch	: Advocaat.
French	: Avocat.
German	: Abakate.
Portuguese	: Abacate.

Botanical description :

The typical avocado forms a tall usually spreading but sometimes distinctly upright-growing evergreen tree, 6 - 20 m. high with a crooked, low-branched trunk rough, often longitudinally furrowed bark; and an ovoid-globose, irregular, densely, foliated crown. The leaves are alternate, crowded at the tips of the branches petioled, simple, ovate-oblong, elliptical, or obovate-oblong. The inflorescences are axillary, borne near the base of the current season's growth, but crowded at the ends of the branches so as often to appear apparently terminal, paniculate many-flowered, and on short or long stalks.

The ovary is single-celled with a single style and disc shaped stigma. The fruits are large composed entirely of ovarian tissue, usually oblique, globose, or pear-shaped, with a rounded or depressed apex, single-seeded, 7 - 20 cm. long and 7 - 10 cm. in diameter. The skin is yellowish green, dark green, or tinged with purple, sometimes dark purple or maroon, shining or dull, glabrous smooth or distinctly roughened (Guatemalan race), thin and papery (Mexican), thick, woody, and brittle (Guatemalen), or thick

and leathery (West Indian), and has scattered yellowish-white or reddish-brown dots. The flesh is thick light yellow, or light green in color, of butter like consistency, sweetish, highly nutritious. The seed is large, globose or pointed with two more or less tightly adhering seedcoats; the cotyledons are nearly hemispherical and pink, yellowish white, or light green in colour (Ochse et al. 1961).

REVIEW OF LITERATURE

It was hard to find enough similar work in the literature. But were able to find, however, some workers who made similar work on other fruit trees especially on citrus.

I- Effect of nitrogen fertilization on avocado trees :

A) Yield and fruit quality :

1. Yield :

Walter and Smith (1950), working with young bearing Valencia orange trees on acid, deep sandy soil in Florida found that yield increased sharply as the rate of nitrogen fertilization increased, but only moderately as potassium increased. They suggested that nitrogen increased fruit set while potassium increased fruit size.

Beattie (1952), reported that urea sprays commencing at petal-fall at a rate equivalent to normal nitrogen soil application, increased yield of Rome Beauty compared with those received soil application of nitrogen.

But this effect was reversed by application to Jonathon trees.

Loizides (1952), working on oranges and grapefruits in Cyprus found that sulphate of ammonium (N) plus superphosphate (P) applied in February did not affect yields in the first year, but gave substantial increase in the two following years. He added that neither nitrogen nor phosphorus alone gave appreciable yield increases.

Reuther and Smith (1952), found that nitrogen fertilization increased slightly Valencia orange tree growth. They also found that apparently total fruit yield was influenced proportionately more by the rate of nitrogen fertilization than was the tree growth. They stated that the high nitrogen treatment produced about 46 percent more pounds of fruit than the low nitrogen treatment while the corresponding increase in trunk cross section was only about 13 percent. They also found that heavy nitrogen fertilization increased yield substantially.

Blasberg (1953) working on apples reported that urea spraying increased yield.

Smith et al. (1953), indicated that of the three