EFFECT OF PLANTING DISTANCE ON GROWTH, YIELD AND FRUIT QUALITY OF WILLIAMS BANANA

BY

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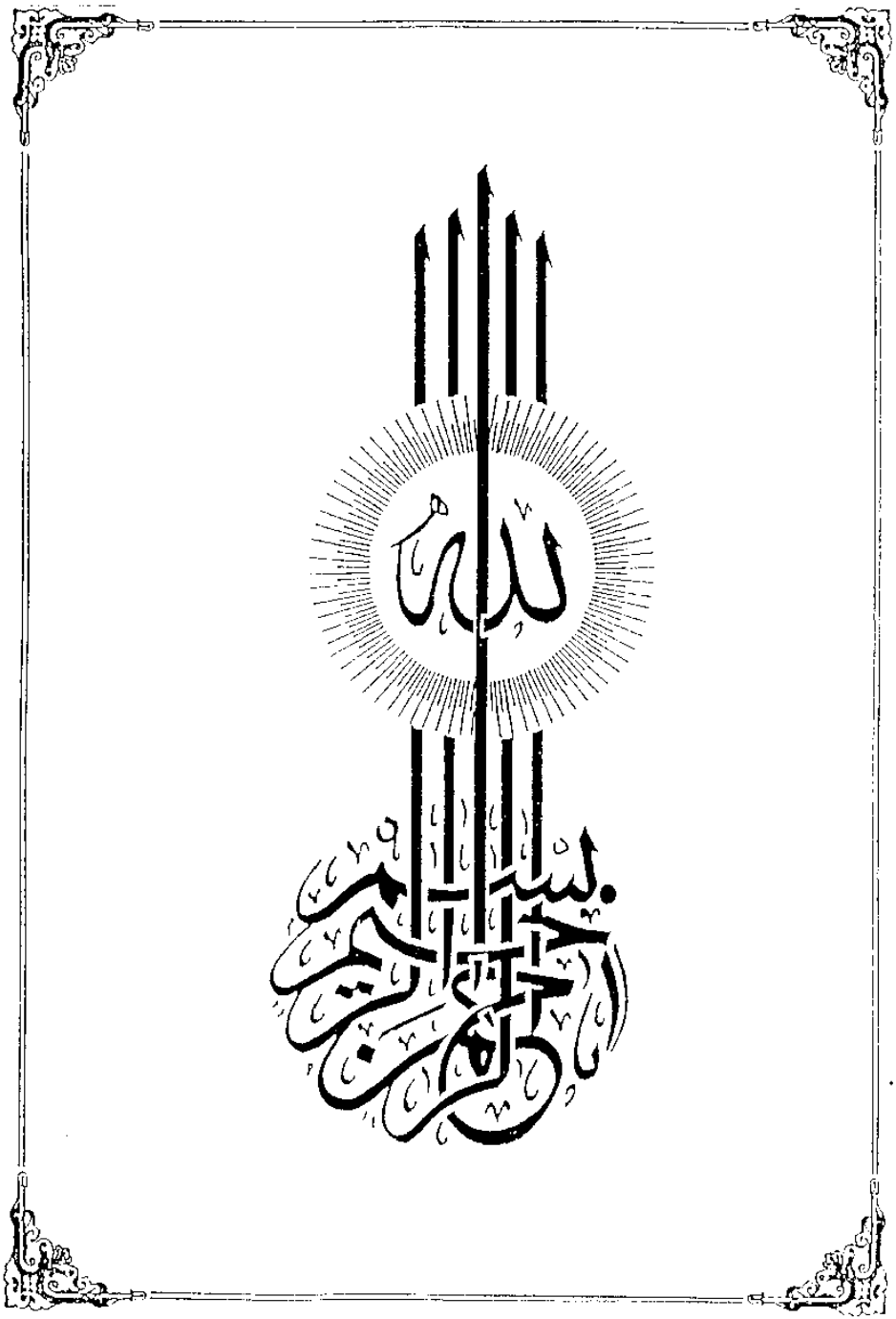

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CONTENTS

INTRODUCTION

Banana is an important fruit plant, where the world production attains 42, 460,000 tons in 1985 (FAO production year book, 1985). Most of this quantity is produced from tropical countries and few amounts are produced from subtropical cnes. A big part of this production (about 6,950,000 tons) is exported to other countries.

The Total planted area of banana in Egypt attained about 28,750 feddans in 1986 and produced about 236,859 tons. (According to the census of Egyptian Ministry of Agriculture, 1986) most of this area (about 80%) is planted with Hindy variety.

In 1981 and 1982, banana production was not sufficient to cover the demand of local Egyptian markets. Therefore, Egypt imported about 112,000 tons of banana in 1981 and about 119,000 tons in 1982. Since that time efforts were concentrated to improve banana production in Egypt. Some new banana cultivars were intorudced in 1982, by Ministry of Agriculture introduced corms ,i.e, of Williams banana. After introducing this variety,

it was important to plan some experimental work to determine the proper cultural practices concerning this new banana cultivar under Egyptian conditions. This research work was planned to determine the best planting distance of Williams banana grown at El-Nanater Research Station, Kalubia Governorate.

REVIEW OF LITERATURE

a) Effect of planting distance on vegetative growth of banana:

1. Length and girth of pseudostem:

Moreau (1965), studied the effect of two planting distances on Gros Michel banana planted at spacing of 2x4 meters (1660 plant/ha) and 3.2x3.2 meters (1000 plants/ ha). He found that the first cycle plants of dense plot reached a height of 5.1 m. While the wider spacing gave a pseudostem of 4.2 m height.

Ahmed and Mannan (1970), planted Amristager banana at 4x4 ft. (1.2x1.2m), 6x6 ft (1.8x1.8 m) and 8x8 ft. (2.4x2.4m) and pit sizes of 1 ft. (30 cm.), 1.5 ft. (45cm) and 2 ft. (60cm). They found that the height of the pseudostem was increased with the decrease of the spacings. The effects of spacing, pit size and their interaction on the bottom-girth of the pseudostem were not significant.

Gomes et al., (1984), found that plant growth was increased with increasing density from 1120 to 3360 plants/ha.

Reynolds and Robinson (1985), working on Williams banana at different densities (1000,1250,1666 or 2222 plants/ha),

found that after 3 crop cycles, the plant height and stem circumference at flowering were increased with increasing plant density.

2. Banana leaves :

Oppenheimer and Gottreich (1960) found that wider spacings made the leaves unfurl , more frequently and thus resulted in earlier flowering compared with closer spacings.

Ahmed and Mannan (1970), planted Amritsagar banana at different distance. They found that neither the spacing nor the pit-size, nor their interaction could influence the number of leaves per plant. They added that the average number of leaves under different treatments, varied from 34.44 to 35.88 leaves.

Robinson (1985), planted Williams banana at densities of 1000-2222 plants/ha. He found that the suckers growth was lowest under the highest density canopy resulting in reduced leaf emergence rate. Furthermore, with

closer spacing and increasing leaf area index of the first rotoon plants, the second ratoon suckers produced progressively more leaves per plant before flowering.

b.1. Effect of planting distance on minerals content of banana leaves :

The research work dealing with the effect of planting distance on leaf minerals content of banana is few. The only available work was that of Kotur and Mustaffa (1984), who studied the effect of spacing and nitrogen fertilizer on leaf nutrient status of Robusta banana. They found that spacing had no appreciable effect on leaf nutrient status. They added that a rate of 210.67 gm.N/plant annually was corresponding to 3.51 % leaf N, and produced highest yield of 44.8 t/ha.

2. Minerals content of banana leaves :

However, it seems suitable to review some research work on minerals content of banana leaves to have a clear picture about the levels of different nutrients.

Hewitt (1955), choose the third leaf from the top of the plant as a standard for analysis established the ranges and critical values for banana leaf nutrients. The ranges of N, P_2O_5 and K_2O were (2.3-3.8 %), (0.53-0.81%) and (2.0-5.3%), respectively, while the critical values for N, P_2O_5 and K_2O were 2.6, 0.45 and 3.3%, respectively.

Behairy (1968), Working on Maghraby banana planted at 4x4.5 m., found that the percentages in leaves ranged from 10.75 to 11.28 for dry weight, 2.723 to 2.923 for N, 0.246 to 0.262 for P and 3.057 to 3.455 for K.

Ali (1968), found that the highest nitrogen percentage in Hindy banana leaves was 3.45 with the highest treatment of nitrogen fertilization, while the highest percentage of nitrogen in Maghraby leaves with the same treatment was 3.11.

Ramaswamy and Muthukrishnan (1974), found that nitrogen percentage in banana leaves rose to the maximum average (3.39) when Robusta banana was treated with 170 gm. N per plant.

Shawky et al., (1974a) planted Basrai banana at 2.m apart and treated the plants with foliar and soil nitrogen application. They found that nitrogen percentage in banana leaves ranged from 2.90 to 3.33.

Shawky et al., (1974b), reported that N, P and K in leaf of Basrai banana were (2.36-4.10), (0.01-0.26) and (1.10-2.42), respectively at different sampling dates.

Jambulingam et al., (1975), found that leaf potassium should be above 4.30 % for optimum production of Robusta banana.

Shawky et al., (1986), studied the effect of spraying with some commercial nutrients on leaf mineral contents and yield of Hindy banana planted at 3.5x3.5 m. They found that the range of N,P,K, Ca and Mg % in leaves in the first season were (2.31-2.95), (0.23-0.77), (2.02-3.68), (1.17-1.62) and (0.30-0.46), respectively. In the second season N,P,K, Ca and Mg % were (1.99-2.91), (0.15-0.20),(2.16-3.73), (1.31-2.10) and (0.42-0.74), respectively.

Abou-Aziz et al., (1987), studied the effect of potassium fertilization on growth and yield of Williams banana. They found that the range of N,P,K % in leaves of the first season were (2.869-3.022), (0.192-0.205) and (3.270-4.351) respectively. In the second season N,P,K % were (2.853-3.165), (0.188-0.192) and (3.220-4.261) respectively.

Abou-Aziz et al., (1987), studied the effect of different rates of nitrogen fertilization on growth and yield of Williams banana. They found that N,P,K % in leaves of the first season were (2.847-3.477), (0.209-0.231) and (3.110-3.170) respectively. In the second season,N,P, K% were (2.851-3.679), (0.212-0.230) and (3.180-3.261), respectively.

3. Effect of planting distance on time of shooting and bunch maturation of banana :

From a work with Lacatan variety in Jamaica Osborne (1953),(as quoted by Ahmed and Mannan, 1970) observed that the period taken by bunches to mature was markedly longer in all localities at densities of 810 per acre or more.

Baghadadi et al., (1959), planted cavendish banana at 1x1, 2x2 and 3x3 m, one off shoot was left with 1x1 m, 2 offshoots with 2x2 m and 3 offshoots wereleft with 3x3,m. They found that the time of maturity was not affected by planting distance.

Oppenheimer and Gottreich (1960), planted Dwarf banana at 3x2.5 and 3x4.0 m spacings, They found that wider spacings made the leaves unfurl more frequently and thus resulted in earlier flowering as compared with closer spacing.

Berrill (1963), stated that " the time of bunch maturation of Cavendish bananas planted at 9 ft. (2.7 m) between rows, 4 to 10 ft. (1.2 to 3.0 m) between plants is shortened with wider spacing than closer spacing".

Azouz et al., (1967), found that there was no effect for planting distance on flowering time or harvesting in their work on Mathaly , Basrai, Bombay green and Hindy

banana planted at different planting distances (2x2, 2.5x3 and 3.5x3.5 m).

Ahmed and Mannan (1970), planted Amritsager banana at 4x4 ft. (1.2x1.2m), 6x6 ft. (1.8x1.8 m) and 8x8 ft. (2.4x2.4 m) and pit size of 1 ft.(30 cm), 1.5 ft.(45 cm) and 2 ft. (60 cm). They found that plants with close space took the longest time for the emergence of their inflorescence (about 267 days). Plants at widest space required shortest time (about 248 days). They added that the period from flowering to harvest (maturation) was shorter with wider spacing.

Irizarry et al., (1975), planted Mariconge plantation at five spacings ranging from 10x5 ft. (3.0 x1.5 m) and 871 plants/acre to 5x5 ft. (1.5x1.5 m) and 1742 plants/acre. They found that flower induction and harvest were slightly delayed under close spacing.

Echeverri and Garcia (1981), planted Dominico banana