SUCCESSION AND FERTILIZATION OF MAIZE CROP IN U.A.R.

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By

Samir Morkos Mikhail

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By : Samir Morkos Mikhail

Approved by :

.....A.R.Khalil

.....

.....Y.Y.Shalaby....

(Committee in Charge

Date : / /1971

A C K N O W L E D G E M E N T

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C O N T E N T S

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I. INTRODUCTION

Maize, Zea mays L., is one of the main cereal crops in U.A.R. At the present time, the internal needs of maize in U.A.R. exceeds the local production. This fact can be clearly explained in the light of the evident high population increase and thus the increase of the imported quantities of maize to cover the discrepancy between maize production and consumption. Average imports amounted 1499430 ardabs in 1960-1964 and 1259764 in 1965. This drives agronomists to search for possible methods of increasing maize yield to give enough diet for the majority of the native population. One way of covering the maize shortage would be increasing the corn acreage, but this solution would entail drastic changes in the model of the now adopted crop rotation. It therefore, seems rather obvious that at the moment increasing the per acre yield by sowing maize twice per year in the same land should be considered the only practical solution for the problem of our maize shortage.

Maize is mainly produced under the system of two or three course rotation especially in case of fertile soils. The succession of two course includes, cotton in the first year, followed by winter cereals and legumes and then by summer or nili maize in the second year. Whereas the succession of three course includes, cotton in the first year,

followed by winter cereals and summer or nili maize in the second year and then by winter legumes and summer or nili maize in the third year. The tradition of this succession in both mentioned rotations permits only one maize crop annually after winter cereals or legumes.

To produce two successive maize crops in the same land and year under the two or three course rotation, the maize crop may take place after taking only three cuts of clover. This could be achieved by seeding clover at about the beginning of October and giving it a growing season till mid March. This period, i.e. 165 days, permits the clover to give three cuttings. Accordingly, the first crop of maize could be seeded about the end of March or the beginning of April and followed by the second crop in the same land at about the beginning or mid August. However, the present work gives a clue for increasing the yield of maize per unit area during a fixed period under the conventional used rotation systems.

To justify this work, two planting dates were tried. The first date was seeded at about mid March for the first crop, followed in the same land with the second crop about the beginning of August. The second date was seeded at

about the beginning of April for the first crop, followed in the same land with the second crop at about mid August.

Two maize varieties were used, American Early to represent the prominent open pollinated varieties and DC 67 to represent the commercial hybrids, to compare their yielding ability under different planting dates and succession.

The quantities of fertilizers added to maize depend partially on rotation and succession of crops. Different rates of potassium, phosphorus and nitrogen were tried in the first crop and they were doubled in the second crop to compensate for nutrients removed by the first crop.

The main objectives of the present work are :

a) To prove the probability of producing two maize crops annually in the same land under the recommended rotation in U.A.R.

b) To provide estimates with respect to various growth and yield characters under different planting dates, succession and fertilizer rates.

c) To obtain information on the effects of succession, planting dates, fertilizers and their interactions on the growth and yield of two important maize varieties.

These estimates and informations would be necessary for increasing the maize production per unit area.

II. REVIEW OF LITERATURE

A. Planting dates :

Prescott (1920) found that planting corn in April, May, June and July required 12, 10 and 6 to 5 days for germination, respectively. Planting on 13th July resulted in the most rapid rates of growth, leaf development, tasseling, silking, maturation and the highest yield. Wallace and Bressman (1937) estimated daily growth rates ranging from 3.2 inches at a temperature of 65°F to 5.4 inches at a temperature of 78°F. Each degree the temperature averaged above 70°F speeded up tasseling 2 to 3 days. McCalla et al.(1939), in Canada, suggested that temperature alone accounted for 40 to 70 per cent of the variability in growth rates and there was a highly positive correlation between growth rate and temperature, while negative correlation with sunlight was observed. Rounds et al. (1951), in Michigan, mentioned that early planting (May 5-9) gave higher average yields of corn than later planting. Bates (1955), in Texas, indicated that mean maximum temperature and mean relative humidity in June, during pollination, were very closely correlated with corn yields. El-Bulkieny (1955), in U.A.R., reported that the best planting date occurred from 15 - 25 July in the Northern part of Delta, 5 - 15 July in Middle and Southern

part of Delta, 15 - 25 July in the Middle part of U.A.R. and 1 July to 15 August in the Upper part of U.A.R. He added that earlier plantings in the Northern part of Delta may result in lower yields due to insect attack. Eugeniusz (1959), in Polland, studying the effect of day length on 24 bred varieties of maize found that short-day conditions checked growth evident by shorter plants, fewer internodes and less development of leaves. In natural day conditions late varieties formed a great amount of green matter. Short-day conditions favoured formation of ears, the total number of which was twice greater than in the long-day. The number of normally developed ears was greater in the short photo-period. The 11-hour day length reduced total yields of green matter. In long-day conditions late dent varieties formed almost twice the short day amount of leaves and stalks. The weight of ears, seeds and husks were greater in short day condations for the majority of varieties. As a rule, the relation of weight of seeds to the remaining above ground parts were higher for maize varieties subjected to short-day photoperiodic induction. Stringfield (1960) reported that best yields were obtained by planting between May 7 and 12. Delayed planting of 1, 2 and 3 weeks gave yield reduction of 2, 7 and 14 bushels/acre, respectively. Aboul-Ela and Hassem (1962), in U.A.R., found that both May and August

10th plantings gave the highest yields in Alexandria. The increase in yield was either due to the difference in number of plants or to the average yield per plant. El-Ebrashy and Mahmoud (1962), in U.A.R., compared a wide range of planting starting from April to August on the yield of maize varieties. They found that planting dates had a considerable effect upon the yields of the different hybrids and varieties. The best yields were obtained by planting between June 5th and July 5th. Delayed planting of 15, 30, 45 and 60 days after June 20th gave yields reduction of 1.2, 2.2, 2.1 and 4.1 ardabs/fad, respectively. Kassem (1964), in U.A.R., studied eight hybrids and open pollinated varieties planted from May to August at 20 day intervals at Alexandria. He concluded that early planting. in May and early June produced higher yields than all other dates. On the other hand, the intermediate planting date on June 20th gave the lowest yield. In the Nile planting season, the best yield was produced by planting during July and up to the first of August. Lutrick (1964), in Florida, planted maize on five dates at 2-week intervals from 1 March to 1 May, found that planting on 15 April and 1 May gave the lowest yields, while that on 15 March gave the highest yields and ear height increased with delay sowing. Benoit et al.

(1965) showed that depression in corn yields at late plantings was associated with decreased temperatures during the ear formation stage. Ragland et al. (1965) found that the rate of leaf area growth of corn planted early in April was positively correlated with temperature, but it was correlated with temperature and relative humidity with late planting in June. They also showed that temperature was highly correlated with corn ear growth (r = 0,7). Bishr (1967), in U.A.R., tested three varieties of maize sown at eight dates, from April to August. He found that planting on June and July produced higher plants and that early plantings tended to increase days required from planting to silk emergence, number of plants carrying two ears and reduced the number of barren stalks. Planting at the end of April gave the highest grain yield, followed by planting at the beginning of July and the lowest yield was obtained from planting at the end of June. Mahmoud (1967), in U.A.R., planted maize at seven dates, ranged from May to July. He found that delay in sowing tended to reduce plant height, leaf area, days from planting to 50 % tasseling or 50 % silking, yield of grain in ardabs/fad and weight of stalks/fad. Bunting (1968), in England, indicated that delay in sowing time usually led to lower yields and produced higher plants with more leaves than

plants from early plantings. The end of April is an appropriate time to sow maize in central and southern England and no further delay is warranted for grain production. Helm et al.(1968) concluded that late planting reduced yield weight, nitrogen content and number of days to tassel while ash content and ear height increased. Yousef (1968), in U.A.R., planted maize at eight dates ranged from April to August, indicated that : The mean plant height and ear height of plants sown about the middle of April was much greater than that for later planting dates, there was a difference of about twenty days in the time of flowering between planting on April 19 and planting on August 1, there was an obvious trend towards less barren in early planting, the number of two ear-plants was larger in the early planting, late planting dates were accompanied by small ear volume, the highest kernel weight was obtained from early planting dates, mean yield of stalks/fad was higher in early plantings, the mean grain yield per plant was greater in early plantings and the highest grain yield/fad was obtained from early planting and the lowest from the latest planting.

B. Succession

Wianko (1927) indicated that it should be necessary or at least desirable to have corn in the rotation at least