MORPHOLOGICAL AND PHYSIOLOGICAL CHANGES IN GRAINS OF SOME EGYPTIAN MAIZE VARIETIES DURING GROWTH AND STORAGE.

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Thesis submitted in partial fulfilment
of the requirements for the degree of

MASTER OF SCIENCE

Plant Production Department,
Faculty of Agriculture
Ain Shams University

1967

This thesis for the M.Sc. degree

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Date : .....

ACKNOWLEDGMENT

The author would like to express his deep gratitude and appreciation to Dr. Moursi, M.A. Professor of Agronomy, Plant Production Dept., Ain Shams University and Dr. Abdel Gawad, A.A. Lecturer in Plant Production Dept., under whose supervision this work was conducted. Their constructive ideas, encouragement and generous help were invaluable during the study and preparation of this thesis.

Sincere thanks are also due to Dr. El Bagoury, O.H. Lecturer in Plant Production Dept., for her kind help and interest.

The author is deeply grateful to High Institute of Agric. at Kafr El Sheikh for giving the chance to conduct the germination experiment in the laboratory.

Introduction

Maize is one of the staple food of the world. Its quantity produced is greater than that of any other cereal crop. Climatic conditions limit its more wide spread cultivation. It is considered as one of the most important grain crops grown in the UAR for human consumption. The total production is not enough for this purpose, and consequently, the Egyptian government is pressing hard to increase the total production of maize by increasing the yield per faddan, producing new hybrid varieties, heavy fertilization and improving cultural treatments.

The total acreage of maize crop during the last four decades amounted to about 1.8 million faddan. It was 1.866.929 , 1.826.856 , 1.540.062 , 1.451.409 and 1.821.021 faddans in 1920, 1930, 1940, 1950 and 1960 respectively.

Harvest of seed corn begins as soon as the crop is physiologically mature. The seed crop may be harvested at 35 to 25 percent moisture level owing to the later maturity. Early harvest at 30 percent moisture avoids excessive loss of seed in the field due to mechanical picker, reduces risk of delays in harvest, stops insect damage such as corn borer and corn-ear worm, avoids severe shelling losses.

[illegible] was designed to study the morphological and physiological changes in grains and [illegible] varieties during growth and storage to investigate the best time of harvesting.

[illegible]

a- Seasonal changes in the growth of maize ears

Lawes and Gilbert (1884), found in wheat plant that the percentage of ash decreased steadily as the plants grew older.

In a series of studies on the effect of emasulation on the sugar content of corn and sorghum Heckel (1912), found that in general this treatment resulted at first in an increase in the amount of sucharose, levulose, and dextrose over that of the check plants, followed by a decrease in these sugars. Some variation was noted, however in the behaviour of different varieties.

Kidd and West (191[illegible]), concluded that the low yields obtained were due to the deterioration of the seed corn during the storage period, leading to bad germination while the yield from such plants were scarcely affected by the maturity of the seeds.

Shaw and Wright (1921), found that the percentage of total protein of sunflower and corn plants decreased as the plants matured.

Brown and Garrison (1922), found that the time from first silk to ripe was either 48 or [illegible] days in corn planted in April, May, June or July.

[illegible] from late milk was only slightly [illegible] the [illegible] stands were the same. Poor stands from the milk and late milk stages were unquestionably caused by the poor vigor of the seedlings. Many were unable to make their way up through the ground.

Working on the germination of corn harvested at milk, dent and mature stages at 15°, 20°, 25° and 30°C Dungan (1924), found that the seeds in the milk stage began germinating earlier than the others. Higher germination percentage were obtained during the first three days from dent than from mature seeds. However, when the final germination was taken, the superiority of mature seeds was evident both in number germinated and quality of seedlings produced. He added that mature seed corn germinated somewhat slower, but with more vigor than corn of the same variety harvested before maturity. Corn containing a larger quantity of moisture during storage germinated quicker, but with less vigor than corn containing a small quantity of storage moisture. He added that radicles and plumules of young grains were smaller than those of old grains.

[illegible] found that the coefficients of correlation between the time of germination and tasseling in corn were conflicting. The correlation between the time of germination and silking was too small to be significant and the same may be said of the correlation with yield. The results indicated that ears which germinated early produced plants which ripened late. The indications are that the plants which tassel and silk early mature late and yield high.

Dungan and Morston (1925), obtained 100 % germination with corn harvested in the milk, soft, dough and hard dough stages.

Alberts (1926), studied the effect of immaturity on shrinkage, shelling percentage, and germination of seed corn. He found the following results :

1- In the early milk stage moisture comprised over four-fifths of the weight of the ears and consequently the shrinkage was high. Shrinkage was lowest in corn that was harvested after it was fully dented. Shrinkage at this stage was 36 % for Golden Glow and 50 % for Murdock.

2- Shelling percentage was obtained at the time when the germination test was made. Shelling percentage increased

from 20 % in the early milk stage to 85 % in the beginning of glaze stage for the Golden Glow variety. A similar increase was obtained for Murdock, namely, 45 % in the early milk stage to 85 % in the beginning of glaze stage. There was little difference in shelling percentage between the beginning of the glaze stage and full dent stage.

3- Corn which was harvested in the early milk stage germinated poorly. Weak sprouts developed from 14 % of the Golden Glow kernels and from 75 % of the Murdock. Kernels which were checked in development in the late milk stage germinated 74 % and 87 % respectively. While the sprouts were stronger than those from kernels harvested in the early milk stage, they were not as strong as those from kernels harvested in later stages. Where development was checked in the dough stage, the germination was 95 % and 97 % respectively. This was as high as for kernels harvested at later stages. Sprouts which developed from kernels at this stage were nearly as strong as those from kernels harvested at the beginning of glaze and the full dent stages. There was little difference, if any, in germination between kernels harvested in the beginning of the glaze stage and those in the full dent stage.

[illegible] and Dungan ([illegible]), found that during the germinative process, radicles emerged more rapidly and plumules less rapidly in early harvested corn than in mature seed. They added that corn harvested in the mature stage produced heavier sprouts than that harvested in the milk, glaze, or dent stages.

Culpepper and Magoon (1930), worked on 15 varieties from sweet corn and two varieties from dent corn at samples after 5, 10, 15, 20, 25, and 30 days from silk emergence. They found from their studies the following results :

1- Increasing in total sugars till 15 days after silk emergence and then decreased towards maturity.

2- Decreasing in the reducing sugars towards maturity.

3- Increasing in the none reducing sugars till 15 days from silk emergence and then decreased towards maturity.

Dustman and Shriver (1931), worked on (Ambrosia trifida) (Giant ragweed), they found that during blooming time, the percentages of crude protein and nitrogen-free extract were the highest.

Malhotra (1932), found that the percentage of ash in hard winter wheat plant was high in the early stages of the development of the plant, then decreased.

[illegible] indicated that immature corn seeds harvested [illegible] days from silk showed low germination in the very immature sample. After 31 days from silk, excellent germination was obtained. The conclusion was shown that good germination and strong plants could be secured from quite immature but fairly well developed seeds that had been properly stored.

Koehler et al (1934), found that the seedling vigor was much better in the more mature stages than in milk and late milk stages.

Robinson (1934), using slightly different classifications found that dough, glazed, full dent, and fully matured stages were attained when the moisture percentages in the kernels were 60, 48 to 55, 40 and 28 to 31, respectively.

Sprague (1936) investigated the connection of the slow and irregular germination of corn planted shortly after harvest and the relation of moisture content at time of harvest. Seeds were collected 18, 21, 25, 30, 35, 41, 45, 50 and 55 days after pollination. Immature seeds became capable of germination with the reduction of moisture to approximately 25 percent. He suggested that the mechanism inhibiting the normal germination of freshly harvested