

S U M M A R Y

of the doctoral thesis

RESEARCH OF THE MAIZE HYBRIDS (*ZEAMAYS L.*) FROM DIFERENT MATURITY GROUPS, BEHAVIOR UNDER WATER STRESS CONDITIONS IN THE SOUTHERN REGION OF ROMANIA

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Corn culture is an important culture for Romania; the climate warming trend can affect the production capacity of the plant. Knowing the level of tolerance to water stress of cultivated hybrids is important to reduce the risk on agricultural production.

The importance, opportunity and topicality of the research theme The choice of the southern area of Romania is not accidental, here the phenomena of drought and heat are much more significant than in the other geographical regions of the country. In this context, I consider the collection, centralization and valorization of the data that will be centralized in the elaboration of the doctoral thesis to be helpful to the growers in this area.

Since the critical period for corn in terms of water consumption coincides with the maximum water deficit (the months of July - August: during this period pollination, the quality of the grains and implicitly the quantity harvested are affected, the observations that will be made will be directed in this direction.

Given the above, I want to be able to support strong farmers who benefit from more inputs and good technology from this geographical area of our country through this doctoral thesis.

The purpose and objectives of the research. The objective of the research is the behavior of some maize hybrids from maturity groups FAO 300-480 under irrigation, in different phenophases and their response during flowering to water stress.

The originality and innovative character of the conducted research results from the study of some maize hybrids maturity groups FAO 300-480 under irrigation, in different phenophases and their response during flowering to water stress, in the new climate context in the conditions of the south of our country.

Experimental conditions. The research carried out for the elaboration of the doctoral thesis was carried out at the A.R.D.S. Mărculești, located in the South-East of Bărești.

The experiments were carried out on a loamy vermicaceous chernozem soil, with a mesic temperature regime and ustic humidity regime. The characteristic of the soil from Mărculești is its relatively uniform texture, namely loamy (clay-dusty loam), neutral to slightly alkaline reaction (pH = 8.0 – 8.3), fairly high humus content on the surface (3%), decreasing on the profile, with relatively high values of the cationic exchange capacity, with a moderate supply of nutrients (0.116-0.160% nitrogen), 7-35 ppm phosphorus, 99-126 ppm potassium.

To achieve the proposed objective, a bifactorial experiment was established, located according to the method of parcels subdivided into three repetitions. The factors analyzed were:

Factor A: Maize hybrids with 5 grades (a₁=P9175; a₂=KWS Bellavista; a₃=KWS Smaragd; a₄=KWS Kashmir; a₅=KWS Durango);

Factor B: Irrigation with 4 graduations: (b₁=Not irrigated – control; b₂=Irrigated after flowering; b₃=Irrigated before flowering; b₄=Irrigated throughout the vegetation period).

The analyzed maize hybrids belong to the FAO 300-480 maturity groups and were investigated under irrigated conditions, in different phenophases and their response during the flowering period to water stress.

During the vegetation period, the following biometric and production characters were analyzed:

- ✓ Cob insertion height;
- ✓ Plant size at harvest;
- ✓ Number of grains per row;
- ✓ The number of rows on the cob;
- ✓ Mass of a thousand grains;
- ✓ Hectoliter mass;
- ✓ Grain humidity at harvest;
- ✓ Grain production per hectare, in kilograms.

The BAURAL four-row experimental plot seeder was used for sowing. Irrigation was carried out by drip, from a drilled well. Productivity items were done by counting them. The graduated ruler was used for plant height measurements and cob insertion height. Hectoliter mass, moisture and grain quantity per plot were made by BAURAL SP2100 combine to harvest experimental plots in two rows. The MMB was calculated using a photocell grain counter together with a precision balance.

During the corn vegetation period, the following measurements and determinations were made:

- measuring the insertion height of the cob;
- date of appearance of male and female blooms;
- determination of the duration of the flowering coincidence;
- measuring the height of plants.

When harvesting the experimental plots with the special combine for research, the following were automatically determined: the yield of grains per hectare, the current humidity of the grains at harvest and HM. Afterwards, the mass of a thousand grains was determined.

Establishing the significance of the differences between the variants was done by analyzing the variance corresponding to the transgression probabilities P of 5%, 1% and 0.1%.

Also, the doctoral thesis has a table of contents in Romanian and English, summary in Romanian, English and French, introduction, bibliography, appendices and list of publications based on the results obtained through research performed within doctoral studies. In total, the doctoral thesis has 207 pages, 74 tables, 118 figures and 8 photographs.

Part I, which comprises the bibliographic study related to the current state of knowledge about corn crop, the biological features of corn, the technology of maize crop, the influence of biological material and the bibliographic study regarding national and international research in the field of irrigation of corn crop and cultivated hybrids;

Part II, with reference to the own research results, comprising: the natural conditions of ARDS Mărculești, the place where the research was carried out, the research objectives, the interpretation of the results regarding the insertion height of the cob, the interpretation of the results regarding the height plants, the interpretation of the results regarding hectoliter mass, the interpretation results regarding number of grains per row, the interpretation of the results regarding the number of rows on the cob, the interpretation of the results regarding TKW, the interpretation of the results regarding grain moisture at harvest, the interpretation of the results regarding grain yield.

General conclusions Regarding the factors, different results were obtained regarding the 8 analyzed characters.

- in 2018 and 2019, the highest cob insertion height values were recorded for almost all hybrids, with the exception of the Durango hybrid, compared to 2017:

- the insertion height of the cob increased from the non-irrigated variants (94.93 cm) to the irrigated variants throughout the growing season (109.23), the differences being distinctly and very significantly positive compared to the non-irrigated variants, taken as a control;

- the highest plant height was recorded in the hybrid Kashmir and the lowest in the hybrid P9175. The differences between Durango and Kashmir hybrids, on the one hand, and the P9175 hybrid, taken as a control, were distinctly significantly positive for irrigation after flowering and for irrigation throughout the growing season;

- the hectoliter mass value, average of the years of study, was higher in the Bellavista hybrid, and the lowest in the P9175 hybrid. The differences between these two hybrids were distinctly significantly positive at all irrigation regimes. The other hybrids, compared with P9175, did not show significant differences, except for the Smaragd hybrid, when irrigated, which gave a distinctly significant positive difference compared to the control P9175;

- the values of the character number of grains per row, in the three years of experimentation, highlight the hybrids P9175, Smaragd and Durango, with values between 35.36 – 35.19. The lowest values were recorded by the hybrid Bellavista, of 33.05. However, on average over the three years of experimentation, the differences between the other hybrids and the P9175 hybrid were insignificant, being between 0.22 and 0.89 grains per row;

- the number of rows of grains on the cob was influenced by the experimental factors. The influence of the hybrid was evident through the character values studied as follows: the highest values were obtained by the Bellavista hybrid (18.43) and the lowest by the Durango hybrid (15.44), the Bellavista and Smaragd hybrids gave very significantly positive differences compared to the control variant P9175. The irrigation regime also had a major influence on the character studied as follows: the highest values of the number of rows per cob were obtained with irrigation throughout the vegetation period, of 16.87 and the lowest, in the non-irrigated version, of 15.98. Distinctly significant and very significantly positive differences were obtained between irrigated and non-irrigated regimes;

- and the TKW was influenced by the experimental factors, the lowest values of the TKW were recorded in the Bellavista and Smaragd hybrids (291 g and 288 g, respectively). The highest values were obtained by the hybrid P9175 (325 g). The Kashmir and Durango hybrids recorded TKW values close to those of the P9175 hybrid, the differences being insignificant at all irrigation regimes;

- the lowest values of grain moisture at harvest were recorded for the P9175 hybrid (12.86%) and the highest for the Durango hybrid (16.04%). All differences compared to the control P9175 were very significantly positive at all irrigation regimes;

- the highest level of production was achieved by the late hybrids, Kashmir, Durango and Smaragd, which achieved productions of 11,995 kg/ha, 11,955 kg/ha and 11,944 kg/ha. The lowest level of production was obtained with the hybrid P9175, of 10,885 kg/ha, followed by the hybrid Bellavista, with 11,327 kg/ha. Compared to the control P9175, only the Kashmir hybrid obtained significantly positive differences, at all irrigation regimes, and the Bellavista hybrid did not show significant differences in any irrigation regime.

Recommendations. As farming advice, we recommend hybrids with high potential, Kashmir, Durango and Smaragd, in the area of influence of ARDS Mărculești, an area that allows the cultivation of late hybrids due to the appropriate climatic input and under irrigation conditions. Early hybrids, in the FAO 300 group, can take advantage of areas where they can reach maturity in early September, so that they can be rotated with winter wheat.