

Quality evaluation of some maize hybrids cultivated under pedoclimatic conditions of Banat area (West of Romania)

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Abstract The purpose of the research is to follow the influence of the biological factor on quality of eight maize hybrids of various maturity groups Florencia(FAO 500), ZP 409(FAO 500), Fundulea 376(FAO 500), Olt(FAO 430), TC 377(FAO 390), Stira (FAO 390), Garbure(FAO 370) and LG 3395(FAO 370). An experiment was set up on a cambic chernozem at Timisoara(west of Romania) in 2010, in a randomised block design with four replications, the level of fertilization being $N_{130}P_{60}K_{60}$. Quality parameters that were monitored to determine the quality of maize cultivars are moisture, hectoliter mass, protein, oil, and starch content. We can conclude that influence of genetic background of various types has been different for yield and quality parameters. Regarding the correlations between quality parameters of maize hybrids our researches led us to the conclusion that between protein content and oils content there was a positive correlation but between hectoliter mass and starch content the correlation was negative.

Key words

maize hybrid, yield, protein, hectoliter mass, oil, starch

The importance of cereal grains to the nutrition of millions of people around the world is widely recognized. Maize is, after wheat and rice, the most important cereal grain in the world, providing nutrients for humans and animals and serving as a basic raw material for the production of starch, oil and protein, alcoholic beverages, food sweeteners and fuel. The green plant, made into silage, has been used with much success in the dairy and beef industries. The total feeding value of maize silage is best characterised by its content of metabolisable energy (MJ ME/kg DM) since this is what is available to the animal through digestion. About 66 – 75% of the digestible energy in maize silage is obtained from starch and sugar[7].

Genetic variability for grain yield components has been reported by Tusuz & Balabanli [5], and the same for oil contents, protein content [4] and total carbohydrates by Korniewicz A. [2].

Muhammad Saleem *et al.*, 2008, in his maize hybrids researches found that oil content is positively and significantly correlated with grain yield. He also reached to the conclusion that an increase in protein contents may decrease grain yield ultimately, so breeding for high protein genotypes require moderate balance between these two characters. Grain starch content and grain yield per plant were found positively and non-significantly correlated at the genic level[3].

Environmental conditions significantly affected maize hybrid responses for grain yield, starch, oil and protein contents. In wet years there was a higher rate of

starch accumulation, while dry years are favorable for protein and oil accumulation[6].

Material and Methods

An experiment was set up on a cambic chernozem at Timisoara(west of Romania) in 2010, in a randomised block design with four replications, the level of fertilization being $N_{130}P_{60}K_{60}$. Eight hybrids of various maturity groups (FAO 370-500) were planted in this experience: Florencia (FAO 500), ZP 409 (FAO 500), Fundulea 376(FAO 500), Olt (FAO 430), TC 377 (FAO 390), Stira (FAO 390), Garbure (FAO 370) and LG 3395 (FAO370).

The first quality parameter that we determined was the productive capacity of the maize varieties. For determination of quality parameters, sampling was done from the mass of maize after harvest. Maize samples were cleaned of foreign matter and then were processed.

Quality parameters that were monitored to determine the quality of maize cultivars are moisture, hectoliter mass, protein, oil, and starch content.

We used the OmegaAnalyzer G device for this determinations. The OmegaAnalyzer G is a high performance transmission spectrometer which is designed for the compositional analysis of whole grain samples using the near infrared absorbency characteristics of sample spectra.

Results and Discussions

Significant differences among the genotypes for grain yield and quality attributes such as oil, protein, starch, were determined from grain.

The results regarding the maize hybrids productivity (Fig.1), show us that in 2010 agricultural year, on a cambic chernozem, the maize production registered values between 6841kg/ha (LG3395) and 8225kg/ha (Florenzia). Florenzia recorded the best results followed by ZP 409 with 7739kg/ha and Fundulea 376(7597 kg/ha).

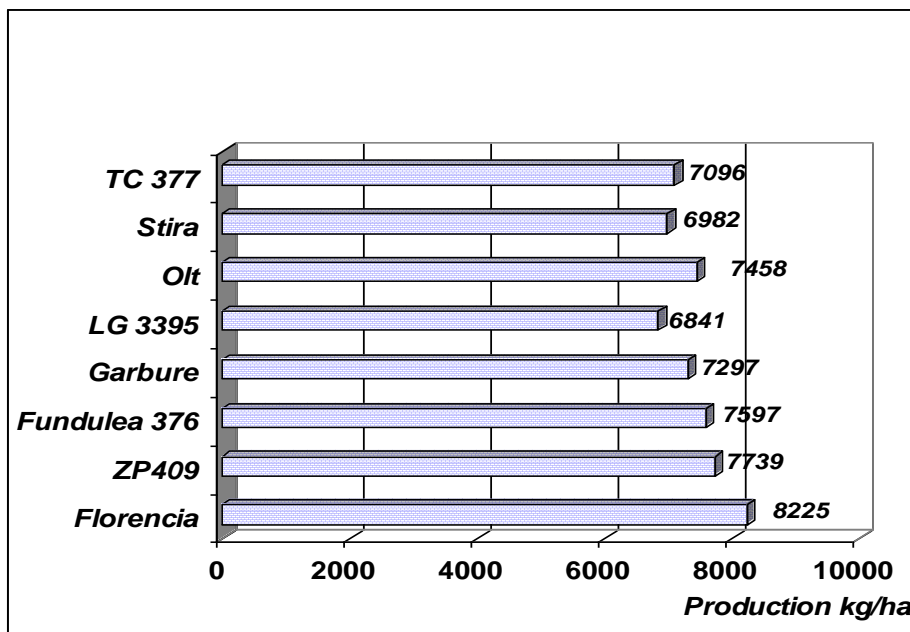


Fig.1. The productive capacity of the maize hybrids

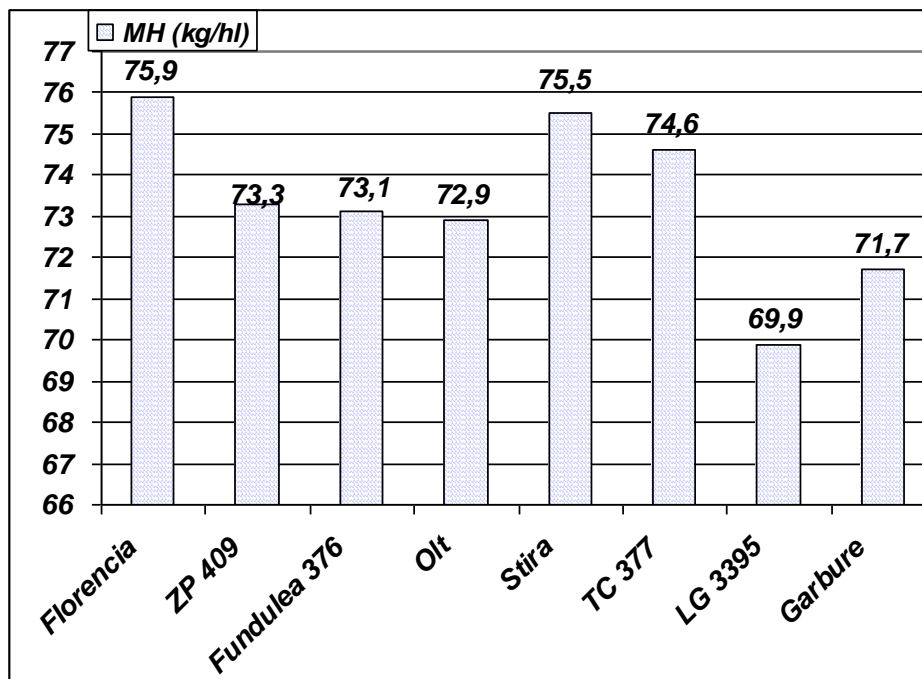


Fig.2. The values of hectoliter mass of eight maize hybrids at Timisoara, in 2010

We observe in Figure 2 that except LG3395(69,9kg/hl) and Garbure(71,7 kg/hl) all the hybrids registered good values of the hectoliter mass. The highest values of this parameter were registered by Florencia(75,9 kg/hl), Stira (75,5 kg/hl)) and TC 377(74,6 kg/hl) maize hybrids.

Regarding the maize hybrids protein contents (Fig.3), this quality parameter registered values between 8,3%(ZP409) and 10%(Stira). Very good result had Florencia(9,8%) followed by Garbure(8,9%), TC 377(8,7%), LG 3395(8,7%) and Fundulea 376(8,6%).

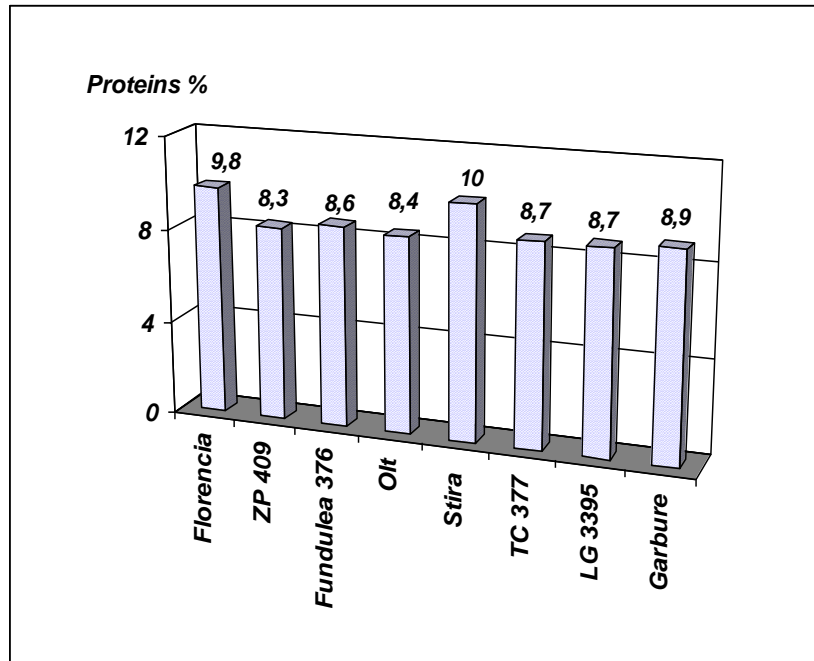


Fig.3 The values of protein contents of eight maize hybrids at Timisoara, in 2010

Analysing the values of oil contents of maize hybrids we observe that the highest values of this parameter were registered by Stira(4,6%) and Olt(4,6) followed by Florencia(4,3%), ZP409(4%), TC

377(3,9%) and Garbure (3,8%) maize hybrids. LG 3395 and Fundulea 376 maize hybrids had both the lowest value of oil content(3,7%).

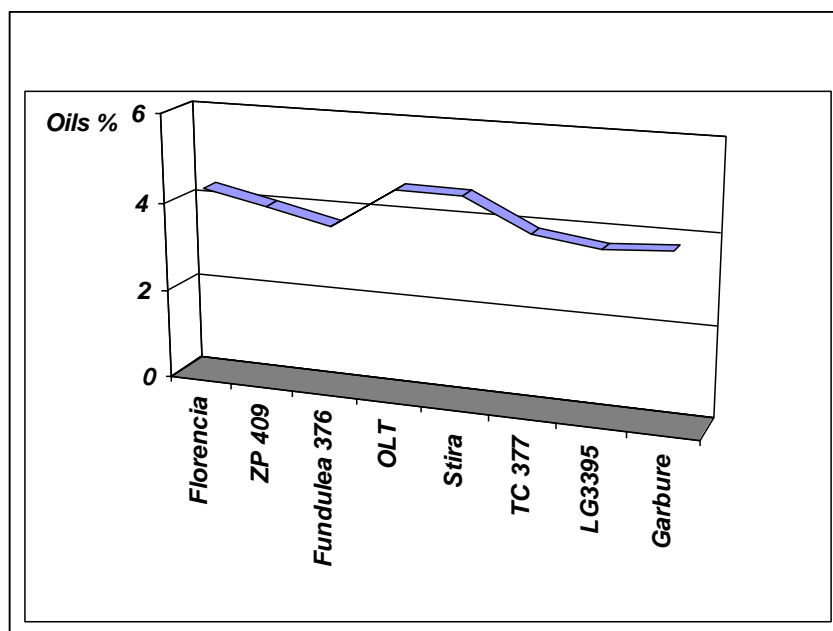


Fig.4.The values of oil contents of eight maize hybrids at Timisoara, in 2010

The values of starch contents studied maize hybrids are presented in Fig.5. The best results regarding starch content registered Florencia(72,7%),Garbure(72,6%)

and TC 377(72,5). The lowest values of this quality parameter were registered by the maize hybrids Stira(71%) and Olt(71,4%).

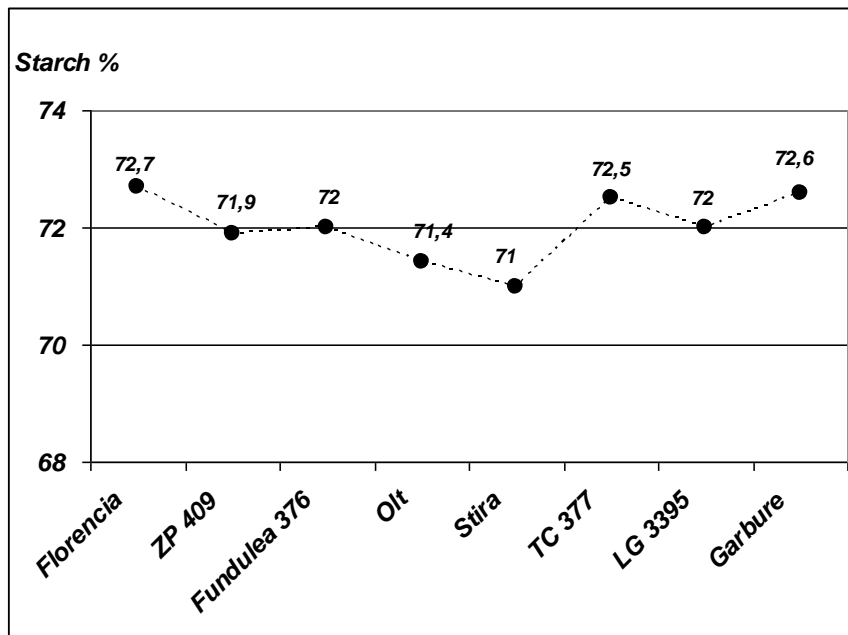


Fig.5.The values of starch contents of eight maize hybrids at Timisoara, in 2010

In Fig.6. is presented the graphical correlation between protein and oil contents of studied hybrids.

We conclude that between protein content and oils content of maize hybrids there is a positive correlation.

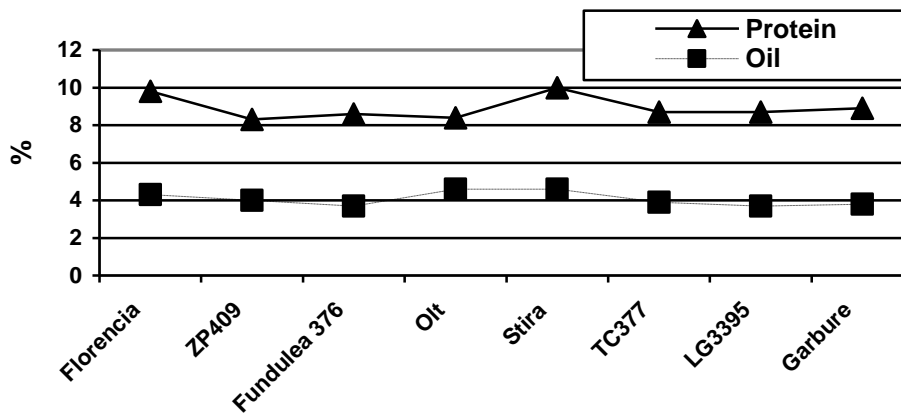


Fig.6. The correlation between protein and oil contents of studied hybrids

We present in fig.7. the graphical correlation between MH and Starch contents of studied hybrids.

We observe that between these two parameters the correlation is negative.

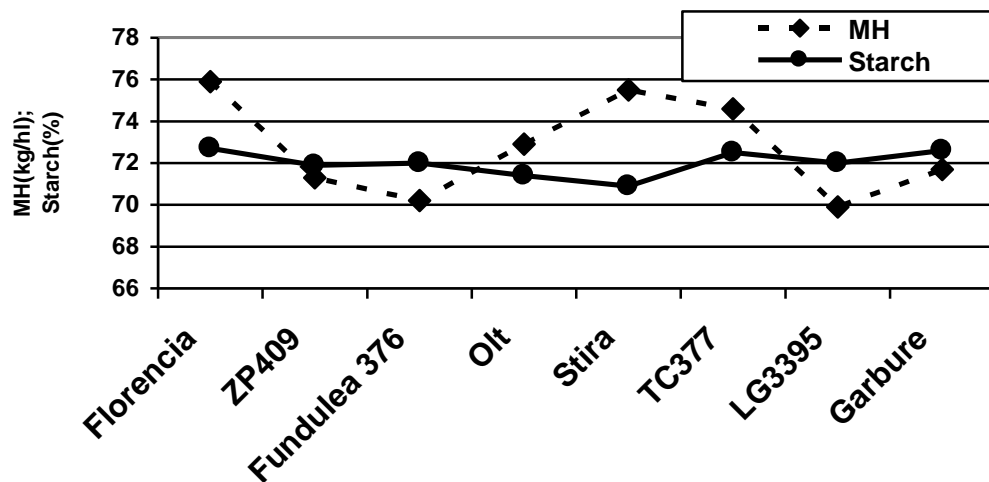


Fig.7. The correlation between hectoliter mass and starch contents of studied hybrids

Conclusions

Analysing the results obtained we can conclude that influence of genetic background of various types has been different for yield and quality parameters.

The results regarding the maize hybrids productivity show us that in 2010 agricultural year, on a cambic chernozem, the maize production registered values between 6841kg/ha (LG3395) and 8225kg/ha (Florencia).

Except LG3395(69,9kg/hl) and Garbure(71,7 kg/hl) all the hybrids registered good values of the hectoliter mass. The highest values of this parameter were registered by Florencia(75,9 kg/hl), Stira (75,5 kg/hl) and TC 377(74,6 kg/hl) maize hybrids.

The maize hybrids protein contents had values between 8,3%(ZP409) and 10%(Stira). Very good result registered also Florencia(9,8%) followed by Garbure(8,9%)maize hybrid.

Analysing the values of oil contents we conclude that the highest values of this parameter were registered by Stira(4,6%) and Olt(4,6). LG 3395 and Fundulea 376 maize hybrids had both the lowest value of oil content(3,7%)

Florencia(72,7%) and Garbure(72,6%) hybrids registered the best results regarding starch content. The lowest values of this quality parameter were registered by the maize hybrids Olt(71,4%) and Stira(71%).

Regarding the correlations between quality parameters of maize hybrids our researches led us to the conclusion that between protein and oils content there was a positive correlation but between hectoliter mass and starch content the correlation was negative.

So, from all the maize hybrids studied in our researches, we recommend Florencia hybrid (of Pioneer Company) for his productive capacity and Stira and Florencia hybrids for their very good quality parameters.

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