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CORRELATIVE CONNECTION BETWEEN CHARACTERISTICS OF MOTHER LINE AND HYBRID SEED F_1 GENERATION OF MAIZE HYBRID ZPTC 196

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Production of the maize hybrid seed (*Zea mays* L.) in the area of the town of Zaječar and its surroundings is limited by the ecological conditions. The loss of precipitations and high air temperatures during summer do not allow the hybrid seed of later vegetation to be produced. However, reduced amount of precipitations in the period of time from August to September, with favourable heat conditions, provide mature and healthy seed material only if the mother line has shorter vegetation period (FAO 200 - 300). This study examines the influence of the cob corn characteristics (cob length, number of seeds on a cob, mass of the seeds on a cob, number of the seeds in a fraction and germination of natural seed material of the maize hybrid ZPTC 196 seed. The applied correlative analysis involved all experimental conditions (two years, plant rows of the mother line, with watering and without watering). The results of the investigation showed that the applied approach of correlative analysis for the fractional content of a cob corn (number and mass per fractions) almost owerwhelming, as far as the seed germination is con-

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cerned, it was probable that all factors having influence on that characteristic were not included.

Key words: correlative connection, hybrid seed, maize, mother line

INTRODUCTION

Different factors single or in mutual interaction, affect the successfulness of maize hybrid seed production (EDMEADES *et al*., 1992.). Wide area of the town of Zaječar is characterized by dry ecological conditions, unfavourable for maize production of both merchantible and seed maize. However, the shortage of precipitations and high air temperatures during July and August can be an advantage for seed production of the groups of earlier maturity hybrids, so there is no need for the process of extra drying in the driers.

Search for the best practical solutions in seed maize production is important for achieving greater mechanic and physiological equalization of the hybrid seed (MIRIĆ *et al*., 1995.). The fractional content of the seed, according to the form and size, is, at the same time, the real result of total hybrid maize seed production and the applied procedures in final processing, (POPOVIĆ and MIČIĆEVIĆ, 1987).

PUCAREVIĆ and UJEVIĆ, (1986) states the calibrated maize seed can give about 15% greater yield than classic finally-processed seed.

This study deals with the research of the influence of certain characteristics of mother lines – components of cobs fertility (cob length, number and mass of seeds on a cob) on the fractional content of the seed of maize hybrid ZPTC 196.

MATERIALS AND METHODS

The examinations were carried out during the vegetation period of the year 1997 and 1999 on the field experiment that is the experimental seed production of the maize ZPTC 196. The experiment was placed on the experimental field of the Agricultural and Technological Research Center in Zaječar in two variants, with and without watering. Watering, in the variant with it, was done by application of artificial rain, at the time when the soil humidity content was below 50% than the field water capacity. The experiment was placed on the area of 15 ares minimum for each way of production. Standard agrotechnics for maize seed production was applied. The relation of the raws of mother and pollinator was 4:2, while the raw length was 50m. Ten cobs per each raw of mother plants (total 40 cobs) were taken in 5 replications for each variant, while tracks of four raws of mother plants were repeated. The protective belt of six raws was sown on each side of the experimental field, that is, one more track (from both sides) with 4 raws of "mother" and two raws of "father".

The hybrid seed was manually processed and divided into two fractions of shape and two fractions of size: tiny-flat (TF), tiny round (TR), coarse flat (CF), coarse round (CR) seed. The shape fraction "round seed" included all seed that was not flat (ball-shaped, polihedronic, deformed, irregular shape).

The seed germination investigation was carried out for the sample of 50 seeds in 2 replications per each fraction under standard conditions (20/30 ^{o}C alternately 16/8 hours in filter paper). The germination was examined for each cob separately.

Obtained results for the number and mass of seed are shown as average values, while the germination was shown in per cents.

The results was statistically processed by the variance analysis, and the coefficient for correlation of the number, mass and germination of seed per each fraction was calculated. Testing differences among mean values was done by LSD test (HADŽIVUKOVIĆ, 1991).

The correlation analysis was done by the number, mass, and germination of the hybrid seed, as dependantly changeable characteristics: cob length, number and mass of seed on a cob. The correlation analysis was done separately for each fraction of hybrid seed shape and size.

RESULTS AND DISCUSSION

The variance analysis results show (Fig. 1-3), that the differences among mean values are not statistically significant for any of the ivestigation characteristics (seed number and seed mass in a fraction, and seed germination in a fraction).

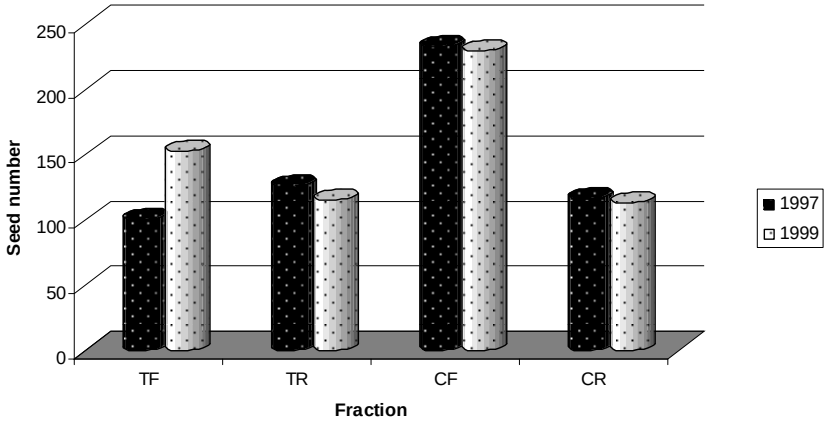

Fig. 1. Seed number per fractions, 1997 and 1999

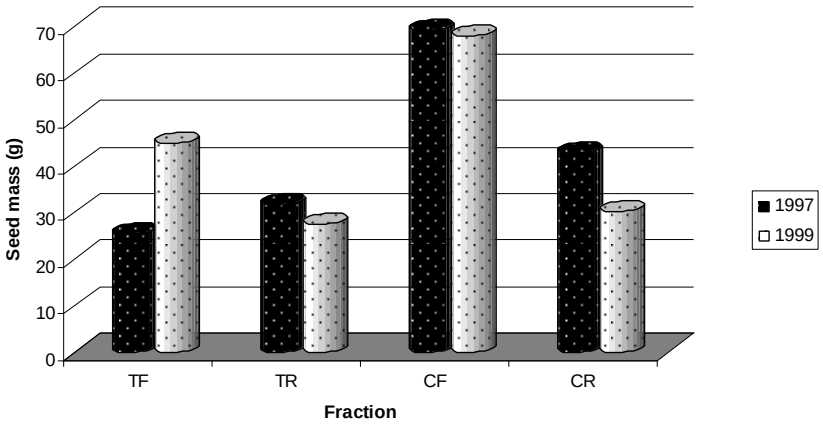

Fig. 2. Seed mass (g) per fractions, 1997 and 1999

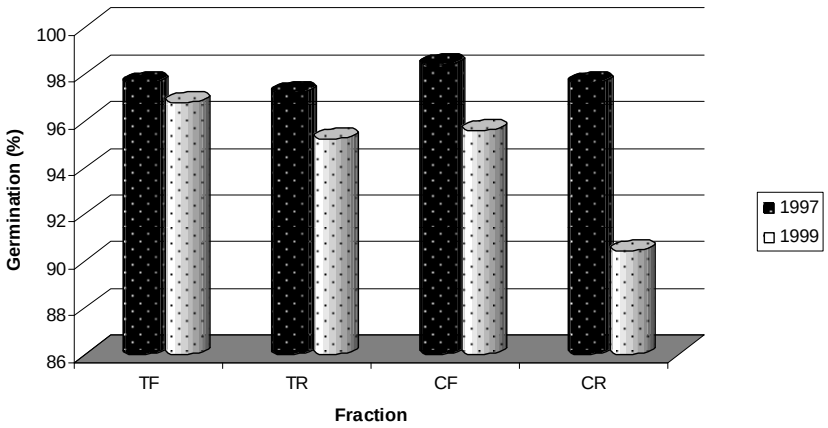

Fig. 3. Seed germination (%) per fractions, 1997 and 1999

The greatest influence on the dependently changeable characteristic of the seed number in fractions had the seed mass in fractions. The greatest influence was achieved on coarse seed fractions.

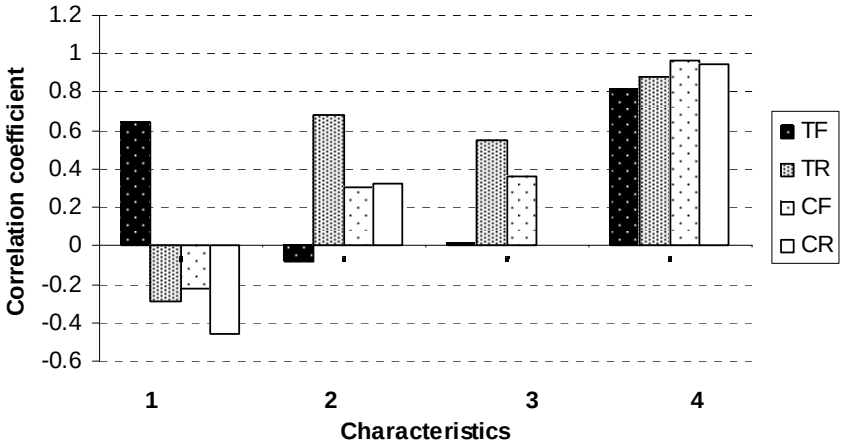

Fig. 4. Correlation analysis of seed number in fractions; Characteristics: 1- Cob length; 2- Number of seed on a cob; 3- Seed mass on a cob; 4- Mass of seed in a fraction

The dependently changeable characteristic of the seed mass in fractions had the greatest coefficient r values (Fig. 5) for the indipendently changeable characteristic of seed number in fractions. Among other characteristics, cob length had high coefficient r value (0.6893).

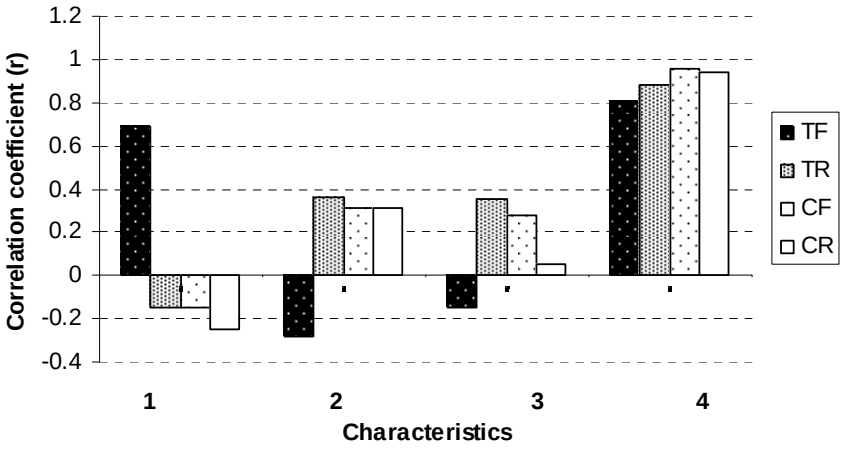

Fig. 5. Correlation analysis of seed mass in fractions; Characteristics: 1- Cob length; 2- Number of seed on a cob; 3- Seed mass on a cob; 4- Number of seed in a fraction

The greatest coefficient r value for seed germination per fractions was achieved at the indipendently changeable characteristic relating to the number of seed on a cob for the seed fraction TF (Fig. 6). This is a negative correlation coef-

ficient value. The greatest influence on the fraction CF germination had indipendently changeable characteristics of the number and mass of seed in a fraction (again negative correlation: Fig. 5). Since all the coefficient r values for all investigated fractions were not above 0.6, it can be said that all factors affecting the germination seed in a fraction were not included.

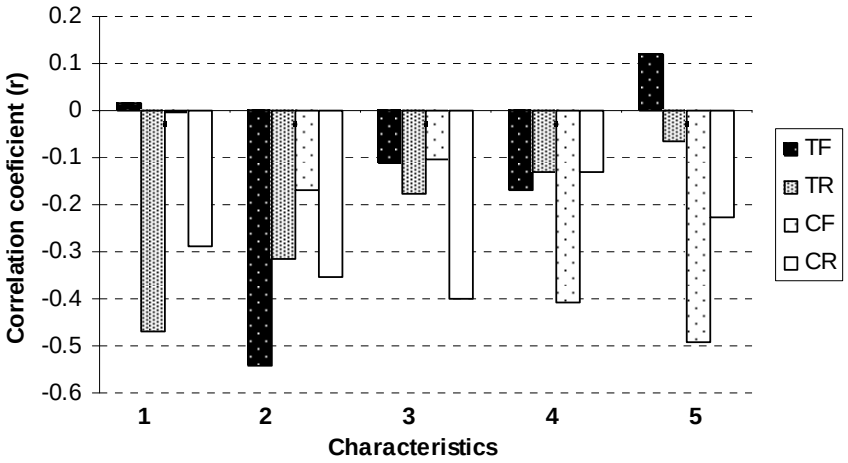

Fig. 6. Correlation analysis of seed germination in fractions; Characteristics: 1- Cob length; 2- Number of seed on a cob; 3- Seed mass on a cob; 4- Number of seed in a fraction; 5- Seed mass in a fraction

CONCLUSION

It was confirmed by the results that the investigated fertility components determine most the fractional content of natural seed material of the hybrid maize seed ZPTC 196. The seed germination was slightly defined by included components of fertility.

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REFERENCES

EDMEADES G.O., J. BOLANOS, and H.R. LAFFITE (1992): Progres in breeding for drought tolerance in maize. Proc. 47th Annual Corn & Sorghum Research Conference, Chicago. ASTA. Washington. (93-111).

HADŽIVUKOVIĆ S. (1991): Statistički metodi sa primenom u poljoprivrednim i biološkim istraživanjima. Poljoprivredni fakultet, Institut za ekonomiku poljoprivrede i sociologiju sela. Novi Sad.

MIRIĆ M., R. POPOVIĆ i L. ĐUKANOVIĆ (1995): Uticaj oblika na važnije komponente setvene vrednosti semena hibridnog kukuruza. Selekcija i semenarstvo, *1*, 83-87.

POPOVIĆ R. i M. MIČIĆEVIĆ (1987): Uticaj dorade na povredu perikarpa. Semenarstvo, *4*, 9-12.

PUCAREVIĆ A. i A. UJEVIĆ (1986): Komponente kvalitete sjemena i faktori koji utječu na njih. Semenarstvo, *1-2*, 6-10.

KORELACIONA POVEZANOST IZMEĐU OSOBINA LINIJE MAJKE I HIBRIDNOG SEMENA F_1 GENERACIJE HIBRIDA KUKURUZA ZPTC196

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Izvod

Proizvodnja semena hibrida kukuruza (*Zea mays* L.) u području Zaječara i okoline ograničena je ekološkim uslovima. Nedostatak padavina i visoke temperature u letnjem periodu, ne dozvoljevaju proizvodnju semena hibrida kasnije vegetacije. Međutim, smanjena količina padavina u periodu od avgusta do septembra, uz povoljne toplotne uslove, omogućava fiziološki zreo i zdrav naturalni semenski materijal, ali samo ako linija majka ima kraći vegetacioni period (FAO 200-300). U radu je ispitivan uticaj osobina klipa (dužina klipa, broj semena na klipu, masa semena na klipu, broj semena u frakciji, masa semena u frakciji), na frakcioni sastav i klijavost naturalnog semenskog materijala hibridnog semena kukuruza ZPTC 196. U primenjenoj korelacionoj analizi obuhvaćeni su sci eksperimentalni uslovi (dve godine, redovi biljaka linije majke, sa navodnjavanjem i bez navodnjavanja). Rezultati istraživanja su pokazali da je primenjeni pristup korelacione analize za frakcioni sastav klipa (broj i masa semena po frakcijama) skoro sveobuhvatan, dok za klijavost semena po frakcijama, verovatno, nisu obuhvaćeni svi faktori koji utiču na tu osobinu.

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