UDC 633.15: 631.527

B. Dziubetskyi,
Academician of the NAAS, Doctor of Agricultural Sciences
N. Bodenko,
M. Fedko,
Candidates of Agrarian Sciences
State Institution Institute of Agriculture of the steppe zone NAAS

Selection of middleripening lines of corn of plasma Iodent on the basis of sisterly double-cross hybrids

Goal. Creation of sister hybrids and synthetic populations of Plasmodium Ayoden and the deduction on their basis of self-pollinated lines, adapted to the conditions of the Northern Steppe of Ukraine and other zones of corn sowing. Methods. Experimental and statistical. Hybrids were sown in a control nursery in the second half of the third decade of April. Results The estimation of double sister hybrids of Plasmodium Ayodent and created on their basis self-pollinated lines with regard to grain yield are given. Conclusions The selection of high combining ability on the basis of "grain yield" and the assessment of a family of selection parameters among families in subsequent self-pollination generations allowed the selection of new lines of plasma Ayodent, which are dominated by the best outcomes of sister synthetic populations by combination ability and other economic features.

Key words: breeding, corn, self-pollinated family, test-cross, combining ability, grain yield.

The level of effectiveness of corn selection depends mainly on the availability of the gene pool of valuable self-pollinated lines [1-3]. Recently, a lot of attention is paid to synthetic populations of different types as the source material for creating lines. They usually consist of 4 to 15 parent components - the best elite lines. In addition, in the synthetic population, it is comparatively easy to combine the gene pool of the most valuable self-pollinated lines, local and exotic patches, and thereby increase the concentration of desired genes [4, 6-8].

A.R. Hallauer and J.B. Miranda offers to use different types of synthetics depending on the purpose of selection [10]. Syntheses consisting of 10 - 20 lines are involved to the solution of short- and long-term breeding programs. There is evidence of the feasibility of using native synthetics created on the basis of related lines, which allows them to acquire new improved versions in a relatively short time [5, 9].

The purpose of the research is to create native hybrids and synthetic populations of Plasmodium Ayoden and to deduce their self-pollinated lines adapted to the conditions of the Northern Steppe of Ukraine and other zones of corn redundancy.

Research methodology. The research was conducted during 2006 - 2014 in the Dnipro Research Institute of the State University of Agriculture of the steppe zone agriculture. The hybrids were sown in a control nursery in the second half of the third decade of April. The size of the sections is 4.9 m2, the repetition is 3 times. Density - 50 thousand plants / ha.

Experiments were carried out in accordance with the methods (Methodology of the State Variety Testing of Agricultural Crops, 2001; Method of Field Experiments with Corn, 1980). The statistical validity of the experimental data was determined using a dispersion analysis, variation parameters and correlation coefficient were calculated according to the method of GF. Lakin (1990). The estimation of parameters of combining ability in the system of incomplete test crosses was carried out according to the method of GK. Dremlyuk, V.F. Gerasimenko (1991).

Weather conditions during the research years were not uniform. In particular, between 2008 and 2011 and 2013, under the temperature regime and a handful of rainfall, were favorable, 2006-2007, 2014, more drought, and 2012 was intense.

The source material was created according to the generally accepted method, that is, initially on the basis of related lines received simple hybrids, in the future - double and 8-line ones. At the initial stage, the self-

recorded plasma lines Ayodent: DK277-10, DK411, DK407 / 7, DK6498, DK34, DK455 / 6, DK477, DK371 were included in the crossings, selected according to the results of their test crossings for economically valuable features in different nursery test. They have high combining ability on the basis of "grain yield" and other valuable indicators. The DK411 line, which is widely used in practical breeding, was the control to evaluate the created lines.

Research results and their discussion. On the basis of the above lines, simple sister hybrids were synthesized for the dialysis scheme, then - double, which, at the same time as self-polluting, crossed with testers to obtain preliminary data on the combined ability of future lines. The standard hybrids of the medium-long Monica 350MV and mid-late Bistrita 400MV were used during the test-cross tests.

For research in 2007 (after a complete selection assessment), double sister hybrids (31) were selected that intermixed with plasma tester Lancaster (DK633 / 266 - 12 × AS3070MV and DK633 / 325 line). The average grain yield of the test crosses was 5.16 t / ha at 15.5% humidity, while in the hybrid standards of Monica 350MV and Bistrica 400MV, these figures were 4.79; 5,10 t / ha and 16,8 and 15,7% respectively. The analysis of the combined ability shows that only 19% of the samples of the values of the effects of general combination ability (HR) were significantly higher than average, 9.5% - lower, the rest - within its limits (Table 1).

Three hybrid combinations with higher estimation of ZKZ effects were identified compared to the control line DK411 (0.41 t / ha): (DK34 × DK455 / 6) × × (DK407 / 7 × DK455 / 6) (0.74 t / ha) ; (DK407 / 7 × × DK455 / 6) × (DK411 × DK455 / 6) (0.48 t / ha); (DK407 / 7 × DK455 / 6) × (DK411 × DK6498) (0.47 t / ha). In addition, 2 more combinations were used for the operation, which had a high-precaution level above the average: (DK34 × DK6498) × (DK407 / 7 × DK455 / 6) and (DK34 × × DK6498) × (DK411 × DK407 / 7). Also, these combinations had low variations of specific combining ability, indicating their ability to provide a close yield level for all crossings carried out

All of them were used for further self-pollination and phenotypic selection of the received families S1-S2 in 2008-2009. Depending on the value of the breeding material of the S1-S2 families, more than 100 plants of each were planted, among which the selection was made on a complex of stately valuable features . From the S3 families, self-pollination was performed simultaneously with the treadmill (DK296M × DK6080; DK296C × DK2380; DK239MV) to evaluate the material on the combined ability.

The number of self-pollinated S3 families in each population is 11-15 (Table 2). Since all self-pollinated families had similarities in the effects of WFD, the average grain yield of their test crosses was almost the same and ranged from 10.50 tons / ha ((DK34 × DK6498) × (DK411 × DK407 / 7)) to 10.76 t / ha ((DK407 / 7 × DK455 / 6) × (DK411 × × DK455 / 6)). The largest difference between the minimum and maximum yields was in the test crosses of families S3 derived from populations ((DK407 / 7 × DK455 / 6) × × (DK411 × DK455 / 6)) and ((DK407 / 7 × DK455 / 6) × × (DK411 × DK6498)) and amounted to 1.71 and 1.41 t / ha respectively. The average population of this indicator in all tested test crosses was higher than the yield of test-crosses of the line control DK411 (10.40 t / ha) and the hybrid standard Monica 350MV (10.07 t / ha) and at the level of the Bistrica 400MV hybrid (10.58 t / ha). Among the test crosses of the S3 families, yields of 15.6% yielded more than 11 t / ha.

The number of S4 families was almost twice as low as S3 due to the selection of the main breeding grounds. Studying the test crosses of families S4 for grain yield (2013) suggests that the variation of this indicator was at the level of test crosses of families S3. The difference between its average values was only 0.27 t / ha, which corresponded to the error of the study. It should be noted that in 16% of test crosses the average yield is more than 8 t / ha, which is higher than in the test crosses of the DK411 line (7.46 t / ha) and the hybrid standards Bistrica 400MV and Monica 350MV (7.62 and 7.73 t / ha respectively).

The number of self-pollinated S5 families was reduced both due to the per se selection, and due to the more arid conditions in 2014, and generally made up of 20 rooms. In the self-winded family ((DK34 × DK6498) × (DK407 / 7 × DK455 / 6)), the S5 test crosses had maximum values (Lim - 3.24 - 6.56).

Selection for high combining ability on the basis of "grain yield" and evaluation the complex of valuable agronomic indicators among self-pollinated families made it possible not only to significantly increase the average yield of test crosses in subsequent self-pollination generations, but also to identify hybrids that

significantly exceeded the standards for grain yield by 0.14-0.85 t / ha at lower humidity or at the level of standards (Table 3).

1. Effects of CKD and variants of CK on the basis of "grain yield" of double hybrids of plasma Ayodent, t / ha (2007)

2. Variation of grain yield in test crosses of families S3 - S5, t / ha

3. Yield and humidity of grain test crosses of the best self-pollinated families S5 Plasma Ayodent (2014)

Conclusions

The selection of high combining ability on the basis of "grain yield" and the assessment of a family of selection parameters among families in successive self-pollinating generations made it possible to isolate the new lines of Plasmodium Ayodent, which are dominated by the best outcomes of sister synthetic populations in terms of combining ability and other economic features.

Bibliography

1. *Бриггс Ф.* Научные основы селекции растений/Ф. Бриггс, П. Ноулз. — М.: Колос, 1972. — 399 с.

2. *Дзюбецький Б.В.* Спеціальна селекція польових культур. Селекція кукурудзи/Б.В. Дзюбецький. — Білоцерківський національний аграрний університет, 2010. — С. 120 – 146.

3. *Домашнев П.П.* Селекция кукурузы/П.П. Домашнев, Б.В. Дзюбецкий, В.И. Костюченко. — М.: Агропромиздат, 1992. — С. 146 – 150.

4. *Зеленский М.А.* Разные исходные материалы и сроки самоопыления при создании нових самоопыленных линий кукурузы/М.А. Зеленский, В.Л. Жемойда//Совершенствование технологии возделывания зерновых культур: научн. тр. УСХА. — К., 1983. — С. 82 – 86.

5. *Комбинационная* способность самоопыленных линий кукурузы плазмы Айодент/Б.В. Дзюбецкий, Н.А. Боденко, Н.Н. Федько, Т.М. Бондарь//Кукуруза и сорго. — 2014. — № 1. — С. 27 – 30.

6. *Создание,* оценка, классификация и использование самоопыленных линий скороспелой кукурузы/С.И. Мустяца, П.А. Борозан, С.Г. Брума, Г.В. Русу//Materialele conferinţei international consecrate jubileului de 40 ani de la data fondării, Institutul de fitotehnie «Porumbeni» — 40 ani de activitate ştiinţifică (17 septembrie 2014). — Paşcani, 2014. — P. 70 – 98.

7. *Соколов В.М.* Фенотипическая изменчивость популяций кукурузы с узкой и широкой фенотипическойосновой по некоторым агрономическим признакам/В.М. Соколов, А.А. Белоусов, Р.А. Кривулько//Генетика селекция и технология возделывания кукурузы. — Краснодар, 1999. — С. 81 – 86.

8. *Супрунов А.И.* Создание новых линий кукурузы для селекции среднеспелых и среднепоздних гибридов кукурузы/А.И. Супрунов, Н.Ф. Лавренчук, М.В. Чумак//Кукуруза и сорго. — 2005. — № 2. — С. 13 – 14.

9. *Хаджинов М.И.* Итоги первого цикла рекуррентной селекции на повышение специфической комбинационной способности из синтетика кукурузы/М.И. Хаджинов, В.П. Гусев//Итоги работ по селекции и генетике кукурузы. — Краснодар, 1979. — С. 112 – 113.

10. *Hallauer A.R.* Quantitative genetics in maize breeding/A.R. Hallauer, J.B. Miranda//Iowa State Univ. Press, Ames. — 1981. — 468 p.