UDC 633.63: 631.52

M. Roik,
Academician of the National Academy of Sciences of the NAS, doctor of agricultural sciences
N. Kovalchuk, V. Lysenko
Institute of Bioenergetic Cultures and Sugar Beet NAN
N. Himich
Yaltushskaya experimental and breeding station of the Institute of Bioenergetic Cultures and Sugar Beet NAAS

Apozygotism as a new method of enrichment of gene pool of sugar beet

Goal. Determine the methodological prerequisites for enriching the domestic gene pool of sugar beet with a fundamentally new source material with an apposogothic seed reproduction method based on a genetic model that provides for the differentiation of offspring of multi-seed hybrid plants with cytoplasmic male sterility (CNS), in particular by the type of aposcy. Methods. A method for the propagation of sterile materials in conditions of a drunk regime was used for obtaining new separable genotypes of sugar beet. Results The genetic model of differentiation of generative and somatic embryogenesis for aposgoty with the use of genetic selective markers has been developed. The variability of the apopogothic offspring of multi-seed hybrid plants according to the phenotypic features of the nuclear genes of separation and CSCs is determined. Conclusion. Homozygous pyelosterile lines of the first asaphogoticheskoy reproduction were isolated and investigated according to the pallidity using the cytometric methods of the Partec AP.

Key words: aposhogotia, embryogenesis, sugar beet, single-calf, sterility, pallidity, genotype, phenotype.

Analysis of recent research. An important component of hybrid breeding at the present stage of development of beetroot is pyro-stearic forms. The use of the phenomenon of cytoplasmic male sterility (CNS) makes it possible to obtain almost 100% hybrid seeds. In Ukraine, as well as in foreign selection, sterility (O-type, Nxxzz) lines is used to expand the pyrocasterilic lines from the CCH for Owen (1945) [1, 2]. However, this method is quite labor-intensive, and it takes a long time to create and stabilize a new, pyrosterile source material. sterility, pallidity, genotype, phenotype.

The modern development of genetic selection programs increasingly requires the search for new, non-traditional methods and approaches that enable us to identify all the potentialities of a plant organism and, at the same time, obtain a new source material in a short time [3].

S.I. Maletsky, K.I. Maletska (1994) first applied the method of a pilotless regime for the proliferation of dust-coated lines without the use of sterility fixers [5]. Multi-seed hybrid plants based on CECs and an apos; gotician were proposed to expand the gene pool of pyro-sterile lines method of reproduction of seeds. Among the problematic issues of using the method of aspositing in breeding is, first and foremost, the instability of certain traits (separation, sterility, pallidity) in aspositary conditions and low productivity of the seedlings [9].

Embryological studies indicate the simultaneous development of embryos from somatic cells of nausea and integuments (somatic embryogenesis) and generative cells of the embryo sac (generative embryogenesis). The genetic diversity of the apoptosis is determined by the polyembryonia in the separate flower fruiting, which induces the formation of 2- and 3-germ stains [7]. The basis of this phenomenon is the generative and somatic embryogenesis, which often occurs in one fruit (polyembryonia). In this case, the germ may develop from both somatic cells of nausea and intuitions, and from generative cells of the embryo sac [4].

The article is devoted to the study of the new method of obtaining an aspo-gothic pyrosterol lines using hybrid F1 plants from the CCH of foreign and domestic breeding.

The purpose of the research is to enrich the domestic gene pool with a fundamentally new source material with an apposogothic method of seed reproduction based on a genetic model that ensures the differentiation of offspring, in particular by the type of aposcy.

Materials and methods of research. Material for research - experimental breeding numbers I and apopogothic reproduction: Lp / M, Vt / M, Bn / M, Fr / M, Sv / M, As / M, Kr / M, Ta / M, obtained on the basis of diploid hybrids F1 The seed is given to us by SI Maletsky (Institute of Cytology and Genetics, Siberian Branch of the Russian Academy of Sciences).

The research was carried out at the Yaltushkivsky Research and Selection Station (IADSS) of the IWCSB NAAS in field conditions (1st year of sugar beet vegetation) and in group isolates (2nd year of vegetation) during 2013-2014.

Seeds obtained and aspositive replication (A1) in the number of 37 rooms were sown in 2013 in the breeding center for breeding YADSS. These breeding materials were also studied in accordance with the pallidity using the cytophotometric method of the Partec ploidy analyzer in the cytogenetics laboratory of the IBCISB NAN [8].

The analysis on the basis of sterility in 2014 was conducted according to the classification of Owen, taking into account the phenotypic features of the nuclear genes of the CNS (chs-0 type, чс-1 type and чс-2 type) [10].

Digestion of multiflorous plants was carried out according to SI method Maletsky [6].

Results of experimental studies. According to the results of the study of the structure of cell populations of selection materials and of apopogothic reproduction using the Partec podidity analyzer, the main characteristics of the variability of the ployidity were shown (Table 1).

Of the 425 plants analyzed, myxo-ploidy with a high percentage of haploid cells - 49.4%, haploid - 4.5%. This suggests that these plants were formed due to generative embryogenesis from reduced haploid gametes. Diploid plants - 37,9%. Seedlings and apomictic re-products were studied on the basis of sterility and separativeness (Table 2).

According to tabl. 2, in the seedlings of the first apomictic reproduction from multinational hybrid plants, the differences in flowering ratios varied from 15.3 to 23.9%, depending on the origin of the selection materials. The seeds of чс-0 type ranged from 18.9% in the selection number Sv / M to 46.5% in the number As / M. Variability by type ste- rylnosti (FM-0, FM-1 and FM-2 types) due to the nature of the selection of donor plants (World Cup and World Cup 0 1 types) and the presence of two types apozyhotiyi (apomixis): generative and somatic embryogenesis.

According to the results of experimental studies, differentiation of apopogothic offspring and reproduction by type of aspagotia (generative, somatic embryogenesis) can be made. The differentiation by type of aposoduction and the separation of homozygous separable pepticosteric lines is achieved on the basis of genetic model (Table 3). Based on the genetic model among the apo-zygotic progeny of A1, the following forms of sugar beet can be distinguished: • Pylo-steeric, distinct biotypes (Beta vulgaris Sxxzz mm) with diploid (2 ×), haploid (x) and myxoploid (x, 2x, 4x) populations (figure); • multicellular pyrosterol lines (Beta vulgaris Sxxzz MM) with haploid (x) and mycoprotein (x, 2x, 4x) state of cell populations; • Multi-seeded pyrotechnic lines: Mm xxzz, Mm Xxzz, Mm xxZz identify for stable genome level 2x. As a result of experimental investigations, the selection of separable pyrosterol lines for the combination of the phenomenon of aposgoty and CSF on the basis of multi-seed hybrid plants was conducted. According to the genetic model, a fundamentally new, separable selection material could only be formed on the basis of the development of germ cells from the embryo sac as recessive homozygotes with marker signs of separation and sterility: m xz (haploid genotype), mm xxzz (dihaploid genotype).

Conclusions

Several multi-seed hybrid plants based on CCHS and the method of apopogothic reproduction of seeds were used to create new source materials and enrich the gene pool of maternal components of domestic sugar beet hybrids. On the basis of the genetic model of the experiment and the study of the variability of the phenotypic features of nuclear genes of separation and sterility, homozygous separable peptidic pyrosterile lines were identified based on generative embryogenesis of the irregular type.

Bibliography

1. *Балков И.Я.* Селекция сахарной свеклы на гетерозис/И.Я. Балков. — М.: Россельмаш, 1978. — 178 с.

2. *Богомолов М.А.* Использование апомиктичных МС линий при создании гибридов сахарной свеклы/М.А. Богомолов//Сахарная свекла. — 2012. — № 9. — С. 27 – 30.

3. *Богомолов М.А.* Особенности использования апомиксиса у сахарной свеклы при создании нового исходного материала/М.А. Богомолов//Там же. — 2008. — № 5. — С. 18 – 20.

4. *Жужжалова Т.П.* Генетическая разнокачественность семян и методы ее преодоления/Т.П. Жужжалова, О.А. Подвигина//Там же. — 2011. — № 7. — С. 14 – 17.

5. *Малецкий С.И.* Наследование признака ЦМС в апозиготических потомствах сахарной свеклы/С.И. Малецкий, Е.И. Малецкая, С.С. Юданова//Энциклопедия рода *Beta*. Биология, генетика и селекция свеклы. — Новосибирск: Сова, 2010. — С. 205 – 216.

6. *Одноростковость* свеклы (эмбриология, генетика, селекция)/С.И. Малецкий, Ю.Н. Шаврукова, С.Г. Вепрев и др. — Новосибирск: Наука. Сиб. отд-ние, 1988. — С. 168.

7. *Репродуктивная* биология сахарной свеклы/Т.П. Жужжалова, В.В. Знаменская, О.А. Подвигина, Г.И. Ярмолюк. — Воронеж, 2006. — С. 232.

8. *Роїк М.В.* Аналіз мінливості рівня плоїдності геному вихідних селекційних матеріалів цукрових буряків з використанням технологій аналізатора плоїдності «Partec»/М.В. Роїк, Н.С. Ковальчук, Л.В. Алексійчук. — К., 2006. — С. 39.

9. *Яцева О.А*. Якість насіння цукрових буряків, отриманого шляхом апозиготії/О.А. Яцева: зб. наук, праць ІЦ Б УААН. — К.: Аграр. наука, 2011. — С. 101 – 107.

10. *Owen F.V.* Cytoplasmikaly inherited male sterility in sugar beet/F.V. Owen//Agric. Res. — 1945. — V. 71 (10). — P. 423 – 440.