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DEVELOPMENT OF COUNTERPARTS RESTORING FERTILITY IN SUNFLOWER.

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The CMS source in sunflower was obtained by Leclerq in 1968 in an interspecific hybrid Helianthus petiolaris Nutt. x H. annuus cultus Genal. This CMS source provided 100% sterility of plants. Difficulties arose in detecting the sources of restoring genes.

M. Kinman (USA) was the first to find restoring genes within the population T 66006, which has hybrids with a wild annual sunflower in its pedigree.

A large amount of work has been done in Romania to find fertility restorers in cultivated sunflower. Within the evaluated varieties restorer genes have been found in the following entries:

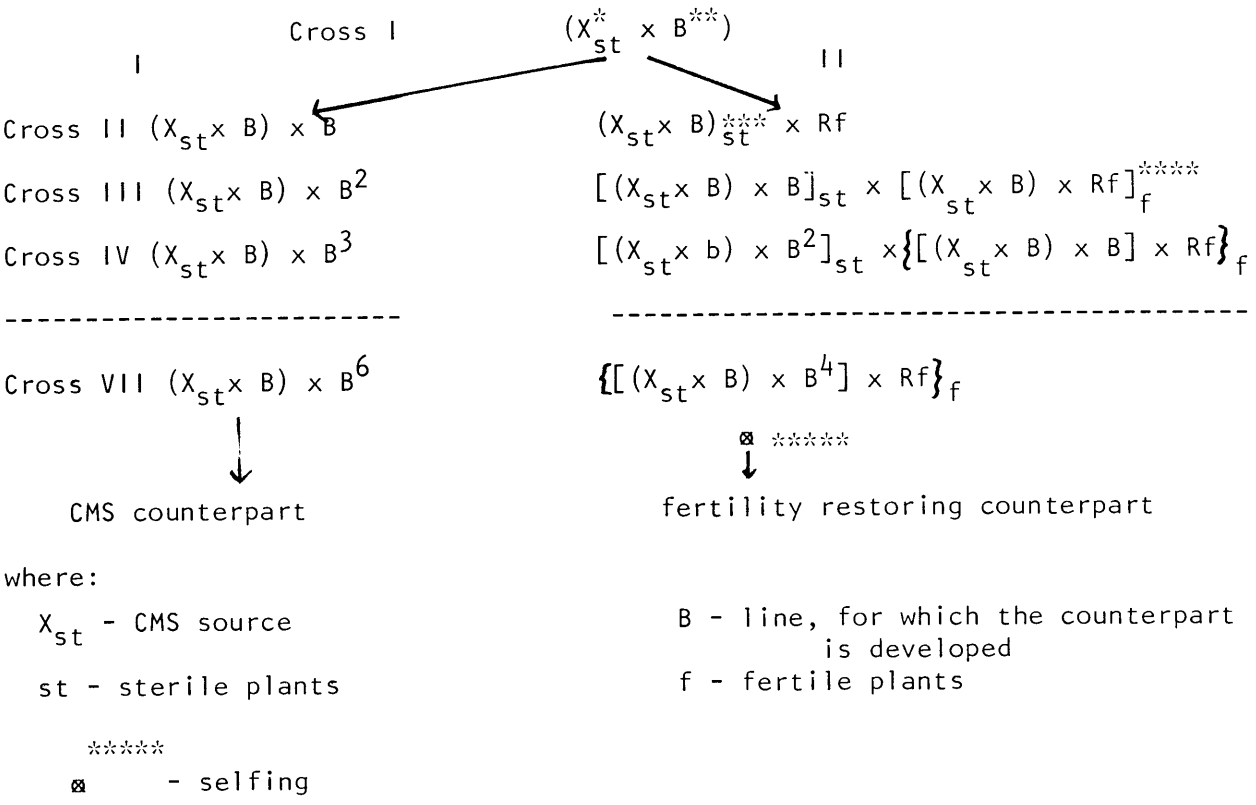
Discovolante - Italy
Slovenska siva - Chechoslovakia
Mezohedesi - Hungary
Blumington - USA
Synthetic II - Romania

Bulgarian breeders have found restorer genes in the variety Siberian Pioneer, and in some of the local Bulgarian varieties-populations.

Difficulties in finding such sources lead to a necessity of obtaining the counterparts restoring fertility among the best breeding lines. There exist several ways of developing these counterparts. Development of counterparts on fertile cytoplaxm is inconvenient because it includes a detection of restorer genes in each generation of back-crossed plants. Echardt and Badjinov (1954) have proposed the method of development of fertility restorers in maize based on sterility. In this method of counterpart development, the CMS plays the analyzing role for restorer genes, thus eliminating the necessity in analyzing crosses.

Maize plants have heterogamous flowers, that is, crosses are performed without castration. To develop the counterparts restoring fertility in sunflower castration is necessary as the flowers are bisexual. When developing the counterparts only some proportion of flowers is castrated and the rest are eliminated. But even in this case it is necessary to castrate the flowers as they are opening, early in the morning from 4 to 6 a.m., during 2-3 days.

An experienced worker is able to prepare not more than 15 heads in two hours. Thus, time limitations of castrations and low labor productivity hamper the work and limit the possibilities of development of the counterparts. Considering the above mentioned, we have proposed a new method of parallel development of a sterile counterpart and of a fertility restorer one. In other words, the developing sertile counterpart is at the same time used to develop the fertility restoring counterpart.



where:

X_{st} - CMS source

st - sterile plants

B - line, for which the counterpart is developed

f - fertile plants

⊠ ***** - selfing

This method allows the backcrossing in developing fertility restorers by pollination of sterile plants. This means that the preparation for pollination (bagging) can be performed during the whole day. Labor productivity thus increased at least 10 times.

As a result, the sterile counterpart and the fertility restoring counterpart for the same line are developed at a time. The plants of fertility restoring counterpart are additionally selfed to convert the restorer genes to homozygotic state.

This method of development of fertility restoring counterparts has been used at All-Union Research Institute of Oil Seed Crops (VNIIMK) since 1974.