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RELIABLE CMS AND Rf SOURCE

In the process of studying a group of annual wild species of sunflower and hybrids with cultivated forms a source of CMS was found in the cross of a sample from Denmark with *H. annuus*. During field studies it was found that this sample obtained under the name of *H. laetifolius* (in 1904) in fact corresponds to subsp. *lenticularis*. Variety VNIIMK 8883 was used as male parent. In the spring planting all 34 F₁ hybrids were sterile. The plants were considered to be middle season in maturity by the length of vegetation period, with a somewhat lengthened period of flowering. In appearance the plants were close to subsp. *lenticularis*. Plants with one head and with poor branching of the lower type amounted to 30%. Others showed strong low or upper branching. Plant height by the time of flowering was about 150-170 cm, that is 15-30 cm lower than in commercialized sunflower varieties.

All plants were with few exceptions strongly coloured with anthocyanine, the colour being most of all expressed in tubular flowers (head disc) and leaf petioles. The stalk is rigid and ribbed, strongly pigmented. The heads are rather large (6-8 cm), well formed, flat or slightly spherical, in general normally inclined. Two plants showed horizontal disposition of heads at maturity. The seeds are small, mainly of fusine type, spotted. The weight of 1000 seeds was 10-18 g.

During summer test planting all 26 plants also appeared to be sterile. Plants of both plantings were similar in qualitative traits.

These hybrids were crossed to *H. annuus* L. subsp. *petiolaris* (var. *petiolaris*, var. *debilis*), subsp. *lenticularis* (var. *lenticularis*, var. *argophyllus*) and subsp. *annuus* (var. *pustovoi-*

tii, var. australis). Hybrid analysis showed that subsp. petiolaris may serve as a reliable source of Rf, but that a serious breeding work was required to obtain a practically valuable material. Thus, hybrids with subsp. petiolaris are rather uniform (in plant height and in phases of development) but show strong tillering (tillers of the 3rd order are observed). In some plants it is difficult to differentiate the main head from the secondary by size. Hybrids F_1 and F_2 , BC_1 practically do not differ in appearance. No sterile forms were observed in these hybrids.

Hybrids with subsp. lenticularis expressed low sterility (10-12%) thus showing a high concentration of restorers in this material. It was utilized to saturate cultivated sunflower with marker lines to obtain Rf lines.

An original Kuban source of CMS was developed on the basis of backcrosses with var. pustovoitii (C 2116, 2310 and others). It was named K1-70. In BC_5 sterile counterparts of the variety Armavirets and line ZS-17 were obtained having marked coloration of the rosette (yellow) and of upper leaves. The counterparts enter the flowering period and mature 3-7 days earlier than their initial forms.

It is known that CMS obtained by P. Leclerq is developed by crossing *H. petiolaris* with *H. annuus*. However, according to descriptions the Leclerq CMS was based on subsp. lenticularis plants. This means that both CMS sources (in France and in this country) are obtained from one and the same botanical form: *H. annuus* L. s. subsp. lenticularis.

CMS K1-70 differs from the Leclerq CMS in phenotypical expression of sterility: plants with CMS K1-70 do not form pollen anthers; the French CMS source forms anthers but they are considerably lighter in colour than in fertile plants and slightly expand from the floret. Sterile counterparts based on these two CMS

sources differ in the period of vegetation. Counterparts based on K1-70 show a 7 days shorter period of vegetation, they are respectively somewhat shorter in height and possess less number of leaves than the French CMS source.

CMS K1-70 and Dr. Leclerq CMS also differ in restoring reaction. It is much easier to obtain Rf for CMS K1-70 than for the French source, but few pollen setting forms are easily emerging in this material.

Inheritance of the trait of few pollen setting is complex and still not quite clear. Utilization of few pollen setting forms as female parents considerably reduces the amount of sterile plants (to 15-20%) in the following season.

At present sterile counterparts of the best samples with marker traits and inbred lines are being developed. Researchers see to it that sterile counterparts possess a complex of important economic traits, mainly low husk percentage (about 20-25%). To obtain two generations a year we utilize greenhouses.

The nature of fertility restorers for Leclerq CMS and CMS K1-70 is not clear. To study the genetic nature of Rf we made backcrosses with samples of subsp. *lenticularis* var. *lenticularis* in 1974. Analysis of segregation in F₂ will help solve this problem.