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SELECTION TO OBTAIN QUICKLY-RIPENING SUNFLOWER (HELIANTHUS ANNUUS L.) IN THE TAMBOV REGION

The Tambov region lies along the northern border of sunflower cultivation in the European part of the Soviet Union. There is a comparatively short warm period here and autumn colds set in rather early and are often accompanied by rains. In these climatic conditions the cultivation of middle-ripening sunflower varieties of the Peredovik type proved ineffective. As a rule, their ripening occurs in nasty weather, which makes harvesting difficult, causes crop losses and leads to the deterioration of the quality of marketable produce.

The Tambov regional agricultural experimental station therefore focusses its attention on producing varieties with a shorter vegetation period. The selection to obtain early varieties is based on the theoretical propositions advanced by Academician V. S. Pustovoit concerning the sunflower's populative nature, and on his methods of periodic selection coupled with a directed repollination of best progenies of elite plants.

As the basic initial material for selecting early biotypes we use complex intervarietal populations. They are made up of the best varieties differing in their ecological and genetic origins and whose combination potentialities have been tested beforehand. As compared to varieties such populations have a richer genetic fund and broader form-shaping possibilities. Each intervarietal population is worked on during a long time and is being continuously improved through an annual vegetative selection and a mass selection of the best biotypes within the framework of their components.

Our work has shown that in the case of a middle-ripening population it suffices to carry out

a one- or two-fold selection to obtain an early sunflower form; in the case of a quickly ripening population a two- or three-fold selection is required and in the case of an ultra-quickly ripening a four- or five-fold selection. Considerable importance attaches to the pollination regime. The rate of selection to obtain quickly-ripening varieties becomes much faster when selection is carried against the background of a compulsory re-pollination of quickly-ripening plants. According to our data, under the four-fold selection the vegetation period reduced by 26 days when free pollination was used, by 33 days when a one time compulsory pollination was used and by 41 day in the case of a two-fold compulsory pollination.

There is however a high positive correlation between the length of the vegetation period and the productivity: shorter periods of sunflower ripening are unavoidably accompanied by decreased harvest and the worse quality of seeds. The selection to obtain quickly-ripening varieties is therefore paralleled by continuous mass and individual selections with an eye to the basic productivity elements. This considerably complicates the overall work and slows down the rate of selection of quickly-ripening varieties.

The use of intervarietal populations enabled us to radically improve the selection material. A comparison of the best competitive testing numbers in the initial and the last periods of our work (1956-59 and 1972-75) has shown that the vegetation period became shorter by 16 days and overall productivity went up. The seeds' oil content grew by 8.4%, their yield by 1.9 centners per hectare and oil yield by 220 kg per hectare (Table 1).

The selection work helped obtain the early-ripening varieties Chakinsky 269 and Chakinsky 321. They ripen 10 days earlier than Peredovik and in the Tombov region are not inferior to it by yield and seeds quality, while proving superior to it in cold years with a drawn-out vegetation period (Table 2).

Table 1

Effectivity of Sunflower Selection by the Method of Intervarietal Populations

Period	Best numbers of competitive testing				
	vegetation period, days	seed huskness, %	seed oil content, %	seed yield, c/h	oil yield, kg/h
1956-59	115	27.1	43.8	19.6	77.8
1972-75	99	20.0	52.2	21.5	99.8
Deviation	-16	-7.1	+8.4	+9.1	+220

Table 2

Characterization of Early-Ripening Sunflower Varieties as Compared to the Peredovik Middle Variety (Tambov Experimental Station, competitive testing 1973-75)

Variety	Vegetation period, days	Seed huskness, %	Seed oil content, %	Seed yield, c/h	Oil yield, kg/h
Peredovik	110	20.4	51.0	22.1	998
Chakinsky 269	100	18.4	52.3	21.8	1,008
Chakinsky 321	100	17.7	53.8	23.9	1,140

Chakinsky 269 was produced on the basis of an intervarietal population comprising seven samples selected by the All-Union Research Institute for Oil Crops, which samples were kindly offered us by Academician V. S. Pustovoit, and also the Yugovostochny and Yenisei varieties. In 1966 Chakinsky 269 was zoned in the Tambov region and in the subsequent years it was zoned in the Lipetsk and East-Kazakhstan regions. It was also tested in several West European countries.

In the Tambov region Chakinsky 269 is sown on 100,000 hectares and accounts for practically all area under sunflower. After collective and state farms switched to cultivating this variety the sunflower yields grew by 2.3 centners per hectare in the region on average and seed-growing markedly improved.

Chakinsky 321 was passed to the state testing in 1975. It was produced on the basis of the intervarietal population including Chakinsky 269, Kubanets, Armavirets and Voronezhsky 64. It has a longer vegetation period than the Chakinsky 269 but surpasses the latter by the yield and seeds' oil content.

It is to be noted that in Tambov region even early varieties that are no doubt superior to the late ones do not yet fully meet production requirements. In moist years when the plants have a long period of vegetation the early varieties have a high dampness of seeds (17-20%), owing to which seeds are quickly spoilt during storing and their sowing and economic qualities deteriorate. Along with selecting varieties the experimental station therefore works to create quickly-ripening varieties reaching picking maturity at the end of August and beginning of September.

In 1971 the Tambovsky quickly-ripening variety was passed on to state testing. It was obtained from the intervarietal population made up of the middle varieties Armavirsky 3497, Zelenka 368 and VNIIMK 8931. The variety ripens 10 to 13 days earlier than Chakinsky 239 but yields 150-200 kg less oil per hectare. Yet

these differences, revealed during strain testing, are largely compensated by the Tambovsky's earlier harvesting, which helps protect the crops from spoilage and losses.

In 1972 the Tambovsky early variety was widely tested on the farms of our region. Where it was harvested in due time it recorded even higher yields than Chakinsky 269. Many farms rightly saw its superior qualities and go on growing it though it has not yet been zoned. In 1975 it was sown on more than 4,000 hectares.

The Tambovsky early variety is superior to the early dwarfs in its height, which makes it easily amenable to today's combine harvesting.

The variety continues to be improved, but even with its present-day productivity it presents a certain practical interest.

In our opinion, varieties of the Tambovsky early-ripening type can be equally successfully cultivated in the northern regions where they will serve as a guarantee of high-quality marketable produce, and in the sourthern regions as a predecessor of winter crops or as an afterreap crop. According to the Crimea agricultural institute the Tambovsky early variety sown as an afterreap crop in 1975 yielded 23.9 centners per hectare under irrigation. It was sown on June 22 and ripened in 71 days. We receive requests for the seeds of this variety from the Crimean region too.

At present the station has a great amount of the initial material on early sunflower. Some numbers are not inferior even to Chakinsky 269 in their cropping capacity and, what is most important, are near it in their huskness and the seeds' oil percentage.

Our selection work to produce early varieties has shown that complex intervarietal population may serve as the basis not only for early varieties, but even for ultra-early ones, which, moreover, boast high yields and seeds' quality. For the northern zone the production

of quickly and ultra-quickly ripening varieties is a vital necessity. Their cultivation will make it possible to harvest sunflower under more favourable weather conditions and will guarantee a high-quality marketable produce.

VNIIMK scientists have rendered us a constant and all-round assistance in sunflower selection. So, taking advantage of this opportunity, we want to express our profound, heartfelt gratitude to them.