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THE SEED PRODUCTION SYSTEM AND METHODS OF GROWING SEED SUNFLOWER IN THE USSR

In 1960 this country adopted the new system of sunflower seed product which assigned researched institutes with growing elite seeds and made seed section of collective and state farms responsible for the production of first batch seeds in necessary quantities for sowing on commercial fields and filling in insurance funds.

As an originator of sunflower varieties which annually occupy 95-96% of areas under this crop in the country, the VNIIMK grows elite and superelite seeds to supply research institutions of all territories and regions with 32 kg of elite seeds and 5-6 centners of superlite seeds per each 10,000 hectares.

Elite seeds are produced at 60 research institutions in this country (of which 27 are in the RSFSR, 20- in the Ukraine and 13 in other union republics) in quantities meeting the requirements of variety renovation and change on collective and state farms. The system has substantially improved sunflower seed production which is one of the basic factors of assuring higher yields. These years have seen a massive use of the best regionalized varieties in production; variety renovation and change have been regularly effected and seed quality considerably improved. Collective and state farms cultivate the more productive, sunflower varieties (Table 1).

Many of these varieties were first regionalized 15-20 and more years age, but owing to their improvement in the process of seed production according to the methods elaborated by Academician V.S. Pustovoit, they remain the best, most productive varieties even now and

Table 1

Description of Most Widespread Sunflower Varieties in the USSR (VNIIMK, 1973-1975)

Variety	Year of regionalization	Acreage in 1975 (000 ha)	Vegitation period from seedlings to maturing (days)	Seed yield (c/ha)	Oil content of dry seeds (%)	Oil yield (c/ha)
VNIIMK 1646	1938	205.3	100	31.8	51.6	14.8
VNIIMK 6540	1950	524.4	98	31.4	52.7	14.9
Armavirsky 3497	1953	1167.2	100	30.4	51.1	14.0
Peredovik	1960	1147.3	99	31.4	53.2	15.0
VNIIMK 8883	1955	575.7	91	31.4	50.6	14.3
Salyut	1971	166.6	87	26.2	49.3	11.7

occupy over 4 million hectares in this country and over 1 million abroad.

The improvement of regionalized varieties in the primary seed production links and their massive introduction into production by means of annual variety renovation effected in the Krasnodar Territory the homeland of high oil sunflower have led since 1950 to a considerable increase in the oil content of commercial raw material and in the oil production of factories (Table 2).

Table 2

Oil Content of Commercial Sunflower Seed and Oil Production at Krasnodar Oil Factories (%)

Indicators	1950	1960	1970	1975
Oil content of commercial seed	32.0	41.7	46.8	48.2
Oil production	30.9	40.3	45.6	47.0

Such improvement have been made all over the USSR. The oil content of commercial seeds has increased from 35% to 47% or by 12% in absolute and 34% in relative figures over 18 years thanks to the introduction of the best regionalized varieties and annual variety renovation.

It is important to note that improved sunflower seed growing has produced an effect which is not always possible under heterosis breeding. What is more, productivity rose on millions of hectares under improved sunflower varieties.

The quality of sown seeds is of signal importance for high sunflower yields, together with a selection of the best possible variety to be sown and the annual variety renovation. In the course of VNIIMK's work on experimental fields over a number of years and the experiments staged by collective and state farms it has been

established that sunflower sowing with first-grade seeds increases yields by 1.5-3.0 c/ha on average than is the case when third-grade seeds are sown. Academician V.S. Pustovoit has elaborated highly efficient methods to obtain high grade seed material, which are compartitively cheap and make it possible for collective and state farms to grow annually high yield quality seeds of their own. The methods are as follows.

Seeds are placed after best precursors in crop rotation fields where sunflower has not been grown for 8-10 years, the space isolation between different varieties being up to one kilometre. Harvesting of cereals is followed by stubble scuffling, application of high dosages of mineral fertilizer and fall ploughing at the depth of 25-30 cm in the optimal periods of time.

Experiments made in various zones of the country showed that mineral fertilization before ploughing increased elite sunflower yield by 2-4 c/ha. Seeds grown on fertilized backgrounds have more crude protein (by 1-1.5%) and more nitrogen and phosphorus (by 14-23%) than seeds grown without fertilization. Seeds like these give 1.5-3.0 c/ha more yield in progeny.

Application of mineral fertilizers to seed sunflower is very profitable. The net income from seed yield addition in the progeny amounts to 80-100 roubles per 1 rouble of fertilizer cost.

To grow large healthy seeds the density of plant stand on seed growing acreage should be 50% that on commercial acreage, or 15-20,000 plants per hectare. For this reason, sowing should be square nest with 2-3 seeds placed in each nest. During thinning effected in the phase of 3-4 pairs of real leaves one best plant should be left in a nest. Thanks to the increase of the nutrition area, plants form plump seeds the mass of 1000 seeds being 80-90 grams and more and the output of sowing fractions after sorting and grading totalling 70%.

Thorough thinning is made to maintain regionalized varieties in order. The first thinning is made before flowering to remove ramilyfying, strapping and diseased plants. The second thinning before approbation or just before harvesting removes plants affected by broom rape, sclerotinia and other diseases.

Germinating power and germination of seeds are known to be the basic indicators of seed's sowing properties determining field germination, viability and eventually crop density and yield. To grow seeds with high germination and germinating power crops should be harvested separately. According to the VNIIMK, harvesting should start 36-40 days after full flowering. After the back of sunflower heads becomes yellow they are cut by sickle and threaded slopely each to its respective stem at the height of 100-120 cm from the ground.

Threshing is made by harvester-combines equipped with the 34-103 device. To decrease losses 640 mm lifters are used and besides, screens are put lower and the cutter is removed.

To decrease seed crushing the rotation velocity of the thresher's drum is lowered to 300 r/min, the concave is lowered down to the end and threshing is made in the first half of the day. According to the VNIIMK, when threshing is made in the first half of the day hulled seeds account for 4-5% whereas in the second half of the day, when seed humidity decreases by 1.5-2%, the quantity of hulled seeds doubles to 10%. Heap when passing over the shackers of a thresher is purified by seed purifying machines and then seeds are sorted out and graded by size.

High oil variety seeds should be kept in sacks at the stack height of 1.5-2 m. Storing in heaps, especially if humidity is over 7%, decreases seeds' germination and germinating power.

Using these simple methods many collective and state farms grow high grade seeds of their

own and receive high sunflower yields. In the Krasnodar Territory, where 350,000 hectares are annually under sunflower, the seed yield has reached 19.3 c/ha over the last five-year period (1970-1975), or 3.5 c/ha more than 10 years ago.

Separate Kuban regions have even higher yields. The Ust-Labinsky district has boasted the yield of 23.3 c/ha on average over 10 years.

Ukrainian collective and state farms also receive high seeds yields, sunflower crops occupying 1.7 million hectares there.

In 1975 the seed oil-content reached a record level, namely 52-53% in big consignments brought to oil factories, 56-58% on variety testing plots and 59-60% in the case of certain varieties.

These achievements have largely come about as a result of the existing system of sunflower seed growing in this country.