

LOW TEMPERATURE STORAGE OF SUNFLOWER POLLEN

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In the fall of 1964, sunflower pollen was subjected to a temperature of -45° C. for several days and then used for pollinating half a sunflower blossom. It was noticed that the stigmas withered more rapidly on the pollinated part of the blossom and later had produced considerably more seed than the selfed side.

Several grams of pollen were collected from sunflowers in the greenhouse. It was thoroughly mixed and divided to be subjected to various pre-treatments prior to storage at temperatures of 0° C. to -45° C.

A suitable medium for germinating sunflower pollen was determined to evaluate the viability of the pollen after certain intervals of storage. It consisted of:

500 ppm $\text{Ca}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}$
200 ppm $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$
100 ppm H_3BO_3
100 ppm KNO_3
15% sucrose

Pollen germination was obtained at all temperatures after 6 months storage. No pre-treatment prior to storage was required. After storage for 1 year, there was a significant reduction in germination under storage temperatures above -20° C. After $1\frac{1}{2}$ years of storage, the only evidence of pollen germination was obtained at -30° C. and -40° C.

However, in pollinating half-blossoms of sunflowers, it appears that pollen that was stored at temperatures below -10° C. for $1\frac{1}{2}$ years is still viable. Further tests are continuing but it appears that sunflower pollen can be quite easily stored in closed vials at temperatures well below freezing.

DISCUSSION

Heiser: Did you store directly without dehydration?

Pawlowski: Yes, without dehydration. We have freeze drying and vacuum drying equipment tied into the study, but it works well just by simple collection in the greenhouse, putting it in a vial and freezing. I am not reporting on the other studies now.

Sackston: Do you use any moist chamber?

Pawlowski: It is kept in humid conditions for about three or four days.

Heiser: Do you use sealing wax?

Pawlowski: No sealing wax was used.

DISTANT (INTERSPECIFIC) HYBRIDIZATION
OF SUNFLOWERS IN THE U.S.S.R.

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(Translation edited and retranslated in part by W. E. Sackston)

Many biologists and plant breeders have worked on interspecific hybridization in the genus Helianthus in the USSR and abroad.

Studies on this problem were begun seventy years ago. In 1896 Cowell crossed H. decapetalus L. with H. petiolaris Nutt. Theilung in 1913 and Suiton in 1914 reported obtaining hybrids of H. annuus L. x H. rigidus Desf. In 1916 T. D. Cockerell crossed H. annuus L. with H. decapetalus and H. tuberosus L. and obtained "false hybrids". In 1932 S. Wagner obtained hybrids by crossing H. cucumerifolius T. et G. with various perennial sunflower species.

Interspecific hybridization in the USSR was practised by F. A. Saziperov, and E. M. Platchek, F. A. Saziperov crossed H. annuus L. with H. argophyllus T. et G. The objective of all these experiments was to investigate interspecific hybridization from the genetical point of view.

Soviet investigators N. A. Schibrya, G. S. Shkrebtienco and I. I. Marchenko were already considering interspecific hybridization as one of the methods of practical plant breeding. They set the objectives of improving topinambur (H. tuberosus) by using sunflower, to increase the resistance of sunflowers to rust and broomrape (Orobanche cumana Wallr.), and to create a perennial sunflower producing tops (for forage), tubers, and seeds. Somewhat later I. I. Marchenko used the perennial tuberous species H. macrophyllus Willd. and H. subcanescens Gray in crosses to obtain annual sunflowers resistant to broomrape and rust.

In 1955 I. Georgieva-Todorova (Bulgaria) crossed the sunflower variety 3-18 with H. laetiflorus (Ed: H. lactiflorus in text) and H. rigidus in studies on the inheritance of agronomically valuable characters. The American workers Heiser (1945, 1947, 1951) and Long (1955, 1957, and 1959) have made interspecific crosses between wild species of the genus Helianthus on a rather large scale. Their work is taxonomic in nature.

At VNIIMK (USSR) work on interspecific hybridization of sunflower was begun by V. S. Pustovoit in 1935 with the aim of producing rust-resistant varieties. The annual form of Texas sunflower (H. lenticularis Dougl.) was crossed with VNIIMK varieties 3519, 1646, 6540, and 8931.

As a result of this relatively small scale work, hybrids were produced which in the variety trials were highly resistant to rust, and gave oil yields per hectare equal to good "zoned" (Ed: "licenced" in Canadian terminology) sunflower varieties.