

SUNFLOWER (HELIANTHUS) GERMPLASM AND ITS UTILISATION IN BREEDING
AT THE RESEARCH INSTITUTE FOR CEREALS AND TECHNICAL PLANTS
FUNDULEA - ROMANIA

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Abstract:

VRINCEANU A.V., IUORAS M., 1985 Sunflower (*Helianthus*) germplasm and its utilisation in breeding at the Research Institute for Cereals and Technical Plants Fundulea-Romania, Not. bot. hort. agrobot., Cluj, IV, 9-13.

Genetic manipulation of a large germplasm collection of sunflower (*Helianthus* L.) at the I.C.C.P.T. Fundulea, Romania resulted in a number of valuable new hybrid cultivars: (Romsun 59, Soren 82, Felix 206, Select, Super, Fundulea 206 etc.). Based on the study of the available germplasm, research is carried out at this institute responsible for sunflower breeding on international level, in order to transfer new valuable genes from wild species to cultivated varieties (e.g. from *H. agrophyllus* to *H. annuus*). As it is difficult to anticipate the future utilisation of different genetic resources, a possible comprehensive gene collection is intended to be put up. Results in detail are published in a special periodical - Helia - edited in collaboration at I.C.C.P.T. Fundulea.

Key words: *Helianthus*, germplasm collection, marker genes, linkage

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Sunflower (*Helianthus annuus* L.) became very popular in Europe as an ornamental during the 16th through 18th centuries. During mid 1800 s, the nutritional value of sunflower seed was recognized and Russian farmers started cultivating sunflower as a viable oilseed crop.

Commercial cultivation of sunflower in North America began in 1900 s. Today, the oilseed sunflower is cultivated on every continent. Sunflower occupies the second place in the world of oil crops. Along these last 40 years breeders raised the oil content in the seed from 28 % to 56 % and improved the agronomic characteristics of the plant, adapting it to the most various environmental and cropping conditions.

Modern sunflower breeding is particularly associated with the utilization of heterosis in the production of superior F_1 hybrids by cytoplasmic, male sterility and fertility restorer system (VRINCEANU and STOENESCU, 1979). The hybrids Fundulea 82, (Sora 82), Fundulea 59 (Romsun 59), Felix, Fundulea 206, Select and Super are superior in seed yield, oil content, plant uniformity and disease resistance (VRINCEANU et al., 1983).

According to HEISER (1969), the 68 sunflower species are classified into four sections without giving them a formal taxonomic recognition. This classification based on the hybridizing ability of the species, reflects the degree of their relationship and represents the most reasonable and realistic analysis of the Helianthus genus.

The wild Helianthus species collection of the Research Institute for Cereals and Technical Plants Fundulea Romania, comprises about 30 different species which are used in sunflower breeding program by hybridization (SKORIC, 1981). For example a research carried out at Fundulea in the 3 last years is intended to transfer the pilosity of H. argophyll T. and G. to the cultivated sunflower, considering that this character provides a higher resistance to drought and to Sclerotinia sclerotiorum (IURCAȘ and VOINESCU, 1984).

Wild Helianthus species proved to be an inexhaustible reservoir of very useful genes and cytoplasm for sunflower breeding. Valuable results have been obtained by using them in breeding for disease resistance, for discovering sterile cytoplasm, genes for pollen fertility restoration, for oil quality and for important agronomic characters.

It is difficult to anticipate the utilization of different genetic resources thus germplasm collections should be large enough. Sunflower germplasm collections at the Research Institute for Cereals and Technical Plants at Fundulea comprise: wild Helianthus species, varieties, populations, hybrids, inbred lines, marker genes and cytoplasmic male sterile types (Table 1).

Table 1

Sunflower (Helianthus) germplasm collections at the Research Institute for Cereals and Technical Plants - Fundulea-Romania

1. Wild species	- Annuals - perennials	- Diploids - tetraploids - hexaploids
2. Varieties, populations and hybrids	- Varieties populations, - synthetic varieties, - synthetic populations	- With normal cytoplasm, - with sterile cytoplasm
	- Single hybrids - three-way hybrids	
3. Inbreds	A.B.C.	
4. Gene collections	- Marker genes - double and treble recessive genotypes - inbreds with marked genetic male sterility	

Marker genes collection at Fundulea - Romania comprises 19 monogenic characters (IURCAȘ and STOENESCU, 1982) and other features which are polygenically determined. The relationships between marker genes were studied in a diallel cross. Based on the already known linkage groups, three new linkages have been revealed (Table 2). Double and treble recessive genotypes were isolated and the heredity of the ray flower colour in sunflower was studied (IURCAȘ and STOENESCU, 1982).

Rezumat

A. VRINCEANU, Monica IURCAȘ, 1985 Germoplasm la floarea soarelui (Helianthus L.) și utilizarea ei în ameliorarea la I.C.G.P.T. Fundulea-România (în engleză), Bot. bot. hort. abrotot., Cluj, IV, 9-13.

Manipularea genetică a unei colecții largi de germoplasm la floarea soarelui (Helianthus L.) a condus la crearea unui număr mare de hibrizi deosebit de productivi (Romsun 59, Sora 82, Felix 206, Select, Super, Fundulea 206 etc.). Bazat pe studiul colecției de germoplasm disponibilă în acest institut cu responsabilități internaționale în ameliorarea florii soarelui, se fac printre altele cercetări privind

Table 2

Sunflower (*Helianthus*) linkage groups

No.	Symbols	Genetic linked characters	% cross-overs	Author and year
1.	TMs ₁	Plant anthocyanin colour and genetic male sterility	1.3 ± 0.2	LECIERQ, 1966 STOENESCU and VRANCEANU, 1977
2.	yBr ₃ ^b	Leaves xantha colour of the top of the plant and total branching	11.6 ± 1.0 38.5 ± 5.1	HOKET and KNOWLES, 1970 IUORAŞ and STOENESCU, 1982
3.	LT	Yellow ligulate flowers and plant anthocyanin colour	10.0	KOVACIK and SCALLOUD, 1982
4.	L ₁ g	Lemon-white ligulate flowers	20.7 ± 6.9	IUORAŞ and STOENESCU, 1982
5.	y PG	Leaves xantha colour of the top of the plant and white pollen	38.2 ± 0.3	IUORAŞ and STOENESCU, 1983
6.	b PG	Total branching and white pollen	27.9 ± 0.5	IUORAŞ and STOENESCU, 1983

transferarea unor gene valoroase de la speciile sălbatice la soiuri cultivate (de ex. de la *H. argophyllus* la *H. annuus*). Întrucât posibilitățile utilizării diferitelor resurse în viitor sînt dificile de prevăzut este în curs de realizare a unei colecții cât mai complete de resurse genetice la *Helianthus*. Rezultatele în detaliu referitoare la această specie se publică într-o revistă de specialitate - *Helia* - editată în colaborare internațională la Fundulea.

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