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Short Communication

CONSERVATION AND UTILIZATION OF SUNFLOWER GERMPLASM

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Sunflower is broadly grouped into: (i) Open pollinated population/Hybrid derivatives, (ii) CMS lines, (iii) B lines/Maintainer lines, (iv) Restorer lines, (v) Inbred lines, (vi) Wild species and (vii) CMS sources. Much emphasis has been given for augmentation after the creation of National Bureau of Plant Genetic Resources in 1976, Project Coordinating Unit (Sunflower) in 1974 and onwards. Systematic work on conservation of genetic resources was initiated towards the end of 1983.

Conservation of genetic resources

Through concerted efforts, new germplasm materials have been introduced from different countries through NBPGR to augment genetic resources every year. Number of introductions made so far is presented in Table 1. The accessions are rejuvenated every year in the *kharif / rabi* seasons. A cold storage module has been commissioned recently in the project. Characterization and evaluation are carried out over the years for various qualitative and quantitative characters. Promising germplasm, was identified and listed in Table 2. The germplasm was also screened for rust and *Alternaria* at Bangalore and for downy mildew at Latur. A number of germplasm lines/open pollinated populations have been identified as resistant to rust and downy mildew in field (Table 3) as well as in laboratory conditions. Only field resistant types have been identified and presented in Table 3. A catalogue containing characterization and evaluation data of germplasm has been developed. Twenty four accessions of sunflower were subjected to moisture stress at early vegetative phase (40-71 days after sowing) and at late vegetative/early reproductive phase (58-93 days after sowing). Drought Susceptibility Index (DSI) was computed for each genotype. Based on DSI values both for seed yield and Total Dry

Table 1 : Status of germplasm conserved

Germplasm type	No. of accessions
Open pollinated population/hybrid derivatives	1352
CMS lines	41
B lines	54
Restorer lines	48
Inbred lines	225
Wild species	157
CMS sources	3
Total	**1880**

Table 2 : Promising accessions of sunflower

	No. of Accessions	Value
Earliness (Days to flower)	Co-1.SS-56, Morden A.No. 1541, 1532, M-787-6-2, 1398, M-78-6-1, 1408, 1440	46 to 50
Seed Yield (g/plant)	EC 153103, EC153107 EC 153099, EC153114 EC 153116, EC 143113 EC 153112, EC 50227 EC 89093-2, EC68414 EC 68415, No. 88 No. 179, No. 61 A.No. 1464, 1366, 1460, 1385, 1461, 1402	33 to 51
Oil Content (%)	EC 165743, 87-2R EC 162269, RLC-4-2 EC165745, RLC-4-5 No. 60, BLC-10-4 EC 161261, BLC-15-6 EC 68415 SG 502 SG 581	40 to 47
Biological yield (g/plant)	EC 153096, EC 153113 EC 153099, EC 153114 EC 153103, EC 153115 EC 153111, EC 163813	123 to 178
Plant height (cm)	No. 414 (Bekecs) HA 291 A. No. 1478, M 787-9-2	60 to 70

Matter (TDM) EC 68414 was considered to be drought tolerant under early as well as late stress conditions followed by EC 68415 and MSFH-17. Susceptible CMS lines (253A, 62A and 350A) and tolerant CMS (339A, 352A and 351A) lines were used in developing drought tolerant hybrid by using the good restorer lines (RHA 298, 265, 6D-1, 274 and 855).

Table 3: Genotypes resistant to different diseases

	Disease	Genotypes
1.	*Alternaria* leaf spot (moderately resistant)	Acc. No. 714, 35, 43, 147, 167, 179, 180, 194, 216, 251, 284, 315, 340, 351, 353, 358, 426, 430, 431
2.	*Rust* (highly resistant)	Acc. No. 661, 687, 708, 715, 765, 786, 792, 810, 928, 830, 832, 847, 889
3.	Combined resistance to rust and leaf spot	Acc. No. 786, 810, 847, 884, 889, 901, 1009, 1020, 1052, 1053, 1058, 1229, 1251
4.	*Downy Mildew* (resistant)	Acc. No. 241, 470, 526, 842, 846, 882, 888, 931, 1234, RHA 278, 334, 344, 345, 346, MRHA-1, MRHA-2

Utilization of genetic resources

Generating new Breeding materials/gene pools

Based on the evaluation results, promising germplasm lines were used to generate material for breeding. Two gene pools - B and R lines were generated using promising maintainer and restorer lines, respectively. These include lines with high oil content, high self fertility and resistance to diseases. The genotypes have been supplied to breeders for developing superior parental lines to be used in heterosis breeding. A gene pool was also constituted to be used as the maintainer source. This gene pool comprised lines with high adaptability, yield, resistance and high oil content.

Development of inbred lines

Inbreeding work is in progress to develop inbred lines using the base population - B line gene pool, R line gene pool, EC 68414, EC 68415 and Morden. Based on the quantitative data, the promising progenies were advanced by selfing. The lines are in F_5 generation.

Diversification of CMS source

At present, only one CMS source (derived from *Helianthus petiolaris*) is being used in the hybrid development programme world over. Research work on diversification of CMS sources have been initiated. Two new CMS sources - CMS PF (*H. petiolaris Fallex*) and CMS I (*H. lenticularis*) are being used in

this programme. Maintainer and Restorer lines have been identified for these sources. The promising maintainer lines have been back-crossed to develop lines in the new CMS background for their use in hybrid development programme in future.

Germplasm supply and accomplishments

Priority has been laid to supply germplasm material to various scientists in the country. Nearly 4000 seed samples of different accessions have been supplied to different indentors. By using germplasm lines supplied by this centre, a number of hybrids have been developed at different locations in the country. Some of the hybrids are released for cultivation. They are LDM-1, LDM-3. In addition, 1000 new hybrids are in testing stages, wherein 20-30 hybrids are significantly superior to the available commercial hybrids.

Future thrust

Priority has been laid in introduction of genetic resources with high oleic acid, high self-fertility and resistance to diseases like downy mildew and rust. Additional CMS and restorer lines, new source of cytoplasmic male sterility also need to be introduced. There is a great need for development of sunflower material with broad genetic base. Introgression of genes from wild species into the cultivated species has been contemplated. In this direction, use of wild species such as *H. argophyllus, H. petiolaris, H. praecox, H. debilis* and others hold promise.