

TWENTY YEARS OF SUNFLOWER (*HELIANTHUS ANNUUS* L.) RELEASES IN THE USA

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The past 20 years have been the "grand period" for sunflower research in the USA, and significant numbers of parental lines and germplasm lines have been released by research workers in the State Agricultural Experiment Stations and the United States Department of Agriculture.

The development and release of cmsHA 60 in 1968 by M.L. Kinman in Texas was the first in a long series of parental lines using the cytoplasmic male sterility developed in France by P. LeClercq, and incorporating high oil content derived from lines developed at VNIIMK in USSR. Fertility restoration in F₁ hybrids was a problem at this time, but intense selection for genes to restore fertility in crosses with the cytoplasmic male sterile lines led Kinman to release RHA 265 in Texas in 1971. A series of 15 additional restorer lines were released in Texas and North Dakota from 1971-1976, along with another 15 cytoplasmic male sterile lines and their fertile counterparts.

The chronological order listing below (within four categories) shows that over 90 parental lines and germplasms have been released in the past 20 years, plus almost 60 fertility restoring lines and populations. Personnel of the USDA were involved in development of all releases made in Texas, North Dakota, and California. These 160-plus releases have been extremely important to private seed companies in developing high oil sunflower hybrids for production in the USA and other parts of the world where hybrid sunflower is widely grown. The nonoil parental lines and germplasm releases have been equally important to that industry. High oil open-pollinated cultivars (such as Peredovik from USSR) were grown on a limited scale in the USA for a short time after initial introduction, but hybrids quickly replaced them in the mid-1970's. Consequently, breeders in the USA did not release any open-pollinated oilseed cultivars during 1968-88. The three nonoil open-pollinated cultivars listed are the only registered sunflower cultivars developed in the USA.

It is hoped that this compilation will be helpful to those seeking information on sunflower releases in the USA. The registration articles published in CROP SCIENCE give detailed information on methods used to develop the released lines, populations, and composites, plus parental material used in their development. An address is also provided where interested persons may write for seed.

In the listing of parental lines and germplasms, only the cytoplasmic male sterile line is listed. It is understood that the male fertile counterpart was also released to maintain the cytoplasmic male sterile line.

I. Parental Lines and Germplasms

Designation	Year/Where Released	Characteristics of line	CROP SCIENCE Registration Number and Reference
TAM-CRD P-21 ms	1968 Texas	Genetic male sterile; recessive gene	----
TAM-CRD HA 60	1968 Texas	Rust resistant	----
TAM-CRD HA 61	1968 Texas	Recessive branching	----
TAM-CRD P-21 VR1	1970 Texas	Genetic male sterile; recessive gene	----

TAM-CRD P-21 VR2	1970	Texas	Genetic male sterile; recessive gene	----
HA 64	1970	Texas	Genetic male sterile; recessive gene	----
cmsHA 60	1971	Texas	High oil, rust resistant	----
cmsHA 89	1971	Texas	High oil, rust resistant	----
cmsHA 99	1971	Texas	High oil, rust resistant	----
cmsHA 113	1971	Texas	High oil, rust resistant	----
cmsHA 124	1971	Texas	High oil, rust resistant	----
cmsHA 232	1971	Texas	High oil, rust resistant	----
cmsHA 234	1971	Texas	High oil, rust resistant	----
cmsHA 285	1974	Texas N. Dakota	Nonoil, rust resistant	PL-1 14:912. 1974.
cmsHA 286	1974	TX, ND	Nonoil, rust resistant	PL-2 14:912. 1974.
cmsHA 287	1974	TX, ND	Nonoil, rust resistant	PL-3 14:912. 1974.
cmsHA 288	1974	TX, ND	Nonoil, rust resistant	PL-4 14:912. 1974.
cmsHA 224	1975	TX, ND	High oil, disease resistant	----
cmsHA 277	1975	TX, ND	High oil, disease resistant	----
cmsHA 289	1975	TX, ND	High oil, disease resistant	----
cmsHA 290	1975	TX, ND	Disease resistant, early	PL-10 19:422. 1979.
cmsHA 291	1976	ND	High oil, short stature	PL-17 19:423. 1979.
cmsHA 292	1976	ND	Nonoil, rust resistant	PL-11 19:422. 1979.
cmsHA 300	1976	ND	High oil, midseason maturity	PL-18 19:423. 1979.
cmsHA 301	1976	ND	High oil, early maturity	PL-19 19:423. 1979.
cmsHA 302	1976	ND	High oil, early maturity	PL-20 19:423. 1979.
cmsHA 303	1976	ND	High oil, midseason maturity	PL-21 19:423. 1979.
cmsHA 304	1976	ND	Nonoil, rust resistant	PL-12 19:422. 1979.
cmsHA 305	1976	ND	Nonoil, rust resistant	PL-13 19:422. 1979.
ND 761	1976	ND	High oil, downy mildew res.	GP-1 19:421. 1979.
cmsHA 306	1980	ND	Nonoil, rust resistant	PL-26 21:638. 1981.
cmsHA 307	1980	ND	Nonoil, rust resistant	PL-27 21:638. 1981.
cmsHA 308	1980	ND	Nonoil, rust resistant	PL-28 21:638. 1981.
cmsHA 207	1981	TX	Charcoal rot resistant	PL-31 23:195. 1983.
Indiana-1 cms	1982	IN	cms source	GP-6 22:1089. 1982.
SFM 1	1983	ND	Moth resistant, oilseed type	GP-14 24:212. 1984.
SFM 2	1983	ND	Moth resistant, oilseed type	GP-15 24:212. 1984.
SFM 3	1983	ND	Moth resistant, oilseed type	GP-16 24:212. 1984.
cmsHA 821	1983	ND	Oilseed type germplasm	PL-41 26:217. 1986.
cmsHA 822	1983	ND	Oilseed type germplasm	PL-42 26:217. 1986.
HA 312	1984	ND	Nonoil, disease resistant	GP-17 25:718. 1985.
HA 313	1984	ND	Nonoil, disease resistant	GP-18 25:718. 1985.
HA 314	1984	ND	Nonoil, disease resistant	GP-19 25:718. 1985.
HA 315	1984	ND	Nonoil, disease resistant	GP-20 25:718. 1985.

DM-2	1984	ND	Race 3 downy mildew resistant	GP-21 25:718.	1985.
DM-3	1984	ND	Race 3 downy mildew resistant	GP-22 25:718.	1985.
DM-1	1984	ND	Race 3 downy mildew resistant	GP-23 25:719.	1985.
ND-01	1984	ND	High oleic synthetic	----	
HA-R1	1984	ND	Disease resistant oilseed type	GP-24 25:719.	1985.
HA-R2	1984	ND	Disease resistant oilseed type	GP-25 25:719.	1985.
HA-R3	1984	ND	High oil, disease resistant	GP-26 25:719.	1985.
HA-R4	1984	ND	Disease resistant oilseed type	GP-27 25:719.	1985.
HA-R5	1984	ND	Disease resistant oilseed type	GP-28 25:719.	1985.
cmsHA 316	1985	ND	Nonoil, rust resistant	GP-35 26:1264.	1986.
cmsHA 317	1985	ND	Nonoil, rust resistant	GP-36 26:1264.	1986.
cmsHA 318	1985	ND	Nonoil, rust resistant	GP-37 26:1264.	1986.
cmsHA 319	1985	ND	Nonoil, rust resistant	GP-38 26:1264.	1986.
cmsHA 320	1985	ND	Nonoil, rust resistant	GP-39 26:1264.	1986.
cmsHA 321	1985	ND	Nonoil, midge tolerant	GP-32 26:1091.	1986.
cmsHA 322	1985	ND	Nonoil, midge tolerant	GP-33 26:1091.	1986.
cmsHA 323	1985	ND	Nonoil, midge tolerant	GP-34 26:1091.	1986.
ND-NONOIL 1	1985	ND	Nonoil population	GP-51 26:1266.	1986.
ND-NONOIL 2	1985	ND	Nonoil population	GP-52 26:1266.	1986.
ND-NONOIL 3	1985	ND	Nonoil population	GP-53 26:1266.	1986.
ND-NONOIL B1	1985	ND	Nonoil population	GP-54 26:1266.	1986.
ND-NONOIL B2	1985	ND	Nonoil population	GP-55 26:1266.	1986.
ND-NONOIL B3	1985	ND	Nonoil population	GP-56 26:1266.	1986.
ND-NONOIL B4	1985	ND	Nonoil population	GP-57 26:1266.	1986.
ND-NONOIL B5	1985	ND	Nonoil population	GP-58 26:1266.	1986.
cmsHA 850	1985	ND	Oilseed germplasm	PL-43 27:825.	1987.
cmsHA 851	1985	ND	Oilseed germplasm	PL-44 27:825.	1987.
cmsHA 852	1985	ND	Oilseed germplasm	PL-45 27:825.	1987.
cmsHA 853	1985	ND	Oilseed germplasm	PL-46 27:825.	1987.
ND-NONOIL M1	1985	ND	Nonoil, midge tolerant bulk	GP-29 26:1091.	1986.
ND-NONOIL M2	1985	ND	Nonoil, midge tolerant bulk	GP-30 26:1091.	1986.
ND-NONOIL M3	1985	ND	Nonoil, midge tolerant bulk	GP-31 26:1091.	1986.
cmsHA 335	1986	ND	Res. to race 4 downy mildew, and rust races 1 and 3		In press
cmsHA 336	1986	ND	Res. to race 4 downy mildew, and rust races 1 and 3		In press
cmsHA 337	1986	ND	Res. to race 4 downy mildew, and rust races 1 and 3		In press
cmsHA 338	1986	ND	Res. to race 4 downy mildew, and rust races 1 and 3		In press
cmsHA 339	1986	ND	Res. to race 4 downy mildew, and rust races 1 and 3		In press
cmsHA 340	1986	ND	Res. to race 4 downy mildew, and rust races 1 and 3		In press

ND-MTC	1986	ND	Midge tolerant germplasm composite	----
cmsHA 341	1986	ND	High oleic oilseed line	GP-67 27:1323. 1987.
cmsHA 342	1986	ND	High oleic oilseed line	GP-68 27:1323. 1987.
cmsHA 343	1986	ND	High oleic oilseed line	GP-69 27:1323. 1987.
cmsHA 349	1986	ND	High oleic, nonoilseed line	GP-75 27:1323. 1987.
cmsHA 350	1986	ND	High oleic, nonoilseed line	GP-76 27:1323. 1987.
cmsHA 351	1986	ND	High oleic, nonoilseed line	GP-77 27:1323. 1987.
cmsHA 352	1986	ND	High oleic, nonoilseed line	GP-78 27:1323. 1987.
cmsHA 353	1986	ND	High oleic, nonoilseed line	GP-79 27:1323. 1987.
ND-02	1986	ND	High oleic oilseed bulk population	GP-82 27:1323. 1987.
ND-EBLYS	1986	ND	Early B-line synthetic population	GP-63 27:616. 1987.
ND-LBLYS	1986	ND	Late B-line synthetic population	GP-64 27:616. 1987.
ND-ERLYS	1986	ND	Early restorer synthetic population	GP-65 27:616. 1987.
ND-LRLYS	1986	ND	Late restorer synthetic population	GP-66 27:616. 1987.

II. Fertility Restoring Lines and Populations

RHA 265	1971	TX	High oil, rust resistant restorer	----
RHA 266	1971	TX	High oil, rust resistant restorer	----
RHA 271	1973	TX,ND	Recessive branching restorer	----
RHA 269	1975	TX,ND	Rust resistant restorer	----
RHA 270	1975	TX,ND	Rust resistant restorer	----
RHA 272	1975	TX	Recessive branching restorer with rust resistance	----
		ND		----
RHA 273	1974	TX	Recessive branching restorer with rust resistance	PL-7 15:106. 1975
RHA 274	1974	TX	Recessive branching restorer with rust resistance	PL-8 15:106. 1975
RHA 275	1975	TX	Recessive branching restorer with rust resistance	----
		ND		----
RHA 276	1975	TX	Recessive branching restorer with rust resistance	----
		ND		----
RHA 278	1975	TX	Recessive branching restorer with rust resistance	----
		ND		----
RHA 279	1975	TX	Recessive branching restorer with rust resistance	----
		ND		----
RHA 280	1974	TX	Nonoil restorer with rust resistance	PL-5 14:912. 1974.
		ND		
RHA 282	1974	TX	Nonoil restorer with rust resistance	PL-6 14:912. 1974.
		ND		
1972 RC	1975	TX,ND	High oil restorer composite	----

RHA 293	1976	ND	Nonoil restorer line	PL-14 19:422. 1979.
RHA 294	1976	ND	Nonoil restorer line	PL-15 19:422. 1979.
RHA 295	1976	ND	Nonoil restorer line	PL-16 19:422. 1979.
RHA 296	1976	ND	Oilseed restorer line	PL-22 19:423. 1979.
RHA 297	1976	ND	Oilseed restorer line	PL-23 19:423. 1979.
RHA 298	1976	ND	Oilseed restorer line	PL-24 19:423. 1979.
RHA 299	1976	ND	Oilseed restorer line	PL-25 19:423. 1979.
RHA 801	1980	ND	Oilseed restorer line	GP-5 21:479. 1981.
RHA 309	1982	ND	Nonoil restorer line with recessive branching	GP-11 23:602. 1983.
RHA 310	1982	ND	Nonoil restorer line with recessive branching	GP-12 23:602. 1983.
RHA 311	1982	ND	Nonoil restorer line with recessive branching	GP-13 23:602. 1983.
RHA 324	1985	ND	Nonoil restorer line	GP-40 26:1265. 1986.
RHA 325	1985	ND	Nonoil restorer line	GP-41 26:1265. 1986.
RHA 326	1985	ND	Nonoil restorer line	GP-42 26:1265. 1986.
RHA 327	1985	ND	Nonoil restorer line	GP-43 26:1265. 1986.
RHA 328	1985	ND	Nonoil restorer line	GP-44 26:1265. 1986.
RHA 329	1985	ND	Verticillium wilt resistant nonoil restorer	GP-45 26:1265. 1986.
RHA 330	1985	ND	Verticillium wilt resistant nonoil restorer line	GP-46 26:1265. 1986.
RHA 331	1985	ND	Verticillium wilt resistant nonoil restorer line	GP-47 26:1265. 1986.
RHA 332	1985	ND	Verticillium wilt resistant nonoil restorer line	GP-48 26:1265. 1986.
RHA 333	1985	ND	Verticillium wilt resistant nonoil restorer line	GP-49 26:1265. 1986.
RHA 334	1985	ND	Verticillium wilt resistant nonoil restorer line	GP-50 26:1265. 1986.
RHA 854	1985	ND	High oil restorer line	PL-47 27:825. 1987.
RHA 855	1985	ND	High oil restorer line	PL-48 27:825. 1987.
RHA 856	1985	ND	High oil restorer line	PL-49 27:825. 1987.
RHA 857	1985	ND	High oil restorer line	PL-50 27:825. 1987.
RHA 858	1985	ND	High oil restorer line	PL-51 27:825. 1987.
RHA 859	1985	ND	High oil restorer line	PL-52 27:825. 1987.
SDHAR1-H084	1985	SD	High oil restorer population	GP-62 27:615. 1987.
RHA 344	1986	ND	High oleic oilseed restorer	GP-70 27:1323. 1987.
RHA 345	1986	ND	High oleic oilseed restorer	GP-71 27:1323. 1987.
RHA 346	1986	ND	High oleic oilseed restorer	GP-72 27:1323. 1987.
RHA 347	1986	ND	High oleic oilseed restorer	GP-73 27:1323. 1987.
RHA 348	1986	ND	High oleic oilseed restorer	GP-74 27:1323. 1987.
RHA 354	1986	ND	High oleic nonoil restorer	GP-80 27:1323. 1987.
RHA 355	1986	ND	High oleic nonoil restorer	GP-81 27:1323. 1987.

III. Germplasm Pools

Helianthus

Germplasm Pool I 1981 CA Genetic variability GP-7 22:1276. 1982.

Helianthus

Germplasm Pool II 1981 CA Genetic variability GP-8 22:1276. 1982.

Helianthus

Germplasm Pool III 1981 CA Genetic variability GP-9 22:1276. 1982.

Helianthus

Germplasm Pool IV 1981 CA Genetic variability GP-10 22:1276. 1982.

Helianthus

Germplasm Pool V-1 1982 CA Genetic variability ----

Helianthus

Germplasm Pool V-2 1982 CA Genetic variability ----

Helianthus

Germplasm Pool VI 1982 CA Genetic variability ----

Helianthus

Germplasm Pool VII 1983 CA Genetic variability ----

ND-BLPL2 1985 ND High oil, downy mildew resistant GP-59 27:373. 1987.

ND-BLOS 1985 ND High oil, downy mildew resistant GP-60 27:373. 1987.

ND-RLOS 1985 ND High oil, downy mildew resistant GP-61 27:373. 1987.

PM1 1987 ND Powdery mildew resistant In press

IV. Cultivars

Arrowhead	1954	MN	Open-pollinated; nonoil	Reg. No. 1	7:404. 1967.
Mingren	1954	MN	Open-pollinated; nonoil	Reg. No. 2	7:404. 1967.
Sundak	1954	ND	Open-pollinated; nonoil	Reg. No. 3	13:584. 1973.