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A List of Germplasm Releases from the University of Wisconsin Table Beet Breeding Program, 1964–1992

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The table beet (*Beta vulgaris* L.) breeding program at the Univ. of Wisconsin–Madison, initiated by W.H. Gabelman in 1949, was geared toward assessing the feasibility of F_1 hybrids. This attempt required an understanding of pollen sterility, inbreeding potential, and seed production characteristics. The primary breeding objectives of the beet program focused on sterile and maintainer lines for the production of hybrids, disease resistance, round to globe-shaped roots, improved color and sweetness, multigerm and monogerm seed, and enhancement of combining ability. Hybrids and inbred lines were released by Gabelman in cooperation with the Wisconsin State Agricultural Experiment Station during 1964–92.

Gabelman took advantage of useful genes found in sugar beet (also *Beta vulgaris* L.) in improving table beet germplasm. The *sf* allele, which conditions self-fertility, was introduced from a sugar beet breeding line obtained from V.F. and H. Savitsky, emigres from Russia working with F.V. Owen, U.S. Dept. of Agriculture–Agricultural Research Service, Fort Collins, Colo. The *sf* allele allowed for inbreeding individual plants, a technique that was not previously possible in beet because of its self-incompatibility. Inbreeding enabled the development of more homogenous populations and ultimately resulted in uniform inbred lines. Similarly, the *x* and *z* alleles, conditioning sterility at the nuclear restorer locus (in homozygous recessive condition), were introduced from sugar beet breeding lines obtained from F.V. Owen. These alleles, in combination with the sterile cytoplasm obtained from Owen, allowed for the development of pollen-sterile breeding lines and their maintainer lines. The *B* allele conditioning annual flowering habit also was obtained from sugar beet breeding material from V.F. Savitsky. The *B* allele allowed for efficient development of sterile inbred lines since spring-sown plants carrying *Bb* flower in Madison, Wis., by mid-August. A cross of the constitution *SxxsfsfBb* x *N__sf_bb* will give rise to 50% annual (*Bb*) progeny, which, because they are flowering, can be classified for sterility in the field. These annual sterile plants can then be decapitated, vernalized, and reflowered in winter in the greenhouse nursery, assuring continuous inbreeding of the sterile line with its maintainer line. The *m* allele, which conditions the monogerm character, also was introduced into table beet via sugar beet germplasm obtained from V.F. Savitsky. The monogerm character has improved the precision of plant spacing, since each seed ball contains one seed that gives rise to only one seedling. The original sugar beet x table beet crosses required ≈10 generations of selection before commercially acceptable round, red roots were recovered.

The inbred lines released from Gabelman's program have been used in the production of hybrid beet seed throughout the world. In particular, the widespread distribution of sterile inbred lines has facilitated the development of hybrid beet in many countries. Many of the inbred lines released by Gabelman also have proved an important source of genes for high-quality uniform beet roots for fresh market and processing.

Little description, other than that found in brief release notices, has been available for distribution to workers in the field of beet breeding and genetics. This report is an attempt to present a compilation of Gabelman's releases, including the year of release, line designation, salient features, and pedigree (Table 1). This report is one of a series that lists W.H. Gabelman's vegetable releases (Goldman, 1996a, 1996b).

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Table 1. Year of release, name or number, description, and pedigree of table beet germplasm released by W.H. Gabelman, 1964–92.

Year of release	Name or no.	Description[z]	Pedigree
1964	W187A[y], W187B[x]	Inbred, monogerm	W187B is an S_6-derived line from a cross of 'Perfected Detroit' and a source of the *m* allele from V.F. and H. Savitsky. W187A is a BC_3 derivative.
1964	W205	Inbred; excellent shape, smoothness, crown size, and color; combines well for quality characteristics with W187	S_4 derivative of a cross between'King Red' and an unnamed breeding line
1964	Pacemaker	F_1 hybrid; monogerm; excellent shape, smoothness, crown size, and color	W187 x W205
1967	W211A, W211B	Inbred, good pollen producer, good color, small crown	Derived from a cross of 'Perfected Detroit' and 'King Red' with breeding lines
1972	W218A, W218B	Inbred, red-anthered sterile, good seed producer, round smooth root, moderate resistance to cercospora	Derived from W162[w] and 'Red Pak'
1972	W260A, W260B	Inbred, brown-anthered sterile, round smooth root	Derived from W28[v] and W163[v]
1972	W279A, W279B	Inbred, monogerm and multigerm, moderate resistance to cercospora	Derived from 'Ruby Queen' and W187
1972	W300C[w]	Inbred, bolt resistant, round smooth root, good pollinator, moderate resistance to cercospora	Derived from 'Red Pak' and W163[v]
1983	Pacemaker 2	F_1 hybrid, excellent shape, smooth exterior, excellent eating quality	W218 x W279

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Table 1. Continued.

Year of release	Name or no.	Description[z]	Pedigree
1983	Pacemaker 3	F_1 hybrid, excellent shape, smooth exterior, excellent eating quality	W218 x W260
1983	Big Red	F_1 hybrid, uniform round shape with small crowns, excellent interior color, smooth exterior, excellent eating quality, resistant to cercospora	W357 x W364
1983	Pacesetter	F_1 hybrid, uniform round shape, excellent eating quality, moderate resistance to cercospora	W279 x W260
1983	W357A, W357B	Inbred, brown-anthered sterile, smooth, bright green leaves, roots round, uniform, small crowns, excellent color, exterior smooth, multigerm, resistant to cercospora	Derived from W303[v], W217[v], and W187
1983	W364A, W364B	Inbred, sterile anthers pink to brown, smooth and uniform root, multigerm	Derived from W32[v] and 'Red Pak'
1983	W371A, W371B	Inbred, red-anthered sterile, smooth and uniform, multigerm	Derived from 'Red Pak' and W218
1992	W411A, W411B	Inbred, monogerm, round roots, partially fasciated flower stalk, improved seed germination over W279	Derived from W279 multigerm and W279 monogerm
1992	W424A, W424B	Inbred, sterile anthers red to brown, cylindrical type, multigerm seed, reddish-green foliage	Derived from W416[v] and W395[v]
1992	W425A, W425B	Inbred, cylindrical type, multigerm	Derived from W416[v] and W330[v]

[z]Descriptions were compiled from field notebooks, release notices sent to agricultural experiment stations, and opinions of W.H. Gabelman. When color is mentioned, it refers to interior color. Cercospora is caused by the fungus *Cercospora beticola* Saccardo.
[y]Genotype of "A" line at *S, X,* and *Z* loci is *Sxxzz.*
[x]Genotype of "B" line at *S, X,* and *Z* loci is *Nxxzz.*
[w]Genotype of "C" line at *S, X,* and *Z* loci is *NXX_ _.*
[v]Inbred not released.