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A List of Germplasm Releases from the University of Wisconsin Onion Breeding Program, 1957–1993

I.L. Goldman[1]
Department of Horticulture, University of Wisconsin–Madison, 1575 Linden Drive, Madison, WI 53706

The onion (*Allium cepa* 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 hybrid onions. Many inbred lines and hybrids were released from the program over the past 39 years. Little description of these releases, other than that found in brief release notices, has been available for distribution to workers in the field of onion 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). I hope that this information will be of use to onion breeders, seedsmen, and geneticists who use this germplasm in their research and development efforts. This report is presented as one in a series of reports describing Gabelman's vegetable releases from the Univ. of Wisconsin (Goldman, 1996a, 1996b).

Early progress toward the development of F_1 hybrid onion cultivars required an understanding of male sterility, inbreeding potential, and seed production characteristics. The primary breeding objectives focused on disease resistance, storability, globe shape, improved color, scale thickness and retention, and combining ability. Gabelman's onion breeding program was heavily influenced by Henry Jones, director of the National Onion Breeding Program of the U.S. Dept. of Agriculture (USDA) in Beltsville, Md. Many of Gabelman's early releases contain germplasm developed by Jones.

The inbred lines and synthetic populations released from Gabelman's program have been used in the production of long-day onion hybrids throughout the world. Many of these inbreds have provided an important source of genes for disease resistance, storability, and scale quality in long-day onion hybrids. In particular, fusarium-resistant germplasm developed in this program paved the way for onion production in regions where this disease had resulted in severe yield loss.

The sterile lines developed by Gabelman incorporated the "S" cytoplasm first reported by Jones and Clarke from the USDA program (Jones and Clark, 1943). In addition to USDA germplasm resources, Gabelman relied heavily on three open-pollinated cultivars, 'Rochester Bronze' (a selection from 'Danvers Yellow Globe'), 'Subitch Yellow Globe', and 'Buckskin', for the derivation of early inbred lines. The cross 'Buckskin' x 'Rochester Bronze', obtained from Everett Horner of Waterford, Wis., was an important source of material during these early years.

The germplasm developed in Gabelman's program was typically released through the Univ. of Wisconsin and the Wisconsin State Agricultural Experiment Station. Inbred lines and hybrids developed before 1983 were released free of charge to the seed industry. Beginning in 1983, inbred lines were released to the seed industry on a royalty basis. Releases were permitted to be used free of charge in breeding programs, but if they served as parents of hybrids, a moderate royalty fee was charged. These fees are then returned to the Univ. of Wisconsin where they are used to support the continued development of the onion breeding program.

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[1]Assistant Professor of Horticulture.

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Table 1. Year of release, name or number, description, and pedigree of onion germplsm released by W.H. Gabelman, 1957–93.

Year of release	Name or no.	Description[z]	Pedigree
1957	W101A[y], W101B[x]	Inbred, moderately early maturity, firm, scales golden bronze and heavy, tendency to double	Derived from a Rochester Bronze bulb obtained from Everett Horner, Waterford, Wis. Parent bulb homozygous for *ms* self-pollinated in 1950; selfed progeny grown in 1951
1957	Golden Beauty	F_1 hybrid, high globe, well-rounded shoulders and base, medium-sized neck, scales golden yellow and soft	B2133 x B12132
1962	Nugget	F_1 hybrid, firm, high globe, scales copper	Iowa 736 x W101
1962	Hickory	F_1 hybrid, round with small neck, firm scales, good scale retention	Iowa 163 x W101
1964	W4A, W4B	Inbred, ozone (tipburn) resistant, single-centered, upright foliage, susceptible to pink root and fusarium	Derived from B15-108 and B2267
1964	Sunburst	F_1 hybrid, globe shape, ozone (tipburn) resistant, maturity similar to 'Epoch', yield similar to Trapp's strain of 'Downing's Yellow Globe', heavy scales	W4A x W101B
1966	W52C[w]	Inbred, round firm, carries male fertility restorer alleles (*MsMs*), good storage quality, ozone (tipburn) resistant, upright foliage	Derived from 'Subitch Yellow Globe' obtained from Peter Subitch of Waukesha, Wis.
1966	WD7C[v]	Inbred, susceptible to pink root and fusarium, general combining ability for yield	Derived from 'Brown Beauty'
1967	W202A, W202B	Inbred, fusarium resistant, susceptible to pink root	Derived from 'Rochester Bronze'
1967	W205A, W205B	Inbred, pink root resistant, moderate resistance to fusarium	Derived from inbred lines C72 and B2215

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Table 1. Continued.

Year of release	Name or no.	Description[z]	Pedigree
1967	W206C[v]	Inbred, pink root resistant, moderate resistance to fusarium	Pink-root-resistant selection from B2190
1967	W207C[v]	Inbred, pink root resistant, very resistant to fusarium	Derived from inbred lines B2264 and B2215
1972	W404A, W404B	Inbred, similar to W101 except with higher level of resistance to fusarium and browner scales	Sibling of W101 (a derivative of Rochester Bronze) obtained from Everett Horner, Waterford, Wis. Also called RBW101
1972	Fusario 12	F_1 hybrid, fusarium resistant	W101 x W202 or the reciprocal
1972	Fusario 24	F_1 hybrid, fusarium resistant	W202 x W404 or the reciprocal
1972	Fusario 245	F_1 hybrid, fusarium resistant	Fusario 24 x W205
1972	Fusario 142	F_1 hybrid, fusarium resistant	(W101 x W404) x W202
1983	W407A, W407B	Inbred, susceptible to pink root and fusarium, excellent seed parent and pollinator	Derived from the inbred lines W202 and W4
1983	W419A, W419B	Inbred, resistant to pink root and fusarium, some contorted seed stalks	Derived from the inbred lines W101 and W205
1983	W420A, W420B	Inbred, resistant to pink root and fusarium, some contorted seed stalks	Derived from the inbred line W404 and BRB (Buckskin Rochester Bronze)
1983	W426A, W426B	Inbred, susceptible to pink root and fusarium, excellent general combining ability	Derived from the inbred lines W202 and W205
1990	W417A, W417B	Inbred, resistant to pink root and fusarium	Derived from W4 and BRB
1990	W434A, W434B	Inbred, intermediate pink root resistance and high level of resistance to fusarium	Derived from a half-sib population composed of inbreds carrying resistance to several diseases
1990	W435A, W435B	Inbred, susceptible to pink root, very resistant to fusarium	Same ancestry as W434
1990	W438A, W438B	Inbred, moderate resistance to pink root, resistant to fusarium	Same ancestry as W434
1990	W439A, W439B	Inbred, pink root resistance and intermediate resistance to fusarium	Derived from the cross (BRB x W404) x Sapporo Ki
1990	W440A, W440B	Inbred, intermediate pink root resistance, high level of resistance to fusarium	Selected in 1984 from a synthetic population constructed in 1975 (designated OMI). OMI was synthesized from inbred lines with good seed production capability
1990	W441A, W441B	Inbred, intermediate pink root resistance, resistant to fusarium	Selected in 1984 from the synthetic OMI
1990	W445C[v]	Inbred, susceptible to pink root and fusarium	Derived from a 1984 selection from Sapporo Ki x W202
1990	W446A, W446B	Inbred, very resistant to pink root and fusarium	Early maturing derivative of OMI
1990	W447A, W447B	Inbred, very resistant to pink root and fusarium	Derivative of OMI
1990	W449C[v]	Inbred, intermediate pink root resistance, very resistant to fusarium	Derived from Sapporo Ki x (BRB x W404)
1993	W454A, W454B	Inbred, white rot resistance, intermediate tolerance to onion maggot, susceptible to pink root and fusarium	Derived from W404 and PI2646540
1993	W455A, W455B	Inbred, foliage blue-green, white rot resistant, intermediate tolerance to onion maggot, susceptible to pink root and fusarium	Derived from W404 and PI2646540
1993	W456A, W456B	Inbred, white rot resistant, tolerance to onion maggot, susceptible to pink root and fusarium	Derived from W404 and PI2646540
1993	W457A, W457B	Inbred, white rot resistant, intermediate tolerance to onion maggot, susceptible to pink root, intermediate tolerance to fusarium	Derived from W404 and PI2646540
1993	W458A, W458B	Inbred, white rot resistant, susceptible to pink root, intermediate tolerance to fusarium	Derived from PI2646540 and W404
1993	W459A, W459B	Inbred, white rot resistant, tolerance to onion maggot, susceptible to pink root, intermediate tolerance to fusarium	Derived from PI2646540 and W404
1993	W460A, W460B	Inbred, white rot resistant, susceptible to pink root and very resistant to fusarium	Derived from W404 and PI2646540
1993	W461A, W461B	Inbred, white rot resistant, good tolerance to onion maggot, moderate resistance to pink root, intermediate tolerance to fusarium	Derived from PI264650 and W202

[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 the dry outer scales. Pink root is caused by the fungus *Pyrenochaeta terrestris* (Hans.). White rot is caused by the fungus *Sclerotium cepivorum* Berk. Tipburn is a disorder caused by ozone-induced injury. The onion maggot is *Delia antiqua* Meig.

[y]Genotype of "A" line for cytoplasm and nuclear-restorer locus is *Smsms*.

[x]Genotype of "B" line for cytoplasm and nuclear-restorer locus is *Nmsms*.

[w]Genotype of "C" line for cytoplasm and nuclear-restorer locus is *NMSMS*.

[v]Genotype of "D" line for cytoplasm and nuclear-restorer locus is *SMSMS*.