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Registration of N30-N56, N741, N743, N745, N747, U362, U363, U367, U369-U374, U389-U394, U396-U398, and U500 Sweetclover Genetic Stocks

Kenneth P. Vogel
University of Nebraska-Lincoln, kvogel1@unl.edu

H. J. Gorz
University of Nebraska-Lincoln

F. A. Haskins
University of Nebraska-Lincoln, fhaskins@neb.rr.com

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Forty-nine white-flowered sweetclover (*Melilotus alba* Medik.) genetic stocks [N30-N45 (Reg. GS-1–16, PI 549120–549135); N46-N53 (Reg. GS-17–24, PI 557503–PI 557510); N54-N55 (Reg. GS-25–Reg. GS-26, PI 629289–PI 629290); N741, N743, N745, N747 (Reg. GS-27–GS-30, PI 557511–PI 557514); U362, U363, U367 (Reg. GS-31, Reg. GS-32, Reg. GS-33, PI 557515–PI 557517); U369-U374 (Reg. GS-34–GS 39, PI 557518–PI 557523); U389-U394 (Reg. GS-40–GS 45, PI 557524–PI 557529); U396-U398 (Reg. GS-46–GS 48, PI 557530–PI 557532); U500 (Reg. GS-49, PI 557533)] (Table 1); and N56 (Reg. no. GS-50, PI 634019), a yellow-flowered sweetclover [*Melilotus officinalis* (L.) Lam.] genetic stock, were developed jointly by USDA-ARS and the Agricultural Research Division, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln and were jointly released in May 2004. The genetic stocks, which contain unique combinations of genes and traits, were developed over more than three decades of cooperative sweetclover genetic research.

The 49 M. *alba* genetic stocks include a set of 16 lines, N30 through N45, which represent all possible homozygous combinations of four allelic pairs, *Y/y, C/c, Cu/cu*, and *B/b* (Table 1). The *Y/y* alleles affect seed color, and the *C/c* alleles are concerned with both seed and seedling color (Gorz et al., 1975). The *Cu/cu* and *B/b* genes affect coumarin (more accurately, o-hydroxycinnamic acid β-D-glucoside) content (Gorz and Haskins, 1969) and β-glucosidase activity (Haskins and Gorz, 1965), respectively. The development of these 16 lines involved both annual and biennial forms of *M. alba*, and the greenhouse conditions under which seed of these lines were produced did not permit distinguishing between these forms. Both forms may be present in these lines.

Lines N46 through N49, and N741, N743, N745, and N747, are two sets of four lines, each set representing all possible homozygous combinations of the *Cu/cu* (coumarin content) and *B/b* (β-glucosidase activity) alleles. N46 through N49 are annuals. They were derived from an initial cross of *cucubb* biennial plants × *CuCuBB* plants of PI 165554, a small, annual, autogamous introduction from India, followed by six successive backcrosses of *cucubb* segregates to the *CuCuBB* annual parent. N741, N743, N745, and N747 are biennial lines. They are F_{21} generation lines derived from an initial *cucuBB* × *CuCubb* cross followed by self-pollination of a single doubly heterozygous plant in each generation from F_1 to F_{17}. The four homozygous genotypes were isolated in F_{18}.

N50 through N53 are biennial lines representing all possible homozygous combinations of the *Y/y* and *C/c* allelic pairs. As indicated above, the *C/c* genes influence seedling color, and both *Y/y* and *C/c* affect seed color. These four lines are the F_6 generation from a single F_1 plant that was obtained from a cross of the N1 strain (*yyCC* genotype) × a line designated JF-1 (*YYcc* genotype). N54 and N55 are biennial lines that are homozygous for susceptibility and resistance, respectively, to stem canker (gooseneck) disease [caused by *Ascochyta caulicola* (Laub.)].

U389 is an annual line that was derived from a single plant of the introduction, PI 165554, mentioned above. All of the other U-numbered lines were developed following treatment of U389 seed with ethyl methanesulfonate. Although not always identified as such, U389 was the "wild-type" (+/+) line used in the referenced studies involving the lines that resulted from ethyl methanesulfonate treatment.

The normal parent (U389) and the chlorophyll-deficient mutants (U369, U371, U372, U373, U374, U396, U397, U398) were used by Markwell and coworkers (Bevins et al., 1993, 1992; Markwell and Chelgen, 1988; Markwell et al., 1986, 1985a, 1985b; Yang et al., 1990) and Nakitani and Baliga (1985) in their biochemical research. U389 also was used by Kneen and LaRue (1988) to create a series of non-nodulating mutants for studying the process of nitrogen fixation in legumes.

N56, a biennial strain of *M. officinalis*, was developed by crossing N27 (a large-seeded, high-coumarin, early-maturing *M. officinalis*) to N1 (a finestem, small-seeded, low-coumarin, late-maturing *M. alba*) with one backcross of finestem, low-coumarin F_2 segregates to N27 followed by a second backcross to N29 (a low-coumarin strain of *M. officinalis*). N56 combines finestem growth habit and low coumarin content of *M. alba* with the large-seeded trait and early maturity of *M. officinalis.*

Registration of these genetic stocks supplements three previously released and registered biennial, yellow-flowered, sweetclover germplasms, N27, N28, and N29 (Gorz et al., 1992a, 1992b). Seed of all lines has been deposited in the National Plant Germplasm System. Requests for any of the 49 *M*. alba lines and N56 *M*. officinalis should be to the National Plant Germplasm System (http://www.ars-grin.gov/npgs.orders.html; verified 9 March 2005). Seed should be scarified before planting. It is requested that appropriate recognition be made if these genetic stocks contribute to research or the development of a new breeding line or cultivar.

K.P. Vogel,* H.J. Gorz, and F.A. Haskins

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Table 1. Phenotypes and genotypes of 49 *Melilotus alba* genetic stocks.

Reg. no.	PI no.	Line no.	Phenotype				Genotype	Reference
			Seed color†	Seedling color	Coumarin	β-glucosidase activity		
GS-1	549120	N30	SG	green	low	low	*yycccucubb*	Gorz and Haskins, 1969; Gorz et al., 1975; Haskins and Gorz, 1965; Specht et al., 1976
GS-2	549121	N31	SG	green	low	high	*yycccucuBB*	Gorz and Haskins, 1969; Gorz et al., 1975; Haskins and Gorz, 1965; Specht et al., 1976
GS-3	549122	N32	SG	green	high	low	*yyccCuCubb*	Gorz and Haskins, 1969; Gorz et al., 1975; Haskins and Gorz, 1965; Specht et al., 1976
GS-4	549123	N33	SG	green	high	high	*yyccCuCuBB*	Gorz and Haskins, 1969; Gorz et al., 1975; Haskins and Gorz, 1965; Specht et al., 1976
GS-5	549124	N34	DG	red	low	low	*yyCCcucubb*	Gorz and Haskins, 1969; Gorz et al., 1975; Haskins and Gorz, 1965; Specht et al., 1976
GS-6	549125	N35	DG	red	low	high	*yyCCcucuBB*	Gorz and Haskins, 1969; Gorz et al., 1975; Haskins and Gorz, 1965; Specht et al., 1976
GS-7	549126	N36	DG	red	high	low	*yyCCcucubb*	Gorz and Haskins, 1969; Gorz et al., 1975; Haskins and Gorz, 1965; Specht et al., 1976
GS-8	549127	N37	DG	red	high	high	*yyCCCuCuBB*	Gorz and Haskins, 1969; Gorz et al., 1975; Haskins and Gorz, 1965; Specht et al., 1976
GS-9	549128	N38	LY	green	low	low	*YYcccucubb*	Gorz and Haskins, 1969; Gorz et al., 1975; Haskins and Gorz, 1965; Specht et al., 1976
GS-10	549129	N39	LY	green	low	high	*YYcccucuBB*	Gorz and Haskins, 1969; Gorz et al., 1975; Haskins and Gorz, 1965; Specht et al., 1976
GS-11	549130	N40	LY	green	high	low	*YYccCuCubb*	Gorz and Haskins, 1969; Gorz et al., 1975; Haskins and Gorz, 1965; Specht et al., 1976
GS-12	549131	N41	LY	green	high	high	*YYccCuCuBB*	Gorz and Haskins, 1969; Gorz et al., 1975; Haskins and Gorz, 1965; Specht et al., 1976
GS-13	549132	N42	MY	red	low	low	*YYCCcucubb*	Gorz and Haskins, 1969; Gorz et al., 1975; Haskins and Gorz, 1965; Specht et al., 1976
GS-14	549133	N43	MY	red	low	high	*YYCCcucuBB*	Gorz and Haskins, 1969; Gorz et al., 1975; Haskins and Gorz, 1965; Specht et al., 1976
GS-15	549134	N44	MY	red	high	low	*YYCCCuCubb*	Gorz and Haskins, 1969; Gorz et al., 1975; Haskins and Gorz, 1965; Specht et al., 1976
GS-16	549135	N45	MY	red	high	high	*YYCCCuCuBB*	Gorz and Haskins, 1969; Gorz et al., 1975; Haskins and Gorz, 1965; Specht et al., 1976
GS-17	557503	N46			low	low	*cucubb*	Gorz and Haskins, 1969; Haskins and Gorz, 1965
GS-18	557504	N47			low	high	*cucuBB*	Gorz and Haskins, 1969; Haskins and Gorz, 1965
GS-19	557505	N48			high	low	*CuCubb*	Gorz and Haskins, 1969; Haskins and Gorz, 1965
GS-20	557506	N49			high	high	*CuCuBB*	Gorz and Haskins, 1969; Haskins and Gorz, 1965
GS-21	557507	N50	MY	red			*YYCC*	Gorz et al., 1975; Specht et al., 1976
GS-22	557508	N51	LY	green			*YYcc*	Gorz et al., 1975; Specht et al., 1976
GS-23	557509	N52	DG	red			*yyCC*	Gorz et al., 1975; Specht et al., 1976
GS-24	557510	N53	SG	green			*yycc*	Gorz et al., 1975; Specht et al., 1976
			Other traits					
GS-25	629289	N54	susceptibility to stem canker (gooseneck)‡				*eeGG*	Gorz, 1955
GS-26	629290	N55	resistance to stem canker (gooseneck)‡				*EEGG*	Gorz, 1955
GS-27	557511	N741			low	low	*cucubb*	Gorz and Haskins, 1969; Haskins and Gorz, 1965
GS-28	557512	N743			low	high	*cucuBB*	Gorz and Haskins, 1969; Haskins and Gorz, 1965
GS-29	557513	N745			high	low	*CuCubb*	Gorz and Haskins, 1969; Haskins and Gorz, 1965
GS-30	557514	N747			high	high	*CuCuBB*	Gorz and Haskins, 1969; Haskins and Gorz, 1965
GS-31	557515	U362	folded leaflet				*ff*	Kleinhofs et al., 1968; Ronnenkamp et al., 1973
GS-32	557516	U363	elongated stem				*elel*	Kleinhofs et al., 1968; Ronnenkamp et al., 1973
GS-33	557517	U367	short-petiole dwarf				$d_{sp}d_{sp}$	Kleinhofs et al., 1968; Ronnenkamp et al., 1973
GS-34	557518	U369	chlorophyll deficient				ch_8ch_8	Kleinhofs et al., 1968; Ronnenkamp et al., 1975; Specht et al., 1975; Yang et al. , 1990
GS-35	557519	U370	chlorophyll deficient				ch_9ch_9	Kleinhofs et al., 1968; Ronnenkamp et al., 1975; Specht et al., 1975;
GS-36	557520	U371	chlorophyll deficient				$ch_{10}ch_{10}$	Bevins et al., 1993; Kleinhoffs et al., 1968; Ronnenkamp et al., 1975; Specht et al., 1975; Yang et al. , 1990
GS-37	557521	U372	chlorophyll deficient				$ch_{11}ch_{11}$	Bevins et al., 1993; Kleinhoffs et al., 1968; Ronnenkamp et al., 1975; Specht et al., 1975; Yang et al. , 1990
GS-38	557522	U373	chlorophyll deficient				$ch_{12}ch_{12}$	Kleinhoffs et al., 1968; Ronnenkamp et al., 1975; Specht et al., 1975; Yang et al., 1990
GS-39	557523	U374	chlorophyll deficient				ch_5ch_5	Gengenbach et al., 1969; Markwell et al., 1985a; Nakitani and Baliga, 1985; Ronnenkamp et al., 1975; Specht et al., 1975; Yang et al., 1990
GS-40	557524	U389	normal parental line				+/+	Bevins et al., 1993; Gengenbach et al., 1970, 1969; Kneen and LaRue, 1988; Markwell et al., 1986; Specht et al., 1975
GS-41	557525	U390	short-internode dwarf				*dwdw*	Gengenbach et al., 1969; Kleinhofs et al. , 1968
GS-42	557526	U391	multifoliolate leaf				*MfMf*	Gengenbach et al., 1969; Kleinhofs et al. , 1968
GS-43	557527	U392	curled leaf				*clcl*	Gengenbach et al., 1969; Kleinhofs et al. (1968).
GS-44	557528	U393	cotyledonary branching				*cbcb*	Gengenbach et al., 1969; Kleinhofs et al., 1968
GS-45	557529	U394	chlorophyll deficient				ch_4ch_4	Bevins et al., 1982; Gengenbach et al., 1970; Markwell et al., 1986,1985b; Specht et al., 1975; Yang et al. , 1990
GS-46	557530	U396	chlorophyll deficient				ch_6ch_6	Gengenbach et al., 1970; Kleinhofs et al., 1968; Specht et al., 1975; Yang et al. , 1990
GS-47	557531	U397	chlorophyll deficient				ch_7ch_7	Gengenbach et al., 1970; Kleinhofs et al., 1968; Specht et al., 1975; Yang et al., 1990
GS-48	557532	U398	chlorophyll deficient, dark veins				$ch_5ch_5ch_vch_v$	Gengenbach et al., 1970; Kleinhofs et al., 1975; Markwell et al., 1985b; Ronnenkamp et al., 1975; Specht et al., 1975
GS-49	557533	U500	chlorophyll deficient, short-internode dwarf				ch_5ch_5dwdw	Gengenbach et al., 1970, 1969

† Seed colors: SG-silver green; DG-dark green; LY-light yellow; MY-medium yellow.
‡ Caused by *Ascochyta caulicola* (Laub.).

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K.P. Vogel, H.J. Gorz, and F.A. Haskins, USDA-ARS and Department of Agronomy and Horticulture, 344 Keim Hall, P.O. Box 830937, Univ.of Nebraska, Lincoln, NE 68583-0937. Joint contribution of the USDA-ARS and University of Nebraska-Lincoln. Journal Series Paper No. 14852. Registration by CSSA. Accepted 28 Feb. 2005. *Corresponding author (kpv@unlserve.unl.edu).

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677 S. Segoe Rd., Madison, WI 53711 USA