Registration of Miscot 8001, Miscot 8004 and Miscot 8006 Germplasm Lines of Cotton

THREE GERMPLASM LINES of cotton, *Gossypium hirsutum* L., Miscot 8001 (Reg. no. GP-590, PI 564679), Miscot 8004 (Reg. no. GP-591, PI 564680), and Miscot 8006 (Reg. no. GP-592, PI 564681), were released jointly by the Mississippi Agricultural and Forestry Experiment Station and Arkansas Agricultural Experiment Station in 1992. The lines were selected for prolific secondary root development and agronomic qualities.

The three lines were derived from crosses made in 1980 using 'McNair 235' as a common parent. The second parent for Miscot 8001, Miscot 8004, and Miscot 8006 was 'Tamcot CAMD-E' (2), PD 875 (3), and 'Stoneville 603', respectively. Prior to crossing, seedlings of each parent were selected for secondary root development on germination paper soaked with 3 mg kg^{-1} trifuluralin [2,6-dinitro-*N*,*N*-dipropyl-4-(trifluo- rometil) benzenamine], then transplanted. Trifluralin is a preplant, incorporated herbicide that is commonly used in cotton production. It inhibits secondary root development of cotton seedlings in treated soil. F_3 seedlings, obtained from bulked F_2 plants, were selected in the greenhouse using modified multiple-adversity resistance procedures (1). The modifications included treatment of soil with 0.28 kg ha^{-1} trifluralin, then placement of the germinated seed on the periphery of a cup to permit selection for secondary root development when the cup was removed. Subsequently, seedlings from the F_3 generation were subjected to a second cycle of selection using the same procedures. Miscot 8001 (tested as 8001-12) and Miscot 8004 (tested as 8004-4) were derived from the first selection cycle, and Miscot 8006 (tested as 8006-3-2) was derived from the second cycle.

In a greenhouse study, Miscot 8001, Miscot 8004, and Miscot 8006 had 32, 40, and 67% more secondary roots, respectively, than did 'DES 119' in trifuluralin-treated soil, and 8, 25, and 30% more, respectively, in untreated soil. In a subsequent test, the three lines had more secondary roots than did 'Stoneville 506'. Miscot 8004 and Miscot 8006 had more roots than their respective mid-parent value. Compared to their common parent, McNair 235, the three lines tended to have higher shoot weights but lower root weights, resulting in lower root to shoot ratios. These data suggest that the secondary roots of these lines may be as numerous but finer than the secondary roots of McNair 235.

After having been selected as progeny rows, the three lines were evaluated in replicated tests during 1987 at two Mississippi sites and from 1988 through 1990 at two Arkansas sites. In the eight tests over 4 yr, lint yields of the three lines were 2.2 to 5.7% less than that of DES 119. Each line yielded significantly less than did DES 119 in two of the eight tests while non-significant differences in yield occurred in the other six tests. Maturity of Miscot 8006 was equal to that of DES 119 while Miscot 8001 and Miscot 8004 matured slightly earlier than DES 119. Average lint percentages of Miscot 8004 and Miscot 8006 were slightly higher than DES 119 but lint percentage of Miscot 8001 was slightly lower than DES 119. Compared to DES 119, fiber of the three lines was significantly shorter in length, coarser (a non-significant higher micronaire), non-significantly different in fiber strength, but significantly lower in elongation.

Seed (25 g) of Miscot 8001, Miscot 8004, and Miscot 8006 may be obtained from the Department of Agronomy, Plant Science 115, University of Arkansas, Fayetteville, AR 72701.

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Registration of ARS-2936 Scarlet Globemallow Germplasm

SCARLET GLOBEMALLOW [*Sphaeralcea coccinea* (Pursh) Rydb.], ARS-2936, Reg. no. GP-4, PI 564590, is a native, perennial, herbaceous species of Malvaceae widely distributed in the Rocky Mountain and Great Plains rangelands of the western USA (4). This species is characterized by widely spreading rhizomes, brick-red petals, and a dense, short, raceme-like inflorescence, and stellate trichomes. Flowers are attractive and plants bloom from May to July or longer with favorable moisture (5). Leaves are palmately veined with the lobes coarsely toothed. Plant height is less than 30 cm and commonly is less than 20 cm. Scarlet globemallow often is found in foothill habitats with sandy or gravelly soils, open flats, talus slopes, along roadsides and generally in arid places (2). Where it occurs, scarlet globemallow is an important rangeland dietary component of small mammals, pronghorn, sheep, and cattle (1).

Seeds of ARS-2936 were harvested from a wildland stand in northern Idaho in 1987. The accession was included in a sheep grazing trial established at Kimberly, ID, where it was compared with 'Hycrest' crested wheatgrass [*Agropyron cristatum* (L.) Gaertn. × *A. desertorum* (Fisch. ex Link) Schultes], 'Spredor 2' alfalfa (*Medicago sativa* L.), three accessions of *S. grossulariifolia* (H. & A.) Rydb., one accession of *S. munroana* (Dougl) Spach., seven accessions of *S. parvifolia* A. Nels., and one other accession of *S. coccinea*. Experimental data were obtained in the fall of 1988 and 1989 and in the spring of 1990 and 1991 (3). Although smaller statured than accessions of globemallow species other than *S. coccinea*, ARS-2936 yielded twice as much forage as the other *S. coccinea* accession in the experiment (Table 1). Utilization of this accession by sheep was superior to other mallow species.

Some 4-m^2 plots of ARS-2936 at Kimberly were fully occupied by this rhizomatous accession 6 mo after establishment by transplanting despite competition from adjacent crested wheatgrass plants. Five observers each noted that the second accession of *S. coccinea* included in the experiment did not spread as extensively as ARS-2936, nor was shoot density from rhizomes equal to that of ARS-2936. *Sphaeralcea coccinea* was the only globemallow species that developed rhizomes. In the non-competitive environment of a spaced-plant nursery near Logan, UT, rhizomes of 1-yr-old plants of ARS-2936 extended a minimum of 45 cm and a maximum of 113 cm in 1 yr. The excellent vegetative spread by rhizomes and the relatively high palatability of ARS-2936 were the primary reasons for the selection of ARS-2936 as a superior ecotype. ARS-2936 is a hexaploid with $2N = 30$ chromosomes (personal communication, 1989, Richard Wang). In 1989 it and all other accessions of globemallow at Kimberly were attacked by a rust (*Puccinia sherardiana* Körn). It also is known to be susceptible to an unidentified leaf-mining insect. Additional identification codes used during the evaluation of this accession were U 2936 and RP 76.

Table 1. Average plant characteristics and forage production of globemallow (*Sphaeraicea* sp.), crested wheatgrass, and alfalfa during fall (1988 and 1989) and spring (1990 and 1991) grazing seasons.

Season / Species / Accession	Dry forage weight		Forage			Phenological stage[2]	Dry matter	Stellate trichome density	Rust[3]
	Pre-grazing	Consumed	Consumption	Selection	Use[1]				
	g plant^{-1}		%	ratio	score	score	%	number mm^{-2}	Score
FALL:									
S. coccinea	22	19	78	1.4	2.8	3.4	53	6.8	1.4
RP 40	12	9	78	1.2	2.8	3.3	55	7.7	1.2
ARS-2936	31	25	78	1.3	2.8	3.5	52	5.9	1.5
S. grossulariifolia	102	63	63	1.0	2.1	4.5	42	11.7	1.7
RP 33	51	32	63	1.0	2.2	4.2	47	10.1	1.5
RP 58	108	64	61	1.0	2.0	4.8	41	13.1	2.3
RP 59	139	88	66	1.0	2.2	4.6	39	11.3	1.2
S. munroana									
RP 53	123	70	63	0.9	2.6	4.9	42	15.3	1.6
S. parvifolia	151	84	58	0.9	1.9	4.6	43	11.0	1.8
RP 34	115	73	69	1.0	2.6	4.7	46	14.4	1.9
RP 35	175	90	55	0.8	1.3	4.6	42	13.2	2.0
RP 36	128	51	46	0.7	1.4	4.7	41	10.5	1.9
RP 54	140	83	60	1.0	2.0	4.6	44	9.0	2.2
RP 55	185	124	65	1.1	2.0	4.7	43	10.8	1.2
RP 56	174	97	60	0.9	2.3	4.7	41	10.2	1.9
RP 73	143	69	50	0.8	1.5	4.5	41	8.8	1.4
Globemallows:	117	68	63	1.0	2.2	4.4	44	10.7	1.6
Wheatgrass:	34	26	73	1.3	4.1	5.4	44	—	—
Alfalfa:	258	190	75	1.2	4.8	4.9	38	—	—
Average	122	74	65	1.0	2.5	4.4	44	10.7	1.6
LSD (0.05)	26	18	6	0.1	0.3	0.3	7	3.0	0.5
SPRING:									
S. coccinea	3	2	81	0.8	1.2	2.5	40	4.9	—
RP 40	2	2	83	1.2	1.7	2.6	40	6.6	—
ARS-2936	4	3	77	0.9	0.9	2.3	40	2.7	—
S. grossulariifolia	8	6	70	0.9	2.6	2.9	34	6.2	—
RP 33	9	8	81	1.1	2.6	2.9	40	6.9	—
RP 58	8	5	61	0.8	2.3	2.9	32	6.7	—
RP 59	9	6	69	0.8	2.8	2.9	32	5.4	—
S. munroana									
RP 53	7	6	80	1.1	3.6	2.8	29	6.8	—
S. parvifolia	10	8	76	1.0	2.8	2.7	31	6.1	—
RP 34	7	6	82	1.1	3.2	2.7	34	5.9	—
RP 35	13	9	72	0.9	2.5	2.8	29	6.6	—
RP 36	11	8	72	0.9	2.6	2.8	33	6.2	—
RP 54	6	5	72	1.0	2.4	2.7	28	5.2	—
RP 55	12	10	82	1.0	3.0	2.7	27	5.9	—
RP 56	10	8	75	1.0	3.0	2.5	35	7.0	—
RP 73	10	8	73	1.0	2.9	2.9	32	5.4	—
Globemallows:	9	7	75	1.0	2.6	2.7	33	6.0	—
Wheatgrass:	73	37	50	0.6	1.8	2.0	30	—	—
Alfalfa:	137	127	95	1.1	4.8	2.0	21	—	—
Average	26	21	76	1.0	2.7	2.6	32	6.0	—
LSD (0.05)	8	7	7	0.0	0.3	0.1	10	1.9	—

[1] Forage use was scored immediately after grazing on a scale of 0 = no forage eaten to 5 = 100% consumption of fine stems and leaves.
[2] Phenological stage was scored immediately prior to grazing as 1 = dormant, 2 = vegetative growth only, 3 = flower buds present, 4 = flowers open, 5 = fruit formed, and 6 = seed shattering.
[3] Rust reaction was scored on a scale of 0 = no infection, 1 = trace to 10% of the leaf surface diseased, . . ., 9 = 91 to 100% of the leaf surface diseased.

It is anticipated that ARS-2936 scarlet globemallow will be a useful forb component of seed mixtures planted for forage production on arid and semiarid sites. Since scarlet globemallow is a native species, ARS-2936 may be seeded on sites where introduced species are prohibited or not desired. ARS-2936 also can be used for soil stabilization and conservation, mine spoil reclamation, and beautification. The low stature, attractive foliage and flower colors, drought and heat tolerance, and spreading growth habit of ARS-2936 will be of benefit for permanent plantings along highways and in perennial gardens.

An isolated seed increase block of ARS-2936 was established near Logan, UT, in 1990. Seed of this germplasm pool, if increased commercially, should be produced in accordance with the Pre-Variety Germplasm Certification Standards adopted by the Association of Official Seed Certifying Agencies. This germplasm qualifies for the Selected Class according to the Utah Crop Improvement Association, the official seed certifying agency for Utah.

Seed will be maintained by the USDA Agricultural Research Service and be available from the corresponding author in 10 gram samples. We ask that appropriate recognition of the original source be given when this germplasm contributes to research or development of new cultivars.

M.D. Rumbaugh,* B.M. Pendery, H.F. Mayland, and G.E. Shewmaker (6).

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Registration of ARS-2892 Munroe Globemallow Germplasm

MUNROE GLOBEMALLOW [*Sphaeralcea munroana* (Dougl.) Spach.] ARS-2892, Reg. no. GP-3,PI564589, is a native, xerophytic, perennial herb widely distributed in shadscale [*Atriplex confertifolia* (Torr. & Frem.)], juniper (*Juniperus* spp.), desert shrub, and mountain brush communities (1). This species is found in southern British Columbia, southwestern Montana and Wyoming, Utah, Nevada, and California (2). In Utah, *S. munroana* is generally restricted to the northern Wasatch Mountains where it intergrades with *S. grossulariifolia* (H. & A.) Rydb. Globemallow plants are self-sterile and insect pollinated. Leaves are three- to five-parted with dentate margins and stellate trichomes. Plant height is 20 to 50 cm and the inflorescence often contains more than 25 flowers with brick-red petals.

ARS-2892 is a selected ecotype of Munroe globemallow. It originated from seed collected from naturally occurring plants growing on the Hyrum Lake Dam (41° 37'N, 111° 52'E), Cache County, UT, on 7 July 1986. The collection site is at a 1325-m elevation and the average annual precipitation is 406 mm. Soils are disturbed, sandy, and rocky. Associated vegetation was alfalfa (*Medicago sativa* L.), sagebrush (*Artemisia tridentata* Nutt.), and cheatgrass (*Bromus japonicus* Murray). Plants of this accession grown in a spaced-plant nursery near Logan, UT, were identified as *S. munroana* by the staff of the Intermountain Herbarium, Utah State University, Logan, UT. ARS-2892 is a tetraploid with $2N = 20$ chromosomes (personal communication, 1989, Richard Wang).

ARS-2892 was evaluated in comparison with 49 other accessions of *S. munroana* and other species of globemallows in non-competitive, spaced-plant nurseries in northern Utah (471-mm mean annual precipitation) and southern Idaho (321-mm mean annual precipitation) from 1987 to 1992. Subjective evaluation and selection of the plants for amount of shoot biomass, leafiness, and seed yield potential repeatedly identified ARS-2892 as the most desirable accession in the nurseries (Table 1). Other experimental identification codes for this accession were RP 38 and U 2892.

Table 1. Mean agronomic attributes of globemallow (*Sphaeralcea* spp.) accessions grown in spaced-plant nurseries in northern Utah and southern Idaho, 1987 to 1988.

Attribute	ARS-2892	*S. munroana*†	All accessions	LSD (0.05)
Survival (%)	97	95	98	—
Plant weight (g)	188	102	94	4.3
Stems (no. plant^{-1})	22	18	16	0.3
Stems length (cm)	38	35	38	1.7
Leafiness (score)‡	2.8	2.4	2.4	0.1
First flower (day)	174	169	170	3.8
Schizocarps ripe at harvest (%)	39	33	31	1.6
Seed weight (g plant^{-1})	1.1	0.7	0.7	0.1

† The species and numbers of accessions evaluated were *S. coccinea* (5), *S. grossulariifolia* (6), *S. leptophyla* (1), *S. munroana* (12), *S. parvifolia* (25), and *S. rusbyi* (1). There were 10 replications with two plants per plot for each accession at each location.
‡ Leaf size was scored 1 = largest to 3 = smallest. Leaf number per plant was scored 1 = most to 3 = least. The leafiness score was obtained by multiplying the leaf size score by the leaf number score with 1 = best to 9 = worst.

The primary reasons for selecting ARS-2892 in preference to the other globemallows examined were its large shoot size, succulence, leafy growth form, and excellent seed yield potential. ARS-2892 is drought and heat tolerant, winterhardy, and survives well in semiarid environments. When included in seed mixtures with adapted grasses, this germplasm will be of value in stabilizing disturbed and eroding lands, including minespoils. It will also be useful in range revegetation and roadside beautification. Since *S. munroana* is a native species, ARS-2892 may be used where introduced species are prohibited or not desired. The attractive foliage and flowers indicate that ARS-2892 could be included in wildflower seed mixtures and planted in perennial gardens.

An isolated seed increase block of ARS-2892 was established near Logan, UT, in 1990. Seed of this germplasm pool, if increased commercially, should be produced in accordance with the Pre-Variety Germplasm Certification Standards adopted by the Association of Official Seed Certifying Agencies. This germplasm qualifies for the Selected Class according to the Utah Crop Improvement Association, the official seed certifying agency for Utah.

Seed will be maintained by the USDA-ARS and available from the corresponding author in 10-g samples. We ask that appropriate recognition of the original source be given when this germplasm contributes to research or development of new cultivars.

M.D. RUMBAUGH,* AND B.M. PENDERY (3)

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