

yields equal to or superior to those of the check cultivars, SC-1, Coker 310, and Coker 201. Lint yields of all germplasm lines were usually superior to those of PD 695, PD 8619, and 'PD-2', which usually cut out during dry, hot weather.

Most of these germplasm lines produced significantly more lint than the normal bract cultivars, Coker 201 and Coker 310, when boll weevils were controlled with azinphosmethyl and *Heliothis* spp. were controlled with fenvalerate after damaged squares reached 10% or when two live larvae were found per 100 terminals on PD 695. Most of these germplasm lines also produced superior yields to those of the resistant checks, PD 695, PD 875, PD 8619, PD-2, and SC-1. This resistance may be at least partially attributed to the earliness of these five germplasm lines. Progenies were selected for resistance to *Heliothis* spp. under natural infestations of these insects that developed under this insecticide regime. Some natural outcrossing also occurred under this insecticide regime that will account for some off-type plants.

When *Heliothis* spp. were controlled with fenvalerate and boll weevils were allowed to cause 10% damaged squares on Coker 310 before being controlled with azinphosmethyl, the five germplasm lines generally produced more lint than the check cultivars, SC-1, Coker 201, and Coker 310, and the resistant checks, PD 695, PD 875, PD 8619, and PD-2.

Although these five cotton lines with diverse germplasm have high yield potential, resistance to insects, and environmental stability to a range of growing conditions, fiber properties are similar to those of Coker 201.

Seed (25 g) of these germplasm lines may be obtained from C.C. Green, USDA-ARS, P.O.Box 2131, Florence, SC 29503.

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Published in *Crop Sci.* 30:235-236 (1990).

### REGISTRATION OF TWELVE NONCOMMERCIAL GERmplasm LINES OF UPLAND COTTON WITH RESISTANCE TO BOLLWORM, TOBACCO BUDWORM, AND BOLL WEEVIL

TWELVE noncommercial cotton, *Gossypium hirsutum* L., germplasm lines (Reg. no. GP-399 through GP-410) (PI 533634 through PI 533645) with resistance to tobacco budworm, *Heliothis virescens* (Fabricius), bollworm, *H. zea* (Boddie), and boll weevil, *Anthonomus grandis* (Boheman), were released by USDA-ARS and the South Carolina Agricultural Experiment Station in 1988. These 12 germplasm lines, PD 0738, PD 0741, PD 0747, PD 0753, PD 0756, PD 0761, PD 0762, PD 0771, PD 0778, PD 0781, PD 0785, and PD 0804 were developed from the cross PD 695 × PD 875. PD 695, a frego bract germplasm line, and PD 875, a normal bract line are resistant to *Heliothis* spp. and boll weevil (1).

When insects were controlled in replicated tests conducted over 4 yr, all of these germplasm lines produced lint yields equal or superior to those of the check cultivars, SC-1, Coker 310, and Coker 201. Most of these germplasm lines produced

significantly more lint than that of PD 695 and PD 8619 (2), suggesting greater environmental stability.

All germplasm lines produced significantly more lint than the commercial cultivars Coker 201 and Coker 310 when boll weevil were controlled with azinphosmethyl and *Heliothis* spp. were controlled with fenvalerate after damaged squares reached 10% or when two live larva were found per 100 terminals on PD 695. Most of these germplasm lines also produced more lint than the *Heliothis* spp. resistant cottons, SC-1, PD 695, and PD 875. Progenies were selected for resistance to *Heliothis* spp. under natural infestations of these insects that developed under this insecticide regime. Some natural outcrossing also occurred under this spray program, which accounts for some off-type plants.

When *Heliothis* spp. were controlled with adequate applications of fenvalerate and boll weevil were allowed to cause 10% damaged squares on Coker 310 before being controlled with azinphosmethyl, eight of the germplasm lines, PD 0741, PD 0756, PD 0761, PD 0762, PD 0778, PD 0781, PD 0785, and PD 0804, which have predominantly frego bract plants, produced significantly higher yields than PD 695 and PD 875. These data suggest that these eight germplasm lines have higher levels of resistance than the parental lines and have greater environmental stability. PD 0738, PD 0747, PD 0753, and PD 0771, which have predominantly normal bract plants, produced yields equivalent or superior to that of PD 695, suggesting that their high prolificness and early maturity provides escape from the boll weevil. Progenies were selected for boll weevil resistance under natural infestations of this insect that developed under this insecticide regime.

These 12 germplasm lines differ in fiber length and micronaire but have fiber and yarn strengths equal to that of PD 695. Fiber and yarn strength of PD 695 is intermediate between that of Coker 201 and SC-1.

These germplasm lines with resistance to *Heliothis* spp., boll weevil, and adverse growing conditions should be useful germplasm in cotton improvement programs particularly if insects develop resistance to insecticides or if effective insecticides are disallowed in cotton production.

Seed (25 g) of these germplasm lines may be obtained from C.C. Green, USDA-ARS, P.O.Box 2131, Florence, SC 29503.

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Published in *Crop Sci.* 30:236 (1990).

### REGISTRATION OF SEVEN GERmplasm LINES OF UPLAND COTTON WITH RESISTANCE TO BOLLWORM, TOBACCO BUDWORM, AND BOLL WEEVIL

SEVEN noncommercial germplasm lines of cotton, *Gossypium hirsutum* L., of diverse ancestry with resistance to bollworm, *Heliothis zea* (Boddie), tobacco budworm, *H. virescens* (Fabricius), and boll weevil, *Anthonomus grandis* (Boheman), were released by USDA-ARS and the South Car-

olina Agricultural Experiment Station in 1988. These germplasm lines should be useful in cotton improvement programs, particularly if effective insecticides are lost to production or if insects develop resistance to the chemicals.

PD 7388 (Reg. no. GP-411, PI 533646) was developed from the second backcross PD 8619<sup>2</sup> (PD 8619 × La. Frego 2). PD 8619 was released as an outstanding germplasm line with resistance to bollworm and tobacco budworm, with high yield potential, and with extra fiber strength (1). Louisiana Frego 2 was developed from the fifth backcross of 'Stoneville 7A' (Stoneville Frego × Stoneville 7A) by J.E. Jones at the Louisiana Agricultural Experiment Station and has resistance to boll weevil.

PD 7439 (Reg. no. GP-412, PI 533647) was developed from the second backcross PD 8650<sup>2</sup> (PD 8650 × La. Frego 2). PD 8650 is resistant to bollworm, tobacco budworm, and boll weevil (3).

PD 7458 (Reg. no. GP-413, PI 533648) was developed from the second backcross 'Coker 310'<sup>2</sup> (PD 8499 × La. Frego 2). Coker 310 is a commercial cultivar developed by Coker's Pedigreed Seed Co. Germplasm lines of PD 8499 × La. Frego 2 possess resistance to bollworm, tobacco budworm, and boll weevil (3).

PD 7496 (Reg. no. GP-414, PI 533649) and PD 7501 (Reg. no. GP-415, PI 533650) were developed from the second backcross of PD 9241<sup>2</sup> (PD 8550 × La. Frego 2). PD 9241 was the progenitor of 'SC-1'(2), the first cultivar from Beasley's tri-species hybrid with extra fiber strength and yield potential equal to southeastern cultivars (5). Germplasm lines from the cross PD 8650 × La. Frego 2 are resistant to bollworm, tobacco budworm, and boll weevil (3).

PD 7586 (Reg. no. GP-416, PI 533651) was developed from the second backcross of PD 9257<sup>2</sup> (PD 8562 × La. Frego 2). PD 9257 was developed from the cross 'TH149' × PD 2165 and has high yield potential and extra fiber strength. Germplasm lines from the cross PD 8562 × La. Frego 2 are resistant to bollworm, tobacco budworm, and boll weevil (3).

PD 7723 (Reg. no. GP-417, PI 533652) was developed from the second backcross of PD 6520<sup>2</sup> (PD 8562 × La. Frego 2). PD 6520 was the progenitor of 'PD-2' (4), an early maturing cultivar with resistance to insects (6). Germplasm lines from the cross PD 8562 × La. Frego 2 are resistant to bollworm, tobacco budworm, and boll weevil (3).

When insects were controlled in four replicated tests from 1981 through 1984, the seven germplasm lines produced lint yields equal or superior to those of the check cultivars, SC-1, Coker 201, and Coker 310. Lint yields of these germplasm lines were usually superior to those of the resistant checks, PD 695, PD 8619, and PD-2, which commonly cut out during dry, hot weather.

All seven germplasm lines produced significantly more lint than Coker 201 and Coker 310 when boll weevils were controlled with azinphosmethyl and *Heliothis* spp. were controlled with fenvalerate after damaged squares reached 10% or when two live larvae were found per 100 terminals on PD 695. Also, these germplasm lines generally produced superior yields to those of the resistant checks, PD 695, PD 875, PD 8619, PD-2, and SC-1. The data suggest that these germplasm lines combine early maturity along with the unidentified PD source of resistance to *Heliothis* spp. with greater environmental stability. These progenies were selected for resistance to *Heliothis* spp. under natural infestations of these insects that developed under this spray regime. Some natural outcrossing occurred, which will account for some off-type plants.

When *Heliothis* spp. were controlled with fenvalerate and boll weevils were allowed to cause 10% damaged squares on Coker 310 before being controlled with azinphosmethyl, the germplasm lines, composed primarily of frego bract plants, produced more lint than the late-maturing, normal bract

cultivars, SC-1, Coker 201, and Coker 310. They also produced equal or superior yields when compared with the frego bract germplasm lines, PD 695, or the earlier maturing, normal bract cottons, PD 875 and PD-2.

These germplasm lines, developed by backcrossing and selection with diverse ancestry, high yield potential, resistance to insects, and environmental stability to a range of weather conditions, should be useful in cotton improvement programs.

PD 7439, PD 7496, PD 7501, and PD 7723 have fiber strengths comparable to that of PD-2.

Seed (25 g) of these germplasm lines may be obtained from C.C. Green, USDA-ARS, P.O.Box 2131, Florence, 29503.

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Published in *Crop Sci.* 30:236-237 (1990).

#### REGISTRATION OF 'MONTANA-101' RUBY VALLEY POINTVETCH GERMLASM

'MONTANA-101' (MT-101) (Reg. no. P-81) (PI 525497) Ruby Valley pointvetch (*Oxytropis riparia* Litv.) germplasm was released in December 1988 by the Montana Agricultural Experiment Station for breeding and experimental purposes. Montana-101 bears the NSSL Serial no. 239 102.01.

Montana-101 germplasm was collected from a wild stand in the Ruby Valley of southwestern Montana. Montana-101 is a perennial, indeterminate legume with a deep taproot and prostrate growth habit (4). Plants have acute, subsessile, opposite leaves with small, purplish, papilionaceous flowers (2). The chromosome number of *O. riparia* has been generally reported as  $2n = 2x = 16$ . However, Astanova and Abusaliyeva (1) found both  $2n = 2x = 16$  and  $2n = 2x = 32$ . The MT-101 chromosome number is  $2n = 2x = 16$ .

*Oxytropis riparia* is native to Russian Turkestan (2) and was first found in the Ruby Valley area of Montana in 1930 (5). It is capable of growing on highly alkaline soil (3). Green and Morris (5) named the plant Ruby Valley milkvetch (*Asragalus rubyi* Green and Morris), but the taxonomy was changed to *Oxytropis riparia* Litv. by Barneby (2).

Hardseed content in pointvetch has been reported as high as 96% (4). Poor stand establishment due to hardseededness can be eliminated with seed scarification. L.S. Hicks (1988, personal communication) found mechanical scarification with a Forsberg scarifier (Forsberg's Inc., Thief River Falls, MN) for 20 to 30 s to be effective in removing the hard