

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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References and Notes

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2. Culp, T.W., A.R. Hopkins, and H.M. Taft. 1979. Breeding insect-resistant cottons in South Carolina. *South Carolina Agric. Exp. Stn. Techn. Bull.* 1074.
3. Culp, T.W. and C.C. Green, USDA-ARS, P.O.Box 2131, Florence, SC 29503; and B.U. Kittrell, Pee Dee Res. and Education Ctr., Route 1, Florence, SC 29501-9603. Registration by CSSA. Accepted 30 June 1989. *Corresponding author.

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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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References and Notes

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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-