

Disease resistance may be a major factor responsible for the apparent wide range in adaptability of Pee Dee 0109, Pee Dee 0111, and Pee Dee 0113.

Seed (25 g) of these germplasm lines may be obtained from AR-SEA-USDA, Pee Dee Exp. Stn., Florence, SC 29503.

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REGISTRATION OF FERTILITY RESTORER DEMETER II COTTON GERMPLASM¹

(Reg. No. GP 144)

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DEMETER II cotton (*Gossypium hirsutum* L.) germplasm was developed by the College Experiment Station, Univ. of Georgia and released to scientists in March 1979.

Development of this germplasm was begun in 1973 when a single plant of DES HAF 277³ was crossed as the female parent with 'Pima S-4' (*G. barbadense* L.). DES HAF 277 had the genome of *G. hirsutum* in *G. harknessii* Brandagee cytoplasm and carried a restorer gene *Rf*⁴. The *Rf* gene behaves as an incomplete dominant gene in crosses of cytoplasmic male sterile upland × upland strains that have the restorer gene. However, it behaves as a complete dominant gene in crosses of cytoplasmic male sterile upland × *G. barbadense* strains with the restorer gene. Sheetz and Weaver⁴ found that Pima has a dominant gene, *E*, that enhances pollen fertility but is not a restorer per se.

F₂ seed of the DES HAF 277 × Pima S-4 were grown at Iguala, Mexico, where the most fertile segregates were selected and backcrossed (BC₁) as females to upland non-restorer strains. The most fertile plants in the BC₁ generation were again backcrossed to non-restorer upland strains (BC₂). A third backcross was made in the same manner and the most fertile BC₃ plants were self pollinated. Individual plants in the BC₃ F₂ generation were crossed onto several cytoplasmic male sterile upland strains in 1977. The BC₄ test cross generation was grown in 1978 and scored for weak fertile and strong fertile hybrid plants. Demeter II is the open pollinated seed from BC₄ progeny rows which has both the *Rf* gene and the "enhancer factor" *E*⁴. Approximately 1/16 of the plants in the BC₄ F₂ generation should be of the genotype *Rf Rf E E* and all plants should have acceptable agronomic properties.

Our research indicates that the fertility enhancer gene *E* must be present in order to obtain adequate fertility in cytoplasmic male-sterile upland × restorer upland crosses. Pure lines of *Rf Rf E E* will be released in the near future. Demeter II can

serve as a valuable source of germplasm for scientists who are developing restorer lines of upland cotton. Seed of Demeter II may be obtained from the Agronomy Dep., Univ. of Georgia, Athens, GA 30602.

REGISTRATION OF MEDIUM STAPLE COTTON GERMPLASM¹

(Reg. No. GP 145 to GP 149)

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THE adverse relationship between extra fiber strength and low lint percentage has been a persistent problem in cotton (*Gossypium hirsutum* L.) improvement programs. Low lint percentage was overcome in the PD breeding program with the introduction of the California breeding line C 6-5 (3). AC 239 (GP 145) and AC 241 (GP 146), F₄ selections from the cross of Hybrid 313 or Line A × C 6-5, have shown a 12% increase in lint yield over that in previously developed PD lines. These lines have genes for extra fiber strength and a lint percentage of 39, which is an increase of 15% from the base lint percentage of 33. AC 239 has extra-large bolls and seeds, which probably reduce its range of adaptability. AC 241 has seeds and bolls about 8% smaller than those of other AC strains, and it has been used profusely in crosses to eliminate low lint percentage in PD material. Hybrid 313 or line A was developed from a complex series of crosses involving Triple Hybrid 171, Sealand 7, and Earlistaple.

These AC lines have been combined with the extra-long staple PD lines FJA and FTA (3) to give the superior germplasm lines PD 2164 (GP 147), PD 3246 (GP 148), and PD 3249 (GP 149). The FJA and FTA lines were developed from a complex series of crosses involving Triple Hybrids 108 and 171, AHA 6-1-4, Sealand, and Earlistaple.

PD 2164 is from the increase of the bulk seed of the progeny of a single F₃ plant selection from the cross of AC 239 × FJA 348. Although this strain produces 25% less lint than 'Coker 100 W,' it has excellent fiber properties and has combined with high fiber-strength lines and southeastern cultivars to produce superior upland cotton (1, 4).

PD 3246 and PD 3249 are from the increase of the bulk seed of the progeny of single F₃ plant selections from the cross of AC 239 × FTA 266. Both strains have excellent fiber properties and combine with high fiber strength lines to produce superior hybrids and progenies (2). PD 3246 is resistant to defoliation with organic phosphate defoliants.

These breeding lines were released by AR-SEA-USDA and the South Carolina Agric. Exp. Stn. in 1979.

Seed (25 g) of each breeding stock may be obtained from AR-SEA-USDA, Pee Dee Exp. Stn., Florence, SC 29503.

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¹ Registered by the Crop Science Society of America. Accepted 15 Oct. 1979.

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³ Meyer, V. G. 1973. Registration of sixteen germplasm lines of upland cotton. Crop Sci. 13:778.

⁴ Sheetz, R. H., and J. B. Weaver, Jr. 1980. Inheritance of a fertility enhancer factor from Pima cotton when transferred into Upland cotton with *Gossypium harknessii* Brandagee cytoplasm. Crop Sci. 20:272-275.