GERMLASM

Registration of TTU 0774-3-3 and TTU 0808-1-6-1 Upland Cotton Germplasm Lines with Improved Fiber Length and Strength


Two germplasm lines of cotton (Gossypium hirsutum L.) designated as TTU 0774-3-3 (Reg. No. GP-878, PI 643915) and TTU 0808-1-6-1 (Reg. No. GP-879, PI 643916) were developed by Texas Tech University and released in 2006 as germplasm for breeding programs developing improved fiber quality. These lines possess longer fiber length, higher length uniformity, short fiber content, acceptable micronaire reading, and higher fiber bundle strength and complement earlier germplasm released for fiber quality. TTU 0774-3-3 is derived from the cross of TTU 202-1107B with ‘Acala 1517-95’. TTU 202-1107B is a high fiber-quality line developed by Texas Tech University through induced mutation and is well adapted to the Texas High Plains (Auld et al., 2000). Acala 1517-95 is an excellent fiber-quality cultivar developed by New Mexico State University (NMSU) (Cantrell et al., 1995). The line TTU 0808-1-6-1 was selected from a cross between a second mutant line, TTU 1722, which has good fiber quality, with NM24052 (DESHAF16/Del Cero) (Tatineni et al., 1996). TTU 1722 is an M1 line selected from a mutagenized population of Paymaster HS 200 (Auld et al., 1998). The crosses and the initial individual plant selections from the F1 were made at Las Cruces, NMSU. F1 plants were selected on the basis of their overall plant appearance, apparent yield potential, high volume instrument (HVI) analyses, and advanced fiber information system (AFIS) analyses for fiber quality. Individual plant selections was also done at Lubbock, TX, in the F2 generation in 2001 and grown out in 2002 as F3s progeny rows. Two germplasm lines identified as uniform in the F3 were evaluated in the field from 2003 through 2005 at Lubbock under drip irrigation and at College Station, TX, under dry land for lint yield, fiber quality, and storm proofness. In all the performance studies, the two germplasm lines were compared with two FiberMax cultivars, FM 958 and FM 989, and two mutant germplasm lines, TTU 202-1107B and TTU 271-2155C. The FiberMax cultivars are the most popular cultivars currently grown on the Texas High Plains. TTU 202-1107B and TTU 271-2155C are two good fiber-quality mutant germplasm lines developed by Texas Tech University (Auld et al., 2000). Fiber quality was determined at the Texas Tech University International Textile Center at Lubbock using HVI and AFIS. Both TTU 0808-1-6-1 and TTU 0774-3-3 are mid-season-maturing germplasm lines. They have normal-shaped leaves and bracts and are glanded and nectaried. Flowers from both lines have cream-colored petals, anthers, and pollen. Bolls have four and occasionally five locks and resist shattering but are not storm proof and thus are suitable for picker harvesting.

Across five field tests and 3 yr at Lubbock and College Station, TTU 0808-1-6-1 and TTU 0774-3-3 had average HVI upper-half mean fiber lengths of 33 and 32 mm, respectively. These values are 13 and 11% longer than the length of FM 958 (P = 0.05). The germplasm lines had 14 (TTU 0774-3-3) and 17% (TTU 0808-1-6-1) higher fiber strength than FM 958 (P = 0.05). Micronaire readings of each of the two germplasm lines averaged 4.2, compared with 4.6 for FM 958 (P = 0.05). The length uniformity indexes for TTU 0808-1-6-1 and TTU 0774-3-3 were 4% higher than both the FiberMax check cultivars. TTU 0808-1-6-1 and TTU 0774-3-3 averaged 123 and 115 cm in height, respectively, compared with 90 cm for FM 958 and 113 cm for FM 989. The two germplasm lines had slightly lower lint yields than the FiberMax cultivars at both the Lubbock and College Station test sites.

Spinning tests were conducted and yarn quality evaluated at the International Textile Center. Advanced fiber information system data were taken from five replications (3000 fibers per replication). Length parameters measured by AFIS reflected the superiority of the two germplasm lines over the FiberMax check cultivars. Both lines showed higher mean length (Ln) and upper quartile length...