Registration of 'Raider 276', a High-Yielding, Improved-Quality Upland Mutant Cotton Cultivar

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‘Raider 276’ (Holland 338-276-1-3-4) (Reg. No. CV-123, PI 645568), an upland mutant cotton cultivar (Gossypium hirsutum L.) was developed by Texas Tech University and jointly released with Cotton Incorporated in 2006. This line possesses good lint yield, increased fiber length, good fiber bundle strength, good fiber uniformity, and good yarn tenacity.

Raider 276 originated from a population of ‘Holland 338’ (SOUTHLAND007X///1919/HX2410//=DPL90) treated with a 2.45% (v/v) solution of ethyl methane sulfonate using a procedure adapted from rapeseed (Brassica napus L.) (Auld et al., 1992, 1998; Kreig and Auld, 1993; Tonnemaker et al., 1992). Raider 276 originated as an M6:7 line in 2001 from M5:6 progeny rows derived from single M, plants selected in 2000 for fiber quality and lint yield exceeding that of Holland 338, ‘FM 958’, and ‘FM 989’. The M6:7 line was evaluated for lint yield and fiber quality in replicated trials at three locations (Lubbock, New Deal, and College Station) in 2001 and two locations (Lubbock, and College Station) from 2003 to 2005. The performance of Raider 276 was compared with two FiberMax cultivars, FM 958 and FM 989, and the original parent, Holland 338. The majority of Texas High Plain cotton hectarage (about 1.6 million) were planted with FiberMax cultivars in 2005 and 2006.

Fiber quality characters were measured using the High Volume Instrument (HVI) and Advanced Fiber Information System (AFIS) at the Texas Tech University International Textile Center (ITC) along with spinning and yarn quality determination. Raider 276 and the check cultivars were spun using industrial-scale ring spinning equipment. Yarn results were compared with the worldwide industrial benchmarks assembled and published by Uster Technologies (2007).

Across seven field tests, Raider 276 yielded 17% more lint per hectare and 5% more than FM 958 (P = 0.05). Fiber length (UHML) for Raider 276 averaged 30 mm (staple 38) compared with FM 958 and FM 989, which averaged 29 mm (staple 37). Holland 338 had fibers with only 28 mm (staple 35) UHM length, significantly lower than Raider 276 (P = 0.05). In 2005, less than 1.5% of the crop in the west Texas region was classed as 38 staple and higher. Length uniformity value for Raider 276 was 83%, similar to the two FiberMax cultivars. The premium range for fiber uniformity is 83.5% and higher for west Texas.

For fiber bundle strength, Raider 276 averaged 31.4 cN/tex (P = 0.05), which exceeds the base level of 26.0 cN/tex. Within the 2005 crop in west Texas, only 2.8% of the bales classed at Abilene, Lamesa, and Lubbock were classed with similar strength levels of Raider 276. The micronaire value of Raider 276 (4.1) is within the USDA premium range of 3.7 to 4.2. Advanced Fiber Information System analyses indicated that Raider 276 had lower immature fiber content, higher fineness, and higher maturity ratio than FM 958. For yarn tenacity, Raider 276 exceeded the Uster Statistics 50th percentile (Uster Technologies, 2007) (Fig. 1).

Although this line was derived through chemical mutagenesis, it possesses only minor morphological differences from the parental cultivar, Holland 338. Under irrigated conditions, Raider 276 flowered 2 to 5 d earlier than the three comparative commercial cultivars, averaged 73 cm in height compared with 68 cm for Holland 338, has cream-colored petals and pollen, and has intermediate stem pubescence compared with FM 958 and FM 989, which have highly pubescent stems. Raider 276 typically has five locules per boll and bolls are broadest at the base, whereas the bolls for Holland 338 are broadest at the middle.

DNA fingerprinting was performed on Holland 338 and Raider 276 to determine if the two lines are genetically different. Sixty-two microsatellite loci, which are polymorphic in upland cotton germplasm, were used. Eight of the 62 marker loci (BNL686, BNL1227, BNL1317, BNL1693, BNL2960, BNL3474, BNL3806, and BNL3994) revealed polymorphism between the two lines suggesting that the mutant Raider 276 is genetically distinct from its nonmutated parent (Table 1).

In summary, Raider 276 combines longer fiber length, stronger fibers, higher fiber length uniformity, and ring spun yarn properties uncommon for current cotton cultivars produced on the Texas High Plains. This could offer real opportunities to open new markets for west Texas producers by giving them