Registration of Arkot 9406ne, Arkot 9605ne, and Arkot 9631ne, Three Nectariless Germplasm Lines of Cotton

Three noncommercial, nectariless breeding lines of cotton (Gossypium hirsutum L.) designated Arkot 9406ne (Reg. no. GP-863, PI 641704), Arkot 9605ne (Reg. no. GP-864, PI 641705), and Arkot 9631ne (Reg. no. GP-865, PI 641706) were released by the Arkansas Agricultural Experiment Station in 2005. The lines were developed using the generalized procedures outlined by Bourland (2004), and resulted from crossing three nectaried lines developed in the University of Arkansas cotton breeding program with three nectariless lines developed by other breeding programs. Jenkins and Wilson (1996) reviewed articles indicating that the absence of nectaries on leaves and flowers confer resistance to tarnished plant bug (Lygus lineolaris Palisot de Beauvois).

Arkot 9406ne was derived from a 1994 cross between La. 850082FN (Calhoun et al., 1994) and Ark 8726–22–01, a high glancing (possessing gossypol glands in calyx lobes) breeding line developed from the cross of La. HG-063 (Jones et al., 1988) by Miscot 8506 (Bourland et al., 1997a). Within F2 populations grown at Southeast Branch Station at Rohwer, AR, in 1996, bolls from visually superior individual plants were harvested and bulked. Plants derived from F3 seeds were selected using general procedures of Bird (1982) to produce seeds for F4 progenies grown in 1997. A progeny designated as 9406–15 was among the ones promoted and tested in replicated strain tests in 1998 and 1999. Individual plant selections from the F6 generation of 9405–15 were evaluated as progenies in 2000. One of these selections was Arkot 9406ne (tested as 9406–15–04). Arkot 9406ne was evaluated in replicated strain tests in Arkansas (15 tests), Georgia (2 tests), and Mississippi (2 tests) from 2001 through 2004. The replicated tests included ‘PSC 355’ and ‘SG 105’ as checks.

Arkot 9605ne was derived from a 1996 cross between Ark 8604–01–13 and NLBGP8PD23S-1–93, a nectariless breeding line developed at Texas A&M University. Ark 8604–01–13 is a breeding line developed from a cross of Miscot 7918 (Bourland and White, 1989a) and Miscot 7803–52 (Bourland and White, 1989b). Arkot 9631ne was derived from a 1996 cross between Arkot 8110 (Bourland et al., 1997b) and MD51ne (Meredith, 1993). Individual plants were selected from the respective F2 populations grown at the Northeast Research and Extension Center at Keiser, AR in 1998. Seed from individual plant selections were evaluated as progenies (designated as 9605–17 and 9631–19) in 1999, 2000, and 2001 at Keiser and Rohwer. Seed from a second cycle of individual plant selections (made from the F3 generation of these two progenies grown at Keiser in 2001) were evaluated in 2002. Two of these selections produced Arkot 9605ne (tested as 9605–17–06) and Arkot 9631ne (tested as 9631–18–07). The two lines were compared to PSC 355 and SG 105 in replicated strain tests in Arkansas (7 tests), Georgia (1 test), and Mississippi (2 tests) in 2003 and 2004.

Lint yields of Arkot 9406ne were equal to, or greater than, yields of at least one check cultivar in each of the 19 tests conducted. Lint fraction, plant height, and fiber properties (except for lower fiber elongation) of the three nectariless lines were similar to yields of Arkot 9406ne and the check cultivars. Lint fraction of Arkot 9406ne was 4% greater than SG 105 in 2004, and Arkot 9631ne both displayed an average lint fraction of 1.9% greater than SG 105. In 2004, marginal bract trichome density of the three nectariless lines was significantly less than PSC 355. Bract size (circumference and length) of each of the three lines was statistically equal to PSC 355 and significantly less than SG 105.

The three nectariless lines have displayed resistance to tarnished plant bug and certain diseases, indicated by fewer damaged flowers in a 2004 field test. All three lines were significantly more resistant than SG 105 to seedling disease (caused by Rhizoctonia solani Kühn). In the 2002 National Fusarium Wilt Test at Tallassee, AL, resistance to Fusarium wilt [caused by Fusarium oxysporum f. sp. vasinfectum (Atk.) Snyder & Hans.] was equal to SG 105 in resistance to seedling wilt. Resistance to the multiple race of bacterial blight, Xanthomonas campestris pv. malvacearum (Smith) Dye, that has caused yield losses in the southern crop belt for and after field inoculations with the pathogen.

The combinations of yield adaptation, fiber properties, specific host plant resistance traits along with the nectariless trait make these lines valuable to cotton breeders. Development of the three lines was supported in part by funding from Cotton Incorporated. Small quantities of Arkot 9406ne, Arkot 9605ne, and Arkot 9631ne were retained to provide line material for subsequent efforts.

Unless specifically approved by the Arkansas Agricultural Experiment Station, the lines may not be used as recurrent parents in a breeding program.

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References