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NOTICE OF RELEASE OF ARKOT 9111 GERMPLASM LINE OF COTTON

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The Arkansas Agricultural Experiment Station announces the release of a noncommercial breeding line of cotton, *Gossypium hirsutum* L., designated Arkot 9111, which was developed using the generalized procedures outlined by Bourland (2004). Arkot 9111 was derived from a 1991 cross between 'H1330' (Bourland, 1996) and M-725 (Shepherd et al., 1996). M-725 is a root-knot nematode (*Meloidogyne incognita* ([Kofoid & White] Chitwood)) resistant germplasm line developed with 'Coker 310' as its recurrent parent.

An individual plant selected from the F_2 population of this cross (grown in 1992 at Southeast Branch Experiment Station near Rohwer, AR) produced the progeny designated as 9111-57. This first-cycle selection was evaluated as a progeny row in 1993, then promoted and tested in replicated strain tests in 1994 and 1995. A 1996 individual plant selection made from 9111-57 (F_5 generation) produced Arkot 9111 (tested as 9111-57-20).

Arkot 9111 was included in 29 replicated field tests at four Arkansas Agricultural Research Station sites in the Mississippi River Delta and compared to 'ST474' in 1997-2000 and 'PSC 355' in 2001-2003 (Table 1). Lint yields of Arkot 9111 were significantly greater than the check cultivar in six of the tests but also significantly less than the check cultivar in six other tests. Its yields tended to be relatively better at north Arkansas sites than at south Arkansas sites. Plant height and fiber elongation of the line were similar to the check cultivars. Arkot 9111 tended to have slightly higher lint fraction, lower micronaire (less coarse fiber), longer fiber length, and lower fiber strength than the check cultivars. Except for slightly lower fiber strength, fiber quality of Arkot 9111 may be considered better than that of ST474 or PSC355.

Table 1. Performance of 9111-57-20 in Arkansas test sites from 1998 through 2003.

Years	Loc[1]	Line/-signifcance[2]	Lint yield	Lint fract	Plant ht	Micro-naire	Len-gth	Unif. index	Stren-gth	Elon-gation
			lb/a	%	cm		in.	%	g/tex	%
2003	Man.	9111-57-20	1140	42.0	82	4.4	1.17	84.8	31.0	8.9
2003	Man.	Check	1100	41.3	81	4.8	1.14	83.9	30.2	9.5
2003	Man.	H,E,L	0,1,0	0,1,0	0,1,0	0,1,0	0,1,0	0,1,0	0,1,0	0,0,1
1999-2003	K-irr	9111-57-20	1256	40.8	101	4.7	1.15	85.1	30.3	8.5
1999-2003	K-irr	Checks	1095	39.0	96	4.9	1.14	84.7	31.3	9.0
1999-2003	K-irr	H,E,L	3,2,0	1,4,0	1,4,0	0,5,0	0,5,0	0,5,0	0,3,2	0,4,1
2001-2003	K-ni	9111-57-20	866	42.1	71	4.3	1.11	83.9	30.7	8.5
2001-2003	K-ni	Checks	762	39.6	64	4.8	1.11	84.5	33.4	8.7
2001-2003	K-ni	H,E,L	1,2,0	2,1,0	1,2,0	0,2,1	0,3,0	0,3,0	0,2,1	1,1,1
1998-2003	Clk	9111-57-20	838	40.1	128	4.3	1.15	85.0	29.3	8.3
1998-2003	Clk	Checks	903	37.5	130	4.4	1.14	84.9	29.7	8.4
1998-2003	Clk	H,E,L	1,4,0	2,3,0	0,3,0	0,4,1	0,5,0	0,5,0	0,5,0	0,5,0
1997-2003	M-ir	9111-57-20	1098	40.2	129	4.8	1.15	84.9	28.8	8.3
1997-2003	M-ir	Checks	1196	39.9	129	5.0	1.13	84.0	29.4	8.4
1997-2003	M-ir	H,E,L	0,3,3	0,6,0	0,3,1	0,4,2	1,5,0	2,4,0	0,6,0	1,4,1

2001-2003	M-ni	9111-57-20	690	40.4	103	4.8	1.13	84.3	31.6	8.7
2001-2003	M-ni	Checks	815	39.7	98	4.9	1.09	83.8	33.0	9.0
2001-2003	M-ni	H,E,L	0,1,2	0,3,0	1,2,0	0,3,0	0,3,0	0,3,0	0,3,0	0,3,0
1997-2003	Roh	9111-57-20	1439	40.5	99	4.8	1.15	84.7	29.3	8.0
1997-2003	Roh	Checks	1536	40.9	104	5.0	1.12	84.3	29.8	8.0
1997-2003	Roh	H,E,L	1,4,1	0,6,0	0,3,0	0,5,1	3,3,0	1,5,0	0,6,0	1,4,1
1997-2003	All	9111-57-20	1086	40.6	105	4.6	1.14	84.7	29.8	8.3
1997-2003	All	Checks	1123	39.7	105	4.9	1.12	84.3	30.4	8.4
1997-2003	all	H,E,L	6,17,6	5,24,0	3,18,1	0,24,5	4,25,0	3,26,0	0,26,3	3,21,5
[1]Locations included irrigated tests at Manila (Man), Keiser (K-ir), Clarkedale (C-ir), Marianna (M-ir) and Rohwer (R-ir) plus non-irrigated tests at Keiser (K-ni) and Marianna (M-ni).										
[2]H,E,L = no. of tests that line was significantly higher (H), equal to (E) and lower (L) than check cultivars.										

Arkot 9111 had higher lint index (more lint per seed), higher seed index (larger seed) and produced more fibers per seed than the check cultivars (Table 2). Compared to these check cultivars, yield production of Arkot 9111 appears to be relatively more dependent on increased lint per seed than on increased number of seed/acre. According to Lewis et al. (2000), this combination of yield components should contribute to more stable yield production.

Table 2. Yield components for 9111-57-20 in Arkansas test sites from 1998 through 2003.

Years	Loc.[1]	Line/Significance[2]	No. of seed/acre	Lint index	Seed index	Fibers/seed
			mil	g	g	ca. no.
2003	Man.	9111-57-20	6.605	7.8	10.6	18163
2003	Man.	Check	7.345	6.8	9.5	14882
2003	Man.	H,E,L	0,1,0	1,0,0	1,0,0	1,0,0
1999-2003	K-irr	9111-57-20	7.437	7.6	10.8	16914
1999-2003	K-irr	Checks	7.583	6.5	9.9	14087
1999-2003	K-irr	H,E,L	0,4,1	4,1,0	3,2,0	3,2,0
2001-2003	K-ni	9111-57-20	5.532	6.9	9.9	17309
2001-2003	K-ni	Checks	5.587	6.3	9.8	13668
2001-2003	K-ni	H,E,L	0,3,0	1,2,0	1,2,0	3,0,0
1998-2003	Clk	9111-57-20	5.395	7.2	10.5	17410
1998-2003	Clk	Checks	6.446	6.2	10.0	14735
1998-2003	Clk	H,E,L	0,5,0	3,2,0	1,4,0	3,2,0
1997-2003	M-ir	9111-57-20	6.350	7.7	11.4	16533
1997-2003	M-ir	Checks	7.794	7.0	10.5	14711
1997-2003	M-ir	H,E,L	0,3,2	2,3,0	2,3,0	2,3,0
2001-2003	M-ni	9111-57-20	4.529	7.6	11.1	16758
2001-2003	M-ni	Checks	5.625	6.8	10.3	15460
2001-2003	M-ni	H,E,L	0,1,2	2,1,0	2,1,0	2,1,0
1997-2003	Roh	9111-57-20	8.376	7.5	11.2	16028
1997-2003	Roh	Checks	9.745	7.0	10.4	15046
1997-2003	Roh	H,E,L	0,3,2	1,4,0	2,3,0	1,3,1
1997-2003	All	9111-57-20	6.466	7.4	10.9	16844

1997-2003	All	Checks	7.364	6.6	10.1	14635
1997-2003	all	H,E,L	0,20,7	14,13,0	12,15,0	15,11,1
[1]Locations included irrigated tests at Manila (Man), Keiser (K-ir), Clarkedale (C-ir), Marianna (M-ir) and Rohwer (R-ir) plus non-irrigated tests at Keiser (K-ni) and Marianna (M-ni).						
[2]H,E,L = no. of tests that line was significantly higher (H), equal to (E) and lower (L) than check cultivars.						

Expect for leaf pubescence, Arkot 9111 is morphologically equal to ST474 and PSC355. Over six tests, leaf pubescence of Arkot 9111 averaged 3.8 compared 5.6 for the hairy-leaf check (either ST474 or PSC355) based on a rating scale of 1 (smooth leaf) to 7 (very hairy) (Bourland et al., 2003). Arkot 9111 had significantly lower leaf pubescence ratings than the hairy-leaf check cultivar (either ST474 or PSC355) in five of the six tests.

During selection, Arkot 9111 was screened for resistance to races 1, 2, 7, and 18 of *Xanthomonas campestris* pv. *malvacearum* (Smith) Dye, the causal agent of bacterial blight. Resistance to these races conveys resistance to all known U.S. races of this pathogen. In subsequent tests, the line did not exhibited symptoms of bacterial blight even after field inoculations with the pathogen. In the Regional Cotton Fusarium Wilt Test at Tallassee, AL, resistance of Arkot 9111 to fusarium wilt [caused by *Fusarium oxysporum* Schlect. F. sp. *vasinfectum* (Atk.) Snyd. & Hans.] was not different from the susceptible check (Table 3). In field tests, response of Arkot 9111 to Verticillium wilt (caused by *Verticillium dahliae*, Kleb.) and to thrips (*Thrips* spp.) was equal to that of ST474 or PSC355. Under high infestation of thrips in 2000, yield of Arkot 9111 was much higher than yield of ST474. In 2002 and 2003 tests, Arkot 9111 showed some degree of resistance to galling by root knot nematode.

Table 3. Host plant resistance measurements for 9111-57-20 in 1999 through 2003

	Vert. wilt at Clarkedale		**Fus. wilt at, Tallahassee, AL**		**Thrips at Keiser[1]**		**Root knot nematode[2]**		
	1999	**2002**	**2001**	**2002**	**1999**	**2000**	**2002**	**2003**	**2003**
Strain	**Wilted plants**		**Wilted plants**		**Unt/trt yield**		**Galling**	**Galling**	**Eggs/plant**
	ca.%	ca.%	%	%	%	%	index	index	no.
9111-57-20	13	25	58	31	80	99	3.51	3.7	33303
ST474	21	.	.	.	81	54	4.91	.	.
PSC355	.	28	.	.	.	.	.	.	.
Rowden	.	.	45	42	.	.	.	.	.
M-315	.	.	7	4	.	.	.	.	.
LA887	.	.	.	.	.	.	2.88	.	.
KC355	.	.	.	.	.	.		4.8	49386
M240					.	.		1.4	619
					.	.			
LSDO. 10	ns	ns	16	22	13	15	0.71	0.6	19469

[1]With cooperation of Glenn Studebaker, 9111-57-20 was evaluated for resistance to thrips (planted with and without systemic insecticide).

[2]Lines were evaluated for galling (low=good) by David Caldwell, Red River, LA in 2002, and for galling and eggs/plant by Terry Kirkpatrick in Drew County, Arkansas in 2003.

The combination of adaptation to the Mississippi River Delta (particularly north Delta), good fiber properties, and specific host plant resistance traits make this line valuable to cotton breeding programs. Development of Arkot 9111 was supported in part by funding from Cotton Incorporated. Small quantities of Arkot 9111 seed may be obtained for breeding purposes from F.M. Bourland, P.O. Box 48, Northeast Research and Extension Center, Keiser, AR 72351. 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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