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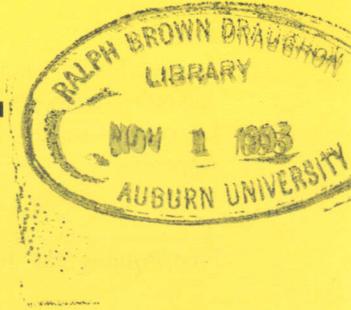
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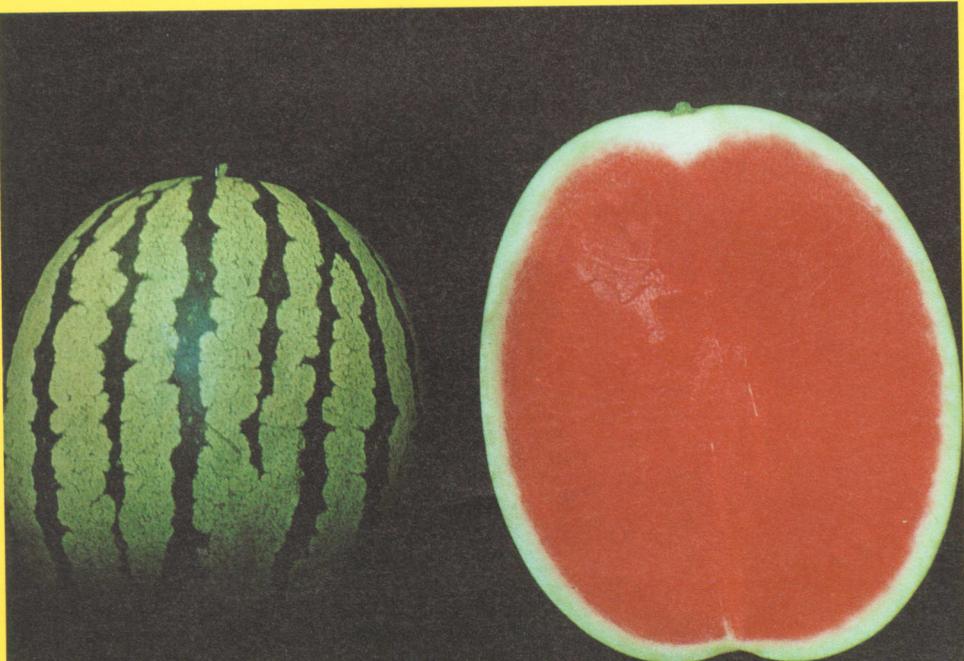
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AU-Sweet Scarlet



**A Disease
Resistant
High Quality
Watermelon
with Dark Red Flesh**



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First Printing 3M, July 1993

Information contained herein is available to all persons without regard to race, color, sex, or national origin.

AU-SWEET SCARLET: A DISEASE RESISTANT HIGH QUALITY WATERMELON WITH DARK RED FLESH

J.D. NORTON, G.E. BOYHAN, D.A. SMITH, AND B.R. ABRAHAMS¹

AU-SWEET SCARLET is a multiple disease-resistant watermelon (*Citaulus lanatus* [Thumb] Matsum of Nakai) variety adapted to growing conditions in the southeastern United States. It has resistance to race 2 anthracnose (*Colletotrichum obiculare* [Berk and Mont.] Ark.) fusarium wilt (*Fusarium oxysporium* [f. sp. *niveum* (E.F.Sm.) Snyder and Hans.]), gummy stem blight (*Didymella bryoniae* [Auersw. Rhem]).

Disease is a major factor limiting production of watermelon in the southeastern United States. Anthracnose, fusarium wilt, and gummy stem blight are three of the most serious diseases. Severe crop losses and reduced yields of melons have resulted from these diseases in certain fields in Alabama. Although the damage seems to be more widespread in the Gulf Coast area, there have been frequent reports of damage in Central and North Alabama.

Although satisfactory control of anthracnose and gummy stem blight may be accomplished with the proper application of fungicides during normal weather conditions, no control measure is effective during periods of high humidity and excessive rainfall. Furthermore, the three leading varieties, Charleston Gray, Jubilee, and Crimson Sweet are not resistant to race 2 anthracnose or gummy stem blight (1,2). The only practical control now available for fusarium wilt is varieties that are inherently resistant to the pathogen.

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VARIETY DEVELOPMENT

The discovery that certain plant introductions (PI 189225 and PI 271778) were resistant to race 2 anthracnose (8) and gummy stem blight (6,7) led to the initiation of an Alabama Agricultural Experiment Station watermelon breeding program to develop multiple disease-resistant breeding lines that produce high yields of excellent quality fruit. Two of these lines AU-1 and AU-3, were released as AU-Jubilant and AU-Producer, respectively (4). The AW-1001CSY breeding line was released as AU-Golden Producer (3). AW-82-50CS was released as AU-Sweet Scarlet (3).

ORIGIN AND BREEDING HISTORY

AU-Sweet Scarlet was developed by the Department of Horticulture, and the Alabama Agricultural Experiment Station, Auburn University. It has multiple disease resistance to race 2 anthracnose, downy mildew, fusarium wilt, and gummy stem blight, as shown in Table 1. Crosses, backcrosses, and selfs were utilized, originating with the crosses Crimson Sweet x PI 189225, All Sweet x PI 362515, and Calhoun Gray x W.R. Peacock as shown in the pedigree, in the Figure 1. Resistance to gummy stem blight and race 2 anthracnose was incorporated into the breeding lines from plant introductions by a backcross program. Progeny were selected in a screening program that utilized an incubation chamber and greenhouse to eliminate susceptible plants from the population (1,3,4,5,6,7,8). Multiple disease resistance of AU-Sweet Scarlet has been excellent in field plantings.

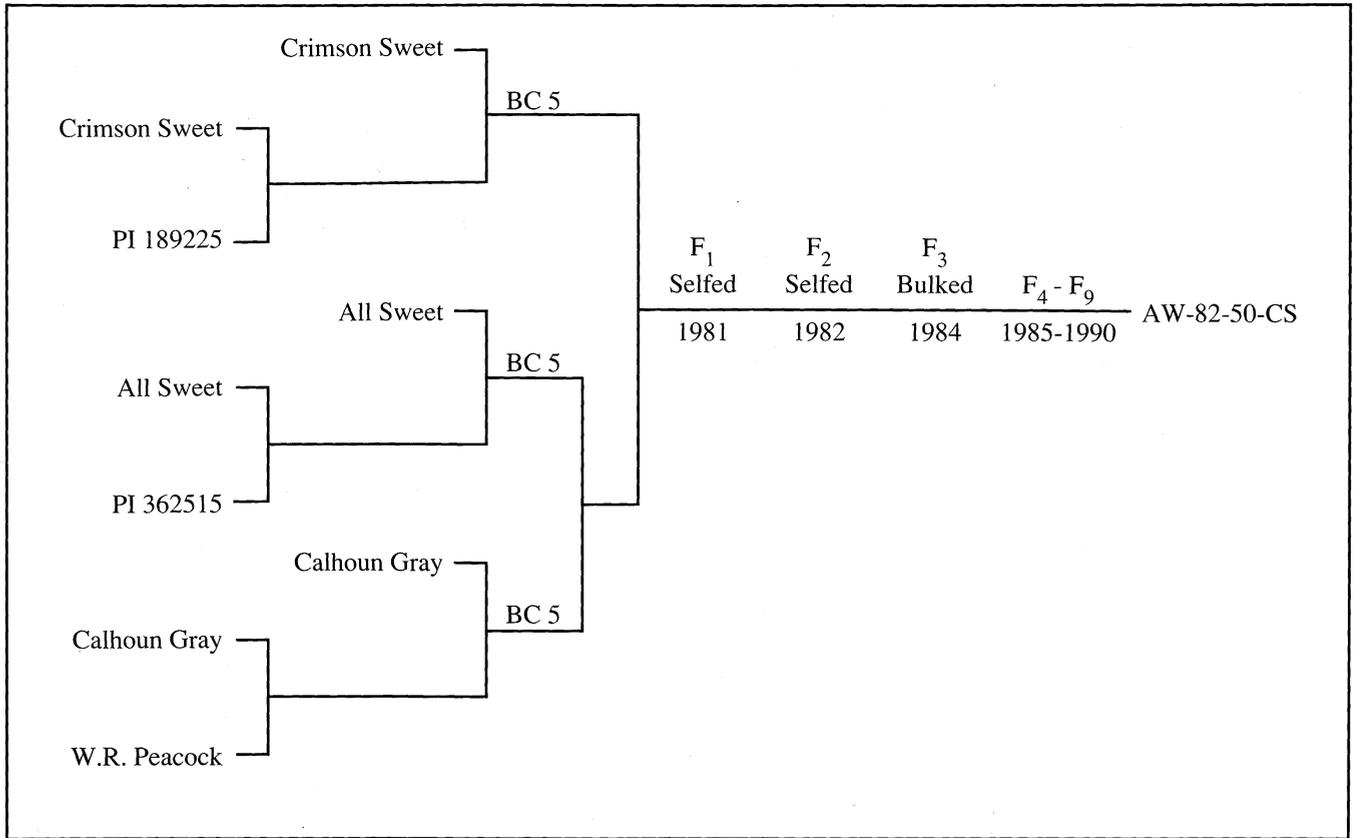
TABLE 1. DISEASE INDEX RATINGS FOR RESISTANCE TO ANTHRACNOSE, FUSARIUM WILT, AND GUMMY STEM BLIGHT

Cultivar	Disease index ¹		
	Anthrachnose race 2	Fusarium wilt	Gummy stem blight
Charleston Gray	5b	3c	5b
Crimson Sweet	5b	2b	5b
Jubilee	5b	3c	5b
AU-Producer	2a	1a	2a
AU-Golden Producer	2a	1a	2a
AU-Sweet Scarlet	2a	1a	2a

¹Disease index: 0 = no injury, 1 = 1-20%, 2 = 21-40%, 3 = 41-60%, 4 = 61-80%, and 5 = 81-100% diseased plants.

²Mean separation within columns by Duncan's multiple Range Test, 5% level.

[5]



Pedigree of 'AU-Sweet Scarlet' watermelon.

Selections were made annually of disease resistant seedlings and high yield of excellent quality fruit. Resistance to gummy stem blight and race 2 anthracnose was secured from PI 189225 and PI 362515. Resistance to fusarium wilt was obtained from Crimson Sweet, All Sweet, Calhoun Gray, W.R. Peacock, and the plant introductions.

AU-Sweet Scarlet has been grown as AW-82-50CS in trials at the E.V. Smith Research Center in Shorter and statewide at a number of Alabama Agricultural Experiment Station research sites. It also has been grown in Southern Cooperative Watermelon Trials in other Southern states, and in demonstration plantings by commercial growers.

DISEASE RESISTANCE

AU-Sweet Scarlet is resistant to downy mildew, race 2 anthracnose, and fusarium wilt, as shown in Table 1. Resistance to gummy stem blight, and race 2 anthracnose are significantly higher in AU-Sweet Scarlet than for Crimson Sweet and the other varieties.

AU-Sweet Scarlet was developed from a program of backcrossing and inbreeding to obtain resistance to anthracnose, downy mildew, fusarium wilt, and gummy stem blight. Crosses, backcrosses, and selfs were utilized, originating with the crosses Crimson Sweet x PI 189225, All Sweet x PI 362515, and Calhoun Gray x W.R. Peacock as shown in the pedigree, in Figure 1. Following the crosses, a backcrossing and disease screening program was followed with selection for disease resistant seedlings and high yield of excellent quality fruit. Results of laboratory, greenhouse and field tests are given in Tables 1 and 2 and Appendix Tables 1, 2, and 3.

FRUIT CHARACTERISTICS

AU-Sweet Scarlet was found to be superior to Charleston Gray, Crimson Sweet, and Jubilee in quality, and disease resistance, as shown in Tables 1 and 2 and Appendix Tables 1 and 2 .

Yield of fruit was comparable to that of Charleston Gray, Crimson Sweet, and Jubilee, as shown in Table 2 and Appendix Tables 1 and 2. Fruit weight compares favorably with other varieties. Rind firmness was higher for AU-Sweet Scarlet than for Crimson Sweet, Jubilee, and AU-Producer, as shown in Table 8. A darker flesh color (46A²) was observed for AU-Sweet Scarlet than for AU-Producer (46B²) and Crimson Sweet (46C²).

Taste tests indicated that the edible quality (color, texture and taste) was higher in AU-Sweet Scarlet than Charleston Gray, Crimson Sweet, Jubilee

²RHS Colour Chart, The Royal Horticultural Society, London.

Table 2. Yield and Fruit Characteristics of Varieties of Watermelons, Four Alabama Locations, 1988-1991

Variety	Yield/ acre	Fruit weight	Soluble solids ¹	Quality preference ²	Width/ length ratio	Rind thickness	Rind firmness ³	Days to maturity	Rind color
	Lb.	Lb.	Pct.			In.			
Crimson Sweet	22,481	18.0	10.4	8.0	.71	.86	20.0	75	Green striped
Jubilee	16,594	21.3	9.6	7.9	.45	1.00	19.1	90	Green striped
AU-Producer	22,513	19.0	10.8	8.2	.85	.75	25.0	75	Green striped
AU-Golden Producer	20,173	18.8	10.8	8.2	.85	.75	22.7	75	Green striped
AU-Sweet Scarlet	19,120	19.3	11.4	9.0	.87	.50	23.6	75	Green striped

¹Total soluble solids determined with Bausch and Lomb refractory, 0-25 percent scale.

²Response index: 9-10 = excellent, 7-8 = good, 5-6 = acceptable, and below 5 = unacceptable.

³Puncture test performed with Instron 1122 Instrument, 1-cm² Magnus Taylor probe. Puncture made at 5-cm intervals beginning at stem end.

and AU-Producer (Appendix Table 3). Mean total soluble solids of AU-Sweet Scarlet flesh was higher than for the other cultivars (Table 2 and Appendix Table 2).

The fruit of AU-Sweet Scarlet are round to oblong-round in shape with few culls. Melons are similar to AU-Producer in size. Sizes are mostly in the 19.8-30.9 lb range but weights of 35 lb. are not uncommon. The rind color is light green with dark green stripes. The flesh is bright red (46A²), firm but not tough. Rind and flesh characteristics make the melons well-adapted to shipping.

SUMMARY

AU-Sweet Scarlet is superior to the current varieties in quality and disease resistance and satisfactory in yield. AU-Sweet Scarlet is multiple disease resistant, with resistance to anthracnose, fusarium wilt, and gummy stem blight. The variety is being released to broaden the base of high quality, disease resistant melons available to growers in the southern United States. This high quality fruit with intense bright red color should be accepted in commercial markets, roadside markets, and for home gardens. Because of AU-Sweet Scarlet's early maturity, it fits well into the commercial production program to lengthen the season for any given production area or grower.

PEST CONTROL

Successful multiple disease resistance is essential for melon production, however, good grower production practices are also important in the control of insects, diseases, and nematodes. Rotation of crops, sanitation, and destruction of weed hosts will greatly reduce pest problems. In addition, a spray schedule may be necessary to control insects and diseases, particularly during periods of high humidity and rainfall.

AVAILABILITY OF SEED

An exclusive release of AU-Sweet Scarlet was made to Hollar and Company, Inc., Rocky Ford, Colorado 81067, for production and marketing of seed. Growers and home gardeners can find high quality seed at wholesale and retail outlets.

ACKNOWLEDGEMENTS

We gratefully acknowledge the assistance of J.S. Bannon and W.T. Hogue, E.V. Smith Research Center, Shorter, AL; J.A. Pitts and K.C. Short, Chilton Area Horticulture Substation, Clanton, AL; M.H. Hollingsworth, North Alabama Horticulture Substation, Cullman, AL; J.T. Eason and M.E. Ruf, Sand Mountain Substation, Crossville, AL; E.L. Carden and N.R. McDaniel,

Gulf Coast Substation, Fairhope, AL; and H.E. Ivey and Larry Wells, Wiregrass Substation, Headland, AL; in increasing seed and conducting cultivar and breeding line trials.

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APPENDIX

APPENDIX TABLE 1. AVERAGE YIELD PER ACRE OF WATERMELON
VARIETIES AT FOUR LOCATIONS IN ALABAMA, 1991-1992

Variety	Clanton	Cullman	Fairhope	Headland
	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>
Crimson Sweet	28,502	23,213	15,164	23,045
Jubilee	18,910	17,963	14,483	15,018
AU-Producer	28,746	22,057	17,252	21,998
AU-Golden Producer	24,318	18,094	13,412	24,869
AU-Sweet Scarlet	24,875	17,407	16,870	17,330

APPENDIX TABLE 2. YIELD, FRUIT WEIGHT, AND SOLUBLE SOLIDS OF WATERMELON
CULTIVARS IN SOUTHERN COOPERATIVE WATERMELON TRIAL, 1989-1990

Cultivar	Yield/ acre	Fruit weight	Soluble solids
	<i>Lb.</i>	<i>Lb.</i>	<i>Pct.</i>
Charleston Gray	42,392	8.7	10.5
Jubilee	35,542	9.7	10.1
AU-Sweet Scarlet	35,460	8.8	11.4

APPENDIX TABLE 3. RESPONSE OF TASTE PANEL TO QUALITY OF WATERMELON
CULTIVARS AND BREEDING LINES, AUBURN, AL, 1988¹

Cultivar or breeding line	Color	Texture	Flavor	Average
Charleston Gray	7.5 ¹	7.8 ¹	7.1	7.5 ¹
Jubilee	7.6	7.9	7.3	7.6
Crimson Sweet	7.8	8.0	8.0	7.9
AU-Producer	7.8	8.1	8.4	8.1
AU-Sweet Scarlet	9.0	9.0	9.0	9.0

¹Response index: 9-10 = excellent, 7-8 = good, 5-6 = acceptable, below 5 = unacceptable.

APPENDIX TABLE 4. FLESH COLOR OF WATERMELON CULTIVARS AND BREEDING LINES, AUBURN, AL, 1988¹

Cultivar or breeding line	Hearts			Subseed		
	L	a	b	L	a	b
Charleston Gray	39.10	30.95	15.25	38.84	27.17	14.73
Jubilee	41.77	29.46	15.15	38.84	27.17	14.73
Crimson Sweet	38.27	28.58	14.60	38.19	23.97	14.60
AU-Producer	43.55	31.05	15.33	39.92	29.75	14.73
AU-Sweet Scarlet	44.62	31.25	15.40	40.54	30.45	16.86

¹Hunter color difference values standardized to red plaque; L = 68.7, a = 23.0, and b = 9.4 where L = total light reflectance, a = red, and b = yellow.

APPENDIX TABLE 5. RIND FIRMNESS (PUNCTURE TEST) OF WATERMELON CULTIVARS AND BREEDING LINES, AUBURN, AL, 1988¹

Cultivar	Top side			Ground side			Avg.
	Stem end	Middle	Blossom end	Stem end	Middle	Blossom end	
	Kg ²	Kg	Kg	Kg	Kg	Kg	Kg
Charleston Gray	27.8	26.9	17.0	26.7	25.4	15.7	23.25
Jubilee	23.4	22.6	12.5	22.8	21.5	11.6	19.10
Crimson Sweet	24.6	23.5	13.7	23.4	22.6	12.3	20.02
AU-Producer	27.4	26.5	15.5	26.3	25.2	15.1	22.67
AU-Sweet Scarlet	28.2	27.4	16.1	27.6	26.5	15.8	23.60

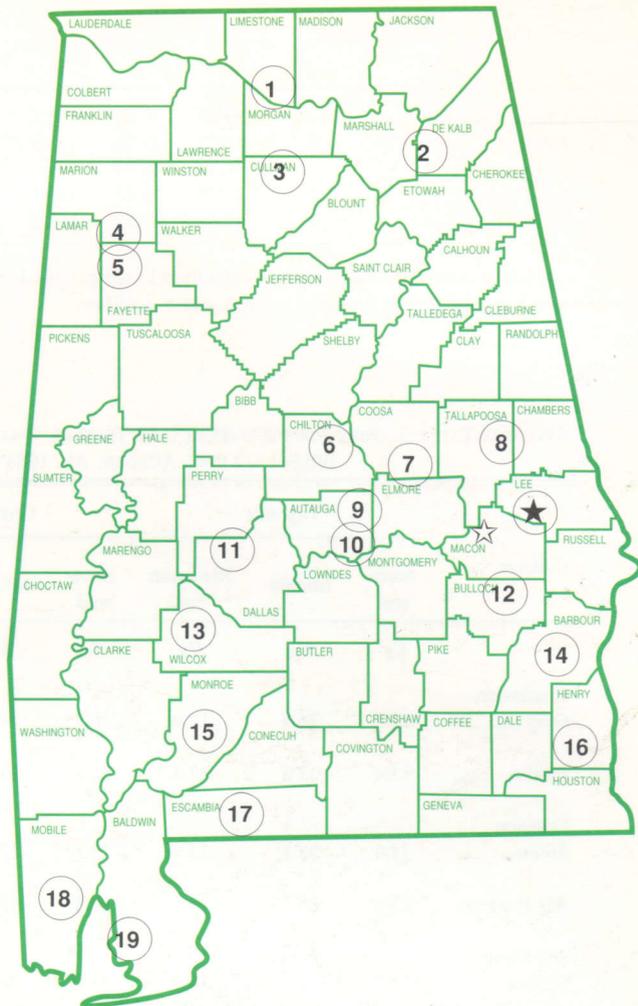
¹Puncture test performed with Instron 1122 Instrument, 1 cm Magnus Taylor probe. Puncture made at 5 cm intervals at stem end.

²One Kg equals 2.2 lb.

Alabama's Agricultural Experiment Station System

AUBURN UNIVERSITY

With an agricultural research unit in every major soil area, Auburn University serves the needs of field crop, livestock, forestry, and horticultural producers in each region in Alabama. Every citizen of the state has a stake in this research program, since any advantage from new and more economical ways of producing and handling farm products directly benefits the consuming public.



Research Unit Identification

- ★ Main Agricultural Experiment Station, Auburn.
- ☆ E. V. Smith Research Center, Shorter.

1. Tennessee Valley Substation, Belle Mina.
2. Sand Mountain Substation, Crossville.
3. North Alabama Horticulture Substation, Cullman.
4. Upper Coastal Plain Substation, Winfield.
5. Forestry Unit, Fayette County.
6. Chilton Area Horticulture Substation, Clanton.
7. Forestry Unit, Coosa County.
8. Piedmont Substation, Camp Hill.
9. Forestry Unit, Autauga County.
10. Prattville Experiment Field, Prattville.
11. Black Belt Substation, Marion Junction.
12. The Turnipseed-Ikenberry Place, Union Springs.
13. Lower Coastal Plain Substation, Camden.
14. Forestry Unit, Barbour County.
15. Monroeville Experiment Field, Monroeville.
16. Wiregrass Substation, Headland.
17. Brewton Experiment Field, Brewton.
18. Ornamental Horticulture Substation, Spring Hill.
19. Gulf Coast Substation, Fairhope.