Circular 310
March 1993
Alabama Agricultural Experiment Station
Lowell T. Frobish, Director
Auburn University
Auburn University, Alabama

AU-Golden Producer: A High Quality, Disease Resistant Watermelon for the South

CONTENTS

First Printing 3.5M, March 1993

AU-GOLDEN PRODUCER: A HIGH QUALITY, DISEASE RESISTANT WATERMELON FOR THE SOUTH

J.D. Norton, G.E. Boyhan, D.A. Smith, and B.R. Abrahams[1]

AU-GOLDEN Producer is a multiple disease-resistant watermelon variety adapted to growing conditions in the Southeastern United States. It has resistance to anthracnose (*Colletotrichum laginarium*, race 2), *Fusarium* wilt (*Fusarium oxysorium niveum*), downy mildew (*Pseudoperonospora cubensis*), and gummy stem blight (*Didymella bryoniae*).

Disease is a major factor limiting production of watermelon in Alabama. Anthracnose, *Fusarium* wilt, and gummy stem blight are three of the most serious diseases of watermelons. 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 organic 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 (*1,2,8*).

VARIETY DEVELOPMENT

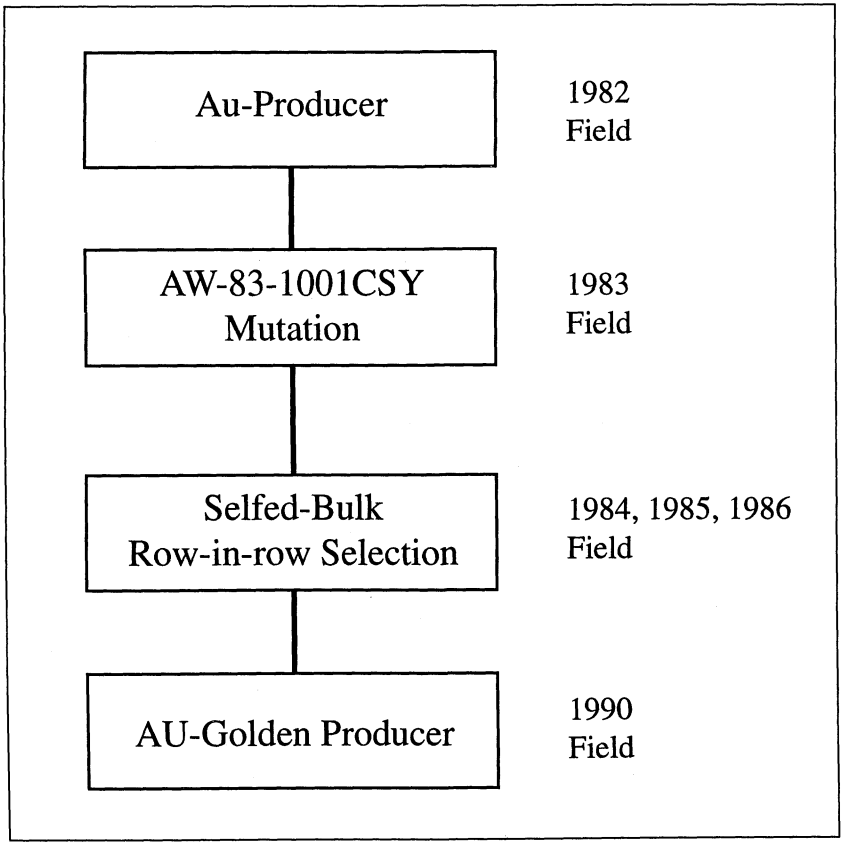
The discovery that certain plant introductions (PI 189225 and PI 271778) were resistant to race 2 anthracnose (*7*) and gummy stem blight (*5,6*) led to the initiation of an Alabama Agricultural Experiment Station watermelon breeding program to develop multiple disease-resistant breeding lines that produce 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 is being released as AU-Golden Producer.

[1]Respectively, Professor, Research Associate, former Associate Professor, and Technician of Horticulture.

ORIGIN AND BREEDING HISTORY

AU-Golden Producer was developed in the Department of Horticulture at Auburn University. It originated from a mutant plant found in an isolated planting of breeder seed of AU-Producer (see figure). AU-Golden Producer has multiple disease resistance to anthracnose (races 1 and 2), downy mildew, *Fusarium* wilt, and gummy stem blight. Resistance to gummy stem blight and race 2 anthracnose, secured from PI 189225, was incorporated into the breeding line AW-76-3 (AU-3) through a screening program that utilized an incubation chamber and greenhouse to eliminate susceptible plants from the population (see figure) (*1,3,5,6*). Resistance to downy mildew and Fusarium wilt was secured from both parents.

AU-Golden Producer has been grown as AW-83-1001CSY in trials at the E.V. Smith Research Center, Shorter, and at a number of Alabama Agricultural Experiment Station research facilities throughout the State, in the Southern Cooperative Watermelon Trials in other southern states, and in demonstration plantings by commercial growers.



Pedigree of AU-Golden Producer

DISEASE RESISTANCE

AU-Golden Producer has been rated for resistance to race 2 anthracnose, *Fusarium* wilt, and gummy stem blight in tests at locations in Alabama and other southern states (Table 1). Resistance to race 2 anthracnose and gummy stem blight was incorporated into the breeding line through a screening program that utilized an incubation chamber and greenhouse to eliminate susceptible plants from the populations (*1,3,5,6*). Multiple disease resistance of AU-Golden Producer 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]		
	Anthracnose race 2	Fusarium wilt	Gummy stem blight
Charleston Gray	5	3	5
Crimson Sweet	3	2	5
Jubilee	3	3	5
AU-Producer	2	1	2
AU-Golden Producer	2	1	2

[1]Disease index: 0 = no injury to 5 = all plants severely injured.

FRUIT CHARACTERISTICS

AU-Golden Producer was found to be superior to Crimson Sweet (a similar cultivar) in yield, quality, and disease resistance and comparable to that of AU-Producer.

Yield of fruit was higher for AU-Golden Producer than for Crimson Sweet, Jubilee, and Charleston Gray and comparable to that of AU-Producer (Table 2).

The fruit of AU-Golden Producer are round to oblong-round in shape with few culls. Fruit weight was greater for AU-Golden Producer than for Crimson Sweet and compares favorably with other cultivars (Table 2). Sizes are mostly in the 20 to 30-pound range but weights of 35 pounds are not uncommon. The rind is smooth, hard and tough, and measures about 3/4-inch thick. The rind color is light green with dark green stripes. The flesh is bright yellow-orange, firm but not tough. Rind and flesh characteristics make the melons well-adapted to shipping. Rind firmness was higher for AU-Golden Producer than for Crimson Sweet (Appendix Table 5). The flesh color of the fruit was a bright yellow orange (23A[2]).

Taste tests indicated that the edible quality (color, texture, and taste) was higher in AU-Golden Producer than Charleston Gray, Crimson Sweet, and Jubilee and similar to AU-Producer. Mean total soluble solids of AU-Golden Producer flesh was higher than for the other varieties (Table 2).

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

TABLE 2. YIELD AND FRUIT CHARACTERISTICS OF VARIETIES OF WATERMELONS, FIVE 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.*		
Charleston Gray	26,645	19.2	9.8	7.3	0.44	0.56	23.3	80	Gray, net
Crimson Sweet	23,213	18.0	10.4	8.0	.62	.86	20.0	75	Green striped
Jubilee	26,808	21.3	9.6	7.9	.43	1.00	19.1	90	Green striped
AU-Producer	26,108	19.0	10.8	8.2	.84	.75	25.0	75	Green striped
AU-Golden Producer	27,045	18.8	10.8	8.2	.84	.75	25.2	75	Green striped

[1]Total soluble solids determined with Bausch and Lomb refractometer, 0 - 25 percent scale.
[2]Response index: 9 - 10 = excellent, 7 - 8 = good, 5 - 6 = acceptable, and below 5 = unacceptable.
[3]Puncture test performed with Instron 1122 Instrument, 1-cm2 Magnus Taylor probe. Puncture made at 5-cm intervals beginning at stem end.

SUMMARY

AU-Golden Producer is superior to the current varieties of this type in yield, quality, and disease resistance and similar to that of AU-Producer. AU-Golden Producer is multiple disease resistant, with resistance to race 2 anthracnose, *Fusarium* wilt, and gummy stem blight. The variety is being released to broaden the base of high quality melons available to growers in the Southern United States. Because the AU-Golden Producer matures early, it fits well into the commercial production program to lengthen the shipping 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. Variety testing of AU-Golden Producer further documents that rotation of crops, sanitation, and destruction of weed hosts will greatly reduce pest problems in watermelons. In addition, a spray schedule may be necessary to control insects and diseases, particularly during periods of high humidity and rainfall, regardless of watermelon variety.

AVAILABILITY OF SEED

An exclusive release of AU-Golden Producer 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.

LITERATURE CITED

(*1*) NORTON, JOSEPH D. 1979. Inheritance of Resistance to Gummy Stem Blight in Watermelon. J. Amer. Soc. Hort. Sci. 14:630-632.

(*2*) _____, J.M. SNELL, H.M. BRYCE, C.C. CARLTON, AND M.H. HOLLINGSWORTH. 1983. Breeding Watermelons for Disease Resistance. Ala. Agr. Exp. Sta. Highlights of Agr. Res. Vol. 30, No. 2.

(*3*) _____, G.E. BOYHAN, B.R. ABRAHAMS, J.S. BANNON, J.A. PITTS, M.H. HOLLINGSWORTH, AND J.T. EASON. New Disease Resistant Watermelons Produced in AAES Research. Ala. Agr. Exp. Sta. Highlights of Agr. Res. Vol. 38, No. 4.

(*4*) _____, R.D. COSPER, D.A. SMITH, AND K.S. RYMAL. AU-Jubilant and AU-Producer: Quality, Disease-Resistant Watermelon Varieties for the South. Ala. Agr. Exp. Sta. Cir. 280.

(*5*) SOWELL, G.B., JR. 1975. An Additional Source of Resistance to Gummy Stem Blight in Watermelon. Plant Dis. Rptr. 59:413-415.

(*6*) _____, AND G.R. POINTER. 1962. Gummy Stem Blight Resistance of Introduced Watermelons. Plant Dis. Rptr. 46:883-885.

(*7*) _____, B.B. RHODES, AND J.D. NORTON. 1980. New Sources of Resistance to Watermelon Anthracnose. J. Amer. Soc. Hort. Sci. 105:197-199.

(*8*) SUVANPRAKORN, KAMOLVAN, AND J.D. NORTON. 1980. Inheritance of Resistance to Race 2 Anthracnose in Watermelon. J. Amer. Soc. Hort. Sci. 105:862-865.

Appendix

APPENDIX TABLE 1. AVERAGE YIELD PER ACRE OF WATERMELON CULTIVARS AND BREEDING LINES AT FIVE LOCATIONS IN ALABAMA, 1988-1991

Cultivar	Thorsby	Cullman	Crossville	Fairhope	Headland
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Charleston Gray	28,595	32,787	20,628	30,915	20,301
Jubilee	24,244	26,207	17,443	28,987	17,183
Crimson Sweet	34,212	34,878	29,476	21,168	14,307
AU-Producer	34,144	25,459	25,479	25,750	20,069
AU-Golden Producer	33,360	34,269	27,928	25,166	14,506

APPENDIX TABLE 2. YIELD, FRUIT WEIGHT, AND SOLUBLE SOLIDS OF WATERMELON CULTIVARS IN SOUTHERN COOPERATIVE WATERMELON TRIAL, 1989-1991

Cultivar	Yield/acre	Number/acre	Fruit weight	Soluble solids
	Lb.		*Lb.*	*Pct.*
Charleston Gray	40,196	1,777	23.0	9.8
Jubilee	42,219	1,743	34.2	9.6
AU-Golden Producer	44,120	2,084	21.1	10.7

APPENDIX TABLE 3. RESPONSE OF TASTE PANEL TO QUALITY OF WATERMELON CULTIVARS AND BREEDING LINES, AUBURN, AL, 1988[1]

Cultivar or breeding line	Color	Texture	Flavor	Average
AU-Producer	7.8	8.1	8.4	8.10
Charleston Gray	7.5	7.8	7.1	7.47
Crimson Sweet	7.8	8.0	8.0	7.90
Jubilee	7.6	7.9	7.3	7.60
AU-Golden Producer	7.7	8.0	8.5	8.17

[1]Response 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, 1988[1]

Cultivar	Hearts			Subseed		
	L	a	b	L	a	b
AU-Producer	39.29	29.55	14.85	39.23	24.53	15.08
Charleston Gray	39.16	30.95	15.25	38.84	27.17	14.73
Crimson Sweet	38.27	28.58	14.60	38.19	23.97	14.60
Jubilee	41.77	29.65	15.15	38.84	27.17	14.73
AU-Golden Producer	36.92	27.42	17.68	35.24	23.84	16.86

[1]Hunter 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.

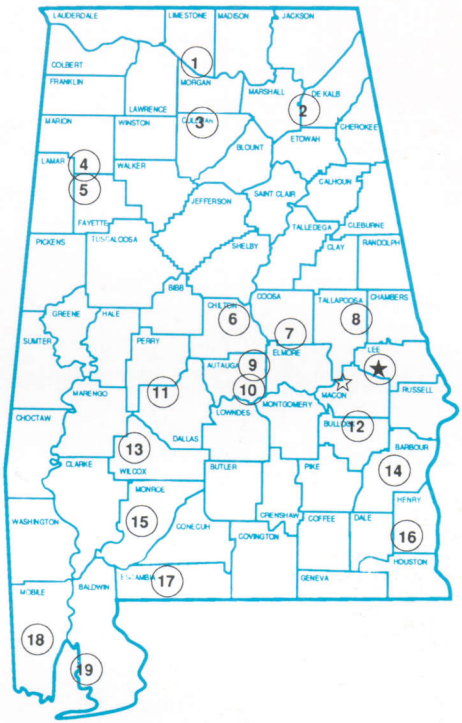
APPENDIX TABLE 5. RIND FIRMNESS (PUNCTURE TEST) OF WATERMELON CULTIVARS AND BREEDING LINES, AUBURN, AL, 1988[1]

Cultivar	Top side			Ground side			
	Stem end	Middle	Blossom end	Stem end	Middle	Blossom end	Average
	Kg	*Kg*	*Kg*	*Kg*	*Kg*	*Kg*	*Kg*
AU-Producer	28.5	28.0	20.3	27.2	26.3	19.7	25.00
Charleston Gray	27.8	26.9	17.0	26.7	25.4	15.7	23.25
Crimson Sweet	24.6	23.5	13.7	23.4	22.6	12.3	20.02
Jubilee	23.4	22.6	12.5	22.8	21.5	11.6	19.10
AU-Golden Producer	28.6	28.3	20.4	27.4	26.4	19.9	25.17

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

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.