



## RESEARCH UPDATE 1992

# FRUITS & VEGETABLES

### New Sweetpotato Clones Produce High Root Yields

Each year, the National Sweetpotato Collaborator's Group coordinates sweetpotato variety trials to judge the performance of new clones under a wide range of environmental conditions. Two new sweetpotato clones, L-87-96 and L-86-33, were evaluated in AAES research at the E.V. Smith Research Center, Shorter, and the Chilton Area Horticulture Substation, Clanton, where they were compared to traditional clones grown in Alabama.

Plantings were made at both locations in early July and harvested in mid-October. Fertilizer rates of 80-50-150 and 50-100-150 pounds per acre of N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O were applied at Shorter and Clanton, respectively. At Shorter, all fertilizer except one-half of the nitrogen was applied 6 weeks after planting. At Clanton, fertilizer was incorporated at planting. Irrigation was applied at planting at Shorter and 0.75 inch of water per week (9.75 inches total) was applied at Clanton.

Raised beds spaced 6 feet apart were used at Shorter. Traditional bedding procedures and between-row spacings of 3.5 feet were employed at Clanton. The within-row spacing at both locations was 1 foot. Plots were harvested after approximately 100

days of growth.

At Shorter, seven clones were evaluated under nonirrigated conditions and raised beds. The favorable conditions of the raised bed compensated for the between-row spacing that was almost twice the traditional spacing. The average yield of U.S. No.

1 roots obtained with the standard clones was 133 bushels per acre. Highest yields were obtained with Georgia Jet and Beauregard, 171 and 151 bushels per acre, respectively.

The yields of U.S. No. 1 roots obtained with L-87-95 (249 bushels per acre) and L-86-33 (169 bushels per acre) were similar to or greater than the highest yields obtained with the standard clones. The yield of marketable roots obtained with L-86-33 (319 bushels per acre) was greater than with the standard clones, except for Beauregard, which produced 374 bushels per acre.

L-86-33, the only numbered line evaluated in 1991 that was also included in the 1990 trial, produced the greatest yield of U.S. No. 1 and total marketable roots during 1990 at this location. However, the highest marketable yield obtained at Shorter in 1991 (460 bushels per acre) was obtained with the other new clone, L-87-95. This was approximately 25 per-

Yields and Production of U.S. #1 Roots From Sweetpotato Clones Evaluated at Clanton and Shorter

Clones	Grades U.S. #1		Marketable yield/acre, bu.	
	Clanton	Shorter	Clanton	Shorter
Cordner .....	45	125	49	235
Jewel .....	35	132	86	273
L-87-95 .....	171	249	255	460
L-86-33 .....	138	169	213	319
Georgia Jet .....	—	171	—	273
Beauregard .....	—	151	—	374
Nugget .....	—	88	—	196

cent greater than the marketable yield obtained with Beauregard, the highest yielding standard clone in the trial. Beauregard, a recent Louisiana release, and the two new clones evaluated had the greatest potential for production of U.S. No. 1 and total marketable roots at this location.

Four clones were evaluated at Clanton under irrigated conditions on a sandy soil. Cordner and Jewel produced only 45 and 35 bushels of U.S. No. 1 roots per acre, respectively, whereas yields with the new clones were at least three times greater than the average of these standards. Highest yields of U.S. No. 1 and total marketable roots at Clanton (171 and 255 bushels per acre, respectively) were obtained with L-87-95, as seen in the table.

L-86-33 also was evaluated at Clanton in 1990, but its yield of U.S. No. 1 roots was lower than with

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## New Varieties of Southernpeas Released

Two new varieties of southernpeas with unique characteristics have been released by the Alabama Agricultural Experiment Station. These new peas resulted from long-term breeding research seeking varieties with improved horticultural characteristics and resistance to insects and diseases.

AUBe, one of the new releases, is a nonvining blackeye type which is expected to be popular for home garden and fresh market uses. AUBe sounds like the name of the Auburn University mascot, Aubie, and the letters abbreviate Auburn University Blackeye. The nonvining growth habit makes it especially convenient for gardeners with limited space. Pods are produced level with or above the foliage and are easy to pick, detach from the peduncles, and shell.

AUBe has a high level of resistance to root-knot nematodes and is less susceptible to cowpea curculio than other blackeye varieties. Only mild symptoms of mosaic virus have been observed during numerous years of testing. AUBe has produced well in yield trials throughout the South. Its yields are about equal to Pinkeye Purple Hull, greater than California Blackeye No. 5, and only slightly less than the high yielding crowder variety, Mississippi Silver, tables 1 and 2.

Genegreen is the other variety re-

leased by the AAES. It combines characteristics of a persistent green seedcoat and black eye and has potential to be an excellent fresh market type blackeye. The persistent green seedcoat trait gives Genegreen an intense mature green seed color, making it extremely attractive as a fresh, shelled product. Genegreen has performed well in yield trials since 1986, averaging 2,623 pounds per acre of shelled yield compared to Pinkeye Purplehull-BVR with 2,250 pounds per acre and Mississippi Silver with 2,741 pounds per acre. It has a slightly viney bush type of growth habit and is considered medium-early in maturity.

Average pod length at the mature green stage is 7.5 inches. The pods are green when fresh, medium brown when dry, and are produced level with or above the foliage. The seeds retain their green color when dry, but may fade to white if exposed to sunlight for 7-10 days after pods are dry.

Significant fading occurs if pods are not harvested within 1 week of drying. Seeds are small to medium sized and are oval to kidney shaped, with a small black eye on the olive green seedcoat. Genegreen has resistance to blackeye cowpea mosaic virus (BICMV).

O.L. Chambliss and A.G. Hunter

**Table 1. Performance of AUBe in Alabama Southernpea Field Trials, Compared to Standard Varieties**

Type harvest and location	In-pod yield/acre				
	AUBe	Pinkeye Purple Hull	Miss. Silver	Giant Blackeye	Calif. Blackeye #5
	Bu.	Bu.	Bu.	Bu.	Bu.
Multiple harvest					
Shorter .....	335	302	379	354	272
Clanton .....	216	221	272	219	223
Once-over harvest					
Fairhope .....	205	270	293	141	—

**Table 2. Five-Year Average for AUBe and Two Other Varieties, Southwide Southernpea Trials**

Measure	Result, by variety		
	AUBe	Pinkeye Purple Hull	Miss. Silver
Multiple harvest yield, bu. ....	145	162	171
Once-over harvest yield, bu. ....	130	114	158
Shellout percentage .....	52	54	56
Days from planting to mature green pods .....	62	62	66
Nematode damage rating (0=no galls, 5=severe galling) .....	1.8	4.3	2.3

## Color of Plastic Mulch Affects Tomato Yields and Harvest Dates

Polyethylene mulches are widely used in production of fresh market tomatoes to increase yields, promote earlier harvest, and assure high quality fruit. Such benefits have been attributed to effects of mulch on soil temperature, water relations, fertility, and weed control.

Mulch surface color can change the quantity of light and spectral balance reaching the plants, which affects growth and fruit production. Research has shown that plants grown on red

mulch had the greatest yields of early-maturing fruit and produced the least amount of foliage. Plants grown on white or aluminum-colored mulch had fewer fruit early in the harvest season, but produced more foliage.

An AAES study was implemented to further evaluate the response of tomato plants to various mulches at the E.V. Smith Research Center, Shorter. Field plots were established there in 1990 on an Orangeburg sandy loam soil. Five-foot-wide strips of commer-

cially available black, clear, white, brown, and green polyethylene mulches were applied to the soil by a mulch layer applicator. Aluminum and red colored mulches were obtained by spraying black plastic with all-purpose enamel paints mixed with a mineral spirit thinner (2:1). Trickle irrigation tubing and methyl bromide fumigation were applied in all plots by the mulch layer applicator in a one-step operation. The polyethylene mulch covered beds

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### Color of Mulch, continued

31 inches wide and 4 inches high.

The seven treatments of mulch plus an unmulched control were arranged in a randomized complete block design with four replications. Experimental plots were 25 feet long with rows 5 feet apart.

Six-week-old Mountain Pride tomato plants were started in a green-

Plants grown on green or aluminum mulch produced more pounds of marketable fruits for the season than those grown on either black or white mulch. Unmulched plants and plants grown on red, brown, and clear mulches produced intermediate yields, table 1. Plants grown on black mulch produced significantly more pounds of marketable fruits than those grown on red mulch.

**Table 1. Plastic Mulch Color Effects on Yield of Mountain Pride Tomatoes by Harvest Date**

Mulch color	Percent of fruit marketable (by weight)					
	July 3	July 5	July 9	July 16	July 20	Total
Green .....	25	85	61	64	82	71
Aluminum .....	29	79	79	58	67	65
Red .....	66	63	60	54	70	61
Brown .....	35	92	59	66	64	67
Clear .....	15	82	70	50	74	61
Black .....	72	74	66	16	62	57
White .....	27	78	60	40	58	54
Unmulched .....	25	76	61	50	92	69

**Table 2. Plastic Mulch Color Effects on Percentage of Marketable Tomatoes Harvested on Each of Five Pickings**

Mulch color	Percent fruit harvested (by weight)					Harvested	
	July 3	July 5	July 9	July 16	July 20	Early	Late
						Pct.	Pct.
Black .....	14	40	14	8	23	55	31
Clear .....	3	35	19	20	31	38	43
Red .....	18	18	12	24	28	36	51
White .....	7	27	14	28	24	34	52
Brown .....	5	24	14	33	24	30	57
Aluminum .....	3	24	15	28	30	27	58
Bare .....	3	19	11	16	50	22	66
Green .....	1	17	10	25	46	19	71

house on March 5 and field transplanted on April 25. In-row plant spacing was 20 inches. General cultural practices were performed in accordance with established recommendations for Alabama.

Fruits were harvested at the breaker color stage. Five harvest dates were required (July 3, 5, 9, 16, or 20). Marketable yield consisted of fruit graded U.S. No. 1 or No. 2. Yields, by weight and by fruit count, were calculated for both marketable and unmarketable fruit for each harvest date. Season totals were calculated and yields were divided into early (July 3 and 5), mid (July 9), and late (July 16 and 20) harvest dates.

harvested from plants grown on clear plastic than from those grown on white plastic mulches.

A higher percentage of fruit was harvested early (July 3, 5) from plants grown on black plastic mulch (55 percent) than from unmulched plants (22 percent) or from plants grown on white (34 percent), aluminum (27 percent), brown (25 percent), or green (19 percent) mulches. Black and red mulches resulted in a significantly higher percentage of fruit harvested earlier than did aluminum and white.

J.E. Brown, W.D. Goff, W.T. Hogue, B.C. Early, and R.P. Yates

### New Sweetpotato, continued

Beauregard. It made the same as Jewel, and considerably more than Cordner.

These results show that high yields of the high quality roots were obtained with the numbered lines in the sweetpotato variety trials conducted this year at Shorter and Clanton. Beauregard, a recent release, also showed a high yield potential compared to other standard clones grown in Alabama.

J.M. Dangler, W.T. Hogue, and J.M. Pitts

## Underground Drip Fertigation System Can Improve Sweet Corn Production

In Alabama, where rainfall patterns are unpredictable, sweet corn producers often benefit from the use of irrigation. Underground irrigation offers specific advantages for the crop because it reduces evaporation of irrigation water and eliminates runoff of excess irrigation water from the field compared to surface drip irrigation. And underground irrigation systems can help reduce the risk of plant diseases which might occur when foliage or soil is wet.

A 3-year AAES study at the Sand Mountain Substation, Crossville, evaluated the ability of an underground drip fertigation system to supply both water and nutrients to the plants. Urea-ammonium nitrogen was applied to the soil through underground drip fertigation, aboveground drip fertigation, and surface dry methods. Dry nitrogen (ammonium nitrate) was surface band-applied as a control. Nitrogen rates of 60 to 120 pounds per acre were applied to sweet corn after planting in either two or four applications by each of the three methods. Dry phosphorous and potassium fertilizers were applied to all treatments according to soil test recommendations.

Underground drip pipe tubing was laid in a 9-inch-deep furrow along each row and covered with surface soil

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## Drip Fertigation, continued

in a one-step operation using a three-point hitch rig attached to a medium-sized tractor. Sweet corn was subsequently planted in each row with both the aboveground and underground systems. Rainfall and number of ears of sweet corn produced were recorded. Rainfall data are given in table 1.

In 1987 and 1989, there were no significant differences in yields regardless of number, rate, or method of nitrogen applications. This was probably because adequate to above normal rainfall was available during the sweet corn's reproductive growth stage, table 2. Underground fertigation at the 120-pound nitrogen rate during years of less than adequate rainfall increased the number of marketable sweet corn ears over the dry nitrogen application method. Although underground fertigation had no yield advantage over the

**Table 1. Rainfall During Growing Season, Sand Mountain Substation**

Month	Rainfall, inches			
	1987	1988	1989	3-year average
April .....	1.93	4.30	3.33	5.30
May .....	4.31	2.26	3.36	4.51
June .....	4.29	0.60	8.27	3.77
July .....	1.91	2.68	9.07	3.98
Total .....	40.10	45.10	66.60	54.70

**Table 2. Sweet Corn Production Per Acre as Influenced by Rate, Number of Applications, and Method of Nitrogen Application**

Applications	Yield/acre, dozen ears		
	1987	1988	1989
<b>Number</b>			
2 .....	1,056	871	637
4 .....	1,081	791	629
<b>Rate</b>			
60 lb./acre .....	1,089	702	566
120 lb./acre .....	1,049	960	694
<b>Method</b>			
Dry .....	1,033	0.66	661
Aboveground fertigation	1,081	895	694
Underground fertigation	1,081	1,137	540

aboveground system, this system should reduce water loss due to evapotranspiration.

J.E. Brown, R.L. Shumack, C.H. Gilliam, L.M. Curtis, J.T. Eason, D.W. Porch, and B.C. Early

## Reflective Mulches for Summer Squash Increase Yields, Reduce Aphids and Mosaic Virus

Mosaic virus diseases can be devastating to yields of yellow summer squash in Alabama, particularly late in the growing season. The virus is transmitted by aphids that acquire and transmit the virus from weeds and cucurbit hosts. Reflective mulches can aid in the control of mosaic virus diseases of cucurbits by discouraging aphid infestations.

An AAES study focusing on the use of various reflective mulches in the production of summer squash was conducted on Orangeburg sandy loam soil (pH 6.2) at the E.V. Smith Research Center, Shorter. Treatments were: (1) black plastic mulch (BPM); (2) yellow painted plastic mulch (YPM); (3) white plastic mulch (WPM); (4) bare soil (BS),

as a control; (5) aluminum painted plastic mulch (APM); and (6) bare soil with Diazinon insecticide (BSI).

Herbicide and fertilizer were applied to the soil just prior to field planting, in accordance with standard recommendations. An additional 40 pounds per acre of nitrogen, in the form of ammonium nitrate, was applied as sidedressing at the time of flowering. The crop was irrigated as needed with an overhead sprinkler system.

On July 25, BPM (1.5 mils thick and 6 feet wide) was applied to rows 20 feet long, spaced 5 feet apart. Methyl bromide was injected beneath the BPM at the same time the mulch was applied in a one-step operation. Alu-

minum and yellow colored paints were applied to some treatments using all purpose paints diluted (2:1) with a mineral spirit paint thinner. BPM was laid on all bare-soil plots with a plastic layer applicator to permit adequate fumigation, then removed for bare soil treatments.

On August 3, Dixie hybrid yellow crookneck summer squash was direct seeded through 18-inch-interval punched holes in rows of the different plastic mulch treatments. The Diazinon insecticide treatment was applied to the plants every 7 days from the time seedlings appeared above ground to the end of the harvest period.

A 4.5-by 10.5-inch yellow pan partially filled with anti-freeze and water (1:1) was placed in each treatment plot to serve as an aphid trap. Aphids were collected four times during the study period beginning on August 24. Plots were harvested a total of nine times beginning October 10. Plants from the different treatments were examined for mosaic virus symptoms, including the degrees of discoloration and malformation that would cause the fruit to be unmarketable. The mosaic viruses were identified serologically from symptomatic plants by the enzyme-linked immunosorbent assays (ELISA) test.

According to the serological test, zucchini yellow mosaic and cucumber mosaic were the two dominant viruses in the squash. The adverse effects of the virus disease on the plants were most severe during the latter part of the growing season.

The APM was most effective in delaying the disease incidence of both mosaic viruses, as shown in the table. WPM and YPM produced similar effects and were the next most effective in delaying the virus diseases. BPM, BS, and BSI were the least effective, respectively, with the highest percentage of the plants displaying symptoms of both mosaic viruses on the plant leaves and fruits. Fewer aphids were collected from APM than from other treatments.

The APM was most effective in reducing the virus symptoms on the plants during the first 3 weeks of harvest. As the plants grew rapidly, their

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## Reflective Mulches, continued

Effects of Reflective Mulches on the Production of Yellow Summer Crookneck Squash

Mulch treatment	Total yield/acre, tons	Percent of total yield		
		Marketable	Nonmarketable	
			Mosaic	Cull
Aluminum .....	11.1	57	39	4
White .....	11.3	42	57	1
Yellow .....	10.0	42	57	1
Black .....	7.9	26	72	2
Bare soil				
(Diazinon) .....	6.9	32	68	0.4
Bare soil .....	5.7	40	59	1

foliage gradually covered the mulch, reducing the mulch's ability to reflect light into the plant canopy. This allowed an increase in the aphid population as the growing season progressed. APM, WPM, and YPM treatments produced the highest squash yields as compared to other treatments. Yields on bare soil are the lowest reported in the table.

Results of this study showed that APM reduced the incidence of both vi-

rus diseases and aphids by delaying the onset of the disease for approximately 3 weeks, thus extending the harvest period for marketable squash. Yield of squash was higher and fewer virus-infected squash fruits were harvested from APM than from BPM, BSI, or BS. Since APM controls zucchini yellow mosaic and cucumber mosaic viruses, it has the potential to be an effective cultural practice in Alabama.

J.E. Brown, R.P. Yates, and W.T. Hogue

## Bertina and Rattlesnake Promising in Pole Bean Variety Trials

Pole beans are attracting the interest of commercial growers in Alabama and are a favorite of home gardeners. Dade, McCaslan, and Kentucky Wonder 191 have been the standard recommended varieties, but variety tests at the North Alabama Horticulture Substation, Cullman, have identified new varieties which show potential for Alabama production.

Sixteen varieties were tested at Cullman in 1990 and 17 were tested in 1991. These were planted 6 inches apart in the row with 5-foot spacings between rows and strung on a two-wire string trellis as they grew. Of the va-

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## AAES Tomato Hybrids Perform Well in 1991 STEP Trials

An experimental hybrid and several advanced breeding lines developed through the AAES tomato breeding program exhibited potential for commercial or home garden production in the 1991 Southern Tomato Exchange Program (STEP)<sup>1</sup> trials. In addition to STEP entries tested at the North Alabama Horticulture Substation, Cullman, eight more Auburn tomato hybrids (ATH) were included for comparison.

Hybrid ATH-9 produced the highest total yield and had a fruit size

<sup>1</sup> This regional breeding line evaluation program was organized in 1945 to help tomato breeders identify advanced breeding lines which are widely adapted. The STEP trial is conducted in three stages: (1) newly developed breeding lines are tested within each state to determine which are suitable for further testing in STEP; (2) top performing lines are released as named varieties; and (3) variety trials are conducted in different production areas in each state and compared to varieties already available commercially.

second only to another AAES hybrid, ATH-876. ATH-876 also produced the highest marketable yield, as noted in the table. Total yield includes all fruit harvested, including high quality fruit too small for marketable grades. Hybrid ATH-234 is not suitable as a fresh market tomato because of its small fruit size, but its high total yield of round, firm fruits may make it well suited as a whole-pack tomato for home canning.

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Tomato Breeding Trial at North Alabama Horticulture Substation, Cullman, 1991

Entry <sup>1</sup>	Growth habit <sup>2</sup>	State of origin	Yield/acre		Average fruit size
			Marketable	Total	
			Cwt.	Cwt.	Oz.
Flora Dade .....	D	Fla.	318	467	5.1
Floradel .....	I	Fla.	382	545	5.4
STEP-709 .....	D	N.C.	405	575	6.4
STEP-714 .....	D	N.C.	451	601	5.7
STEP-716 .....	I	Mo.	387	463	5.8
STEP-717 .....	I	Mo.	518	617	6.4
STEP-720 .....	I	Ala.	386	470	6.1
STEP-722 .....	D	N.C.	272	415	6.1
STEP-724 .....	D	N.C.	442	503	6.6
STEP-734 .....	D	Ala.	306	512	5.8
STEP-735 .....	D	Ala.	341	468	5.6
STEP-736 .....	D	Ala.	224	417	6.1
ATH-8 .....	I	Ala.	484	587	6.0
ATH-9 .....	I	Ala.	596	704	6.4
ATH-45 .....	I	Ala.	524	575	6.3
ATH-234 .....	I	Ala.	105	636	4.2
ATH-459 .....	D	Ala.	223	336	5.3
ATH-876 .....	I	Ala.	613	676	6.6
ATH-908 .....	I	Ala.	362	468	5.5
ATH-915 .....	I	Ala.	480	571	6.1

<sup>1</sup> Commercial varieties used for comparison: Flora-Dade for determinate entries, Floradel for indeterminate entries.

<sup>2</sup> D = determinate, I = indeterminate.



### Bertina and Rattlesnake, continued

ieties listed in the table, all had green pods except Goldmarie, which had yellow pods. Rattlesnake and Selma Zebrina had striped pods. Most varieties required 50-54 days to reach first harvest in 1991. Early Riser, Goldmarie, Precoces, Selma Star, and Selma Zebrina required only 47 days, while Blue Lake, Genuine Cornfield, and Alabama No. 1 required 61 days to reach maturity.

Results from 3 or more years of variety testing are needed before new varieties are recommended. However, the 2 years of results reported here indicate that both Bertina and Rattlesnake, which maintained highest yields during each of the 2 testing years, may merit small test plantings by growers. Other varieties appear to be sensitive to changes in the environment and/or management conditions, as indicated by substantial differences in 1990 and 1991 yields.

A.G. Hunter, M.H. Hollingsworth,  
and O.L. Chambliss

### Tomato Hybrids, continued

ATH-9 has an indeterminate growth habit and oblate fruit shape. Its fruits are flavorful with good external and internal color, and are firm enough for shipping. ATH-876 also is an indeterminate type, its fruit are more globe shaped and are slightly better colored than ATH-9. Both hybrids had fair resistance to early blight and excellent resistance to leaf mold.

This trial marks the 43rd year that the AAES has been a cooperater in the STEP trials. Such well-known tomato varieties as Homestead, Manapal, Floradel, Atkinson, Walter, and Florida MH-1 were released following their evaluation in the STEP trials. Based on the performance in this year's tomato trial, ATH-9, ATH-876, and ATH-234 have the potential to make a contribution to the improvement of fresh market or home garden tomato varieties available to Alabama growers.

O.L. Chambliss, A. G. Hunter, and  
M.H. Hollingsworth

**Pole Bean Variety Trial Results, North Alabama Horticulture Substation, Cullman**

Variety	Total yield/acre	
	1990	1991
	Lb.	Lb.
Alabama No. 1 .....	16,194	7,974
Belmonte <sup>1</sup> .....	19,794	-
Bertina .....	21,533	21,786
Blue Lake .....	10,088	6,894
Blue Lake FM-1 .....	-	6,108
Dade .....	9,690	13,764
Early Riser .....	-	17,808
Genuine Cornfield .....	14,361	4,661
Goldmarie .....	18,293	17,501
Kentucky Blue .....	-	11,025
Kentucky Wonder .....	15,896	13,546
Kentucky Wonder 191 .....	14,485	11,038
McCaslan <sup>1</sup> .....	8,562	-
Novax .....	13,444	12,000
Precoces .....	16,053	14,132
Rattlesnake .....	20,067	19,323
Rinox .....	16,799	16,871
Selma Star .....	16,079	17,527
Selma Zebrina .....	12,882	11,739

<sup>1</sup> These varieties were not tested in 1991 because McCaslan seed germinated poorly and Belmonte was not available. Two new varieties, Early Riser and Kentucky Blue, were added in the 1991 trial.

### EDITOR'S NOTE

Mention of company or trade names does not indicate endorsement by the Alabama Agricultural Experiment Station or Auburn University of one brand over another. Any mention of non-label uses or applications in excess of labeled rates of pesticides or other chemicals does not constitute a recommendation. Such use in research is simply part of the scientific investigation necessary to fully evaluate materials and treatments.

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