Atkinson, a Rootknot and Fusarium Wilt Resistant Tomato Variety of the Rutgers Class

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'Atkinson', a rootknot nematode and *Fusarium* wilt resistant tomato variety, probably the first of the Rutgers class to be released to the public, was named in honor of George F. Atkinson who first described the life cycle of the rootknot nematode at Alabama Agricultural and Mechanical College (now Auburn University) in 1889 (1).

The basic concept in the breeding of Atkinson was that a high quality tomato of the Rutgers type, resistant to rootknot, *Fusarium* wilt and to leaf diseases was needed for the fresh market, for the green wrap trade, and for home gardeners. Commercial varieties and breeder's lines of the Rutgers type were selected from the Southern Tomato Exchange Program (STEP) trials at Auburn for crossing to develop Atkinson. The STEP program is a cooperative tomato testing and exchange program among the agricultural experiment stations of the Southeast, Hawaii, and Puerto Rico, coordinated by the United States Department of Agriculture Vegetable Breeding Laboratory (USVBL), Charleston, South Carolina.

The source of rootknot resistance was the Hawaii Experiment Station line HES 4521. In the earlier screening tests for rootknot resistance, finely chopped, heavily knotted roots of okra and/or tomato plants were used as inoculum. In the later tests the screened nematodes themselves were used.

Description

The Atkinson variety, formerly AU 22, has a vigorous indeterminate vine with heavy stems and foliage of average density. Its fruit is larger than that of most varieties, weighing up to 1.1 pounds and averaging three-tenths to five-tenths pounds. The shape is deep oblate, the flesh firm and meaty and the core small. The immature color is green with a yellow cast, the shoulder is a darker green but colors evenly upon ripening. The internal color of Atkinson is better than that of Homestead 24 because it has less light colored fiber around the seeds. The eating quality of Atkinson is very good. It tastes less acid than Homestead 24. A comparison of fruit quality factors of the two varieties is presented in the table. Atkinson resembles the variety Marion.

Atkinson is several days earlier than Rutgers and about as early as Homestead 24. The yield is usually better than that of Rutgers, approaching that of Homestead 24 when unstaked but probably superior when staked. Atkinson can be expected to be superior in soils heavily infested with nematodes.

Atkinson was reported among the best tomatoes in the 1966 STEP observational trial at Charleston (STEP 500). Commercial growers also rated it high when it was grown for the fresh market and for green wraps in the Dothan area of Alabama in the spring of 1965 and 1966.

Atkinson is resistant to the southern rootknot nematode *Meloidogyne incognita incognita* and to the cotton rootknot nematode *M. incognita acrita* Chitwood. It is also resistant to race 1 of *Fusarium oxysporum f. lycopersici* (Sacc.) Snyder & Hansen. From field observations, the foliage of Atkinson is resistant to *Septoria* leaf spot caused by *Septoria lycopersici* Speg. and moderately resistant to early blight caused by *Alternaria solani* (Ell. & Mart.) L. R. Jones & Grout. Foliage retention of Atkinson in the field is better than that of most varieties, including Homestead 24 and Rutgers.

Atkinson is moderately susceptible to fruit cracking and catfacing.

Acknowledgements

The author wishes to thank certain participants in the STEP program for the use of their stocks in breeding Atkinson. E. V. Wann, USVBL, Charleston, South Carolina, writes: "STEP 174 was an F_6 selection from the USVBL line T 1697 – Cr W 169, developed by C. F. Andrus from a series of crosses involving the varieties Victor, Dobbies Champion, Pan America and Rutgers. Incidentally, STEP 174 is a sister line to STEP 89 which was released as Homestead".

W. M. Epps, Department of Botany and Bacteriology, Clemson University, states that STEP 281 (S.C. 626) was derived from advanced generations of the complex F_1 cross: Homestead x ([Pan America x (P.I. 79532 x Marglobe)] x Pan America). P.I. 79532 was a selection of *Lycopersicon pimpinellifolium* Mill. resistant to *Stemphylium* leaf spot as well as to *Fusarium* wilt.

The variety Marion is based on selections from the reciprocal of the above cross. HES 4521, a Hawaii Experiment Station line, homozygous Mi Mi for resistance to rootknot nematodes, was contributed by W. A. Frazier, Department of Horticulture, Oregon State University, Corvallis. This line was the product of successive cooperative efforts to transfer the rootknot resistance of the wild Peruvian tomato, *L. peruvianum* (L.) Mill. P.I. 128657, to the cultivated tomato, *L. esculentum* Mill. by P. G. Smith, Department of Vegetable Crops, University of California,

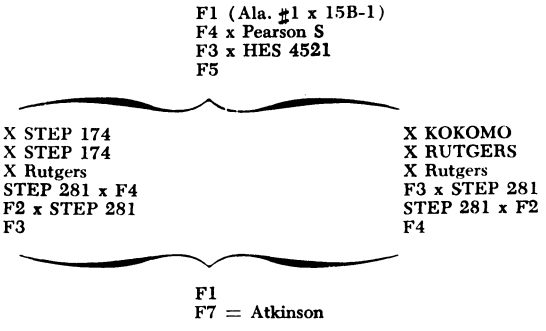

Figure 1—Pedigree of Atkinson. The pedigree of Atkinson is presented with due regard to the direction in which the crosses were made, with the female parent always written first in the sequence of crosses. There is a possible error in the pedigree where 3 successive backcrosses to Rutgers could replace the two to STEP 174 plus one to Rutgers. However, the odds are 4:1 in favor of the pedigree as presented, based on the expected frequency of F2 lines segregating determinate plants after these respective backcrosses.

Table 1—Comparison of seven fruit quality factors of Atkinson and of Homestead 24[a]

Variety	Total solids	Soluble solids	pH	Total acidity (citric)	Ascorbic acid mg/100g	Flavor	Color
	%	%		%	mg		
Homestead 24	6.8	5.9	4.3	.56	22.5	7.2	7.6
Atkinson	7.4	6.2	4.6	.51	21.0	8.0	8.3

[a]Flavor and color were rated on 1 (poorest) to 10 (best) scale. Each figure is an average of four ratings. Data were furnished by Hubert Harris, Kenneth S. Rymal, and J. G. Kaffezakis, Department of Horticulture, Auburn University.

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Davis, by V. M. Watts, Department of Horticulture, University of Arkansas, Fayetteville, and by W. A. Frazier in what is now known as the famous Smith-Watts-Frazier triangle (2,3,4). Alabama No. 1 was a productive line with medium-large oblate, green shouldered fruits from F. E. Johnstone, Department of Horticulture, University of Georgia, Athens. USVBL No. 15B-1 was a prolific flowering, determinate summer-set line from C. F. Andrus, USVBL, Charleston, South Carolina.

The author also wishes to thank Norman A. Minton, Crops Research Division, ARS, USDA, Coastal Plain Experiment Station, Tifton, Georgia and Raymond L. Shepherd, ARS, USDA, Department of Agronomy, Auburn University, for help with nematode tests and C. C. Carlton, superintendent, Horticulture Substation, Clanton, Alabama, for conducting tomato yield trials. Thanks are also due Sam T. Jones, Department of Horticulture, Auburn University for evaluating Atkinson in farmer's trials at Dothan, Alabama.

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Preventing Fruit Formation on Landscape Trees[1]

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Preventing fruit formation may be desirable for several reasons: they may retard tree growth and development, present unpleasant odors, make mowing and maintenance difficult, clog drains, attract undesirable birds and insects, stain cars and patios, or be aesthetically unattractive.

Defruiting was first practiced by hand but as time progressed, chemicals were found which could replace hand labor for defruiting. Although not too successful, various caustic and hormone materials were tested and after many years only a few chemicals emerged, but they are not always useful because of foliage injury or the inability to prevent fruiting (1, 2, 3, & 5).

Thus it would seem apparent that renewed interest in preventing fruit-set would be justifiable. Since the use of caustic and hormone chemicals is sometimes impractical, a limited investigation was undertaken to test materials which might act as physical barriers to pollination and fertilization by covering the stigma and other flower parts with a thin, impervious film. If this could be accomplished without adverse affects to the foliage, etc. preventing fruit-set could become highly practical.

Being soluble in water, viscous and easily applied with a hand sprayer Plyac[2] and related derivatives[3] and Wilt-Pruf[4] were selected as possible fruit-set preventing compounds (4).

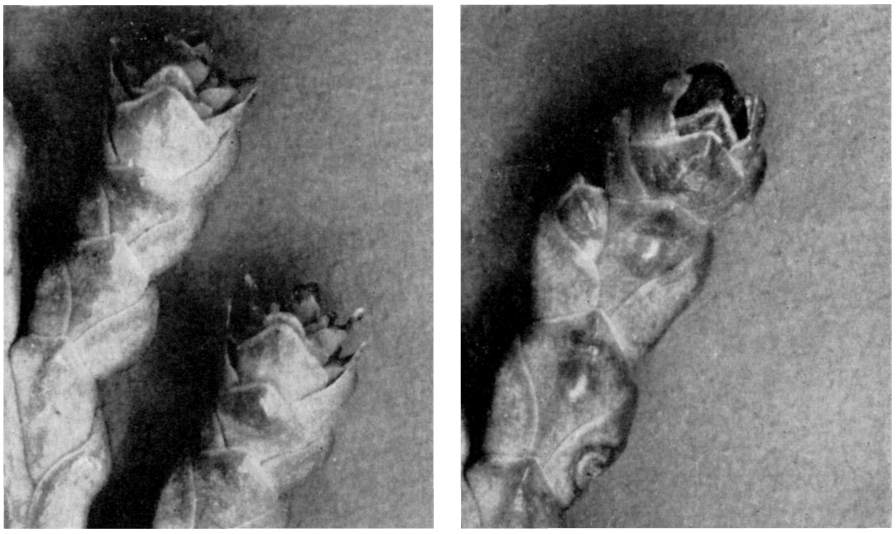

Fig. 1. Thuja occidentalis ovulate strobili: left, before treatment; right, after treatment with Plyac-M. (Both, x5.)

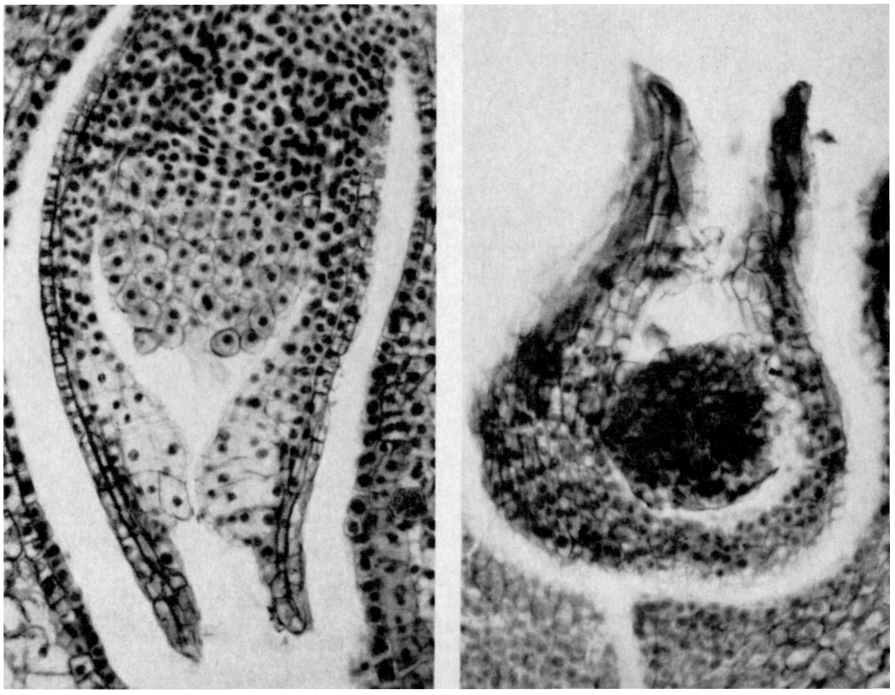

Fig. 2. Thuja occidentalis ovules, longitudinal sections: left, untreated; right, four days after treatment with Plyac-M. (Both, x125.)

[1]Approved for publication by the Director, Michigan Agricultural Experiment Station, Journal article number 4105.

[2]Consists of emulsifiable polyethylene and octyl phenoxy polyethoxy ethanol. Previous formulations consisted of emulsifiable polyethylene, fatty acid amide and alkyl aryl sulfonate. It is produced by Allied Chemical Corp., General Chemical Div., Morristown, N.J.

[3]Plyac-M was used for most of the reported work. It is a 20% solution of alkanol amide in water; code S.N. 2-10597-10.

[4]A 49% poly vinyl chloride complex, produced by Nursery Specialty Products, Inc. 202 E. 47th St., New York, N.Y. 10017.

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