

## History of Pear Breeding in Tennessee

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### Abstract

An active pear breeding program was located at the University of Tennessee from 1925 to the mid 1960s. The objectives of the program were to develop pear cultivars with resistance to fireblight and with acceptable fruit quality. From 1945 to 1966, the program released 'Orient,' 'Ayers,' 'Dabney,' 'Mooers,' 'Hoskins,' 'Carrick,' 'Morgan,' and 'Mericourt.'

Breeding pears for the southern environment was a major emphasis of the Horticultural Department of the University of Tennessee (UT) for several decades. The pear has been described as the most popular fruit in North America in the 1870's (16). Drain (5) felt that the pear was better adapted to southern states than the apple and was potentially a better southern fruit. However fireblight [*Erwinia amylovora* (Burr.) Winslow et al.] became the major limiting factor in pear production in the warm, humid areas of eastern North America (1).

A pear breeding program was started in 1925 at UT when J. A. McClintock started a collection of fireblight tolerant breeding material. In his collection were two trees collected from a farm near Knoxville (10) that were later named 'Early Faulkner' and 'Late Faulkner.' Although the two cultivars were never formally introduced, they became cultivars of local interest and were later used extensively in the breeding program. McClintock left in 1931 to accept a position at Purdue University.

Brooks Drain became the project leader in 1931. Dr. Drain had previously taught at the University of Massachusetts. Drain developed a more focused, systematic approach for the UT breeding project. His primary ob-

jectives were to develop pear trees with fireblight resistance and acceptable fruit quality for fresh and processing markets. A secondary objective was to develop trees with resistance to leaf spots. Starting in 1931, Drain (3) crossed Oriental type pears [*P. serrulata*, *P. calleryana* Decne., *P. ussuriensis* Maxim., and *P. serotina* Rehd. (*P. pyrifolia* (Burm.) Nak.)] with *P. communis* P. (L). and then backcrossed one or two times to *P. communis*.

He encountered difficulty with many of the *P. communis* trees flowering 4 to 6 weeks after the Oriental pears. He described using methods of forcing branches in greenhouses, and tenting trees with tobacco cloth in order to secure crosses. Trees were exposed to fireblight by hand inoculation. The first new shoot growth of seedling trees in the nursery was inoculated by syringe with cultured fireblight bacterium (9). Seedling trees received inoculation with fireblight three times during each of the second and third years in the nursery row. Seedlings that failed to develop fireblight after 6 inoculations were topworked onto older trees for further observations (3). Drain later described the budding or grafting a susceptible cultivar (i.e. 'Bartlett') into the 1 or 2 year old test selection as one of the most efficient methods of testing resistance. The topworked susceptible portion of the tree would be inoculated with fireblight. If the development of fireblight stopped at the graft or bud union, then test selection was described as having high resistance.

A small number of crosses were made in 1932 and 1933, using *P. serrulata*, *P. calleryana*, and *P. ussuriensis* as the Oriental parent component of the

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crosses. Of 156 progenies from those crosses, 29% had not developed fireblight by the tenth year, but none appeared promising (3). Drain indicated that *P. serotina* (*P. pyrifolia*) was a better source of fireblight resistance. Crosses made in 1934 through 1938 resulted in 51 percent of offspring that had not developed fireblight by 1943 and their average time of flowering was later than 'Kieffer'. All cultivars that were eventually released were the result of crosses made in the 1934-1938 time period.

The pear trials were located at research stations at Knoxville, Clarksville, Springfield, and Jackson, Tennessee. Drain reported that by 1935 there were over 2000 hybrid pear seedlings in the nursery at Knoxville (2). By 1937, several hundred seedlings resistant to fireblight were topworked at the Mericourt Experiment Station at Clarksville. Natural occurrence of fireblight was especially severe in 1941, resulting in 120 of the crosses being discarded (11). Over 1000 seedlings were hand inoculated and over 12,000 new seedlings planted that year. Drain et al. reported (12) that the inoculation of 5000 seedlings in the following year heavily taxed the department. Drain reported in annual Experiment Station

reports in 1944 and 1945 there was a shortage of manpower to perform needed work. He reported in 1945 that 8 crosses looked promising and that 'Duchesse d'Angouleme' appeared exceptionally useful as a parent (4). Its progenies usually grew well and bore heavy crops. Some of its offspring had very good fruit quality. Dr. Drain (6) reported in 1949 that eighteen experiment stations in the eastern United States were evaluating one or more of the Tennessee selections.

The first cultivar released by the UT Agr. Expt. Sta. was 'Orient' in 1945. It was originally bred by Walter Van Fleet of USDA. Dr. Drain (5) indicated that it probably originated from a cross of a European cultivar and a cultivar from China, but the original records were uncertain. It was described as resistant to fireblight (4) and was suggested for Southern states. Drain reported in 1945 that the fruit had attracted attention for canning. Drain and Shuey (10) reported in 1954 that 'Orient' had been grown by thousands of growers (probably including home orchards).

From the estimated 30,000 to 40,000 progenies (9), Drain and associates released four pear cultivars in 1954 and two in 1957. All of those cultivars

**Table 1. Pear cultivars bred in Tennessee.**

Cultivar	Year		Parent cross			Fireblight resistance <sup>2</sup>	Reference
	introduced	Breeder	♀		♂		
Early Faulkner	----	McClintock			unknown	R	(10, 14)
Late Faulkner	----	McClintock			unknown	R	(10, 14)
Orient	1945	Fleet, USDA			unknown	R	(5)
Ayers	1954	Drain	Garber	x	Anjou	R	(10)
Dabney	1954	Drain	Seckel	x	Garber	MR	(10)
Mooers	1954	Drain	Duch. d'Angouleme	x	L. Faulkner	R	(10)
Hoskins	1954	Drain	Seckel	x	L. Faulkner	R	(10)
Carrick	1957	Drain & Safley	Seckel	x	Garber	R	(9)
Morgan	1957	Drain & Safley	Bartlett	x	L. Faulkner	R	(9)
Mericourt	1966	Drain <sup>3</sup>	Seckel	x	L. Faulkner	R	(13)

<sup>2</sup>R = resistant, MR = moderately resistant.

<sup>3</sup>Cross made by Drain.

**Table 2. Fruit characteristics of Tennessee pears.**

Cultivar	Maturity date	Dessert quality	Canning quality	Fruit size (cm)		Reference
				Length	Width	
Orient	Mid-August	Fair	Good	8.3	8.3	(5)
Ayers	Mid-August	Good	Medium	7.0	7.0	(7, 10)
Dabney	Late-July	V. Good	Poor	6.4	7.0	(7, 10)
Mooers	Late-Sept.	Good	Good	8.3	8.3	(7, 10)
Hoskins	Early-Oct.	Good	Good	6.4	6.4	(7, 10)
Carrick	Late-August	Good	--	7.6	7.0	(9)
Morgan	Late-August	Good	--	7.6	7.0	(9)
Mericourt	Early-Sept.	V. Good	Fair	6.0	6.0	(13)

were named for former UT Presidents. Drain described all those cultivars as resistant to fireblight except 'Dabney' which was moderately resistant (Table 1). 'Dabney' was described (7) as being the first early season pear of high dessert quality for southern growers (Table 2). 'Ayers' is a mid-season pear described as having the best dessert quality of the cultivars released in 1954 (7). A disadvantage of 'Ayers' is that it is pollen sterile (Table 3). 'Mooers' is a late fall cultivar and 'Hoskins' is a winter pear. Both were rated good for canning and for dessert quality. Drain (10) indicated that 'Hoskins' was the first winter pear suitable to the southern part of the United States.

Two early season pears were released in 1957. 'Carrick' was described as flowering early but tending to bear

**Table 3. Pollination characteristics of Tennessee pears.**

Cultivar	Pollen fertility	Bloom date <sup>2</sup>	Reference
Orient	limited viable	+4	(4, 5)
Ayers	pollen sterile	+9	(10)
Dabney	fertile pollen	+5	(10)
Mooers	pollen sterile	+11	(10)
Hoskins	fertile pollen	+16	(10)
Carrick	fertile	-4	(9)
Morgan	fertile	+12	(9)
Mericourt	--	--	

<sup>2</sup>Number of days before (-) or after (+) 'Kieffer'. The bloom period of 'Kieffer' at Knoxville lasted from 3/16 to 3/28 in 1957.

good quality rusty-red colored fruit each year (9). The tree tended to be spreading in growth habit. An advantage of the 'Morgan' pear was that it tended to flower later than the Tennessee pear selections of the same maturity period. The tree grew upright and produced good quality fruit. In a talk to the Tennessee Horticulture Society, Drain referred to the 'Morgan' as the "Southern Bartlett" because of fruit flavor and size, and because 'Bartlett' was a parent (8).

After Dr. Drain's retirement in 1959, the test orchards were rapidly culled (15) although the horticultural staff continued evaluation of some selections for several years. In 1966, a new cultivar 'Mericourt' was named in honor of the Mericourt Experiment Station at Clarksville (14). 'Mericourt' (13) was reported to be one of the most fireblight resistant trees in the program and to have very good dessert quality.

Roever (15) reported that 'Ayers' appeared the most useful of the Tennessee pears introduced prior to Drain's retirement. The only Tennessee cultivars that the authors are aware of being available through nurseries are 'Ayers', 'Orient', and 'Carrick'. None of the cultivars have been maintained on Tennessee Experiment Stations. The authors are unaware of scionwood being available for 'Early' or 'Late Faulkner'. Scionwood for the other cultivars are available from various sources.

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Fruit Varieties Journal 45(3):146-150 1991

## Effect of Plant Spacing on Strawberry Yield in Two Cultural Systems<sup>1</sup>

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### Abstract

The effects of mother plant spacing of 'Redchief' strawberry on yield were evaluated with two cultural systems: runnerless and matted row. In both systems, the plots with narrowest between-row spacings (30 cm for runnerless rows and 45 cm for matted rows) had the greatest yields per unit area. Decreased within-row spacing decreased berry weight and number per plant but did not affect yield per unit area. Because of high plant cost for the runnerless row system, the matted row system was clearly superior for 'Redchief' in our trials.

### Introduction

Midwestern strawberries are commonly grown in matted rows on flat beds with 0.9 to 1.0 m between rows and 30 to 45 cm row widths (23). Runnering during the growing season fills in the row with plants. Runnerless systems are being tested in the Midwest using raised beds. These systems, also called ribbon or narrow rows, are modifications of the "hill system" used

<sup>1</sup>Received for publication August 6, 1990, Purdue Agr. Expt. Sta. Journal Series No. 12,322.

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