

Pecan Cultivars for North Florida¹

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Summary

The performance of twenty six cultivars of pecan [*Carya illinoensis* (Wagenh.) K. Koch] has been evaluated at the North Florida Res. Ed. Center (NFREC)-Monticello from 1989 to 1999. Yield (percentage of full crop), resistance to leaf and nut diseases (mainly pecan scab) and resistance to limb breakage were estimated on 2 to 10 trees of each cultivar. Average yield from 1989 to 1999 was 33% of a full crop across all cultivars; only 'Curtis' and 'Moreland' averaged more than 50% of a full crop. Resistance to leaf diseases varied greatly among cultivars, and was highest for 'Moreland,' 'Curtis,' and 'Elliot.' Based upon yield, nut size, percentage kernel, resistance to leaf and nut diseases and precocity, the highly recommended cultivars for North Florida are 'Cape Fear,' 'Elliot' and 'Moreland;' recommended cultivars include 'Curtis' and 'Sumner.' 'Desirable,' 'Gloria Grande,' 'Kiowa' and 'Stuart' are conditionally recommended. 'Melrose' and 'Owens' are also recommended for trial since they have performed well at the NFREC-Monticello, but have not been adequately tested at other locations.

Introduction

The southeastern United States (and particularly Georgia) is the major pecan producing region in the United States and in the world. High humidity and high summer rainfall have limited the range of acceptable cultivars for the southeastern United States due to the difficulty in controlling pecan scab (*Cladosporium carigenum* Ell et Lang.). The recent introduction of new high yielding, scab susceptible cultivars such as 'Wichita' or 'Western Schley' has given the southwestern United States a competitive advantage over the Southeast. Impediments to the culture of pecans in the southeastern United States have included: 1) lack of new high yielding cultivars that are scab-resistant; 2) lack of tree size control and suitable dwarfing rootstocks; 3) lack of consistent yield due to alternate bearing; 4) ineffective marketing strategies, and; 5) competition from other nut crops (walnuts, almonds, pistachios) that have been more successfully marketed (Andersen 1995).

Unusual climatic conditions during the last several years have had a negative impact on pecan production in Florida and in the Southeast. In north Florida severe winter freezes, untimely late spring frosts, cloudy/hazy atmospheric conditions during the growing season, erratic patterns of precipitation and

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1. This document is HS 106, one of a series of the Horticultural Sciences Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Original publication date June 2001. Reviewed April 2008. Visit the EDIS Web Site at <http://edis.ifas.ufl.edu>.
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intense disease pressures have contributed to low yields and poor quality over the last several years. For example, the entire pecan crop at the NFREC-Monticello was lost in 1990 due to a late spring frost. Only two cultivars in 1992 and one cultivar in 1994 and 1995, out of 26, produced at least one-half a full crop at the NFREC-Monticello. In 1992 precipitation was erratic, while in 1994 over 88 inches of rain fell between January and October. Weather conditions were more favorable during 1995, but premature defoliation during 1994 had a carry over effect the following year. Yield was fair to good for most cultivars of pecan at the NFREC-Monticello during 1996, while during 1997 and 1998 yield was highly variable among cultivars. During 1999 the average crop potential of the 26 cultivars was 50%, although actual yield was substantially less due to nut diseases.

In the southeastern pecan belt, disease susceptibility has become of paramount concern. Pecan scab is the disease of major importance where it infects both leaves and nuts. Aphids have been the major insect pest of pecan; however, recently (since 1993) imported species of ladybug beetles and other natural enemies have provided adequate control of aphid populations and chemical control has generally not been required.

Pecan breeding and pecan cultivar testing is a long-term investment. Pecan trees are not precocious, and it requires 5 to 10 years after a cross is made until the resultant hybrid can be evaluated (Madden 1968). In addition, the resistance of a given pecan cultivar to insects and diseases varies and generally declines over time. These facts underscore the need for long term evaluation and testing of pecan cultivars at various locations throughout the United States.

Materials and Methods

At the NFREC-Monticello, 26 pecan cultivars have been evaluated from 1989 to 1998. Trees generally received fungicides (Super Tin, Orbit, Tilt, etc.) once a month or once every two months from April through August to help control leaf and nut diseases. Insecticides were generally not applied to most blocks in any year. Supplemental irrigation was generally not provided. Data were collected on 2 to

10 trees of each cultivar. Trees were at least 12 years old in 1989.

Yields were rated as the percentage of maximum yields obtainable for a given tree size. The resistance to pecan scab and other diseases on leaves, pecan scab on nuts and limb breakage were rated on a scale of 0 to 10 with 10 being the highest resistance. Nut weight, %kernel (kernel weight/total nut weight) and % pops (nuts that were not filled) were evaluated on 100 nuts from each tree in 1989.

Results and Discussion

A pattern of alternate bearing occurred for pecan trees at the NFREC-Monticello (Table 1). On average at least 50% of a crop was produced in 1989, 1991, 1993, 1996 and 1999, whereas a maximum of only 16% of a full crop was produced in 1990, 1992, 1994 and 1995. Yield during 1997 and 1998 varied greatly with cultivar. Synchronous alternate bearing is believed to be the result of environmental and physiological conditions. For this nine-year period an average of ca. 33% of a full crop was produced, (i.e. a full crop would equate to ca. 1500 to 2000 lbs. Per acre). Thus, average yield for all cultivars combined was 600 lbs/acre over this eleven-year period; however, marketable yield was less than this as a result of losses due to nut diseases and insufficient kernel filling.

Only a small percentage of pecan cultivars are adapted to north Florida. Yield, nut quality, disease resistance and a tendency to resist limb breakage are important criteria by which to determine the suitability of pecan cultivars to a given location. Only 'Curtis,' and 'Moreland' produced an average of at least 50% of a full crop over the eleven-year period. 'Cape Fear,' 'Chickasaw,' 'Curtis,' 'GarBohls,' 'GraZona,' 'Kiowa,' 'Melrose,' 'Moreland' and 'Owens' produced at least 40% of a crop. The best overall yield was produced in 1993; however, because of over-supply, the price offered to the grower was only 40 to 75 cents a pound. Virtually all cultivars displayed a tendency to bear heavy and light crops in alternate years; 'Owens' was the cultivar with the least alternate bearing tendency. During 1994, a year of extremely heavy rainfall, only 'Elliott' produced a good crop (i.e. 75%). The

following year only 'Curtis' produced at least 50% of a crop, whereas in 1996 most pecan cultivars produced at least 50% of a crop.

Many pecan cultivars are not recommended for north Florida because of limitations such as a low percentage kernel or poor resistance to scab and other leaf diseases. Nut weight varied from ca. 5 to 10 g which translates to ca. 90 to 45 nuts per pound, respectively (Table 2). Percentage kernel, which is a better indicator of nut quality, was at least 50% for all cultivars except 'Griffin' and 'Stuart.' Percentage kernel calculations did not include unfilled nuts (pops). Percentage pops in 1989 was high (>25%) for 'Desirable,' 'GraBohls,' 'GraTex,' 'Gra Zona,' 'Griffin,' 'Jackson,' 'Melrose,' 'Moreland' and 'Stuart.' 'Desirable,' 'GraBohls,' 'GraZona' and 'Stuart' had at least 40% pops.

Poor resistance to leaf diseases (Table 3) contributed to low yields, low percentage kernel and a high frequency of pops. Resistance to leaf and nut diseases varied from year to year mainly as a function of the humidity and precipitation during the growing season. Note that all pecan cultivars with an Indian name: 'Cherokee,' 'Cheyenne,' 'Chickasaw,' 'Kiowa,' 'Mohawk,' 'Tejas' and 'Wichita' had an average leaf disease rating of less than seven. Other cultivars with poor disease resistance include: 'Desirable,' 'GraBohls,' 'GraZona,' 'Griffin,' 'Mahan' and 'Mahan Stuart.' The cultivars with the highest overall yield ('Curtis' and 'Moreland') also had the highest level of resistance to leaf diseases (Table 3). These data do not support the contention of Wolstenholme and Malstrom (1980) when evaluating a United States pecan breeding program that breeding for scab resistance should be rated as a lower priority than yield potential.

A fungicide spray program is required for successful pecan production in the southeastern United States. Only pecan cultivars with a disease resistance rating of higher than seven should be considered for north Florida. 'Cheyenne,' 'Mahan Stuart,' 'Tejas' and 'Wichita' had the lowest level of resistance. Indian-named cultivars and the Gra series of cultivars generally had inadequate disease resistance.

Nut disease resistance also varied greatly among cultivars (Table 4). 'Curtis,' 'Elliott' and 'Moreland' had the greatest resistance to scab. Nuts of 'Jackson,' 'Kernodle,' 'Melrose' and 'Sumner' were also highly disease resistant. Cultivars with a nut disease rating of less than 5 will not likely produce marketable nuts. For example, only 9 of 26 were likely to produce marketable nuts during 1999. In general, the Indian-named cultivars had the least resistance to nut diseases.

The strength of wood varies greatly among cultivars (Table 5). 'Cape Fear,' 'Curtis,' 'Elliott,' 'GraTex,' 'Griffin,' 'Jackson,' 'Moreland,' 'Owens' and 'Tejas' were cultivars with the highest resistance to limb breakage. However, it must be remembered that limb breakage is both a function of inherent wood strength and crop load. For example, 'Tejas' does not fill nuts in north Florida even with a good fungicide program. Thus, wood of 'Tejas' does not have to contend with the weight of a heavy crop of nuts, indicating that wood strength of 'Tejas' is no better than most of the other cultivars.

Table 6 was compiled based upon data, observations, and discussions with research and extension personnel and growers. Six major parameters have been chosen as important variables: yield, nut size, % kernel, resistance to scab and other leaf diseases (downy spot, zonate leaf spot, brown spot, leaf spot, liver spot, etc.), and precocity (the length of time required before a crop can be produced = length of juvenility). Numerical yield and nut size ratings vary from 1 (lowest) to 4 (highest). Tree size has been taken into account in establishing yield ratings. Percent kernel, resistance to scab and resistance to leaf disease are rated from poor to excellent and precocity is indicated in years.

'Cape Fear' and 'Moreland' are cultivars highly recommended for north Florida due to above average yield, nut size and disease resistance. Although nut size of 'Elliott' is small, it is highly recommended because of excellent disease resistance, 'Curtis' is recommended because it has produced consistently high yields and is disease resistant. 'Sumner' is a recommended cultivar because it has a good combination of yield, nut quality and disease resistance. 'Desirable' and 'Kiowa' are conditionally

recommended because they require an intensive disease control program. 'Stuart' is conditionally recommended because of poor precocity and low percentage kernel. 'Gloria Grande,' 'Melrose' and 'Owens' offer some potential (moderate to high yield, disease resistant) and are recommended only for trial since additional information is needed. None of the remaining cultivars released from the U.S. Dept. Agr. Breeding program in Brownwood, Texas (denoted by Indian names) are recommended for north Florida. Cultivars selected in the arid west are all susceptible to scab and other leaf diseases. 'GraBohls,' 'GraCross,' 'GraTex' and 'GraZona' do not appear in Table 2, and are not recommended.

Sherman et al. (1982) recommended 'Cape Fear,' 'Choctaw,' 'Curtis,' 'Elliott,' 'Kiowa' and 'Moreland' for trial in north central Florida. More recently, Crocker (1988) recommended 'Cape Fear,' 'Curtis,' 'Desirable,' 'Elliott,' 'Stuart' and 'Sumner' for commercial plantings in Georgia. While 'Cape Fear,' 'Curtis' and 'Elliott' are recommended in the present study and in the two previous studies, 'Moreland' has not been adequately tested throughout the southeastern United States; however, under Florida conditions (i.e. high humidity and high disease pressures) it has performed exceptionally well.

One final, very important consideration in selecting a pecan cultivar is the pattern of stigma receptivity and pollen shedding (Table 7). Pollen must be shed at a time when stigma are receptive for pollination to occur. Since there is often little overlap in stigma receptivity and pollen shedding within a given cultivar, cultivars with complimentary pollination characteristics should be planted together. 'Moreland,' although not listed in Table 7, is protogynous and 'Cape Fear' or 'Desirable' can serve as pollenizers (O'Barr et al., 1989).

A summary of recommended cultivars follows:

Highly recommended cultivars

'Cape Fear': 'Cape Fear' trees are strong with a deep taproot. It is protandrous and precocious. 'Cape Fear' has been a high producer at the NFREC-Monticello. Nut weight is typically 7.5 to 8.2g (58 nuts per pound) with a 55% kernel. Kernel

color is bright and quality is excellent. Resistance to scab is good and resistance to other leaf diseases is fair.

'Elliott': The wood of 'Elliott' trees is also strong. It is protogynous, but is not precocious. 'Elliott' has been a moderate producer. Nut size is small, typically 5.5g (82 nuts per pound) with a 54% kernel. Kernel color is bright, and quality and flavor are excellent. Resistance to scab and leaf diseases is rated good.

'Moreland': 'Moreland' is a strong tree that has produced consistently high yields in north Florida. It is protogynous, and moderately precocious. Nut size is about 8.2g (55 nuts per pound). The nut is similar to Schley. Percentage kernel is 55%. Color is somewhat bright and quality is high. Tolerance to scab and other leaf diseases ranks among the highest of any pecan cultivar.

Recommended cultivars

'Curtis': 'Curtis' is a strong tree. It is protogynous, but is not precocious. It has been one of the most consistent producers in north Florida, although nut size is small (5.0g, 90 nuts per pound). Percentage kernel is about 53%, and kernels are somewhat dark in color with dark brown speckles. Flavor is good. 'Curtis' is somewhat resistant to scab and other leaf diseases; however, because of small nut size, a dark kernel and late maturity, it is not highly recommended.

'Sumner': 'Sumner' is a largely overlooked pecan cultivar. It is a moderately strong tree and is moderately precocious. Nuts are large (9.5g, 48 nuts per pound), and percentage kernel is about 54%. Overall nut quality is good although kernels can be somewhat dark. 'Sumner' has a high resistance to scab and other leaf diseases.

Conditionally recommended cultivars

'Desirable': 'Desirable' trees have been planted extensively in the Southeast, often as a pollenizer to 'Stuart.' Wood of 'Desirable' is weak. 'Desirable' is protandrous and is moderately precocious. Nut size is typically large (9.5g, 48 nuts per pound) with a 53% kernel. Kernel color is light and quality is good.

Consumer acceptance is very high. However, resistance to scab and leaf diseases is poor. A strict spray schedule (and good weather) are prerequisites for successful culture in Florida.

'Gloria Grande': 'Gloria Grande' is a strong tree and resembles 'Stuart' in nut characteristics. It is protogynous, but not precocious. Nut size is typically large (9.0g, 51 nuts per pound). Nut fill is better than 'Stuart,' and is usually in the range of 52%. Kernel quality is good and color is light. Resistance to scab and other leaf diseases is very good.

'Kiowa': 'Kiowa' trees are slow growing and the wood is brittle like many of the cultivars with Indian names. It is protogynous and precocious. Yields have not been high. The nut resembles 'Desirable' in appearance, although it is larger (10g, 45 nuts per pound). Percentage kernel is about 55%. Color is light and quality is excellent. 'Kiowa' is very susceptible to scab and other leaf diseases. A strict spray schedule (and good weather) are prerequisites for successful culture in Florida.

'Stuart': 'Stuart' is the best known pecan cultivar. Trees are moderately strong and do not require as much training or pruning as other cultivars. 'Stuart' is protogynous, but is not precocious. Nuts are large (96g, 50 nuts per pound) and attractive. Percentage kernel, however, is usually low (often 45%). Kernel color is average and quality is variable. 'Stuart' was formerly regarded as tolerant to scab and other leaf diseases but is now rated as average in both categories. 'Stuart' retains a high status among pecan cultivars largely because of tradition. Due to the long period of time before 'Stuart' bear nuts (10-12 years) it is not recommended for new plantings; however, if it occurs in existing mature orchards it is a tree worthy of retention.

Cultivars recommended for trial

'Melrose': 'Melrose' is a strong tree and a consistent producer of high yields. 'Melrose' is protogynous, but is not precocious. The pecan is medium in size (7.5g, 60 nuts per pound) and is somewhat pointed. Kernel color is medium dark. It has good resistance to scab and other leaf diseases. 'Melrose' is only recommended on a trial basis for north Florida since little data are currently available.

'Owens': 'Owens' produces a moderate crop of moderate to large sized nuts (up to 10g, 45 nuts per pound). It is protandrous, but is not precocious. Percentage kernel is about 51%. Color tends to be medium dark. 'Owens' has good resistance to scab and leaf diseases. It is not recommended for commercial planting because of a dark kernel.

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Table 1. Yield of cultivars at the NFREC - Monticello (1989-1999).

Cv	Yield Estimate ^z											Avg.
	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	
Cape Fear	67	0	79	13	84	5	2	94	12	48	72	43
Cherokee	25	0	90	3	55	0	0	68	0	0	30	25
Cheyenne	-	0	33	70	45	5	10	0	0	0	13	19
Chickasaw	67	0	73	17	83	0	0	80	0	0	35	33
Curtis	80	0	70	22	80	0	60	90	48	30	78	52
Desirable	39	0	57	22	68	0	2	48	31	23	30	29
Elliott	30	0	63	8	45	75	0	43	25	23	85	36
GraBohls	88	0	85	0	90	0	0	47	95	40	88	48
GraCross	77	0	60	20	73	23	0	63	63	13	70	42
GraTex	43	0	34	0	59	33	0	52	30	10	68	30
GraZona	80	0	80	17	97	0	3	93	50	80	10	46
GraKing	70	0	53	0	63	13	20	80	68	10	58	40
Griffin	35	0	38	0	33	30	23	8	58	0	50	25
Jackson	25	0	15	14	40	10	8	42	37	12	46	22
Kernodle	53	0	63	0	70	7	23	27	57	3	50	32
Kiowa	48	0	68	5	83	33	13	65	25	8	35	38
Mahan	-	0	0	0	95	0	0	45	0	0	20	16
Mahan Stuart	-	0	23	18	48	15	0	0	0	0	28	14
Melrose	63	0	97	0	80	17	13	63	53	37	90	46
Mohawk	-	0	43	15	58	16	6	28	14	0	18	18
Moreland	85	0	85	45	80	0	20	95	65	15	70	52
Owens	53	0	63	70	57	43	0	70	37	60	60	47
Stuart	36	0	46	20	35	7	13	75	60	12	40	32
Sumner	33	0	63	22	79	5	0	71	32	51	60	39
Tejas	30	0	50	3	20	0	0	0	0	0	35	14
Wichita	40	0	54	30	70	2	2	30	20	12	43	28
Avg	51	0	56	16	63	15	11	52	33	19	50	33

^zYield estimate=percentage of full crop.

Table 2. Cultivar performance at the NFREC - Monticello (1989).

Cv	Nut wt. (g)	% kernel	% pops
Cape Fear	7.2	57	20
Cherokee	4.7	58	25
Cheyenne	-	-	-
Chickasaw	5.9	58	0
Curtis	4.7	53	18
Desirable	6.9	53	45
Elliott	5.5	53	9
GraBohl	6.3	54	72
GraCross	8.5	54	5
GraTex	7.9	57	25
GraZona	8.8	50	45

Table 2. Cultivar performance at the NFREC - Monticello (1989).

Cv	Nut wt. (g)	% kernel	% pops
GraKing	9.9	65	20
Griffin	6.1	46	39
Jackson	10.9	57	45
Kernodle	10.2	51	13
Kiowa	6.9	50	21
Mahan	-	-	-
Mahan Stuart	-	-	-
Melrose	3.4	63	30
Mohawk	-	-	-
Moreland	7.5	56	40
Owens	8.8	51	17
Stuart	6.9	44	54
Sumner	9.2	52	21
Tejas	3.2	61	18
Wichita	4.8	53	18

Table 3. Resistance of pecan cultivars to leaf diseases at the NFREC - Monticello (1989-1999).

Cv	Resistance to Leaf Diseases ²													Avg.
	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999			
Cape Fear	3.3	5.1	8	9	9.8	6	7.6	9.4	8.8	8.6	8.8	7.6		
Cherokee	4	4.8	6.3	6.3	9	1.3	6.8	6.8	3.2	1.8	6.5	5.2		
Cheyenne	-	3.3	6	5.3	7	1	4	5.5	2	0	4.8	4		
Chickasaw	3.3	2	8.7	7.3	9.7	5	7.7	8	5.7	3	8	6.7		
Curtis	5.3	7.8	9.3	8	10	8.3	8.8	9	8.3	8.8	9.3	8.4		
Desirable	3.7	4.6	5.8	7.5	9.3	3.1	5.3	7.4	7.6	5.6	7	6.2		
Elliott	2	3.8	9.3	7	10	8.8	8	9	7.8	9.5	9.3	7.8		
GraBohls	6	6.5	3.5	5.5	7.5	1.3	5.3	7.5	8.5	8	6.8	6		
GraCross	4.7	7.7	8.3	7.3	9	6.7	8	8.7	8.7	7.7	8	7.7		
GraTex	4.7	6.3	5.6	5	9	6.7	6.4	6.8	7.4	7.2	8	6.6		
GraZona	2	5.7	5.3	4.3	7.7	2.7	7	7	6	8	7.3	5.9		
GraKing	4.8	5.3	7.3	3.8	8	6.3	7.5	7.5	8	6.5	8.8	6.7		
Griffin	2.5	2.5	3.8	6.5	8.8	7.8	7.5	7.8	7.8	8	7.3	6.4		
Jackson	6.5	7	7.5	6	9.4	8.7	7.4	7.4	7.3	7.8	8	7.6		
Kernodle	4	6	8.7	6.8	9	5	5.7	6.7	6.7	7	7.3	6.7		
Kiowa	3.5	5.3	5.5	6.5	9.7	6.3	7	5.8	6.3	8.5	6.8	6.4		
Mahan	-	6	4	6.5	9.5	4.5	7	6.5	8	6	8	6.7		
Mahan Stuart	1.8	1.8	7	6.5	7.3	1	5	6.3	2.3	4	6.8	4.5		
Melrose	5	7.3	8.3	5.3	8.3	7.7	8.3	7.3	6	7.7	9	7.2		
Mohawk	-	3	6	7.3	9	5.4	6	5.8	2.6	2.2	7	5.6		
Moreland	6.5	7	9.5	8	10	8.5	9	8.5	7.5	9	8	8.4		
Owens	5.3	5.3	7.7	8	8.7	5.7	8.3	9.5	8.7	8.5	8	7.6		
Stuart	3.6	5.3	7.3	6.8	8.8	5.1	6.5	7.5	8.2	5.2	7	6.5		
Summer	5.4	7	8.7	6.8	10	6.5	9.6	7.7	8.6	9.1	8.3	7.9		
Tejas	1.3	4.3	4.3	4.7	8	1	5	6.3	2.7	0	6.5	3.9		
Wichita	2.4	5	3.8	4.3	8.8	2.7	4.8	6	5	4.2	6.7	4.9		
Avg	4.4	5.4	7.1	6.5	8.9	5.4	6.9	7.3	6.8	6.2	7.6	6.7		

²Leaf disease resistance based on a scale from 0 to 10. (0 =low resistant, 10= high resistance).

Table 4. Resistance of pecan cultivars to nut diseases at the NFREC - Monticello (1991 - 1999).

Cv	Resistance to Nut Diseases ²										Avg
	1991	1992	1993	1994	1995	1996	1997	1998	1999		
Cape Fear	6.6	9	9.8	2.5	9	9	7	4.2	6	7.1	
Cherokee	2	4	4.5	-	-	3.5	-	-	1	3	
Cheyenne	4	5.7	7	1	2	-	-	-	1	3.5	
Chickasaw	7	7	9.3	-	4	-	-	-	1.5	5.8	
Curtis	9.5	7.8	10	-	8.3	9.5	5.3	9	8	8.5	
Desirable	3.5	5.8	8.8	-	4	6.6	5.4	7.7	3.6	5.7	
Elliott	9.3	8	10	9.5	-	9	8	9	9.5	9.1	
GraBohls	3.5	-	6.3	-	-	7.3	6	6	3.3	5.7	
GraCross	5.3	7.5	9	2.7	-	9	8.3	6	4.3	6.5	
GraTex	5.6	-	9.4	7.6	-	7.8	6.3	7.5	7	7.2	
GraZona	2.3	2.5	7.3	-	2	5.7	4.7	4.7	2	4.5	
GraKing	7	-	7.3	3	7.5	9	8.5	6	6	6.8	
Griffin	5.5	-	9	2.8	7.3	8.5	7.3	8	3.8	6.5	
Jackson	8.5	6.4	9.8	6.7	5.3	8.3	8.3	-	7.8	7.6	
Kernodle	6.3	-	9.7	7	4	7.7	6.3	6	3.3	6.3	
Kiowa	3.5	4	9.7	1	4.3	2.3	2	5.5	1.5	3.8	
Mahan	-	-	7.5	-	-	3.5	-	-	-	5.5	
Mahan Stuart	5.5	6	8.3	1	-	-	-	-	4.7	5.1	
Melrose	7	-	9.3	8	6.7	8	5	8	7.3	7.5	
Mohawk	3.8	6	8.2	2	2	7	5	4	4.5	4.8	
Moreland	9.5	8	10	-	7.5	8	8	9	8	8.5	
Owens	7.3	8	8.3	4.7	3	8.5	7.7	7.5	3	6.5	
Stuart	4.4	5.8	9.7	1.6	5	5.7	5	4	2	4.7	
Sumner	4.4	5.8	9.7	1.6	-	8.7	5.7	8.3	7	6.4	
Tejas	1.7	2	9	-	-	-	-	-	0	3.2	
Wichita	2.2	0.7	6.2	1	3	-	2.3	5.3	0	2.6	
Avg	5.4	5	8.4	3.6	5.1	7.3	6.1	6.3	4.2	5.7	

²Nut disease resistance based on a scale from 0 to 10. (0 = low resistance, 10 = high resistance).

Table 5. Resistance of pecan cultivars to limb breakage at the NFREC - Monticello from 1993 - 1999.

Cv	Resistance to Limb Breakage ^z									
	1993	1994	1995	1996	1997	1998	1999	Avg.		
Cape Fear	9.4	10	8.2	9.8	9.2	9.5	8.2	9.2		
Cherokee	8	7.3	5.8	7.3	7.5	6.5	6	6.9		
Cheyenne	9.8	10	4.3	9.8	8.3	9	7.5	8.4		
Chickasaw	6.7	3.3	4.5	6.3	8.3	7.3	6	6		
Curtis	9.5	8.3	8.8	9.5	7.3	9	8.3	8.6		
Desirable	7.8	5.9	6.2	8.6	8.3	8	7.5	7.3		
Elliott	10	9.5	9	9.3	9.8	9.3	8	9.2		
GraBohls	7.5	7.8	5.5	8.5	9	8	7.8	7.8		
GraCross	9.7	8.7	7.3	8.3	9	9	8.7	8.7		
GraTex	9.9	9	7.7	9.3	9.3	9.2	7	8.8		
GraZona	8	7.3	8	8.3	8.7	9	8.8	8.4		
GraKing	9.3	8	6.8	8.3	7.8	7.5	7.8	7.9		
Griffin	10	9	7.3	9.5	9.8	9.3	9.5	9.3		
Jackson	9.6	9.3	7.8	9	9.3	8.4	9	8.6		
Kernodle	8.7	7	8	10	7.7	9.7	9.3	8.6		
Kiowa	6.3	8.8	6.8	8.8	9.3	8.8	8.3	8.3		
Mahan	9.5	7.5	7.5	8	8.5	9	7	8.2		
Mahan Stuart	9.3	6	8	9.3	8	9	7.8	8.2		
Melrose	7.7	9.3	8	6	8.7	9.3	8.7	8.2		
Mohawk	9.8	6.8	7.6	8.6	8.6	9	6.3	7.8		
Moreland	9	9.5	10	9	8.5	8.5	8.5	9		
Owens	10	9	8.3	9.5	8.7	9	9	9.1		
Stuart	9.7	7.8	8.2	9.8	9.8	10	9	9.3		
Summer	9.7	7	9.6	9.1	8.9	9.3	8.6	8.8		
Tejas	10	9.3	7.3	9	9	9	8.3	8.8		
Wichita	7.7	6.8	5.2	9	8.7	8.8	8.5	7.9		
Avg	9	8.1	7.8	8.8	9	8.4	7.8	8.4		

^zResistance of limb breakage rated on a scale from 0 to 10. (0 = severe limb breakage, 10 = no limb breakage).

Table 6. Yield, nut wt. % kernel, resistance to scab and leaf diseases, precocity and recommendation status of 37 pecan cultivars.

Cultivar	Yield ^z	Nut wt. ^y	% kernel	Resistance to Scab ^z	Leaf Dis. ^x	Precocity ^w	Recommendation ^v
Barton	4	1+	avg	good	good	8-Jun	NR
Caddo	3+	1	good	avg+	avg	8-Jun	NR
Candy	3	1	good	good	?	6-Apr	NR
Cape Fear	3+	3	good	good	avg	6-Apr	HR
Cheyenne	3	2	avg-	avg-	avg	5-Mar	NR
Chickasaw	3	1+	poor+	poor	avg	5-Mar	NR
Cherokee	3	1	poor	poor	avg	6-Apr	NR
Choctaw	3	2	good	avg	avg	10-Aug	NR
Curtis	3-	1	good	avg+	good	12-Oct	R
Davis	3	3-	poor	good	good	10-Aug	NR
Delmas	3+	3-	avg	poor	avg-	?	NR
Desirable	3	3+4-	avg	poor	poor	10-Aug	CR
Elliott	3	1	good	excellent	good-	12-Oct	HR
Farley	2	1+	avg	good	avg	12-Oct	NR
Forkett	3	3-	good	avg-	avg	12-Oct	NR
Gloria Grande	3-	4-	avg	good	good	10-Aug	R
Griffin	2	2	poor	poor	poor	10-Aug	NR
Harris Super	2	3	avg	poor	avg-	10-Aug	NR
Jackson	3	4-	good	avg+	avg	8-10?	NR
Kernodle	3-	3	good	avg	avg+	10-Aug	NR
Kiowa	3-	4	good	avg-	avg	8-Jun	CR
Mahan	2	4	poor	avg	avg	8-Jun	NR
Mahan Stuart	2+	4+	poor+	avg+	avg	8-Jun	NR
Melrose	3+	3-	good	good	avg	10-Aug	TR
Moneymaker	4	2	poor	avg	avg	?	NR
Moore	3+	3	poor+	poor	avg-	?	NR
Moreland	3+	3	good	good	good	10-Aug	HR
Owens	2+	4	good	good	avg	10-Aug	TR
Schley	3	3	good	avg-	avg	?	NR
Shawnee	3-	1+	poor	poor+	avg-	10-Aug	NR
Pawnee	?	4-	avg	avg-	avg	8-Jun	NR
Shoshoni	3	2+	poor	avg	avg	6-Apr	NR
Stuart	3-	4-	poor	avg	avg	12-Oct	CR
Success	2	3	avg	avg	poor	?	NR
Sumner	3	3+4-	good	good	good	8-Jun	R
Tejas	1-4-	1+	poor	poor	poor	5-Mar	NR
Van Deman	2	3	poor	avg-	?	?	NR
Wichita	1-4-	2	poor	poor	poor	8-Jun	NR

^z Yield rating varies from 1 (low), 2+ (average), 3 (good), 4 (excellent).

^y nut wt. varies from 1 (6.0 to 6.9g), 2 (7.0 to 7.9g), 3 (8.0 to 8.9g), 4 (<9g).

^x % kernel and resistance to scab and leaf diseases.

^w Precocity (in years to reach bearing age).

^v Recommendation: HR (highly recommended), R (recommended), TR (recommended for trial), CR (conditionally recommended), NR (not recommended).

Table 7. Stigma Receptivity and Pollen Shedding of Pecan Varieties at Brownwood, Texas, 1974.

	APRIL															MAY																				
VARIETY	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Desirable	=====															-----																				
Caddo	=====															-----																				
Cherokee	=====															-----																				
Riverside	=====															-----																				
Cape Fear	=====															-----																				
Moore	=====															-----																				
48 15 3 (Major H Evers)	=====															-----																				
San Saba Improved	=====															-----																				
Western	=====															-----																				
Barton	=====															-----																				
Cheyenne	=====															-----																				
Mahan	-----															=====																				
Chickasaw	-----															=====																				
Candy	-----															=====																				
Elliott	-----															=====																				
Ideal	-----															=====																				
Schley	-----															=====																				
Apache	-----															=====																				
Curtis																																				
Shoshoni																																				
Sioux																																				
Stuart																																				
Wichita																																				
GraBohls	-----															=====																				
53 9 191 (Mahan X Odom)	-----															=====																				
Mohawk	-----															=====																				
Tejas	-----															=====																				
Choctaw	-----															=====																				
Shawnee																																				