

Pecan Variety Study on the Safford Agricultural Center 1999

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Abstract

In 1986 a replicated study of eight varieties of pecans was planted on the Safford Agricultural Center at an elevation of 2954 feet above sea level. The objective of the study was to determine which varieties would produce best under the saline conditions found in the Safford valley. WO-3, the highest overall producer of the study, produced the best yield in 1999, with a yield over 2600 pounds per acre. This paper also contains kernel percentages and other nut characteristics found in the study during the 1999 harvest seasons and a summary of the yields since 1997.

Introduction

Pecans are a small crop in southeastern Arizona being grown on approximately 4500 acres with about 1000 of those acres in Graham county. Using an average yield of 2000 pounds per acre, a nut turnout of 55% and the 1998 price of \$1.25 per pound, they produce \$1.375,000 of income for the county, which is equivalent to more than 6% of the income from all crops in the county in 1998. In addition to the pecans being grown commercially, many trees are grown in an urban setting for the pleasure of the homeowner. With this income potential and the urban interest, more emphasis ought to be placed on this crop.

Materials and Methods

In 1986 eight varieties of pecans varying from the Burkett that has been grown in the valley for many years to currently recommended varieties, such as: Western, Wichita, Barton, and Mohawk and the newer varieties such as: Cheyenne, Sullivan and WO-3 were planted in four replications in a Pima clay loam variant with a soluble salt content around 2000 parts per million. The transplants were placed with 25 feet between trees in a row and 25 feet between rows in a diamond grid. Area per tree was calculated at 0.014 acres. Nitrogen fertilizer was applied each spring and surface flood irrigation was applied approximately monthly during the summer season. Soil sulfur was applied twice and gypsum was applied once over the years to reduce the affects of sodium. As the trees reached nut bearing age irrigations were increased somewhat, but management levels would still not be considered aggressive. In 1999 ten irrigations were applied with a total of approximately 5 acre feet of water and 100 pounds of nitrogen was applied to the soil on May 27th. On May 25th and June 11th zinc sulfate and low biuret urea (4 pounds of each compound dissolved in 100 gallons of water) were applied to the foliage. In December the trees were mechanically shaken and the nuts picked up from each tree by hand. Nuts were run through a huller and the percent tight nuts were determined, the good nuts were weighed and per acre yields were calculated. Twenty nuts were taken from each tree to determine nuts weight and they were measured for size. These nuts were then shelled to determine kernel percentages and the kernels were inspected for quality.

This was the third year that nuts were harvested for yield on these plots and the second year that management levels were increased.

This is a part of publication az1178: "2000 Citrus and Deciduous Fruit and Nut Research Report," College of Agriculture and Life Sciences, the University of Arizona, Tucson, Arizona, 85721.

Results and Discussion

Table 1 contains yield and other measured or observed characteristics that could affect yield. WO-3 produced the highest yield by a significant margin over the other varieties in the study. Kernel percentages were 4 percent higher than those observed in 1998 and 8 percent higher than observed in 1997 (1). This along with the increased yields are probably a reflection of the improved management. An increase was, however, seen in the percent tights in 1999 over the previous year. The last column in Table 1 was the diameter of the tree trunks measured below any forks and generally a couple of feet above the ground. This measurement is related to tree size and the ability to produce fruit. There was a positive correlation between kernel yield and trunk diameter ($r=0.40$, $P=0.02$).

Table 2 provides data on the weight and size of nuts by variety. A decline in nuts per pound over the last three years indicates that heavier nuts are being produced. From the observed length and width measurements one could also deduce that the nuts are generally larger. Heavier nuts tend to contain more oil and be better filled. The fill rating on Table 3 is an indication of how well the kernel is filled. This rating is a combination of how well the dorsal ridges are filled as well as whether the kernel has air spaces in the center. A rating of 10 would be a plump nut with narrow dorsal grooves and with no air spaces in the center of the nut. A rating of 5 would be a kernel with large dorsal grooves and large air spaces in the center of the nut. In some varieties of pecans the dorsal grooves are narrow and trap packing material on the inside of the shell. The shell fragment retention is a measure of that characteristic. If one nut half out of one hundred contained a small piece of this packing material, the value would be 1.0. The size uniformity rating is an indication of how uniform the length of the kernel is. If all kernels were the same length, the value would be 10. Appearance ratings indicated how uniform the kernels were in color and plumpness. A value of 10 is the most desirable.

Table 4 contains a yield summary of the varieties over the three years of the study. Some varieties are more alternate bearing than others. The variety, WO-3, in these three years, has only shown an increase in yield from year to year. Cheyenne, the number two variety, showed a decided alternate bearing characteristic. Mohawk, which had produced in the middle of the group, mysteriously, didn't produce fruit in 1999.

References

1. Clark, L.J. and E.W. Carpenter. 1999. Pecan variety study on the Safford Agricultural Center, 1997-1998. 1999 Citrus and Deciduous Fruit and Nut Research Report, the College of Agriculture, The University of Arizona, Tucson, AZ. Series P-117, pp. 82-86.

Table 1. Yield components of pecan variety trial harvested 1999 at the Safford Agricultural Center.

Variety	In-shell Yield (lbs/ac)	Kernel Percent	Kernel Yield (lbs/ac)	Estimated % Length of kernel fill	Percent Tights	Trunk Diameter (in)
WO-3	4617.4 a ¹	58.4 abc	2679.5 a	78.8 bc	19.2 ab	6.8 ab
Barton	3240.9 b	62.2 ab	1948.7 b	71.3 c	27.1 a	7.4 a
Cheyenne	3084.1 b	59.7 abc	1841.3 b	100.0 a	9.0 cd	5.9 abc
Western Schley	3031.8 b	55.0 bc	1686.4 b	86.3 b	22.6 ab	6.3 abc
Wichita	1939.3 bc	64.3 a	1250.4 bc	83.8 b	13.9 bc	4.9 c
Burkett	1306.8 d	55.4 abc	712.6 d	91.3 ab	21.2 ab	6.8 ab
Sullivan	557.6 d	52.6 c	277.4 d	80.0 bc	3.6 d	5.3 bc
Mohawk	--	--	--	--	--	5.3 bc
Average	2539.7	58.5	1485.2	84.5	16.7	6.09
LSD(05)	1363.1	8.9	740.0	11.5	8.9	1.4
CV(%)	36.1	10.3	33.5	9.2	41.8	15.4

1. Values followed by the same letter, within columns, are not significantly different at the 95% level of confidence using Duncan's Multiple Range Test.

Table 2. Nut weights and dimensions of pecan variety trial harvested 1999 at the Safford Agricultural Center.

Variety	Nuts per pound	Nut Shell Dimensions			Length to Width Ratio
		Length (in)	Width 1 (in)	Width 2 (in)	
WO-3	69.0 ab ¹	1.57 a	0.95 c	0.83 bc	1.66 ab
Barton	77.4 a	1.48 a	0.95 c	0.83 bc	1.57 ab
Cheyenne	60.5 b	1.50 a	1.01 b	0.86 b	1.49 b
Western Schley	77.8 a	1.51 a	0.90 c	0.78 d	1.69 a
Wichita	70.3 ab	1.56 a	0.95 c	0.81 cd	1.65 ab
Burkett	58.6 b	1.31 b	1.09 a	0.95 a	1.20 c
Sullivan	59.7 b	1.62 a	1.01 b	0.83 bc	1.61 ab
Mohawk	--	--	--	--	--
Average	67.6	1.51	0.98	0.84	1.55
LSD(05)	11.5	0.14	0.05	0.04	0.18
CV(%)	11.4	6.0	3.7	3.2	7.9

1. Values followed by the same letter, within columns, are not significantly different at the 95% level of confidence using Duncan's Multiple Range Test.

Table 3. Nut meat characteristics by pecan variety at the Safford Agricultural Center, trial harvested 1999.

Variety	Fill Rating	Shell fragment retention	Size uniformity Rating	Appearance Rating	Kernel Color
WO-3	7.9 bc ¹	3.8 a	7.6 c	7.6 c	med brown
Barton	7.3 c	3.8 a	7.6 c	7.6 c	med/drk brn
Cheyenne	9.2 a	2.5 a	9.1 a	9.1 a	light brown
Western Schley	8.4 b	0.0 a	8.0 bc	8.0 bc	med brown
Wichita	8.5 b	0.0 a	8.0 bc	8.0 bc	lt/med brown
Burkett	8.5 b	2.5 a	8.8 ab	9.0 ab	med brown
Sullivan	7.9 bc	0.0 a	9.0 a	8.5 abc	light brown
Mohawk	--	--	--	--	--
Average	8.2	1.8	8.3	8.3	--
LSD(05)	0.67	4.9	0.78	1.0	--
CV(%)	5.5	--	6.3	8.1	--

1. Values followed by the same letter, within columns, are not significantly different at the 95% level of confidence using Duncan's Multiple Range Test.

Table 4. Kernel yield summary of pecan variety trial from 1997 to 1999 at the Safford Agricultural Center.

Variety	1997 Kernel Yield (lbs/ac)	1998 Kernel Yield (lbs/ac)	1999 Kernel Yield (lbs/ac)	Average Kernal Yield
WO-3	966.8 (1)	1334.5 (1)	2679.5 (1)	1660.3
Cheyenne	958.0 (2)	269.1 (5)	1841.3 (3)	1022.8
Western Schley	840.4 (3)	383.9 (4)	1686.4 (4)	970.2
Barton	739.0 (5)	96.6 (7)	1948.7 (2)	928.1
Wichita	661.2 (6)	156.1 (6)	1250.4 (5)	689.2
Burkett	491.2 (7)	514.2 (3)	712.6 (6)	572.7
Mohawk	828.4 (4)	836.8 (2)	--	555.1
Sullivan	481.2 (8)	81.0 (8)	277.4 (7)	279.9
Average	754.8	459.0	1299.5	837.8