

Performance of Mature Pecan Varieties in the Low Desert 1997 and 1998

Richard Gibson, Linda Nunan, and Michael Kilby

Abstract

Mature pecan trees at Picacho, Arizona were evaluated for variety performance during 1997-98. Total average yield per tree, percent kernel and percent viviparity were observed. During 1997, a severe viviparity year, only Bradley, Cheyenne, Souix and Tejas showed viviparity values of 20% or lower. Tejas did not return an acceptable percent kernel leaving Bradley, Cheyenne and Souix as potential varieties able to withstand low desert growing conditions on a regular basis. In 1998, the cool growing season confounded the test and no conclusions were drawn from the data.

Introduction

Total nuts harvested and overall nut quality determine both the volume of crop and the final price at market. Below average yields and significant numbers of low quality nuts currently threaten the economical viability and sustainability of low desert pecan enterprises. Yields over 2,000 pounds per acre are common throughout the pecan belt of North America while yields in the low desert areas of Arizona average about 1,700 pounds per acre. These reduced yields are the result of poor fruit set and variable fruit shed during the season. They are also the result of poor quality ratings caused by pecan nut viviparity, undeveloped or improperly developed meats, kernel color and similar conditions.

Since pecan nut yields and quality are generally not a problem in the middle to high desert production areas in Arizona, the problem seems to be a low desert phenomenon. Nuts produced in low desert orchards usually suffer significant losses, especially in years that are characterized by hot, humid late summer and early fall months when the nut is in final stages of development. This implicates the harsh desert environment as a major factor in pecan nut quality.

Informal observations of variety performance indicate that there may be differences between varieties in their response to environmental conditions. These differences may result in corresponding differences in the response of pecan varieties to warm and humid conditions during the late summer and early fall months.

The problem is compounded by the pecan's tendency to alternate bear, that is to bear a heavy yield one or two years and then to rest for one or two years. This on-and-off cycle causes variable yields throughout the belt and reduces the cash flow of individual growers during the off-year.

The objective of this survey was to track any differences between varieties that may result in higher yields and quality at harvest time specifically due to varietal response to the environment.

Materials and Methods

Mature pecan trees planted in the mid-1970's at Picacho, Arizona were chosen for the 1997-98 study. Five trees from each variety were selected and marked with a number between 1 and 5 within a row. Trees were selected in 1997 when they exhibited a heavy load of nuts, thus, not all trees were necessarily adjacent to each other during the study. The trees were managed during the growing season by the grower and all trees in the study were treated exactly like all of the other trees in the block.

At harvest, a random sample of nuts was taken from underneath each tree after shaking. The nuts were selected by using a standard set of ropes that mark off a specific area of the circle under the tree. All nuts within the ropes, including those that were touched by the rope boundaries were included in the sample. Nuts were evaluated for overall yield, percent kernel, viviparity, nut weight, and the number of nuts per pound. The 1997 or on-year data and the 1998, or off-year results are presented below.

Results and Discussion

Table 1 outlines the summary of values recorded for all parameters and varieties measured in 1997 and Table 2 provides the same information for 1998.

Yield. Significant differences in yield were noted between the varieties tested. In 1997, the highest yielding varieties were Choctaw at 113.63 pounds and Souix at 113.06 pounds. All values are an average of trees sampled. Cheyenne and Wichita were next with 98.19 and 95.13 pounds respectively. Intermediary varieties were Comanche, Western Schley and Mohawk at 84.75, 83.69 and 48.06 pounds. The lowest yielding variety in the 1997 test was Bradley at 34.39 pounds.

Western Schley proved to be the most productive by weight in 1998 with the five trees averaging 158.18 pounds per tree. Bradley was second with an average of 61.89 pounds followed by Wichita at 48.13 pounds, Shoshoni at 37.71 pounds and Chickasaw at 9.07 pounds.

The variable yield between years is an indication of alternate bearing and possibly differing production capability of soils within the orchard. Apparently the Western Schley and Bradley trees selected actually experienced a reversed on and off-cycle underscoring the difficulty in visually estimating yield during the growing season.

Percent Kernel. Percent kernel is determined by weighing the nut before cracking and then the weight of the kernel halves only. A percent value was calculated by dividing the total nut weight into the kernel weight. Ratings over 55% are considered acceptable.

In 1997, only Tejas and Comanche listed percent kernel values below 55% at 51% and 49% respectively. In 1998, two varieties rated higher in percent kernel than the other three. Wichita scored 62.5% and Bradley was close with 61.4%. The other varieties in order were Chickasaw at 57.9%, Shoshoni at 55.5% and Western Schley at 57.1%

The lower readings in 1997 may have been related to the on-growth cycle and the added stress upon the trees from carrying a heavy load. Tejas and Comanche may not be varieties best suited for low desert production based upon percent kernel.

Percent Splits. Viviparity was measured by noting the number of nuts per sample that demonstrated a split shell with or without a radical extending through the opening.

In 1997, Choctaw at 67%, Wichita at 67%, Comanche at 35% and Western Schley at 30% suffered significant losses to viviparity. Cheyenne at 14% and Souix at 14% may be varieties to consider for low desert production based upon viviparity tendencies.

In 1998, Wichita scored 23.7% splits in this test. The other varieties were significantly lower with Shoshoni rating 7.6%, Western Schley at 6.0%, Bradley at 0.6% and Chickasaw had no splits in this test.

The relatively low viviparity ratings in 1998 were the result of cooler weather early in the spring which delayed leafing out and fruit set by about 2 to 3 weeks in the growing season. During the growing season, the fruiting cycle continued to be 2 to 3 weeks behind. It is theorized that this delayed maturity prevented the developing crop from experiencing hot, humid temperatures during the critical period when the developing nut is most susceptible to viviparity and other quality problems.

The vagrancies of the weather combined with the corresponding variability in variety response to those weather conditions have probably skewed the data during the 1998 growing season. More work needs to be done in order to better understand the response of varieties to desert growing conditions.

Table 1. Yield summary data for pecan varieties evaluated during the 1997 growing year at Picacho, AZ.

Variety	No. Trees	Average Tree Yield (lbs.)	Average % Splits	Average % Kernel
Bradley	1	34.39	20	59
Cheyenne	4	98.19	14	58
Chocktaw	4	113.63	67	58
Commanche	1	84.75	35	49
Mohawk	4	48.06	26	57
Souix	4	113.06	14	58
Tejas	4	133.25	5	51
Western Schley	4	83.69	30	59
Wichita	4	95.13	46	58

Table 2. Yield summary data for pecan varieties evaluated during the 1998 growing year at Picacho, AZ.

Variety	No. Trees	Average Tree Yield (lbs.)	Average % Splits	Average % Kernel
Bradley	5	61.89	0.6	61.4
Chickasaw	5	9.07	0.0	57.9*
Shoshoni	5	37.71	7.6	55.5
Western Schley	5	158.18	6.0	57.1
Wichita	4	48.13	23.7	62.5

*3 out of 5 trees did not bear 10 nuts.