FRUIT AND NUT CROPS RESEARCH IN TEXAS, 1987

COMPILED AND EDITED BY:

Robert E. Rouse
Texas Agricultural Experiment Station
2415 East Highway 83
Weslaco, TX 78596

David H. Byrne
Department of Horticulture
Texas A&M University
College Station, TX 77843

The Texas Agricultural Experiment Station, Neville P. Clarke, Director,
Texas A&M University System, College Station, TX.

SUBJECT TOPIC: Pecan Growth and Development as Influenced by Environmental Factors.

INVESTIGATOR(S): J. Benton Storey, College Station

CROP(S): Pecans

ABSTRACT:

Objectives:

1) Control of vivipary.
2) Rejuvenation of mature orchards.
3) Estimations of pecan crop yields.
4) Determine how to dry early harvested pecans and maintain quality.

General Approach:

1) Vivipary can be controlled by maintaining soil moisture at field capacity throughout the entire season including October. Since this degree of management seldom exists, the majority of growers need a system more within the realm of what they can accomplish. The direct use of anti-gibberellins such as paclobutrazol (Cultar) manufactured by ICI and paclobutrazol analog (XE1019) manufactured by Chevron has not retarded vivipary. However, the gibberellin retardants have controlled growth to the point of almost completely stopping shoot elongation in the higher concentrations. The growth control of these compounds may well solve the problem of rapid compensatory growth of hedged trees. Hedging and subsequent growth retardation could keep the trees small enough to be harvested early with catching frames. Early harvest solves the vivipary problem and increases the value of the nuts because of early season prices which may open at $1.30/lb in mid-October and drop to $.80 by mid-December.

2) Treatments in a 30-year old orchard spaced 50' x 50' consisted of removal of alternate rows, heading back, and thinning out of one-third of the major scaffolds. All of these are compared with controls that have limbs touching in the middles.

3) Pecan crop estimation is practiced by buyers, growers and scientists but all methods are subjective to serious error. Since prices are set on estimates as early as June, it becomes very important that they be as accurate as possible. IPM requires a constant knowledge of nut set in order to evaluate the economics of pesticide application.

Findings:

1) XE1019 reduced growth from 37 cm on the control to 2.5 cm on all treatments the second year following soil treatment.

2) Heading back reduced yield of marketable 'Desirable' nuts the 3rd year (1985) following treatment, but tree removal was the only treatment that produced more marketable nuts than the control in the 4th year (1986). Tree removal, which allowed more sunlight around the canopy of the 'Stuart' trees, produced more marketable nuts in the 3rd year (57 kg/tree compared with 34 kg/tree in the control) but the heading back treatment was superior during the 4th year (6.5 kg/tree compared with only 1 kg/tree).

3) Mathematical modeling of estimated pecan crop yields has been developed to predict yield from September nut counts. June and July nut counts can measure the crop at the time but are less reliable in measuring final yield.

   The model will be further tested in 1987.

New Initiatives:

1) Retardants are being tested in Robertson, Zavala, Uvalde, Maverick, Comanche and Hood Counties.

   Another approach to the vivipary problem is based on the hypothesis that pollen from a northern cultivar such as 'Johnson' and 'Pawnee' would carry their characteristic for delayed germination through a Xenia effect to southern cultivars. All possible combinations of 'Pawnee', 'Johnson', 'Wichita' and 'Cherokee' hand pollinated crosses and reciprocal crosses have been made. Nuts will be harvested when mature but prior to shuck split. The nuts will be incubated to measure ease of germination. If northern pollen retards germination of southern cultivars then planting recommendations should solve much of the vivipary problem in new orchards.

   Lipase activity will be measured during the latter stages of maturity to determine the reliability of lipase analysis as an indicator of germination.

2) Pecan harvest is moving into September and early October in order to avoid vivipary and to take advantage of early harvest. Drying is essential under such harvest conditions but parameters for drying that will sustain nut quality are unknown.

Therefore, a study is being undertaken to evaluate the influence of drying on nut quality. Nut samples will be taken weekly from August 1 until late November. Extracted oil will undergo quantitative and qualitative analysis. Means will be sought that will favor development of oleic fatty acid in preference to the more unsaturated fatty acids known to be more prone to the development of rancidity.

3) Soybean has a single gene control of oleic acid production. Some cultivars exist in which fatty acids are almost exclusively oleic acid. This mono unsaturated fatty acid has a long shelf life and is thus desirable. Pecan germplasm at Brownwood will be evaluated for oleic acid to determine the inheritance patterns. If the gene exists in pecan, the use of it in breeding will make an excellent contribution to keeping quality of future pecan releases.