A Method of Estimating Pecan Yield

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Abstract. A quick method of estimating pecan yield is described and compared with mechanically harvested yields. The estimate accounted for 80% of the yield variation.

The tremendous amount of labor required over a short time period necessitates a quick method for estimating pecan yield for research purposes. There are often only 10 large trees or less per acre, and test plots may cover several acres, usually in grower-owned orchards. Quality and price of nuts fall rapidly as the season progresses; therefore, the grower cannot wait long for the researcher to obtain data. Hand harvest of whole trees may take one individual one day per tree, if trees are large. Mechanical harvest often mixes nuts from different trees, and a cleaning process also is required. Total tree harvest by hand or by machine is the usual procedure (3, 5, 6), but the method of determining tree yield sometimes is not specified (1, 2). Occasionally, yield is estimated by harvesting yield within rectangular quadrants (J.W. Daniel, personal communication). The method reported here was used by the author in an irrigation study (4).

The described method measures yield from four 3.6° circle sectors around each tree, thus totaling 1/25 of the tree's yield. Yield then is multiplied by 25 to estimate total yield. Two small chains are used as sides of the circle sector (radii), and the formula for a chord (2 r sin ½ θ) is used to calculate the length of spacers placed at the prescribed distance from the center of the circle. A 5-cm-wide metal band with a 61 cm (2 ft) radius is placed around the tree. The ends of the band are connected by a hasp and the band is held in place by attached spikes that are pushed into the ground. The ends of the chain are attached to 2 screw eyes on the band, spaced 3.8 cm apart. Radii of 61, 305, 610, and 915 cm required spacer lengths of 3.8, 19, 38, and 57 cm, respectively (Fig. 1). With the tree in the center of the band, the chains are attached 61 cm from the center of the tree. One person attaches the chains to the band while another stretches the chains away from the tree, usually in the direction of diagonal trees in order to avoid contamination from the adjacent trees. The chains are then laid on the ground and the nuts laying between the 2 chains are harvested. With practice, the 61-cm distance from the center

of the tree trunk and the 3.8-cm spacer at that point can be estimated since a small error at this narrow spacing would make little difference. The use of the tree encircling band can be discontinued when estimating 61 cm from the center of the tree to conserve time. When the chains are pulled tight, the spacers force them to be straight and pointed toward the center of the tree.

The procedure was tested under rather severe conditions with the thought that if it was satisfactory under these conditions, it should be even improved under ideal conditions.

Trees had been pruned by selective limb pruning which sometimes left them slightly assymetrical. The sweepers around the wheels of the self-propelled tree shaker also made paths underneath the trees and left nuts unevenly distributed. The nuts were shaken from the trees one day prior to utilization of the harvest method. Yield from 30 trees (from 14 to 64 years old, including 11 cultivars)

was estimated using the apparatus. The trees then were harvested completely using a Lockwood 480 pecan harvester. The regression equation, $y = 2.75 + 0.80x$, accounted for 80% of the variation in the data ($R^2 = 0.80$), where y = total tree yield and x = yield from 4 quadrant samples X 25.

Three of the apparatus were used in Byron, Ga to estimate yield of 256 10-year-old trees in one day using only 36 man hr.

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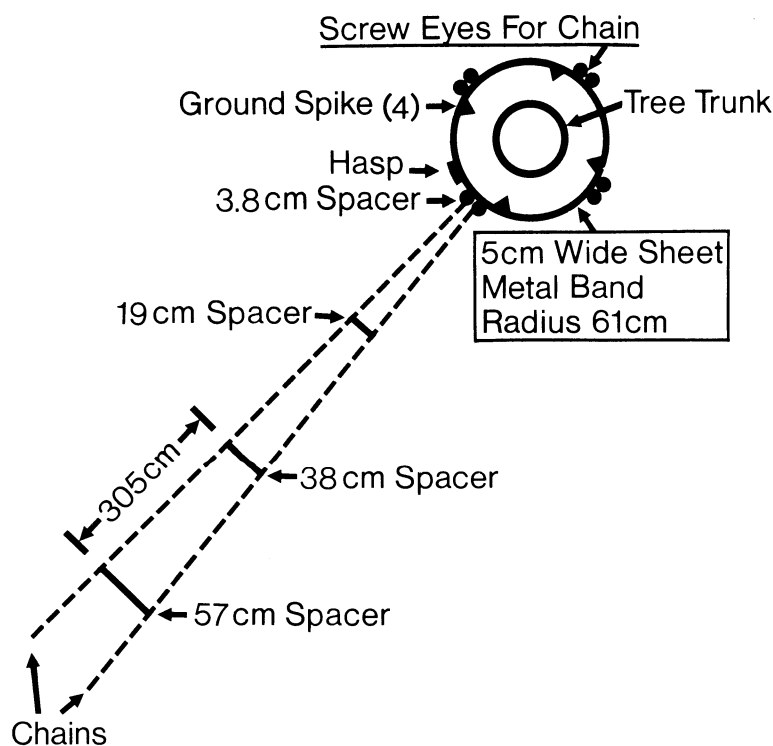
Fig. 1. Apparatus for estimating yield of pecan trees. Area within the 2 chains represents 1/100 of the area underneath the tree (metal band and tree trunk area are drawn to larger scale than the remainder for clarity. Spacers are at 61, 305, 610, and 915 cm from the center of the tree).