Research updates pecan tree fertilizer recommendations

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Nutrient management is one of the most important tools for optimal orchard production. Since some nutrients are used during the following year’s growing season, it is important that nutrient management be strictly followed every year, particularly during years with low production. Proper fertilization can decrease stress and improve the health and development of trees. Annual application of nitrogen and adequate levels of phosphorus have been shown to help reduce alternate bearing in pecan trees.

To develop a proper fertilization plan, it is essential to collect leaf samples each year in July. For procedures on collecting leaf samples, see Pecan Leaf Sampling (www.noble.org/ag/horticulture/pecansampling). Samples are analyzed and used to make fertilizer recommendations for the following year. Collaborative work between Oklahoma State University, the Noble Foundation and Auburn University has resulted in a scientific article, Pecan Leaf Elemental Sufficiency Ranges and Fertilizer Recommendations (www.hortla.okstate.edu/faculty/smith/pdfs/FertilizerRecommendations.pdf).

New research at Oklahoma State University suggests application of phosphorus and potassium in a band halfway between pecan trees and the dripline.
which is the first comprehensive paper on sufficient nutrient levels and fertilization recommendations for the entire pecan growing industry.

**Nitrogen**
Nitrogen (N) should be applied in late February to early March before bud-break occurs. In areas where flooding is known to occur, a split application is recommended. The first application should consist of 60 percent of the recommended amount, followed by the remaining 40 percent in May. Research has shown that nitrogen absorption rapidly increases when stored nitrogen pools are nearly depleted. This means nitrogen demand is greatest when nitrogen stores are being replenished. This normally occurs in the early spring during periods of rapid growth and leaf expansion (Acuna-Maldonado, et al., 2003). Of the nitrogen that is absorbed, approximately 93 percent is transported to stored nitrogen pools which are used the following growing season. This is why it is critical to apply nitrogen annually.

**New research/new recommendations**
New research conducted at Oklahoma State University by Dr. Mike Smith has led to a change in the recommended application method of phosphorus and potassium. The same application amount per acre is recommended. However, it is now recommended to apply both phosphorus and potassium in a band halfway between the trunk and the drip line of the tree instead of broadcasting over the entire area around the trees. If drip irrigation is used, then phosphorus and/or potassium should be applied near the drip irrigation line (Smith, 2012). The soil around the band is overloaded with phosphorus and potassium, allowing the roots to absorb the nutrients which are then translocated throughout the tree. This research has led to an increase in the minimum leaf concentrations of both nutrients.

**Phosphorus**
Phosphorus (P) reduces leaf scorch, aids in preventing early defoliation and is an important nutrient in nut growth (Smith, 2003). The minimum concentration of leaf P for native pecan trees is 0.12 percent and 0.14 percent for improved varieties (Smith, 2012). Phosphorus should be applied annually until recommended leaf nutrient levels are reached. Once nutrient levels are above minimum concentrations, application should be stopped until levels once again fall below the desired amount.

**Potassium**
Potassium (K) is linked to kernel oil content (Hunter and Hammer, 1956) and plays a role in transporting carbohydrates (Rohla, 2010). The minimum concentration of leaf K for native pecan trees is 0.75 percent and 1.0 percent for improved varieties (Smith, 2012). Banding potassium and phosphorus together will reduce passes through the pecan orchard.

**Other nutrients**
Other nutrients are important for a healthy orchard and should not be overlooked. Trees may not show signs of a deficiency, but nutrient levels may be low enough to sufficiently lower production. For current recommended application rates, see the abovementioned *Pecan Leaf Elemental Sufficiency Ranges and Fertilizer Recommendations*. 

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