OBSERVATIONS OF GROWTH, SCAB CONTROL AND PHYTOTOXICITY FROM PHOSPHITE ON NON-BEARING TREES

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Abstract

Phosphites are a reduced form of phosphate. In pecan production, phosphites are used as a fungicide and are very effective at controlling pecan leaf scab. With the greatest effect of scab on bearing trees, non-bearing trees do not need strict fungicide programs. In recent years, phosphites were researched for additional nutrient benefits. As a nutrient, phosphite is not available to the plant with its conversion in the soil found to be too slow to be agriculturally relevant (Thao et al, 2009). Phosphites were found to suppress the developmental response of plants with P deficiency as well as mimic P in some plants with P deficiency (Thao et al., 2008). In addition to nutritional benefits, this study was conducted to see if phosphite use translated into a horticultural benefit for non-bearing pecan trees. Four treatments of differing rates and intervals of K-Phite were replicated four times on no-bearing pecans. Height and caliper growth were compared as well as leaf nutrient samples compared.

Materials and Methods

Five treatments replicated four times included: 2 quarts of K-Phite per acre at 3-week and 6-week intervals, and 4 quarts of K-Phite per acre at 3-week and 6-week intervals. A hand-held, backpack sprayer was used to apply K-Phite7LP at onto 2-year-old Caddo pecan trees. Treatments were conducted per tree in a single row, and trees were sprayed until runoff. A total of five applications were made from May through August. Both tree height and caliper were measured at the beginning and end of the growing season. Caliper measurements were taken at 4 feet from the ground. Tree height measurements were taken at the highest terminal. Leaf tissue samples were analyzed from each treatment in August. Both scab and phytotoxicity ratings including incidence and severity were taken from 10 compound leaves on each individual treatment in September. Statistics were conducted using the SigmaPlot data software.

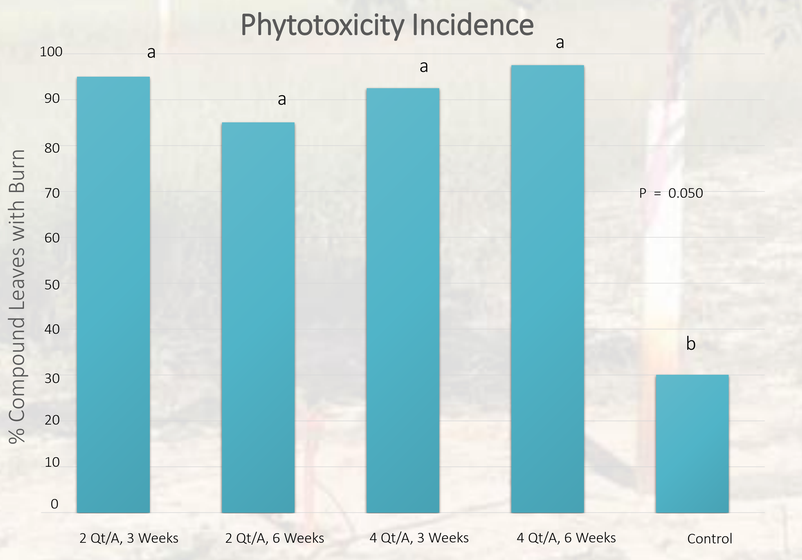
Phytotoxicity present at the 2 quart per acre, every 3-week treatment.

Phytotoxicity present on 4 quart per acre, every 3-week treatment.

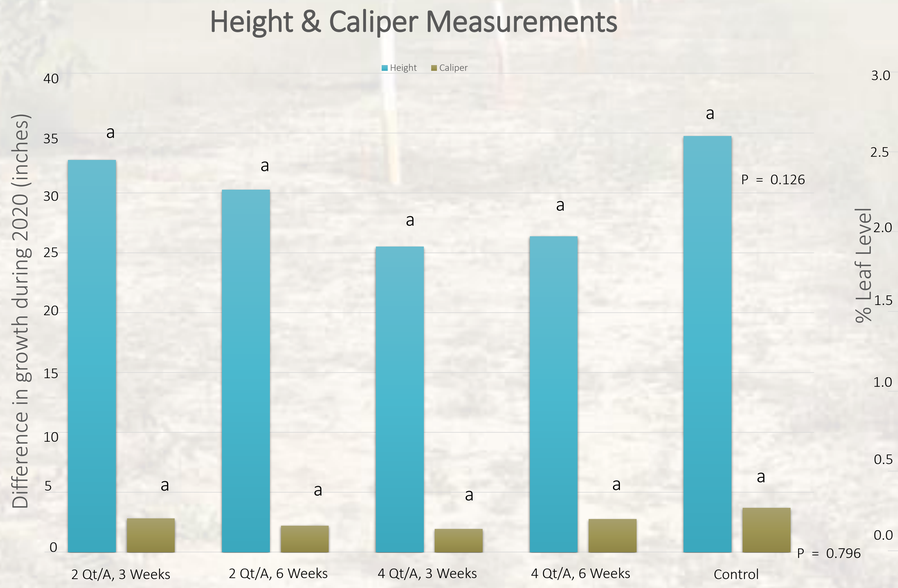
Very little scab was observed on control.

Results

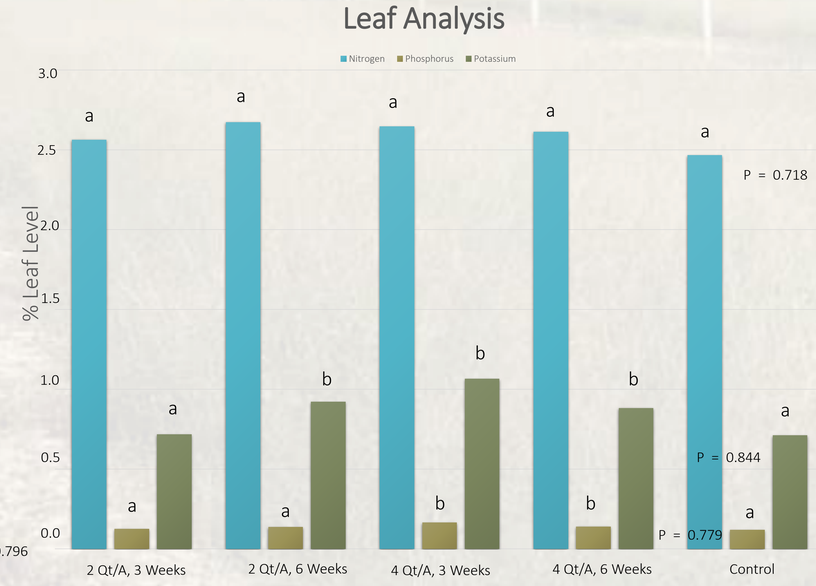
- Phosphite does control scab.
- There was not enough scab (Median 2.5) to spray trees with fungicide.
- Each treatment had more phytoxicity than control. The application rate made a difference.
- There were no differences in leaf nitrogen.
- Trees were able to pick up phosphorus.
- K-Phite did supply potassium.
- There were no differences in tree height or caliper. No horticulture benefit to the trees was observed.



Phytotoxicity incidence was taken on 10 compound leaves per treatment on the bottom half of the tree. Every treatment had greater phytotoxicity than control.



Height (blue) and caliper (green) measurements were parameters used to measure horticulture benefits from phosphite sprays. In the first year, there were no differences in tree height or caliper. Interestingly, the control tree had more height and caliper, though the difference was only numerical.



Nitrogen (blue), phosphorus (light green) and potassium (dark green) were compared from leaf tissue analysis as an additional parameter for horticulture benefits. There were no differences in leaf nitrogen in any treatment compared to the control. The trees were able to take up phosphorus with K-Phite and K-phite did supply potassium in both four-quart treatments.

Summary

Results discovered that although potassium levels were significantly higher than the control, this did not translate into a plant benefit since no difference was measured in growth. The highest mean (2.5) of scab severity was found on the control, but it was only significantly more than one other treatment. Scab on compound leaves was not at a high enough incidence or severity to justify fungicide sprays. Phototoxicity incidence and severity on compound leaves was also found to be significantly greater than the control. This indicates that phosphite sprays on young trees is not necessary to control scab nor does it provide a growth benefit on young trees.

Acknowledgements

- Hoang Thi Bich Thao, Takeo Yamakawa, Aung Kyaw Myint & Papa Saliou Sarr (2008) Effects of phosphite, a reduced form of phosphate, on the growth and phosphorus nutrition of spinach (*Spinacia oleracea* L.), Soil Science and Plant Nutrition, 54:5, 761-768, DOI: 10.1111/j.1747-0765.2008.00290.x
- Hoang Thi Bich Thao, Takeo Yamakawa. Phosphite (phosphorous acid): Fungicide, fertilizer, or bio-stimulator, Soil Science and Plant Nutrition (2009) 55, 228-234

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