

Efficiency of Nitrogen Utilization in Prune Trees

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Evaluation of leaf nitrate as a physiological parameter of nitrogen metabolism.

Rationale:

(1) Nitrate levels are maintained at relatively low concentration (i.e., 300 ppm) in leaves of most deciduous fruit trees.

(2) Nitrate reductase (NR) the enzyme which converts nitrate to organic form is very sensitive to environmental stress. Thus, drought, heat, dense shade, etc., result in significant decreases in nitrate reductase activity (NRA) and therefore nitrate assimilation. Thus, we reasoned that any factor which influenced NRA may significantly increase the concentration of nitrate in leaf tissue.

Expt. 1. To test the effect of withholding irrigation on the nitrate concentration of plum, apricot, peach and walnut leaves.

Result. No consistent effect on leaf nitrate was observed. The interpretation that drought does not influence leaf nitrate must be considered tentative, i.e., samples were collected during the season following the heavy rains of Jan-Feb 1978. Thus, the actual severity of plant water stress was not monitored. Leaf analyses from irrigated and non-irrigated walnut trees indicated a strong trend toward increasing nitrate in the leaves of non-irrigated trees, particularly late in the season.

Expt. 2. To test the effect of leaf age (prune, almond, walnut) and nitrogen status (almond) on leaf nitrate. Results. (1) Nitrate accumulated in leaves of the three species prior to leaf fall and (2) The level of leaf nitrate was conspicuously related to the rate of N application and may be a useful diagnostic parameter. That is, differences in total N of almond leaves from trees fertilized at 0 and 8 #N/tree were about 25%. The nitrate concentration in the same leaf samples differed by about 300%.