Title Pistillate flower abortion and ethylene production in English walnut

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Abstract

Pistillate flower abortion (PFA) is the loss of female flowers approximately two weeks after bloom, prior to abscission of non-fertilized flowers. Ovaries in PFA type flowers stop enlarging at approximately 3-4 mm in size, and abscise 10 to 14 days later, PFA in walnut is correlated with the presence of 'excess' pollen on the stigma.

PFA differs with cultivar. 'Serr' is the most susceptible to PFA; and PFA in 'Serr' can exceed 90%, although many other cultivars have low levels of PFA. PFA is not uniformly expressed in or between orchards, and is not consistent.

Ethylene production can be inhibited by application of aminoethoxyvinylglycine (AVG), and ethylene perception prevented by application of 1-methylcyclopropene (1-MCP). In vitro pollination of receptive walnut flowers resulted in ethylene production that peaked 12-30 hours after pollination. Non-pollinated flowers did not produce ethylene at the same levels as pollinated ones. Application of aminoethoxyvinylglycine resulted in a significant decrease in ethylene production by pollinated flowers, while application of 1-methylcyclopropene resulted in a significant increase in ethylene production by the flowers.

Whole tree experiments evaluating the effectiveness of 1-methylcyclopropene in reducing PFA were conducted. Although 1-MCP increases ethylene production in vitro, it reduces PFA in the field.

Chilling and post chilling heat units can both affect the time of bloom, and temperature during the bloom period will also affect the length of bloom in temperate fruit trees. Since PFA correlates with pistillate and staminate bloom overlap, one approach to predicting PFA is to predict bloom overlap this may allow for an estimate of the severity of pistillate flower abortion (PFA) in a given year. Historical data was used to develop a predictive model for bloom time and length.

High levels of phenolic compounds make RNA extraction from English walnut (*Juglans regia L.*) difficult. Although methodology for extraction of RNA from walnut exists, the procedures require 500-1000 mg of tissue. A hot borate RNA extraction procedure was modified for smaller amounts of tissue. The procedure described here enables effective isolation of RNA from 100 mg of walnut tissue, and allows the use of microcentrofuge tubes.