

EVALUATION OF RETAIN[®] FOR REDUCING PISTILLATE FLOWER ABORTION AND INCREASING YIELD IN ‘SERR’ WALNUTS

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INTRODUCTION

Pistillate flower abortion (PFA) is the loss of nut-producing pistillate flowers early in the season, typically 2 to 3 weeks after bloom. PFA is the principal factor limiting productivity in ‘Serr’ walnut while affecting other cultivars to lesser and varying degrees. Research by Vito Polito at UC Davis showed that excessive pollen tubes growing down the style of the walnut pistillate flower produce a surplus of ethylene that triggers flower abscission. Valent BioSciences developed ReTain[®], a naturally occurring plant growth regulator product produced by fermentation. The active ingredient, AVG (aminoethoxyvinylglycine hydrochloride), temporarily reduces ethylene production by blocking a key enzyme (ACC synthase) in the biosynthesis pathway. Preliminary single limb spray trials conducted by UC Farm Advisor Bob Beede in 2003 showed a substantial reduction in PFA from 79% to 11% with a single early bloom application. An in vitro study conducted by Polito in 2004 (2005 Walnut Research Reports) showed that ReTain[®] reduced ethylene levels in pollinated walnut pistillate flowers. Further whole tree spray trials by Beede and Grant in 2004 and 2005 showed reductions in PFA between 19% and 52% with attendant yield increases ranging from 0.4 to 1.2 tons per acre. These results prompted the addition of walnuts to the ReTain[®] use label in 2006 for increasing nut set.

OBJECTIVE

To assess the efficacy of a single early season Retain[®] ground application in mitigating ‘Serr’ PFA and increasing yield in large-scale grower trials.

PROCEDURES

Seven ‘Serr’ trials were conducted in four counties in 2006 (Table 1) as part of a product performance-monitoring program initiated by Valent BioSciences Corporation. At each site, one-acre treated and one-acre untreated control (UTC) treatment plots were established parallel to one another with a minimum three to five-row buffer between treatments to avoid spray drift. Blocks were paired based on distance from pollinizer row (if any) and tree uniformity. A single ground application of ReTain[®] at the rate of one 333g water-soluble bag (50g AVG) in 100-200 gallons per acre was grower applied at a speed of 1.25-2.5 mph timed at 5-30% pistillate bloom. All ReTain[®] applications were made between April 13th and April 24th.

Nut set was determined by tagging 30 double-flowered fruiting shoots (60 flowers total), on each of six trees in treated and untreated blocks. Tagging was done within two days prior to or after ReTain[®] applications at each site. Where applicable, half of the tagged shoots faced the pollinizer row and half faced away. In general, tagged shoots were located in the middle one-third of tree canopies at each site. The number of nutlets per tagged shoot was determined four

weeks after treatment to assess PFA and again nine weeks after treatment to assess non-pollination drop. Non-pollination drop was insignificant at all sites; only the PFA results are included in this report. Test trees were commercially shaken at harvest and yield recorded for each tree. Several sub-samples of field harvested nuts were collected, hulled and dehydrated to determine yield on a dry in-shell weight basis from field harvest weights.

RESULTS AND DISCUSSION

Results varied considerably among sites (Table 1). In six of the trials, a single early season ReTain[®] application reduced the percentage of PFA. Reductions in PFA in the remaining trials ranged from 8.7- 32.7%. ReTain[®] increased yields in all sites; dry in-shell yield increased between 96 to 1,462 pounds per acre. In three trials, yield increases from a ReTain[®] treatment were 5% or less. In the remaining four trials, yield increases due to a ReTain[®] treatment were substantial and ranged from 42-252%. Reductions in PFA were not consistently proportional to yield increases. This has been observed in previous trials, and is likely due to the fact that the mid-canopy limbs used for PFA assessments are not necessarily representative of the whole-canopy effects of ReTain[®] reflected in nut yields.

A number of factors may have contributed to the inconsistent results among sites. PFA in Serr walnuts was highly variable this year ranging from light to heavy depending on location. As with any plant growth regulator, timing and coverage are critical. Low winter chilling and cool, wet spring weather resulted in a protracted bloom making the 5-30% receptive pistillate flower timing difficult to estimate. Ground spray coverage may have been inadequate in sites with large trees (>40 feet) where walnut production is limited to the outer third canopy.

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