

USES OF PLANT GROWTH REGULATORS IN TREE NUT CROPS

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ABSTRACT

Plant growth regulator (PGR) use in tree nut crops targets maximizing total yield and improving harvest efficiency more than increasing visual appeal. The effect of the PGR must be substantial in order to justify the development, registration, and application costs. This paper will review PGR research known to the author in walnuts, almonds, pistachios, and pecans, and it will also identify some of the horticultural challenges faced in each of these crops that might be mitigated by PGR use.

Other than limited acreage in Oregon, California is the only state in North America where walnuts are commercially grown. Ethephon is used frequently as a preharvest aid. Applied at packing tissue brown (the final stage of nut maturity where the tissue surrounding the kernel turns from white to a uniformly tan to brown color), ethephon provides exogenous ethylene to increase the rate of hull dehiscence. The result is an accelerated harvest by seven to ten days and improved nut quality from lighter colored kernels. Evidence will be presented to suggest that walnut cultivars are not equally responsive to ethephon, a phenomenon which could be the more likely cause for poor response than inadequate coverage, high temperature, or incorrect timing. Research will also be shown to suggest that stress tolerant cultivars, such as Serr, resist defoliation from ethephon treatment, even when applied under low soil moisture conditions. Severe defoliation results when ethephon is applied to pecan. This affects next year's buds.

Results from current work with ReTain[®], an AVG-based, ethylene synthesis inhibitor compound from Valent BioSciences, will be presented as a practical solution to walnut pistillate flower abortion (PFA). ReTain[®] appears to sufficiently reduce ethylene production from multiple pollen tube growth. This significantly increases fruit set and commercial yield of the Serr variety, which can have PFA above 50%.

Walnuts are also characterized as having poor branch angle and attachment of laterals arising from current season growth. This prevents growers from developing their primary scaffold branches in the same year as the trunk and thus, delays commercial harvest to the fifth or sixth year. An unsuccessful attempt with Promalin (BA plus GA₄₋₇) will be presented.

Pistachios have been shown to be responsive to the rest breaking agents hydrogen cyanamide (Dormex) and horticultural mineral oil, with the latter now widely used commercially due to cost and convenience. Research presented will show the beneficial effects of oil on advancing bud break, maturity, yield, and percent split nuts. Benzyladenine (6 BA) in combination with urea applied in June and July has also been shown to mitigate alternate bearing by significantly increasing yield in the off-year. The amount of 6 BA and urea directly effect response. Efforts to improve nut size with gibberellic acid (GA) and fruit removal with abscisic acid (ABA) will also be presented.

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Attempts to improve almond nut removal, advance maturity, and achieve better cross pollination between cultivars with Alar[®], ethephon, and Cycocel[®] had some success but the side effects of smaller kernel size and phytotoxicity stopped further investigation in the 1970's. The author is unaware of any research with PGR's to control tree size once full canopy is attained.

