IMPROVING EFFICACY OF CITRUS ABSCISSION SPRAYS THROUGH MORE UNIFORM SPRAY COVERAGE

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ABSTRACT

The selective fruit abscission compound 5-chloro-3-methyl-4-nitro-1H-pyrazole (CMNP) improves mature fruit removal of mechanically harvested orange trees in Florida. Uniform fruit removal depends on peel contact by CMNP sprays. When conventional radial-discharging air-blast (AB) sprayers are used, fruit removal is variable, especially in tall dense canopies. Fruit detachment force (FDF) and fruit removal were measured when CMNP was applied with an AB or a multi-head air-blast ‘OXBO T-1000’ (OX) sprayer. CMNP (200 ppm [200 mg·L⁻¹]) was applied at 1873 and 2810 L·ha⁻¹ (200 and 300 gal·acre⁻¹) with the AB or OX sprayers to Hamlin’sweet orange [Citrus sinensis (L.) Osb.] in Immokalee, Fla, in Dec 2005. Additional trials were conducted in ‘Valencia’ sweet orange at various locations throughout Florida from 2008 to 2008 that included 1405 L·ha⁻¹ (100 gal·acre⁻¹) applications. Application volumes were adjusted by varying tractor travel speed and pressure of delivery if necessary. In some cases, water sensitive paper was placed in the canopy at heights of 1, 2, and 4 m (approx. 3’, 6’, and 12’) at inside and outside canopy positions and viewed immediately after application. Four days after treatment, FDF at the same heights and canopy depths (1, 2, and 4 m at inside and outside canopy positions) was determined. Fruit from OX-sprayed trees had lower and more uniform FDF at all canopy positions. In contrast, fruit from AB-sprayed trees had greater variability in FDF, especially at the top and inside the canopy. Fruit were mechanically harvested using a tractor-pulled canopy shaker, a trunk shake-and-catch or a self-propelled canopy shake-and-catch system. Mature fruit removal was greater and less variable in OX-sprayed than AB-sprayed trees and required less spray volume. The results demonstrate that uniform CMNP coverage can minimize variation in its efficacy and improve mature fruit removal of trees harvested with any commercial citrus mechanical harvester operating in Florida.