Horticulture (Abscission agents)

THE ABSCISSION AGENT CMNP AS AN AID TO MECHANICAL HARVESTING OF SWEET ORANGE

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INTRODUCTION

- Strong industry interest in mechanical harvesting of sweet oranges in Florida
  - Current mechanical harvester fruit removal rates: 70% - 90% of the crop
  - Goal: to find an abscission agent that increases removal rates
- CMNP (5-Chloro-3-Methyl-4-Nitro-1H-Pyrazole)
  - Of abscission agents tested, CMNP most effective
  - 1st publication in 1973
  - An application for full registration has been submitted to the EPA
  - Best Management Practices (BMPs)
CMNP EFFICACY AND SPRAY CONSIDERATIONS

- Requires direct contact with the fruit
CMNP EFFICACY AND SPRAY CONSIDERATIONS

- Application rates of 200 – 300 ppm at up to 300 gal/acre provide excellent and consistent loosening throughout the harvest season.
Loosening occurs up to 5 days after application.
CMNP EFFICACY AND SPRAY CONSIDERATIONS

- Air temperature < 20°C delays loosening

\[
y = 15.357 + \frac{71.121}{1 + e^{-\left(\frac{x-16.2074}{1.2948}\right)}} \\
0.9383
\]

\[r^2 = 0.9999**\]

(Yuan and Burns, 2004)

(60°F) (70°F)
CMNP EFFICACY AND SPRAY CONSIDERATIONS

- Air temperature < 20°C delays loosening
HARVEST EFFICIENCY
AND OTHER ADVANTAGES
Self-propelled canopy shaker
HARVEST EFFICIENCY AND OTHER ADVANTAGES

Pull-behind canopy shaker
HARVEST EFFICIENCY AND OTHER ADVANTAGES

- Higher fruit removal at lower canopy shaker head speeds with CMNP
HARVEST EFFICIENCY AND OTHER ADVANTAGES

- Trees treated with CMNP have less debris (leaves and branches) in the trailer loads

Debris per load

Canopy shaker head speed (cpm)

Source: Spann, UF IFAS
HARVEST EFFICIENCY AND OTHER ADVANTAGES

- Will aid gleaning
Best Management Practices

- **CMNP application considerations**
  - Requires full canopy coverage
  - Maximum label rate: 300 ppm at 300 gal/acre.
  - Requires adjuvant: Activator 90 (alkylphenol ethoxylate, alcohol ethoxylate and free fatty acids) at 0.55 mg L\(^{-1}\).
  - Loosening occurs for up to 5 days after application under optimal conditions
  - Loosening consistent throughout the harvest season
  - Does not cause phytotoxicity of leaves, flowers, or the newly developing ‘Valencia’ fruit. Does not cause the abscission later to form on the newly developing fruit.

- **Effect of environmental factors**
  - Avoid rain 24 hr after application
  - Loosening is delayed by temperatures < 20\(^{\circ}\)C, but this occurs predictably and can be managed
  - Drought stress has no effect on loosening
  - Drying rate not a factor affecting efficacy

- Cultivar and Rootstock: No evidence of strong differences
Best Management Practices

**Harvest considerations**

- **Canopy shakers settings:**
  - Lower canopy shaker head speeds
  - Faster tractor speeds

- **Harvest advantages:**
  - Increases removal to > 90% of entire crop
  - Less injury to canopy
  - Less trash in trailer

- **Other considerations**
  - Harvest scheduling needs to consider fruit drop, but this can be managed
  - Fruit quality is not affected as the fruit moves from tree to juice plant