



USE OF AN ABSCISION AGENT FOR HARVESTING MANDARINES IN SPAIN

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Aim and scope of this research

Spain accounts for more than 55% of the European citrus production, which is predominantly oriented towards the fresh market. Harvesting accounts for more than 50% of production costs, and for this reason methods of mass harvesting are under research.

Abscission agents decrease fruit detachment force of mature fruits and may improve machinery performance. However, they may increase defoliation, affect the production of the following season, damage the fruit or produce physiological stress, so they must be investigated.

Very few information about how abscission agents for mechanical harvest of mandarins in Mediterranean conditions can be found in the literature. It is important to determine an adequate dosage if abscission agents are needed.



Materials and methods

- Four mandarin varieties compared against Navel Lane Late oranges: Marisol, Orogrande, Clemenules and Fortune
- 2 harvesting seasons (2009 and 2010)
- 5 ethephon dosage levels: 0, 2400, 4200, 4800 and 8400 mg/tree



- Trunk shaker settings: Frequency 15 Hz, Amplitude 25 mm, Time 5 s
- Compared against manual harvest



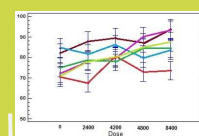
- Variables related to efficacy and quality of the operation
 - ✓ Percentage of detached fruit
 - ✓ Percentage of detached fruit without calyx
 - ✓ Defoliation (mass of detached leaves)
- Variables related to effect on the fruit
 - ✓ Fruit detachment force
 - ✓ Color and maturity indexes
 - ✓ Firmness (percentage of deformation)
- Variables related to tree physiology before and after harvest
 - ✓ Stem water potential
 - ✓ Stomatal conductance
 - ✓ Transpiration
 - ✓ Photosynthesis
 - ✓ Intercepted radiation
 - ✓ Yield at the following season



Results

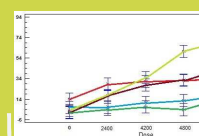
EFFICACY AND QUALITY OF THE OPERATION

Detached fruit (%)



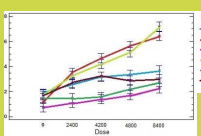
Increased with dose except in Clemenules.

Fruit without calyx (%)



Both variables increase with dose.

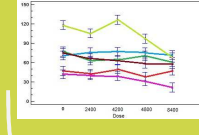
Defoliation (kg)



Significant differences between varieties are found.

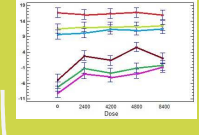
EFFECT ON THE FRUIT

Detachment force (N)



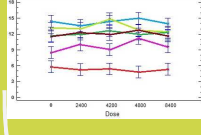
Decreased only in Marisol and Navel Lane Late orange.

Color Index



Increased only in Marisol and Orogrande.

Maturity Index

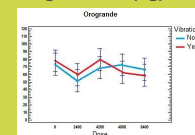
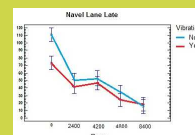


No effect, neither on maturity Index nor firmness.

EFFECT ON THE TREE

- No effect found on stem water potential, stomatal conductance, transpiration, photosynthesis and % intercepted radiation.
- No effect on yield at the following season. Only significant decrease in orange Navel Lane Late.

Yield at the following season (kg)



Conclusions

- Ethephon increased the percentage of harvested fruit (except in Clemenules), but also increased fruit without calyx and leaf detachment. However, decrease of fruit detachment force was not significant (except in Marisol), probably because detachment mechanism is related more to shear than to traction stress.
- It induced color changes in early mandarins (Marisol and Orogrande) but did not increase the Maturity Index nor decreased firmness.
- Moreover, it did not stressed the trees.

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