

## RELATIONSHIP BETWEEN CALCIUM AND SUN SCALD DISORDER IN FRUIT OF 'SKAGG'S BONANZA' NAVEL ORANGE (*CITRUS SINENSIS* (L.) OSBECK)

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In a variety-rootstock trial including 'Skagg's Bonanza', 'Atwood' and 'Frost Nucellar' Navel Oranges on five rootstocks, a rind disorder was observed, developing between mid August and mid October in the flavedo of some of the fruit exposed to direct solar radiation. This phenomenon was confined to the 'Skagg's Bonanza' cultivar. The disorder began as a superficial, grayish-yellow discoloration of the flavedo and developed gradually into brown, depressed necrotic spots up to 30-40 mm in diameter. None of the artificially shaded fruit under cardboard hoods was affected, compared with 24% scalded fruits among the unshielded control. A significant rootstock-effect was observed within the 'Bonanza' cultivar, both on fruit susceptibility to sun scald and on total calcium content of the flavedo. The most susceptible combinations were low in Ca. Low-Ca content was also associated with absolute low, as well as relatively low, content of the fraction of Ca as insoluble oxalate salt. Two successive spray applications of Ca nitrate 1% (w/v) at the beginning of August and again in mid September on 'Bonanza'/Volkameriana trees, significantly reduced the amount of infected fruit from  $7.0 \pm 0.7\%$  to  $2.1 \pm 0.3\%$ . Fruits of 'Atwood' and 'Frost' had never shown the disorder, although their total Ca content was quite similar to that of 'Bonanza' on Sour Orange, or even lower, as in 'Bonanza' on Rangpur Lime. Potassium content tended to be negatively correlated with calcium, but not in every case. Total content of magnesium and sodium in the flavedo was also analyzed, but no significant or consistent differences were found. The dry matter content of the flavedo was significantly affected by some of the rootstocks: increased on Troyer Citrange and decreased on Volkameriana. This property in itself was not associated with the occurrence of the disorder. In conclusion, sun scald seems to be a genetic susceptibility of the flavedo of 'Skagg's Bonanza' Navel Orange to direct solar radiation. In this cultivar, it is apparently associated with Ca: increased in fruit with a relatively low Ca content, and reduced by application of exogenic Ca. Thus, it follows the pattern of a Calcium-Related Disorder characteristic to citrus fruit, as demonstrated by us previously.

*Key Words:* Citrus, calcium, physiological disorders, oxalate, rootstocks.