

Slaked lime and other alternatives to calcium chloride treatment of apples

B. Plísek¹

Fruit of the apple cultivar 'Clivia' is very susceptible to bitter pit. Therefore this cultivar was involved in several trials in the 1980's in Holovousy. For example in 1986 eight to forty per cent fruit from individual plots were damaged by the disorder. The pitted apples had lower calcium and higher nitrogen contents than the healthy ones. The confidence intervals for differences in means were 99% and 95% respectively (**, *). In 1988 'Clivia/M2 trees (planted 1964) were treated (sprayed) with calcium chloride solution (1,2%; 10 trees) or calcium hydroxide solution (slaked lime, 2% as CaO; 10 trees) on the 12th of August. Other trees in the same part of the orchard were untreated. In this part (sections of row 1 and row 2) all trees were pruned in winter each year. The pruning could be described as moderate. In the third parallel row trees were pruned or not pruned alternately in a section of 20 trees in the winter 1987/88. The pruning in this section could be described as slightly rejuvenating. All trees in the orchard were subjected to a kind of 'contour pruning' by a machine on the 8th of July 1988: branches which reached too far into the interrow were shortened. This operation was not intended in the experiment.

The apples were harvested on 10th October. Ten (5 and 5) boxes of apples (14 kg each) from the untreated trees in rows 1 and 2 were used in an experiment with dipping the fruit in 2% CaCl₂ or 2% (as CaO) slaked lime solutions for 2 minutes. The fruit of all variants was cold stored for 5 months. Then the percentage of healthy and of pitted and/or decayed fruits was evaluated. 83,3% apples from the untreated trees were healthy. The effects of both calcium chloride and calcium hydroxide as a single spray were equal with 88,9% healthy fruit. The difference between treated and untreated trees was significant (*). Also the effect of dipping the fruit was significant with calcium hydroxide, 90,1% healthy apples, and highly significant (**) with calcium chloride, 94,3% healthy apples.

The slightly rejuvenating winter pruning had complex and long-run consequences. The results of the year 1988, pruned and unpruned trees respectively: 41,7 and 47,0 kg/tree; fruit weight 110,6 and 116,9 g/fruit;

¹Bedrich Plísek, Research and Breeding Institute of Pomology, CZ-50751 Holovousy

nutrient contents in fruit (mg/100g fresh weight) 36,5 and 29,9 N (**); 22,4 and 20,6 P; 106,4 and 113,9 K; 3,5 and 3,8 Ca; percentage of healthy fruit after storage 76,9 and 91,2 (**). The relatively high yield from the pruned trees shows that the pruning was not too severe. In 1989 no trees were winter-pruned. In spite of this the effect of the previous year's pruning was striking. The results of pruned and unpruned trees follow in order and in units as above: 16,1 and 36,3; 88,7 and 61,9; 27,33 and 25,4 N; 15,9 and 12,1 P (**); 129,1 and 92,6 K (**); 3,53 and 5,63 Ca (**). Unfortunately the results of storage could not be evaluated.

Conclusions

Calcium sprayings improve the storage potential of apples. In recent literature several CaCl_2 applications are recommended rather later in summer. Under conditions of low risk of early (on tree) bitter pit incidence the calcium sprayings can be replaced with dipping the fruit after harvest in a calcium bath. Our experiments have shown that slaked lime is a useful and more natural alternative to calcium chloride. The most natural measure improving storage potential of apples is selecting suitable cultivars, minimizing the winter pruning and avoiding excess N and K nutrition of the trees.