Calcium in Apples

Why Calcium

Calcium is regarded as the essential element for the preservation of post-harvest quality. This applies not only to apples, but to a range of other fresh horticultural crops where inadequate supply of calcium during development results in important economic losses.

Physiological disorders associated with low calcium in apples include bitter pit, premature fruit drop, water core, lenticel blotch pit, late storage corking and senescent scald.

Calcium status influences regulation of respiration, respiration rates & ethylene production.

At the cellular level, calcium plays a binding (glue like) role in the complex polysaccharides and proteins forming the cell wall. In the outer cell membrane, deficient calcium levels cause leakiness of the cell membrane and distorted growth (from improper cell wall formation).

It is this integral role of calcium at the cellular level that provides firmer, higher quality fruit.

Quality fruit treated with Organic-Ca & Organic-N

Getting Calcium to the fruit

Key ways to get calcium to the fruit:

1. Uptake by roots - Most of the calcium will be taken up by plant roots. Soil pH of 6 - 6.6, soluble calcium, healthy roots and healthy soil all contribute to calcium uptake.
2. Foliar sprays - It is hard to get calcium to every part of the tree consistently.

Spray calcium on the fruit to ensure uptake by fruit

Calcium moves within the plant with the transpiration stream (xylem). The intensity of transpiration controls upward movement of calcium. The problems with calcium in apples often relate to the distribution of calcium within the tree and the factors that affect it such as water, heat and presence of boron.

Organic-Ca foliar sprays contain calcium with boron and amino acids to open stomata, which allows easier movement of calcium into and through the plant.

Essentials for Ca uptake

1. **Soluble calcium source - Organic-Ca**
2. **Boron + Amino Acids - Organic-Ca**
3. **Healthy roots - Vitazyme / Super Kelp**

Prevention Program

A program to control bitter pit and corking in apples should involve a number of management practices:

1. Soil and Calcium Health

It is particularly important to ensure available soil calcium levels and the acidity of the soil are optimal (i.e. pH of 6-6.5). Improving soil health (& pH) along with the use of soluble calcium via the irrigation will improve calcium uptake by the root system.

A point to remember is that calcium can be absorbed only by the young root tips that are not suberized. This area is behind the root tip. Encouraging good root health is essential. We recommend Super Kelp (root growth, stress tolerance) or Vitazyme (root growth, stress tolerance, photosynthesis, multiple modes of action).

2. Balanced Nutrition

Use soil testing to check soil pH and leaf analysis to determine the balanced uptake of all essential nutrients. Avoid excessive levels of nitrogen, potassium and magnesium; and deficient levels of calcium, boron and zinc; since these conditions may contribute to deficient fruit-calcium levels.

3. Moderate tree vigour

Vegetative portions of a tree have a relatively high level of calcium and are seldom deficient. Consequently, excessive tree vigour can use calcium that otherwise may be available for the fruit. Excessive pruning and nitrogen fertilization, coupled with overcrowding of trees, are often interrelated and can result in overly vigorous trees.

4. Moderate fruit density

High levels of corking and bitter pit are often found on trees with a light crop. When the fruit is large and low in calcium, they are prone to low-calcium physiological disorders. Apples on trees with an excessively large crop usually have little corking and bitter pit.

5. Foliar Calcium Applications

Calcium sprays have been successful in controlling corking and bitter pit, and should be part of an overall program. Fruit calcium levels vary from year to year, between orchards and between fruit on the same branch, making it important to apply calcium close to fruit.

Organic-Ca sprayed on leaves and fruit enters into the tissue mostly though openings such as the stomata and lenticels. Organic-Ca contains 100% soluble calcium and boron to improve assimilation and specific amino acids to open stomata, allowing easier movement of Organic-Ca into and through the plant.

Organic-Ca Program for Apples

Flowering: 5L/ha; 2-3 times via irrigation
Fruit set to Maturity: 100-300ml/100L water; foliar spray every 10-14 days

Using Organic-Ca as a foliar spray in apples:

- Target fruit - Increase in the calcium concentration in the fruit is affected by direct uptake of the spray solution by the fruit.
- Commence spraying at fruit set and continue regular applications to as near to picking as is practicable.