

ASPECTS OF AVOCADO NUTRITION WITH EMPHASIS ON BORON AND ORGANIC MULCHING

B. Nigel Wolstenholme

Horticultural Science, School of Agricultural Sciences and Agribusiness
University of Natal, Pietermaritzburg, South Africa

The South Africa has approximately 13,000 ha (32,000 acres) of avocados, with a total production varying between 50 000 and 100 000 tons, of which approximately 60% is exported. It is mostly located in warm to cool subtropical areas with a predominantly summer rainfall of approximately 800 - 1200 mm. Most soils are of granitic or doleritic origin, are highly leached, acid to very acid, and are infertile. They are mostly oxisols (red clay loams to loamy clays), basically well-drained in spite of clay contents from 20 to over 50%.

Plant nutrition is based on soil and leaf norms adapted for local conditions. Liming is an important aspect of soil amelioration. It is known that production of avocado fruit is both "energy (carbon) expensive" and relatively "mineral cheap" (in comparison to predominantly sugar-storing fruit such as citrus and deciduous fruits). Nevertheless, a large crop (15 - 20 tons/ha) makes significant demands on the soil, which must be matched with appropriate fertilizer applications based on soil and leaf analysis. Nitrogen is a key manipulator element in attempting to balance vegetative and reproductive growth, and the avoidance of excessive vigor in vigorous cultivars. Soils high in organic matter mineralize relatively large amounts of nitrogen in South Africa's warm, wet soils in summer.

Fruit quality is of paramount importance for an export-oriented industry. Good fruit shipping quality is certainly associated with adequate Ca nutrition, and suitable ratios between Ca, Mg and K. Increasingly our industry has learnt from Australian research in similar soils and climates that in spite of boron sprays during flowering and fruit set, we have been living with unrecognized boron deficiency problems for decades. Carefully controlled soil boron applications are helpful in increasing yield and improving fruit quality. It was very evident during visits to orchards in the high rainfall areas of Mexico that boron deficiency is widespread, and it is probable that it contributes to dwarfing of cultivars such as 'Colin V-33' and other dwarf selections.

Research on the use of organic mulches in KwaZulu-Natal by Moore-Gordon and co-workers has shown both increased yield and improved fruit size in 'Hass', due mainly to reduction of stress at critical times. This work has also led to detailed anatomical and especially physiological studies on avocado fruit growth, which is now much better understood. Current research is integrating the role of plant growth hormones, especially cytokinins and abscisic acid, with key sugars (including the sugar alcohols perseitol and mannoheptulose) in the regulation of fruit growth. Under our conditions, mulches are most effective during the dry, stressful winter and spring periods associated with flowering, fruit set and early fruit growth. Availability and economics, and C:N ratio and rapidity of breakdown determine choice of mulch. A C:N ratio between 30 and 100 is probably best. It is important to know to what extent the mulch contributes nutrients as it decomposes, and to adjust fertilizer applications accordingly. Leaf analysis is a key tool in this respect.