

## Mango Leaf and Soil Sampling

M. Poffley, formerly Horticulture Division and G. Owens, Horticulture Division, Darwin

Analysis of soil and leaves can be a useful tool for monitoring the nutrient status of a mango orchard. Nutrition research on mangoes suggests that leaf and soil analyses will be useful when analyses are carried out over a number of years and the fertiliser program is adjusted according to the results of the monitoring program.

This analysis, however, does have its limitations. QDPIF research has shown that in the short term, there is very little correlation between nutrient levels in the leaves and yield response of mangoes to fertiliser applied. Analysis will not automatically indicate that the plant is nutrient deficient, or has excessive levels that may be toxic of any particular element, unless that element has been specifically tested for.

### LEAF ANALYSIS

Leaf analysis shows the nutrient levels in the leaves at that particular point in time. Results could vary considerably depending on the physiological state of the tree. For example if a tree is putting on a new flush it is not unusual for nutrients to be drawn out of the older leaves and transferred into the new growth. With the tree in a state of flush, taking a sample for analyses may not provide worthwhile results. Work in Queensland indicates that the best time to take mango leaf sample is after the trees have been dormant for a period, this is just before flowering in May or June.

The recommendation is to select a number of trees from each block and mark them for future identification. The same trees are sampled each year at the same time. Over a period of time, the grower's records should be able to detect a pattern e.g. if phosphorus levels increase each year the rate of application can be reduced. A one off sample will not indicate if the levels are increasing or decreasing so it is impossible to ascertain with any accuracy how much and what type of fertiliser to apply.

### Leaf Sampling

Trees to be sampled should be marked for easy identification and the same trees sampled every time.

### Time

Leaf samples should be taken from trees when they are in dormant state, i.e. not flushing or flowering. Usually May/June. Avoid sampling if the trees have been recently sprayed with nutrients (trace elements etc) or fungicides.

### Condition

Leaves collected must be fully expanded and "hardened off", i.e. green not red or pink.

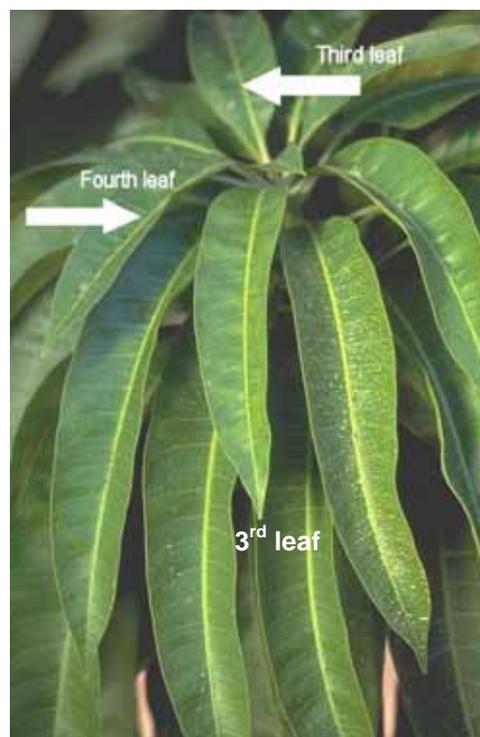


Figure 1.

## Position

The leaves selected should come from the end of the branch, the third and fourth leaf from the terminal bud (see Figure 1). About 12 terminals should be sampled at even spaced points around the tree.

## Amount

About 24 leaves from each tree are needed for a sample. These should be kept in a clean paper bag and labelled with the tree number.

*Alternatively the samples from each block can be bulked up and submitted as one sample. This may be desirable if a grower has a large number of blocks and wants to economise on sampling costs. Using this method the same trees should still be sampled each time as described above.*

## SOIL ANALYSIS

Similarly, soil analysis only measures the levels of elements in the soil samples at that particular time. Analysis will not indicate if there are any diseases or pests in the soil or if the soil is best suited for fruit tree, vegetable, pasture or flower growing.

Where soil tests are particularly useful is measuring the pH level of the soil. A pH level of 7 is considered neutral. If the pH level is higher than 7, e.g. pH 8, the soil is alkaline. Conversely, if the pH level is lower than 7, e.g. pH 6, the soil is acid. Mangoes will tolerate a wide range of pH levels, but at the extreme ranges of pH certain elements become unavailable to the plant even though there may be adequate or high levels of these elements in the soil.

The ideal pH level is 6.5 where all elements are available to the plant. Soil sampling before the rains start (November/December) will determine the pH level in the soil. This is useful for calculating if and how much agricultural lime or dolomite (if the soil is low in magnesium) is needed to correct the pH. For the best effect this should be applied at the beginning of the Wet so it can be evenly distributed into the soil. A second soil sample should be taken at the same time as the leaf sample (May/June).

## Soil Sampling

### Time

Soil samples are best collected after harvest before the Wet commences. A second sample should be taken at leaf sampling.

### Area

Soil samples are taken from the area where fertiliser is applied, between the trunk and the outer edge of the tree canopy (see Figure 2). Avoid taking samples from areas where fertiliser is lying on the surface. Scrape away any organic or chemical residue before sampling (see Figure 3).

### Method

Ensure tools used are clean or contamination of the sample may result. Do not use galvanised implements. A clean plastic bucket should be used for holding the soil samples. Each sample is taken from the surface to a depth of 15–20 cm, and should contain soil from the whole profile. The easiest method is with a soil auger. If a soil auger is not available dig a hole



**Figure 2.** Collect soil samples from inside the drip line



**Figure 3.** Remove the leaf litter and any fertiliser

with a spade to 15–20 cm deep, then shave off a slice from the side of the hole for the sample.

### Amount

Up to 10 samples are collected from an orchard, depending on how large the area is. These are collected across the orchard taking a diagonal line from corner to corner, so as to cover the whole area evenly. The samples are placed in a plastic bucket (see Figure 4) and mixed together. From this a total volume of 200-300 mL is taken (see Figure 5) and placed in a clean plastic bag which is labelled with the orchard name or number for identification.



**Figure 4.** Collect samples in plastic bucket



**Figure 5.** Mix and take a “grab” sample of soil

### Samples collected in conjunction with leaf samples

The method is the same except that each tree is sampled individually, rather than the whole orchard.

Four samples are collected at even spacings under each tree. These are mixed together and placed in a bag labelled with the tree number. A total volume of between 200–300 mL of soil is needed for analysis from each tree.

### Sample Handling

- Soil samples should be placed in new (preferably clip-lock) plastic bags and labelled appropriately (see Figure 6).
- Leaf samples should be placed in a clean paper bag provided by the fertiliser supplier.
- Keep a record of sampling dates and numbers of samples.
- Samples should be kept in a cool dry place (e.g. Esky – ice free). If leaf samples need to be stored for 1 or 2 days, place them in the crisper section of the fridge.
- Leaf samples should be kept no longer than two days prior to dispatch to the laboratory.
- If using a commercial laboratory interstate, post samples using overnight bags and check that you have filled in the laboratory paperwork correctly.
- Usually your agricultural chemical/fertiliser supplier will organise the sample bags and the dispatch to the laboratory.



**Figure 6.** Clearly label the sample and send for analysis

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