Hill Laboratories
BETTER TESTING BETTER RESULTS

Crop Guide
Kiwifruit/Green

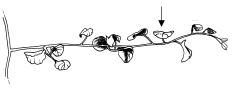
KB Item: 3464v8

Sampling Notes

Leaf analysis provides a more accurate and reliable assessment of the nutrient status of the kiwifruit plant than does soil testing. Greater emphasis, therefore, should be placed on the plant tissue results. Two sampling options are described below. Data is available for optimum levels for virtually the whole growing season, from late October to early April.

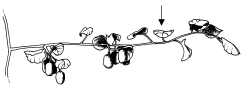
Leaf (1) (Before Fruit Set)

Sampling Time:	October-November (Before fruit set)
Plant Part	Leaf & petiole
Collect From:	Youngest mature leaf
Quantity per Sample:	2-4 leaves from each of 20 vines
Recommended Tests:	Basic Plant (BP), Chloride (Cl)
Comments:	Diagnosing deficiencies at this early stage may allow time to correct them for the current season's crop, whereas sampling after December is considered too late. These deficiencies will be more pronounced than later in the season, when the plants will have adapted to their growing conditions.



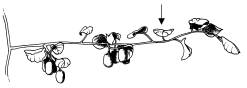
Leaf (2) (December - February)

Sampling Time:	December-February
Plant Part	Leaf & petiole
Collect From:	Second leaf past the final fruit cluster from non-terminated female vines
Quantity per Sample:	2-4 leaves from each of 20 vines
Recommended Tests:	Basic Plant (BP), Chloride (Cl)
Comments:	This is regarded as the standard sampling time because nutrient levels will have stabilised. These mid-season samples should also reflect the effectiveness of the fertiliser programme adopted and the nutrient availability during the spring growth period.



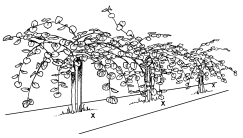
Leaf (3) March - April)

Sampling Time:	March-April
Plant Part	Leaf & petiole
Collect From:	Second leaf past the final fruit cluster from non-terminated female vines
Quantity per Sample:	2-4 leaves from each of 20 vines
Recommended Tests:	Basic Plant (BP), Chloride (Cl)
Comments:	This is regarded as the standard sampling time because nutrient levels will have stabilised. These mid-season samples should also reflect the effectiveness of the fertiliser programme adopted and the nutrient availability during the spring growth period.



Soil

Sampling Time:	Prior to crop establishment and annually during autumn and early winter
Core Depth	15cm
Collect From:	From the root zone of the vines
Quantity per Sample:	15 - 20 cores
Recommended Tests:	Basic Soil (BS), Available Nitrogen (AN)
Comments:	Separate samples should be taken from blocks that differ in age, cultivar types, tree performance, soil types, topography and fertiliser history. Where fertiliser has been broadcast, sample from the root zone of the vines. Where fertiliser has been banded, samples should only be taken from areas under the vines which have previously received fertiliser. If the orchard has herbicide treated strips, then it is best if these are sampled separately from the grassed areas between rows. Quite different nutrient levels may exist between these two areas. When sampling prior to orchard establishment, a 15 - 40 cm depth sample should also be taken, primarily to check the sub-soil pH.



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Interpretation

Interpertation of the laboratory's results is possible by comparison with normal levels expected for the crop in question. The interpretation given is based on the best information available and relate specifically to the sampling instructions given.

Leaf (1) (Before Fruit Set)

Analyte	Unit	Range
Nitrogen	%	2.4 - 4.0
Phosphorus	%	0.25 - 0.70
Potassium	%	2.3 - 3.0
Sulphur	%	0.35 - 0.50
Calcium	%	1.2 - 2.2
Magnesium	%	0.25 - 0.40
Sodium	%	0.0 - 0.10
Iron	mg/kg	60 - 120
Manganese	mg/kg	50 - 120
Zinc	mg/kg	20 - 60
Copper	mg/kg	10 - 20
Boron	mg/kg	22 - 40
Chloride	%	0.40 - 1.0

Leaf (2) (December - February)

Analyte	Unit	Range
Nitrogen	%	2.2 - 3.0
Phosphorus	%	0.16 - 0.30
Potassium	%	1.8 - 3.0
Sulphur	%	0.30 - 0.50
Calcium	%	1.9 - 3.5
Magnesium	%	0.30 - 0.55
Sodium	%	0.0 - 0.050
Iron	mg/kg	50 - 100
Manganese	mg/kg	50 - 150
Zinc	mg/kg	15 - 30
Copper	mg/kg	8.0 - 15
Boron	mg/kg	30 - 50
Chloride	%	0.50 - 1.5

Leaf (3) March - April)

Analyte	Unit	Range
Nitrogen	%	2.0 - 2.7
Phosphorus	%	0.18 - 0.30
Potassium	%	1.8 - 3.0
Sulphur	%	0.30 - 0.60
Calcium	%	2.5 - 4.0
Magnesium	%	0.35 - 0.70
Sodium	%	0.0 - 0.050
Iron	mg/kg	65 - 150
Manganese	mg/kg	50 - 200
Zinc	mg/kg	15 - 30
Copper	mg/kg	7.0 - 12
Boron	mg/kg	30 - 50
Chloride	%	0.60 - 1.6

Soil

Analyte	Unit	Range
pH	pH	5.8 - 6.5
Olsen Phosphorus	mg/L	30 - 60
Potassium	me/100	0.60 - 1.2
Calcium	me/100	6.0 - 12
Magnesium	me/100	1.0 - 3.0
Sodium	me/100	0.0 - 0.40
CEC	me/100	12 - 25
Volume Weight	g/mL	0.60 - 1.0
Available Nitrogen	kg/ha	100 - 150

Comments

Potassium deficiency is widespread and probably the most serious deficiency in kiwifruit grown in New Zealand. It may be confused with drought stress or wind damage. Crop requirements for this element have been underestimated in the past.

Minor nitrogen deficiencies are difficult to detect and require early season leaf analyses.
Magnesium deficiencies are not usually observed until February, and then only in older leaves of the current season's extension growth. The later-season sample results, therefore, will probably show more clearly magnesium deficiencies than the spring samples.

Early season deficiencies may manifest as smaller and/or fewer fruit and smaller leaves, rather than reduced mineral concentrations in the leaf.

Irrigation waters high in sodium can cause problems, as kiwifruit cannot tolerate high levels of this element. The sodium levels in the leaf tissue do not increase appreciably, making diagnosis of this problem difficult from plant tissue alone. Soil tests and/or irrigation water analysis would indicate if this toxicity is likely.

Manganese deficiency has been identified on high pH soils (pH 6.8). In contrast, manganese toxicity has also been identified on low pH soils (pH 5.2). Zinc deficiencies occur rarely and must be remedied quickly before or soon after leaf emergence.

Kiwifruit has been identified as a boron sensitive crop. The effect of excessive boron is reduction of fruit yield and also premature ripening in cool storage. Irrigation water with high boron levels may induce boron toxicity.

There is an inverse relationship between the availability of nitrate and the uptake of chloride, i.e. higher nitrate levels will suppress chloride uptake.

References

Smith, G.S.; Asher, C.J. and Clark, C.J. 1985. Kiwifruit nutrition. Diagnosis of nutritional disorders. AgPress Communications Ltd, Wellington.
Fertiliser recommendation for horticultural crops. HortResearch HortNET, 1997.
Blackmore, L.C; Searle, P.L and Daly, B.K. 1987. Methods for chemical analysis of soils. NZ Soil Bureau Scientific Report 80. NZ Soil Bureau, DSIR.

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