



Certificate of Analysis

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Client: Annavocado Limited	Lab No: 3043732	shvpv1
Address: 51 Grammer Road RD 3 Katikati 3170	Date Received: 29-Jul-2022	
	Date Reported: 02-Aug-2022	
	Quote No:	
	Order No:	
	Client Reference: 294610	
	Submitted By: Walter Lown	

Sample Name: SW - NE

Lab Number: 3043732.1

Sample Type: SOIL Avocado (S28)

Analysis	Level Found	Medium Range*	Low	Medium	High
pH	pH Units	6.1	6.0 - 6.5		
Olsen Phosphorus	mg/L	19	25 - 50		
Potassium	me/100g	0.44	0.50 - 0.80		
Calcium	me/100g	8.6	7.0 - 18.0		
Magnesium	me/100g	1.49	1.00 - 3.00		
Sodium	me/100g	0.09	0.00 - 0.50		
CEC	me/100g	24	12 - 25		
Total Base Saturation	%	45	60 - 85		
Volume Weight	g/mL	0.67	0.60 - 1.00		
Phosphorus (Mehlich 3)*	mg/L	7	55 - 110		
Potassium (Mehlich 3)*	mg/L	97	150 - 250		
Calcium (Mehlich 3)*	mg/L	1,109	1100 - 2200		
Magnesium (Mehlich 3)*	mg/L	117.1	100 - 300		
Sodium (Mehlich 3)*	mg/L	13	0 - 90		
Sulphur (Mehlich 3)*	mg/L	13			
Iron (Mehlich 3)*	mg/L	52			
Manganese (Mehlich 3)*	mg/L	5.8	8.0 - 35.0		
Zinc (Mehlich 3)*	mg/L	9.3	5.00 - 15.0		
Copper (Mehlich 3)*	mg/L	8.8	2.0 - 20.0		
Boron (Mehlich 3)*	mg/L	1.63	2.50 - 4.50		
Cobalt (Mehlich 3)*	mg/L	< 0.1			
Aluminium (Mehlich 3)*	mg/L	1,769			
Base Saturation %		K 1.9 Ca 36 Mg 6.3 Na 0.4			
MAF Units		K 6 Ca 7 Mg 22 Na 3			



This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised. The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked * or any comments and interpretations, which are not accredited.



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	Submitted By: Walter Lown

Sample Name: SE - NW

Lab Number: 3043732.2

Sample Type: SOIL Avocado (S28)

Analysis	Level Found	Medium Range*	Low	Medium	High
pH	pH Units	6.1	6.0 - 6.5		
Olsen Phosphorus	mg/L	14	25 - 50		
Potassium	me/100g	0.41	0.50 - 0.80		
Calcium	me/100g	6.2	7.0 - 18.0		
Magnesium	me/100g	0.98	1.00 - 3.00		
Sodium	me/100g	0.09	0.00 - 0.50		
CEC	me/100g	20	12 - 25		
Total Base Saturation	%	39	60 - 85		
Volume Weight	g/mL	0.68	0.60 - 1.00		
Phosphorus (Mehlich 3)*	mg/L	4	55 - 110		
Potassium (Mehlich 3)*	mg/L	92	150 - 250		
Calcium (Mehlich 3)*	mg/L	799	1100 - 2200		
Magnesium (Mehlich 3)*	mg/L	75.3	100 - 300		
Sodium (Mehlich 3)*	mg/L	12	0 - 90		
Sulphur (Mehlich 3)*	mg/L	12			
Iron (Mehlich 3)*	mg/L	39			
Manganese (Mehlich 3)*	mg/L	7.2	8.0 - 35.0		
Zinc (Mehlich 3)*	mg/L	4.7	5.00 - 15.0		
Copper (Mehlich 3)*	mg/L	6.8	2.0 - 20.0		
Boron (Mehlich 3)*	mg/L	1.56	2.50 - 4.50		
Cobalt (Mehlich 3)*	mg/L	< 0.1			
Aluminium (Mehlich 3)*	mg/L	1,858			
Base Saturation %		K 2.1 Ca 32 Mg 5.0 Na 0.4			
MAF Units		K 6 Ca 5 Mg 15 Na 3			



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	Submitted By: Walter Lown

Sample Name: SE - NW

Lab Number: 3043732.4

Sample Type: LEAF Avocado (P28)

Analysis	Level Found	Medium Range*	Low	Medium	High
Nitrogen*	% 2.2	2.4 - 2.9			
Phosphorus	% 0.13	0.12 - 0.18			
Potassium	% 0.7	0.9 - 1.2			
Sulphur	% 0.25	0.20 - 0.30			
Calcium	% 1.47	1.20 - 2.00			
Magnesium	% 0.41	0.30 - 0.55			
Sodium	% 0.003	0.00 - 0.250			
Iron	mg/kg 45	40 - 100			
Manganese	mg/kg 143	80 - 300			
Zinc	mg/kg 43	25 - 50			
Copper	mg/kg 7	5 - 15			
Boron	mg/kg 25	30 - 50			
Chloride*	% 0.17	0.0 - 0.25			



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	Client Reference: 294610
	Submitted By: Walter Lown

Sample Name: SW - NE

Lab Number: 3043732.3

Sample Type: LEAF Avocado (P28)

Analysis	Level Found	Medium Range*	Low	Medium	High
Nitrogen*	% 2.0	2.4 - 2.9			
Phosphorus	% 0.10	0.12 - 0.18			
Potassium	% 0.6	0.9 - 1.2			
Sulphur	% 0.23	0.20 - 0.30			
Calcium	% 1.20	1.20 - 2.00			
Magnesium	% 0.39	0.30 - 0.55			
Sodium	% 0.003	0.00 - 0.250			
Iron	mg/kg 39	40 - 100			
Manganese	mg/kg 83	80 - 300			
Zinc	mg/kg 22	25 - 50			
Copper	mg/kg 6	5 - 15			
Boron	mg/kg 23	30 - 50			
Chloride*	% 0.17	0.0 - 0.25			

The above nutrient graphs compare the levels found with reference interpretation levels. NOTE: It is important that the correct sample type be assigned, and that the recommended sampling procedure has been followed. R J Hill Laboratories Limited does not accept any responsibility for the resulting use of this information. IANZ Accreditation does not apply to comments and interpretations, i.e. the 'Range Levels' and subsequent graphs.



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		Submitted By:	Walter Lown	

Soil Analysis Results

Sample Name:		SW - NE	SE - NW				
Lab Number:		3043732.1	3043732.2				
Sample Type:		SOIL Avocado	SOIL Avocado				
Sample Type Code:		S28	S28				
pH	pH Units	6.1	6.1	-	-	-	-
Olsen Phosphorus	mg/L	19	14	-	-	-	-
Potassium	me/100g	0.44	0.41	-	-	-	-
Potassium	%BS	1.9	2.1	-	-	-	-
Potassium	MAF units	6	6	-	-	-	-
Calcium	me/100g	8.6	6.2	-	-	-	-
Calcium	%BS	36	32	-	-	-	-
Calcium	MAF units	7	5	-	-	-	-
Magnesium	me/100g	1.49	0.98	-	-	-	-
Magnesium	%BS	6.3	5.0	-	-	-	-
Magnesium	MAF units	22	15	-	-	-	-
Sodium	me/100g	0.09	0.09	-	-	-	-
Sodium	%BS	0.4	0.4	-	-	-	-
Sodium	MAF units	3	3	-	-	-	-
CEC	me/100g	24	20	-	-	-	-
Total Base Saturation	%	45	39	-	-	-	-
Volume Weight	g/mL	0.67	0.68	-	-	-	-
Phosphorus (Mehlich 3)*	mg/L	7	4	-	-	-	-
Potassium (Mehlich 3)*	mg/L	97	92	-	-	-	-
Calcium (Mehlich 3)*	mg/L	1,109	799	-	-	-	-
Magnesium (Mehlich 3)*	mg/L	117.1	75.3	-	-	-	-
Sodium (Mehlich 3)*	mg/L	13	12	-	-	-	-
Sulphur (Mehlich 3)*	mg/L	13	12	-	-	-	-
Iron (Mehlich 3)*	mg/L	52	39	-	-	-	-
Manganese (Mehlich 3)*	mg/L	5.8	7.2	-	-	-	-
Zinc (Mehlich 3)*	mg/L	9.3	4.7	-	-	-	-
Copper (Mehlich 3)*	mg/L	8.8	6.8	-	-	-	-
Boron (Mehlich 3)*	mg/L	1.63	1.56	-	-	-	-
Cobalt (Mehlich 3)*	mg/L	< 0.1	< 0.1	-	-	-	-
Aluminium (Mehlich 3)*	mg/L	1,769	1,858	-	-	-	-



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		Client Reference:	294610	
		Submitted By:	Walter Lown	

Plant Analysis Results							
Sample Name:		SE - NW	SW - NE				
Lab Number:		3043732.4	3043732.3				
Sample Type:		LEAF Avocado	LEAF Avocado				
Sample Type Code:		P28	P28				
Nitrogen*	%	2.2	2.0	-	-	-	-
Phosphorus	%	0.13	0.10	-	-	-	-
Potassium	%	0.7	0.6	-	-	-	-
Sulphur	%	0.25	0.23	-	-	-	-
Calcium	%	1.47	1.20	-	-	-	-
Magnesium	%	0.41	0.39	-	-	-	-
Sodium	%	0.003	0.003	-	-	-	-
Iron	mg/kg	45	39	-	-	-	-
Manganese	mg/kg	143	83	-	-	-	-
Zinc	mg/kg	43	22	-	-	-	-
Copper	mg/kg	7	6	-	-	-	-
Boron	mg/kg	25	23	-	-	-	-
Chloride*	%	0.17	0.17	-	-	-	-



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Analyst's Comments

Samples 1-2 Comment:

The medium or optimum range guidelines shown in the histogram report relate to sampling protocols as per Hill Laboratories' crop guides and are based on reference values where these are published. Results for samples collected to different depths than those described in the crop guide should be interpreted with caution. For pastoral soils, the medium ranges are specific for a 75mm sample depth, but if a 150mm sampling depth is used the nutrient levels measured may appear low against these ranges, as nutrients are typically more concentrated in the top of the soil profile. These soil profile differences are altered upon cultivation or contouring. Further explanation of the derivation of the medium and optimum ranges is available on request.

Samples 1-2 Comment:

The Medium Ranges and bar graph interpretations shown above for Mehlich 3 zinc and copper are based on plant requirements for the Low regions of the graph, but the Medium and High Ranges more realistically reflect the levels typically found in orchards where copper and zinc sprays are regularly used. The upper end of the High range approximates to levels that may give rise to eco-toxic effects over time. If the Mehlich 3 copper level exceeds 50 mg/L, a 'Total' copper test is recommended.

Samples 1-2 Comment:

As the Mehlich 3 test is an acid extraction it is not measuring plant available Al, but the dilute acid soluble Al. This tends to be the amorphous, non-crystalline Al, i.e. that Al likely to fix applied soluble P. In-house investigations have shown reasonable correlation between m3-Al and the Anion Storage Capacity (Phosphate Retention) test. M3-Al does not determine the likelihood of aluminium toxicity. Please refer to the laboratory Technical Note: Mehlich 3 Soil Test for further information.

Samples 3-4 Comment:

Revised Medium Range levels for Avocado leaves have been introduced in March 2007. These new ranges are based on levels found in NZ avocado samples over the previous five seasons. The previous interpretive ranges had been taken from overseas research, which did not appear to fit well with NZ crops for certain elements, notably P, B, Zn. For other elements, the Medium Ranges have been contracted significantly, to reflect the typical levels found in the NZ crop. No distinction has been made for varietal differences.

Samples 3-4 Comment:

Where trace element levels (Mn, Zn, Cu, Fe) show as elevated on the histogram report, this may be due to spray residues, foliar fertilizer or dust contamination on the foliage.

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Sample Registration*	Samples were registered according to instructions received.	-	1-4
Soil Prep (Dry & Grind)*	Air dried at 35 - 40°C overnight (residual moisture typically 4%) and crushed to pass through a 2mm screen.	-	1-2
pH	1:2 (v/v) soil:water slurry followed by potentiometric determination of pH. In-house.	0.1 pH Units	1-2
Olsen Phosphorus	Olsen extraction followed by Molybdenum Blue colorimetry. In-house method.	1 mg/L	1-2
Potassium	1M Neutral ammonium acetate extraction followed by ICP-OES. In-house.	1 MAF units	1-2
Calcium	1M Neutral ammonium acetate extraction followed by ICP-OES. In-house.	1 MAF units	1-2



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		Submitted By:	Walter Lown	

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Magnesium	1M Neutral ammonium acetate extraction followed by ICP-OES. In-house.	1 MAF units	1-2
Sodium	1M Neutral ammonium acetate extraction followed by ICP-OES. In-house.	2 MAF units	1-2
Phosphorus (Mehlich 3)*	Mehlich 3 Extraction followed by ICP-OES.	1 mg/L	1-2
Sulphur (Mehlich 3)*	Mehlich 3 Extraction followed by ICP-OES.	1 mg/L	1-2
Potassium (Mehlich 3)*	Mehlich 3 Extraction followed by ICP-OES.	1 mg/L	1-2
Calcium (Mehlich 3)*	Mehlich 3 Extraction followed by ICP-OES.	2 mg/L	1-2
Magnesium (Mehlich 3)*	Mehlich 3 Extraction followed by ICP-OES.	1.0 mg/L	1-2
Sodium (Mehlich 3)*	Mehlich 3 Extraction followed by ICP-OES.	2 mg/L	1-2
Iron (Mehlich 3)*	Mehlich 3 Extraction followed by ICP-OES.	1 mg/L	1-2
Manganese (Mehlich 3)*	Mehlich 3 Extraction followed by ICP-OES.	0.2 mg/L	1-2
Zinc (Mehlich 3)*	Mehlich 3 Extraction followed by ICP-OES.	0.5 mg/L	1-2
Copper (Mehlich 3)*	Mehlich 3 Extraction followed by ICP-OES.	0.2 mg/L	1-2
Boron (Mehlich 3)*	Mehlich 3 Extraction followed by ICP-OES.	0.15 mg/L	1-2
Cobalt (Mehlich 3)*	Mehlich 3 Extraction followed by ICP-OES.	0.1 mg/L	1-2
Aluminium (Mehlich 3)*	Mehlich 3 Extraction followed by ICP-OES.	1 mg/L	1-2
Potassium	1M Neutral ammonium acetate extraction followed by ICP-OES. In-house.	0.01 me/100g	1-2
Calcium	1M Neutral ammonium acetate extraction followed by ICP-OES. In-house.	0.5 me/100g	1-2
Magnesium	1M Neutral ammonium acetate extraction followed by ICP-OES. In-house.	0.04 me/100g	1-2
Sodium	1M Neutral ammonium acetate extraction followed by ICP-OES. In-house.	0.05 me/100g	1-2
Potassium	1M Neutral ammonium acetate extraction followed by ICP-OES. In-house.	0.1 %BS	1-2
Calcium	1M Neutral ammonium acetate extraction followed by ICP-OES. In-house.	1 %BS	1-2
Magnesium	1M Neutral ammonium acetate extraction followed by ICP-OES. In-house.	0.2 %BS	1-2
Sodium	1M Neutral ammonium acetate extraction followed by ICP-OES. In-house.	0.1 %BS	1-2
CEC	Summation of extractable cations (K, Ca, Mg, Na) and extractable acidity. May be overestimated if soil contains high levels of soluble salts or carbonates. In-house.	2 me/100g	1-2
Total Base Saturation	Calculated from Extractable Cations and Cation Exchange Capacity.	5 %	1-2
Volume Weight	The weight/volume ratio of dried, ground soil. In-house.	0.01 g/mL	1-2

Sample Type: Plant

Test	Method Description	Default Detection Limit	Sample No
Plant Prep (Dry & Grind)*	Oven dried at 62°C overnight and ground to pass through a 1.0mm screen. By convention for plant analysis, analytical results are reported from this sample fraction and are not corrected for residual moisture (typically 5%), unless units denoted as %DM.	-	3-4



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		Submitted By:	Walter Lown	

Sample Type: Plant

Test	Method Description	Default Detection Limit	Sample No
Avocado Acid Detergent Wash*	Leaves were washed with an Acid Detergent solution prior to drying and grinding.	-	3-4
Nitrogen*	Estimated by NIR, calibration based on Total Nitrogen (N) by Dumas combustion. To correct result to fully dry-basis, multiply by 1.05 (assuming 5% residual moisture).	0.2 %	3-4
Phosphorus	Nitric Acid/Hydrogen Peroxide digestion followed by ICP-OES. To correct result to fully dry-basis, multiply by 1.05 (assuming 5% residual moisture). In-house.	0.02 %	3-4
Potassium	Nitric Acid/Hydrogen Peroxide digestion followed by ICP-OES. To correct result to fully dry-basis, multiply by 1.05 (assuming 5% residual moisture). In-house.	0.1 %	3-4
Sulphur	Nitric Acid/Hydrogen Peroxide digestion followed by ICP-OES. To correct result to fully dry-basis, multiply by 1.05 (assuming 5% residual moisture). In-house.	0.02 %	3-4
Calcium	Nitric Acid/Hydrogen Peroxide digestion followed by ICP-OES. To correct result to fully dry-basis, multiply by 1.05 (assuming 5% residual moisture). In-house.	0.02 %	3-4
Magnesium	Nitric Acid/Hydrogen Peroxide digestion followed by ICP-OES. To correct result to fully dry-basis, multiply by 1.05 (assuming 5% residual moisture). In-house.	0.02 %	3-4
Sodium	Nitric Acid/Hydrogen Peroxide digestion followed by ICP-OES. To correct result to fully dry-basis, multiply by 1.05 (assuming 5% residual moisture). In-house.	0.002 %	3-4
Iron	Nitric Acid/Hydrogen Peroxide digestion followed by ICP-OES. To correct result to fully dry-basis, multiply by 1.05 (assuming 5% residual moisture). In-house.	5 mg/kg	3-4
Manganese	Nitric Acid/Hydrogen Peroxide digestion followed by ICP-OES. To correct result to fully dry-basis, multiply by 1.05 (assuming 5% residual moisture). In-house.	3 mg/kg	3-4
Zinc	Nitric Acid/Hydrogen Peroxide digestion followed by ICP-OES. To correct result to fully dry-basis, multiply by 1.05 (assuming 5% residual moisture). In-house.	2 mg/kg	3-4
Copper	Nitric Acid/Hydrogen Peroxide digestion followed by ICP-OES. To correct result to fully dry-basis, multiply by 1.05 (assuming 5% residual moisture). In-house.	1 mg/kg	3-4
Boron	Nitric Acid/Hydrogen Peroxide digestion followed by ICP-OES. To correct result to fully dry-basis, multiply by 1.05 (assuming 5% residual moisture). In-house.	1 mg/kg	3-4
Chloride*	Estimated by NIR, calibration based on 2% acetic acid extraction, potentiometric titration. To correct result to fully dry-basis, multiply by 1.05 (assuming 5% residual moisture).	0.05 %	3-4

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 01-Aug-2022 and 02-Aug-2022. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

This certificate of analysis must not be reproduced, except in full, without the written consent of the signatory.



Andrew Whitmore BSc (Tech)
Client Services Manager