Plant Nutrition

– the Macro & Micro Trends

IBA Agronomy Forum May15th 2012 Dundee Scotland

Jim Grierson – GSK Blackcurrant Advisor – New Zealand

Sampling methods adopted

Tissue

Youngest mature leaf (blade & petiole)

Specific sites to collate trends

Timing, post flower

Soil

Early autumn (late February)

May repeat if require in early spring (August)

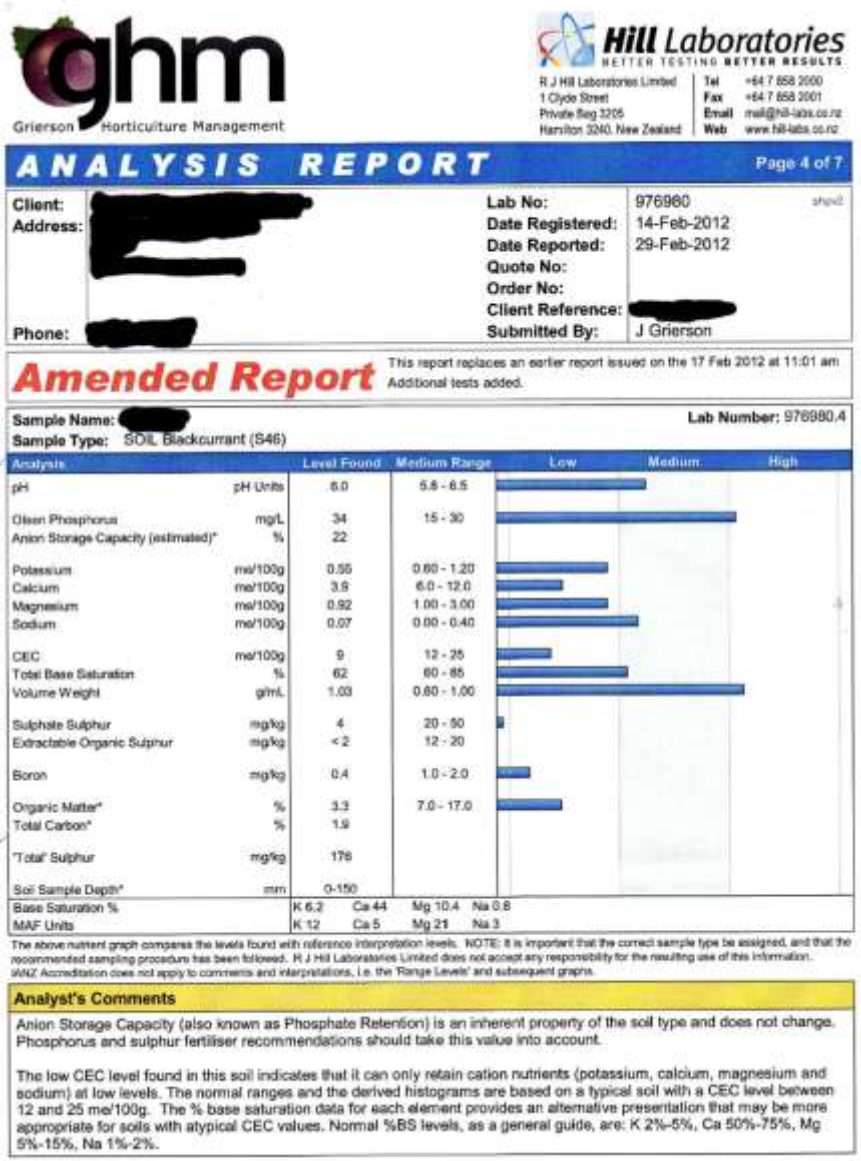
Core depth 15cm

Sample site from the rooting zone of the bushes across the plantation block

Also specific sites to collate trends

Recommended Tests

Soil Sample Nutrient Range



ghm
Grierson Horticulture Management

Hill Laboratories
BETTER TESTING BETTER RESULTS

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ANALYSIS REPORT Page 4 of 7

Client:	[redacted]	**Lab No:**	976960
Address:		**Date Registered:**	14-Feb-2012
		Date Reported:	29-Feb-2012
		Quote No:	
		Order No:	
		Client Reference:	[redacted]
Phone:	[redacted]	**Submitted By:**	J Grierson

Amended Report This report replaces an earlier report issued on the 17 Feb 2012 at 11:01 am
Additional tests added.

Sample Name: [redacted] **Lab Number:** 976960.4
Sample Type: SOIL Blackcurrant (S46)

Analysis		Level Found	Medium Range	Low / Medium / High
pH	pH Units	6.0	5.8 - 6.5	
Olsen Phosphorus	mg/L	34	15 - 30	
Anion Storage Capacity (estimated)*	%	22		
Potassium	me/100g	0.55	0.60 - 1.20	
Calcium	me/100g	3.9	6.0 - 12.0	
Magnesium	me/100g	0.92	1.00 - 3.00	
Sodium	me/100g	0.07	0.00 - 0.40	
CEC	me/100g	9	12 - 25	
Total Base Saturation	%	62	60 - 85	
Volume Weight	g/mL	1.03	0.80 - 1.00	
Sulphate Sulphur	mg/kg	4	20 - 50	
Extractable Organic Sulphur	mg/kg	< 2	12 - 20	
Boron	mg/kg	0.4	1.0 - 2.0	
Organic Matter*	%	3.3	7.0 - 17.0	
Total Carbon*	%	1.9		
'Total' Sulphur	mg/kg	176		
Soil Sample Depth*	mm	0-150		
Base Saturation %		K 6.2 Ca 44 Mg 10.4 Na 0.8		
MAF Units		K 12 Ca 5 Mg 21 Na 3		

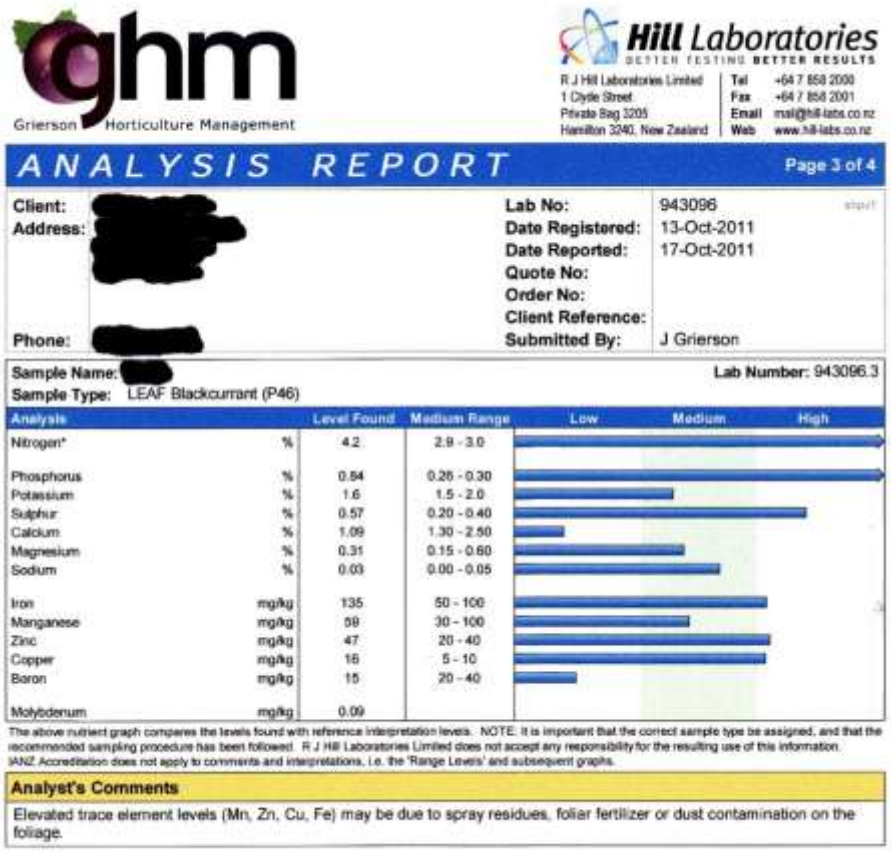
The above nutrient graph compares the levels found with reference interpretation levels. NOTE: It is important that the correct sample type be assigned, and that the recommended sampling procedure has been followed. R J Hill Laboratories Limited does not accept any responsibility for the resulting use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

Analyst's Comments

Anion Storage Capacity (also known as Phosphate Retention) is an inherent property of the soil type and does not change. Phosphorus and sulphur fertiliser recommendations should take this value into account.

The low CEC level found in this soil indicates that it can only retain cation nutrients (potassium, calcium, magnesium and sodium) at low levels. The normal ranges and the derived histograms are based on a typical soil with a CEC level between 12 and 25 me/100g. The % base saturation data for each element provides an alternative presentation that may be more appropriate for soils with atypical CEC values. Normal %BS levels, as a general guide, are: K 2%-5%, Ca 50%-75%, Mg 5%-15%, Na 1%-2%.

Recommended tests
Tissue Sample Nutrient Range



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Client: [redacted]
Address: [redacted]
Phone: [redacted]

Lab No: 943096
Date Registered: 13-Oct-2011
Date Reported: 17-Oct-2011
Quote No:
Order No:
Client Reference:
Submitted By: J Grierson

Sample Name: [redacted]
Sample Type: LEAF Blackcurrant (P46)
Lab Number: 943096.3

Analysis		Level Found	Medium Range	Low / Medium / High
Nitrogen*	%	4.2	2.9 - 3.0	
Phosphorus	%	0.84	0.26 - 0.30	
Potassium	%	1.6	1.5 - 2.0	
Sulphur	%	0.57	0.20 - 0.40	
Calcium	%	1.09	1.30 - 2.50	
Magnesium	%	0.31	0.15 - 0.60	
Sodium	%	0.03	0.00 - 0.05	
Iron	mg/kg	135	50 - 100	
Manganese	mg/kg	59	30 - 100	
Zinc	mg/kg	47	20 - 40	
Copper	mg/kg	16	5 - 10	
Boron	mg/kg	15	20 - 40	
Molybdenum	mg/kg	0.09		

The above nutrient graph compares 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.

Analyst's Comments

Elevated trace element levels (Mn, Zn, Cu, Fe) may be due to spray residues, foliar fertilizer or dust contamination on the foliage.

Key Nutrients for NZ conditions

- **Nitrogen**- 80 units per year to grow crops
- **Phosphorus**- Very low requirement
- **Potassium**- Effected by crop removal
- **Calcium**- High requirement, hard to achieve (Soil, cane, fruit)
- **Boron**- Very low levels on the East coast of NZ (.3to.6)
- **Sulphur**- Very low levels on East coast of NZ (5-6)
-
- **pH** – Ideal level **6.2** NZ soils range from 5.1 thru 6.5
- **pH levels** if not addressed by lime applications they have trended down over the past three seasons especially the last 12 months.

Action taken

- **Sample soils every two years & tissues every year.**

- *In both situations have **set plots** for annual sampling to capture plantation **trends.***
- *Analysis of macro and micro nutrients, is very important as crop quality and yield can be seriously reduced even when there are no visual signs of deficiency.*

- **Macro-Primary**
- **N-** Best applied early spring if required (Bud Break)
- **P-** Do not apply unless levels are 3-5
- **K-** Check crop removal via soil test Feb/Sept apply Pot Sulphate late Feb/Sept
- **Ca-** Apply CAN mid Feb/Sept, Apply foliars
- **S-** As above for **K**
- **Mg-** In colder seasons Mg deficiency will out, Apply foliar pre/post flower

- **Micro-Secondary**
- **B-** Apply with base fertiliser in Autumn or foliar late grape
- **Mo-** Apply foliar late grape with Boron application
- **Z-** Apply foliar at the Good Green Tip stage/early grape
- **Cl- Cu-Fe-Mn** Not a problem in NZ crop

To summarise-

Key findings to date

- Apply **Macro- nutrients** in the early to mid autumn period
- Apply **Micro-nutrients** as foliars or via fertigation systems through the various growth stages
- Boron the exception.
- **Do not** apply **N** too close to flowering

Plenty of research required

- **Timing –**Growth Stages, Soil Type, Crop age, Irrigation & Pruning regime
- **Product availability & suitability**
- **Environment issues**
- **Correlation between -**soil, cane, leaf, petioles, fruitlet and fruit.
- **Methodology-**New & Old

Good crop **Nutrition** is secondary only to your **irrigation & pruning** regime!