

Hazelnuts - developing **Good Agricultural Practices**

- Weed management
- Nutrient management

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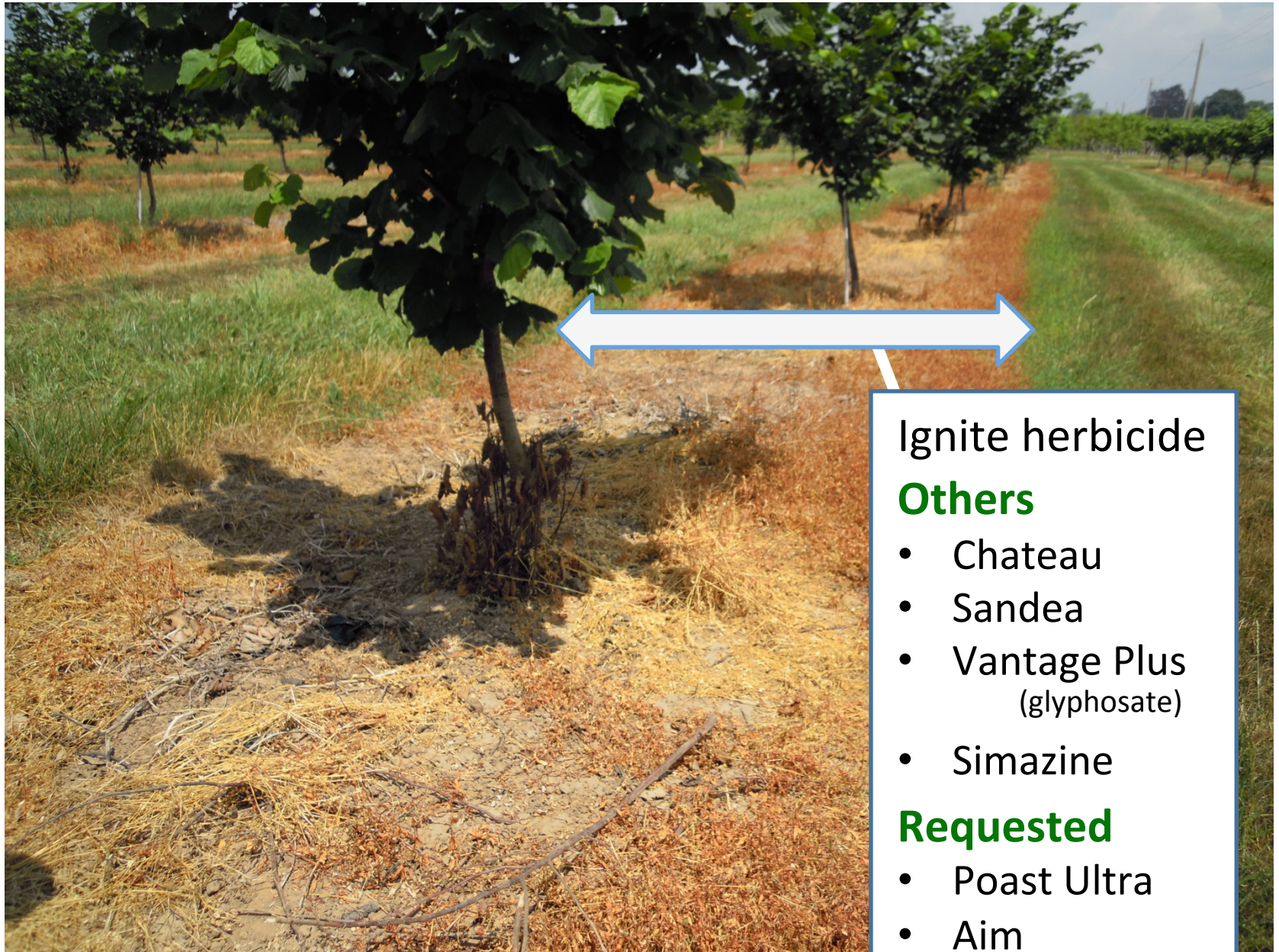


- Management of weeds, nutrients, irrigation
- Soil & leaf tissue testing, soil moisture probes



- Annual crops, food quality, income \$
- Irrigation, insecticides, fungicides, herbicides

Weed Management



Ignite herbicide

Others

- Chateau
- Sandea
- Vantage Plus
(glyphosate)
- Simazine

Requested

- Poast Ultra
- Aim

Sucker Management



Sucker control

- Gramoxone – **don't use it**
- Ignite – **may damage trees**
- Aim ?? - needs registration

Nutrient competition - weed management



A - humus horizon

B - mineral horizon

C - soil formation horizon



Weed management - optimum use of fertilizer by the trees



Tree roots

Aggressive
grass roots

Interpreting a soil test report

Report Number:
Account Number: 95001

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, Ontario, N5V 3P5
Telephone: (519) 457-2575 Fax: (519) 457-2664



To: hazelnut producer

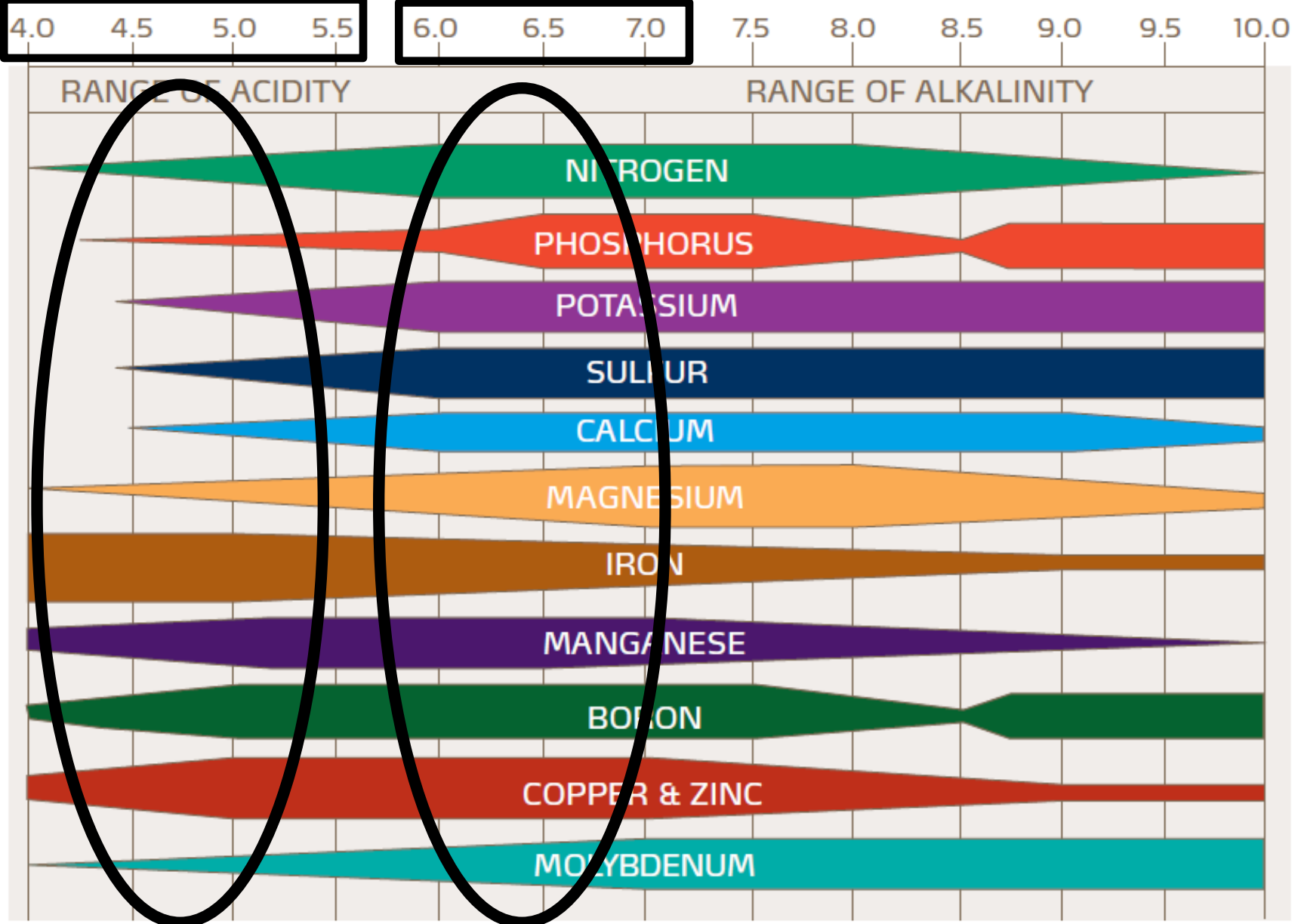
Reported Date:		Printed Date: Sep 20, 2016				SOIL TEST REPORT										Page: 1 / 1	
Sample Number	Lab Number	Organic Matter	Phosphorus - P ppm Bioarb	Bray-P1	Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	Sodium Na ppm	pH pH Buffer	CEC meq/100g	Percent Base Saturations						
01-GAR	63529	4.0	13 L	18 VL	106 M	145 L	3800 VH	18 VL	7.6	20.5	% K	% Mg	% Ca	% H	% Na		
02-FIE	63530	3.5	16 L	20 VL	70 L	140 L	2070 VH	13 L	7.7	11.7	1.3	5.9	92.5	0.3	0.5		
Sample Number	Sulfur S ppm	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Boron B ppm	Soluble Salts meq/cm	Saturation %P	Aluminum Al ppm	Saturation %Al	Nitrate Nitrogen NO3-N ppm	K/Mg Ratio	ENR	Field ID			
01-GAR	11 VL	2.1 L	77 VH	62 VH	1.1 M	0.8 M		1 VL	672	0.0 G		0.22	52				
02-FIE	8 VL	1.8 L	91 VH	75 VH	0.8 M	0.6 M		1 VL	758	0.0 G		0.15	47				

OE VL = VERY LOW, L = LOW, M = MEDIUM, H = HIGH, VH = VERY HIGH, G = GOOD, MA = MARGINAL, MT = MODERATE PHYTO-TOXIC, T = PHYTO-TOXIC, ST = SEVERE PHYTO-TOXIC

SOIL FERTILITY GUIDELINES (lbs/ac)

Sample Number	Crop	Yield Goal	Lime Tons/Acre	N	P2O5	K2O	Mg	Ca	S	Zn	Mn	Fe	Cu	B
01-GAR	Hazelnut Trees		0.0	75	100	160	25	0	20	4.5	0	0	0	1.5
02-FIE	Hazelnut Trees		0.0	75	130	160	15	0	20	5.0	0	0	0	2.0

The Influence of Soil pH on Nutrient Availability



Hazelnuts

J. Olsen

A comprehensive approach to nutrient management will help you ensure availability of optimum levels of nutrients for tree growth. Components of a comprehensive nutrient management strategy include:

- Soil analysis before planting (useful in predicting the need for potassium, magnesium, or lime applications)
- Observations of annual shoot growth, leaf size and color, and crop yields

Suspect a nutrient deficiency if the cause of poor tree performance is not primarily one or more of the following: lack of pruning, soilborne pests, winter injury, poor soil drainage, physical injury, disease, poor weather, insects, poor pollination, rodents, deep cultivation, shallow soil, or limited moisture.

Leaf tissue analysis

Search Google: hazelnut nutrient management, Oregon

http://extension.oregonstate.edu/umatilla/mf/sites/default/files/Hazelnut_Nutrient_Management_Guide_EM8786-e.pdf

New orchards: pre-plant soil tests

Potassium (K)

Broadcast K and plow it under during preparation of land for planting. Apply according to Table 5.

Table 5.—K application rates for new hazelnut orchards.

If soil test for K is (ppm)	Apply this amount of K ₂ O (lb/acre)
0–75	300–400
75–150	200–300
over 150	0

Magnesium (Mg)

Broadcast Mg and plow it under during preparation of the land for planting. If the soil test for Mg is less than 0.5 meq/100 g of soil, apply enough dolomite to lim to pH 5.6. Dolomite contains magnesium and calcium carbonate and acts in a manner similar to limestone for correction of soil acidity.

Intercrops add complexity and profitability during orchard establishment

Lime – pH adjustment

Table 6.—Lime application rates for hazelnut orchards.

If the buffer test for lime is	Apply this amount of lime (ton/acre)
Below 5.2	4–5
5.2–5.6	3–4
5.6–5.9	2–3
5.9–6.2	1–2

Aim for pH 6.5 – 7.0



Leaf tissue analysis – ideal range for each hazelnut nutrient

Nutrient	Deficiency	Below normal	Normal	Above normal	Excess
<i>Nitrogen</i> (% dry weight)	<1.80	1.81–2.20	2.21–2.50	2.51–3.00	>3.00
<i>Phosphorus</i> (% dry weight)	<0.10	0.11–0.13	0.14–0.45	0.46–0.55	>0.55
<i>Potassium</i> (% dry weight)	<0.50	0.51–0.80	0.81–2.00	2.01–3.00	>3.00
<i>Sulfur</i> (% dry weight)	<0.08	0.90–0.12	0.13–0.20	0.21–0.50	>0.50
<i>Calcium</i> (% dry weight)	<0.60	0.61–1.00	1.01–2.50	2.51–3.00	>3.00
<i>Magnesium</i> (% dry weight)	<0.18	0.19–0.24	0.25–0.50	0.51–1.00	>1.00
<i>Manganese</i> (ppm dry weight)	<20	21–25	26–650	651–1,000	>1,000
<i>Iron</i> (ppm dry weight)	<40	41–50	51–400	401–500	>500
<i>Copper</i> (ppm dry weight)	<2	3–4	5–15	16–100	>100
<i>Boron</i> (ppm dry weight)	<25	26–30	31–75	76–100	>100
<i>Zinc</i> (ppm dry weight)	<10	11–15	16–60	61–100	>100

Nitrogen (N)

Young trees

Apply N only after 2 growing seasons have passed.
Young trees should grow 18–30 inches annually.

Table 2.—Nitrogen application rates for young hazelnut trees.

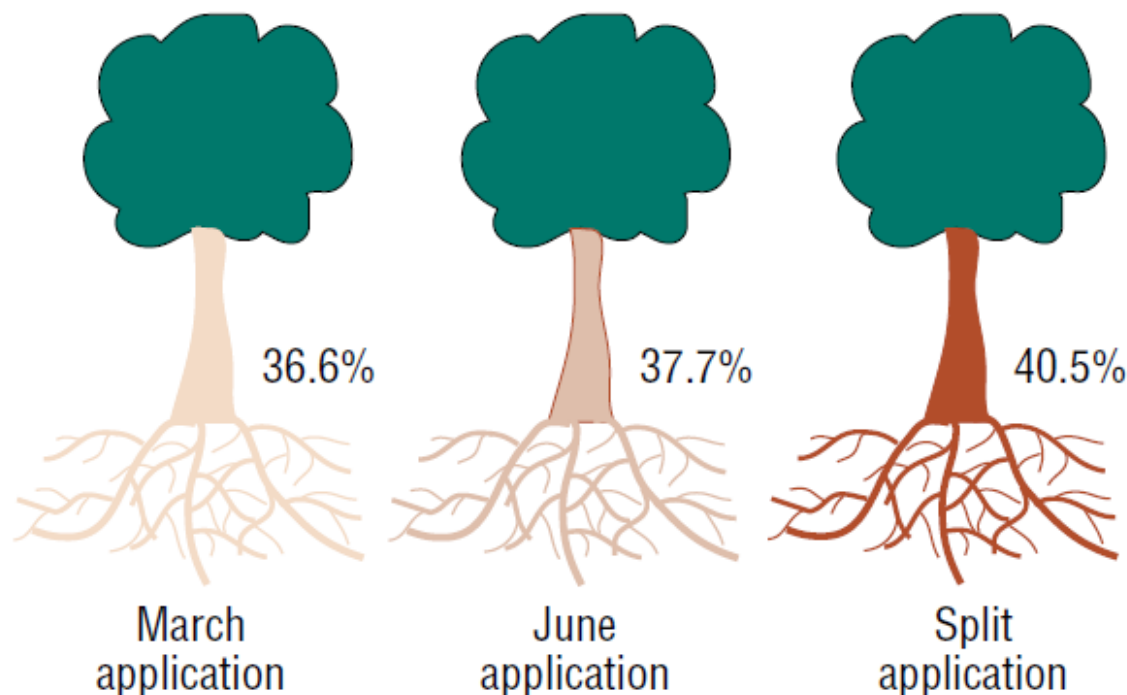
Age (year)	Apply this amount of N (lb/tree)
0–2	0
3–5	0.25–0.33
6–7	0.33–0.50
8–10	0.50–0.75

Nitrogen for mature hazelnut trees

Table 3.—Leaf analysis guide for N application.

% leaf N in August	Status	Apply this amount of N (lb/tree)
Under 1.8	Severe deficiency	3.0 (2 years)
1.8–2.2	Deficiency	2.0–3.0
2.2–2.5	Optimal	1.5–2.0
Over 2.5	Excess	0

Apply N in a 1- to 2-foot band around the tree, broadcast throughout the orchard, or broadcast 20–30 percent for a broadcast application according to the results of leaf analysis and response of the orchard. **Note:** Over-application of N over several years, might lead to excessive



Nutrients for mature hazelnut trees

- Phosphorus (P) - only apply if test indicates deficient
- Potassium (K)

Table 4.—Leaf analysis guide for K application.

% leaf K in August	Status	Apply this amount of K₂O (lb/tree)
Under 0.5	Severe deficiency	8–10
0.5–0.7	Deficiency	6–8
0.7–0.9	Borderline (test again in 1–2 years)	0
Over 1.0	Optimum	0

- Boron – improves nut set if leaf analysis is below 30 ppm
- Magnesium
- Zinc (Zn)
- Sulfur (S)

Grazing livestock in commercial orchards – not a new idea



No graze before harvest – post harvest only

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Thank you

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