

SOIL TESTING METHODS AND INTERPRETATIONS



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FOREWORD

The British Columbia Soil, Feed and Tissue Testing Laboratory in Kelowna is operated by the Soils Branch of the British Columbia Ministry of Agriculture. The laboratory provides information to assist technical advisors in making management recommendations within the agriculture industry of British Columbia. The information contained in this booklet will be of most use to district agriculturists, soil and field crop specialists, research scientists at universities and federal research stations and agricultural consultants who may be advising producers of crop/soil management practices.

Soil Testing Section

The laboratory's soil testing section provides fertilizer and cropping recommendations for a wide range of crops in every agricultural area of the province based on soil samples submitted by farmers.

Feed and Tissue Testing

The laboratory's feed testing section provides information on nutrient content of forage and feed samples submitted by farmers. Based on this information, the animal nutritionist in the Livestock Branch formulates rations for livestock.

The tissue testing section analyzes plant tissue samples for major and micro plant food elements from tree fruits, greenhouse crops, vegetable, and nursery crops. Based on this information, laboratory professional staff, horticulturists, agriculturists, and field specialists make fertilizer and cropping recommendations.

The laboratory also provides a wide range of analytical services in support of diagnostic and research projects conducted by researchers at universities, federal research stations, and various branches of the British Columbia Ministry of Agriculture.

Information in this publication is based on extensive field and laboratory research. Modifications and refinements will be made as necessary when new information becomes available. Whenever possible, metric designations are shown with imperial conversions in brackets as part of a continuing national metric conversion program.

Recommendations contained in this publication have been approved by the Soil Fertility subcommittee of the British Columbia Soil Science Lead Committee.

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ABBREVIATIONS

lb/ac — pounds per acre

kg/ha — kilograms per hectare

ppm — parts per million

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GENERAL DESCRIPTION OF SOIL TEST METHODS

1. Sampling Techniques

(a) Routine Field Soils

Soil sample boxes, soil information sheets and a booklet describing how to take samples are supplied to growers through either the laboratory or district agriculture offices.

The basic consideration is to get a composite sample, obtained by taking samples from 0 – 15 cm (0 – 6 in.) depth in 10 – 20 locations in a field.

Field size per sample will depend on the uniformity of the field and type of crop.

Air drying the sample prior to submitting to the laboratory is required for the Peace River area and Central Interior. In other areas air drying prior to submission is not essential.

(b) Sampling for Special Purposes

Sampling techniques have been devised for orchard soils and grapes. Instructions for sampling these areas are supplied on a regional basis.

For special projects or diagnostic purposes, specific sampling techniques are devised prior to setting up the project or study.

2. Sample Preparation in the Laboratory

Samples are dried in an oven at 55°C. They are then crushed in a mechanical grinder to pass through a 2 mm (1/12 in.) screen. After grinding, samples are placed in clean boxes and stored in ventilated cabinets. Aliquots of this sample are taken for the various determinations.

3. Methods (Field Soils)

(a) Organic Matter

The method used is a modification of the Wakley Black method. In this method the organic matter is partially oxidized with sodium dichromate and sulfuric acid under specific conditions. The residual organic matter in solution is measured photometrically. Results are calibrated against organic matter determined by the standard Wakley Black method. Results are reported in percent organic matter by weight.

(b) Soil Texture — is done by the "feel" method.

(c) pH — with pH meter in a 1:2 soil water mix. Equilibrium time 30 minutes.

(d) Conductivity.

The electrical conductance is measured on the same soil water mix as the pH using a conductivity meter and a micro type dip cell. Readings are converted to conductivity on a saturation extract by use of a calibrated conversion table.

Footnote: In this laboratory, two sizes of spoons are used to measure soil volumes — a 2.4 cc capacity is assumed to be 2.5 grams and a 4.8 cc capacity which is assumed to be 5 grams of soil.

These tables are reliable up to a conductivity of 1.00 Mmhos/cm. Soils with a conductivity higher than 1.00 are repeated using the saturation extract technique. Results are reported in Mmhos/cm.

(e) Nitrate — Nitrogen (Modified Phenoldisulfonic acid method)

(i) Extracting solution is 0.02 N Cu SO₄ and 0.007 N Ag SO₄.

(ii) Soil to solution ratio 1:10 by volume.

(iii) Shaking time 10 minutes.

(iv) Levels determined colorimetric using phenol 2:4 — disulfonic acid as color reagent.

(f) Phosphorus (Bray P-1 colorimetric method).

(i) Extracting solution is 0.025 N HCL and 0.03 N NHF.

(ii) Soil solution ratio 1:10 by volume.

(iii) Shaking time 1 minute.

(iv) Determination — colorimetric using 1 amino 2 naphthal — 4 sulfonic acid.

(g) Potassium, Calcium, Magnesium, Sodium.

(i) Extracting solution is neutral normal ammonium acetate.

(ii) Soil solution ratio 1:10 by volume.

(iii) Shaking time 1 minute.

(iv) Determination by atomic absorption spectrophotometer.

(h) Boron

Soil and water (1:2 ratio) are refluxed in Taylor tubes on a heated aluminum block. After centrifuging and filtering, the boron in the extract is measured colorimetrically using azomethine (Method developed by M.K. John, H. Chuah and J. Neufeld).

(i) Sulfate Sulfur (Modified Johnson Nishita procedure)

(i) Extracting solution 0.1 Molar Calcium Chloride.

(ii) Soil solution ratio 1:2 by volume.

(iii) Shaking time 30 minutes — Samples are centrifuged and filtered.

(iv) Determination — Essentially the procedure consists of distilling the SO₄-S solution in the presence of strong reducing agent (hydriodic-hypophosphorus formic acid mixture) to convert the SO₄ to H₂S. The H₂S is distilled in a stream of nitrogen gas and trapped in an alkaline solution. Addition of a bismuth solution (bismuth nitrate pentahy-

drate in acetic acid plus gelatin) forms a colloidal suspension. The density of the solution is read on a colorimeter.

(j) Aluminium and Manganese

- (i) Extracting solution is 0.02 Molar Calcium Chloride.
- (ii) Soil to solution ratio is 1:2 by weight.
- (iii) Shaking time 15 minutes — samples are centrifuged and filtered.
- (iv) Determination of elements by atomic absorption or colorimetric.

4. Methods (Greenhouse Soils)

- (i) All elements are extracted with dilute (0.018N) acetic acid.

(ii) Soil to solution ratio 1:5 by volume.

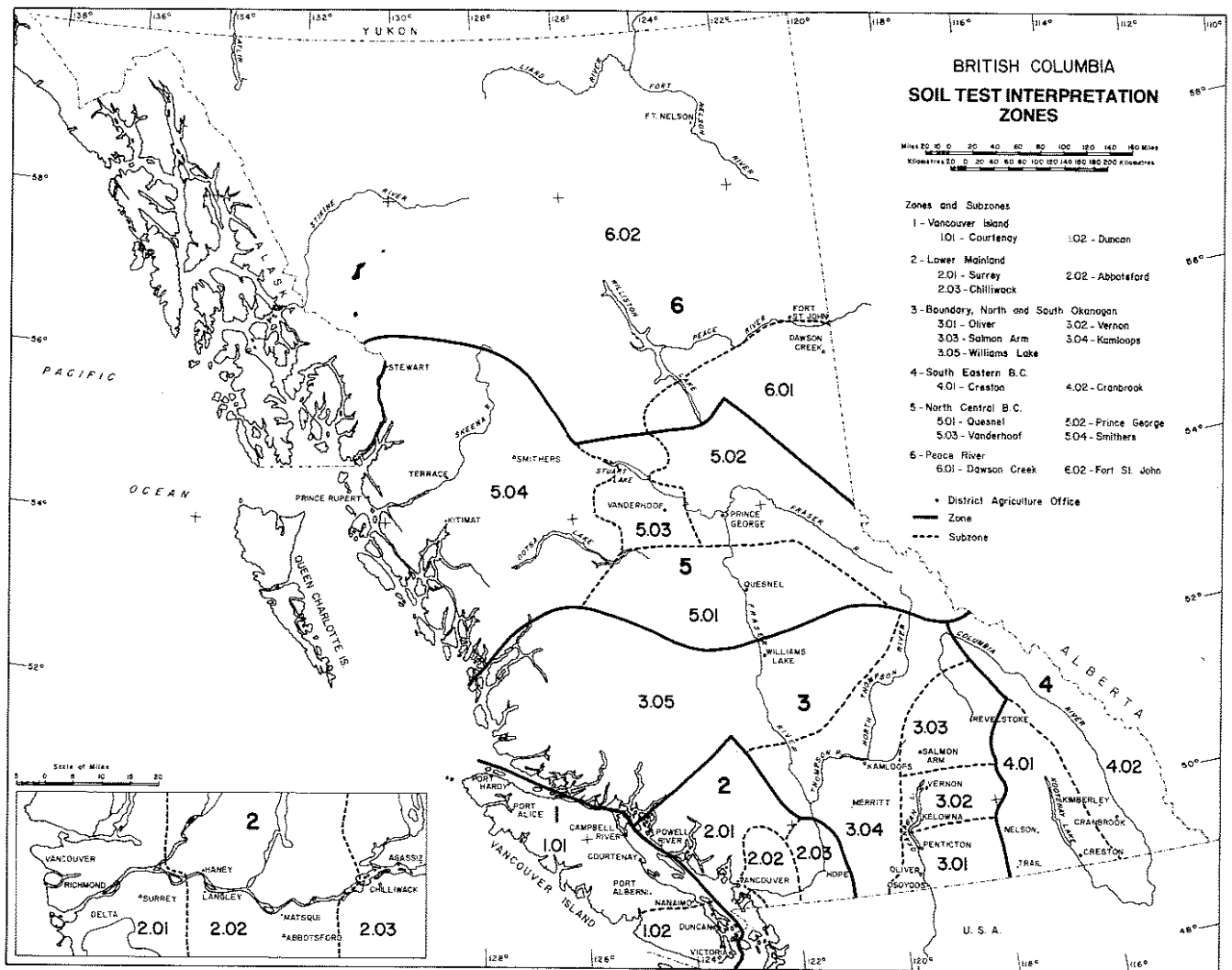
(iii) Shaking time — 30 minutes.

(iv) All results reported in p.p.m.

5. Methods (Irrigation Water Quality Tests.)

The tests include: pH, conductivity, sodium (Na), calcium (Ca) and magnesium (Mg). The conductivity test is reported in Mmhos/cm; sodium, calcium and magnesium are reported in p.p.m. and Meg/l. The sodium adsorption ratio (SAR) is calculated. Results are interpreted as to suitability for irrigation.

A boron test is done if boron toxicity is suspected.



SOIL TEST INTERPRETATIONS

Table 1

**Area — Vancouver Island, Lower Mainland,
Okanagan, Kootenay, Kamloops and Williams Lake
(Zones 1, 2, 3, 4, and Subzone 5.01)**

**Recommended Phosphorus (P₂O₅) Applications for Selected Crops
Based on Soil Test Values**

Phosphorus (P)		Phosphorus (P ₂ O ₅) Required kg/ha (lb/ac)			
Soil Test Value ppm (lb/ac)	Rating	01	02	03	04
		Crop Group 1 Barley, Oats, Rye, Grasses (Hay, Pasture, Silage)	Crop Group 2 Red Clover, Wheat, Oats (As com- panion crop for new seeding of Forage) Grass-legume	Crop Group 3 Alfalfa, Peas, Beans, Lentuce, Spi- nach, Small Fruits, Cucumber, Squash, Marrow, Pumpkin, Corn	Crop Group 4 Onions, Potatoes, Tomatoes, Cauli- flower, Broccoli, Cabbage, Brus- sels Sprouts, Asparagus, Rhubarb, Rootcrops, Celery, Bulbs
5 (10)	L-	134 (120)	157 (140)	190 (170)	224 (200)
10 (20)	L	90 (80)	134 (120)	157 (140)	190 (170)
15 (30)	M-	67 (60)	90 (80)	134 (120)	157 (140)
30 (40)	M	45 (40)	67 (60)	90 (80) ^{1/2}	134 (120)
30 (60)	M+	28 (25)	45 (40)	67 (60)	90 (80)
40 (80)	H-	0 - 17* (0 - 15)	28 (25)	45 (40)	67 (60)
50 (100)	H	0 - 17* (0 - 15)	0 - 22* (0 - 20*)	0 - 28* (0 - 25*)	0 - 45* (0 - 40*)
70 (140)	H+	0 - 17* (0 - 15*)	0 - 22* (0 - 20*)	0 - 28* (0 - 25*)	0 - 45* (0 - 40*)
70+ (140+)	H+	0 - 17* (0 - 15*)	0 - 22* (0 - 20*)	0 - 28* (0 - 25*)	0 - 45* (0 - 40*)

* Starter effect in some areas

NOTE — Nitrogen recommendations for crops in Zones 1, 2, 3, 4, and 5 are not given in this publication. The nitrogen recommendations for the various crops used by this laboratory are listed in the "Fertilizer Guides" published for each agricultural area.

Table 2

Area — Vancouver Island, Lower Mainland, Okanagan, Kootenay, Kamloops and Williams Lake (Zones 1, 2, 3, 4, and Subzone 5.01)

Recommended Potassium (K₂O) Applications for Selected Crops Based on Soil Test Values

Potassium (K ₂ O) K		Potassium (K ₂ O) Required kg/ha (lb/acre)			
Soil Test Value ppm (lb/acre)	Rating	Crop Group 1 Cereals 32	Crop Group 2 Grass 33	Crop Group 3 Alfalfa, Red Clover, Grass-legume, Field Corn, Pigeon Peas, Lentils, Small Fruits, Sweet Corn, Peas, Bush Beans, Spinach 34	Crop Group 4 Onions, Tomatoes, Potatoes, Celery, Cauliflower, Broccoli, Cabbage, Brussels Sprouts, Root Crops, Cucumbers, Squash, Marrow, Pumpkin, Bulbs, Rhubarb, Aspara- gus, Hops 35
25 (50)	L-	168 (150)	224 (200)	224 (200)	280 (250)
35 (70)	L	112 (100)	168 (150)	224 (200)	280 (250)
50 (100)	L+	90 (80)	112 (100)	168 (150)	280 (250)
65 (130)	M-	67 (60)	90 (80)	112 (100)	224 (200)
80 (160)	M	45 (40)	67 (60)	90 (80)	168 (150)
100 (200)	M+	22 (20)	45 (40)	67 (60)	112 (100)
125 (250)	H-	0 - 22* (0 - 20*)	0 - 22* (0 - 20*)	45 (40)	90 (80)
150 (300)	H	0 - 22* (0 - 20*)	0 - 22* (0 - 20*)	0 - 45* (0 - 40*)	67 (60)
175 (350)	H+	0 - 22* (0 - 20*)	0 - 22* (0 - 20*)	0 - 45* (0 - 40*)	45 (40)
175+ (350+)	H+	0 - 22* (0 - 20*)	0 - 22* (0 - 20*)	0 - 45* (0 - 40*)	0 - 45* (0 - 40*)

* Starter effect in some areas

Table 3A

Area — Lower Mainland and Vancouver Island (Zones 1 and 2)

Description of Soil and Crop Groups used in Lime Requirements

Soil Group 1 — Upper Limit of pH 5.0.

These are organic soils including peat and muck soils as well as mineral soils containing 15% organic matter or above. This will be identified by the soil test laboratory.

Soil Group 2 — Upper Limit of pH 6.0.

Recent deposits of Fraser River, Vedder River, reclaimed soils of Sumas Lake. The soil series are Grevell, Monroe, Fairfield, Prest, Hjorth, Lickman, McElvee, Vedder and Sumas. These should be identified from soil map. Those soils with 10 – 15% organic matter, as identified by the soil test laboratory should also be included in this group.

Soil Group 3 — Upper Limit of pH 6.4.

This includes all soils of Fraser Valley and Vancouver Island with organic matter less than 15%, excepting those soil series of Group 2.

Description of Crop Group

Crops vary considerably in their ability to produce satisfactorily at different soil reactions. The following grouping is based on soil reaction preference of crops.

Crop Group 1	Crop Group 2	Crop Group 3	Acid Preferring Crop
Alfalfa	Alsike clover	Bent grass	Blueberry
Asparagus	Barley	Blackberry	Cranberry
Beets	Brussels sprouts	Crimson clover	Potatoes*
Cabbage	Carrots	Fescue	
Cauliflower	Corn	Field beans	
Celery	Cucumber	Loganberry	
Lettuce	Garden beans	Oats	
Muskmelon	Kale	Parsley	
Onion	Kentucky bluegrass	Raspberry	
Parsnip	Kohlrabi	Reed canary grass	
Spinach	Orchard grass	Rye	
Sweet clover	Peas	Strawberry	
	Pumpkin	Timothy	
	Radish	White clover	
	Red clover		
	Squash		
	Tomato		
	Turnip		
	Vetch		
	Wheat		

* For potatoes apply lime if there is calcium deficiency, or pH below 4.8 on mineral soil.

Table 3B

Area — Vancouver Island and Lower Mainland (Zones 1 and 2)

Lime Recommendations for Organic Soils — Soil Group 1

This will include peats and mucks and mineral soils containing 15% or more organic matter. (This will be identified by soil test).

pH	Lime Requirements tonnes hectare (tons acre)		
	Crop Group 1 Alfalfa, Asparagus, Beets, Cabbage, Cauliflower, Celery, Lettuce, Muskmelon, Onion, Parsnip, Spin- nach, Sweet Clover	Crop Group 2 Alsike Clover, Barley, Brussels Sprouts, Carrots, Corn, Cucum- ber, Garden Beans, Kale, Ken- tucky Blue Grass, Kohlrabi, Orchard Grass, Peas, Pumpkin, Radish, Red Clover, Squash, Tomato, Turnip, Vetch, Wheat	Crop Group 3 Bent Grass, Blackberry, Fescue, Field Beans, Loganberry, Oats, Parsley, Raspberry, Reed Canary Grass, Rye, Strawberry, Timothy, White Clover
4	18 (8)	14 (6)	9 (4)
4 - 4.5	14 (6)	4.5* (2*)	4.5 (2*)
4.6 - 5.0	4.5* (2*)	0 (0)	0 (0)
5.1 - 5.5	0 (0)	0 (0)	0 (0)
5.6 - 6.0	0 (0)	0 (0)	0 (0)
6.1 - 6.4	0 (0)	0 (0)	0 (0)
6.4+	0 (0)	0 (0)	0 (0)

* Rates above this level should be split, so that for annual crops it may be applied in consecutive years. For establishing perennials, insure thorough mixing of the cultivated layer. Mix half the amount into the soil and plow under; then mix other half into the plowed surface. For established crops, never apply more than one-quarter of this rate in one year.

Table 3C

Area — Vancouver Island and Lower Mainland (Zones 1 and 2)

Lime Recommendations for Mineral Soils — soil Group 2

pH	Lime Requirements tonnes/hectare (tons/acre)								
	Crop Group 1 Alfalfa, Asparagus, Beets, Cabbage, Cauliflower, Celery, Lettuce, Muskmelon, Onion, Parsnip, Spinach, Sweet Clover			Crop Group 2 Alsike Clover, Barley, Brussels Sprouts, Carrots, Corn, Cucumber, Garden Beans, Kale, Kentucky Blue Grass, Kohlrabi, Orchard Grass, Peas, Pumpkin, Radish, Red Clover, Squash, Tomato, Turnip, Vetch, Wheat			Crop Group 3 Bent Grass, Blackberry, Fescue, Field Beans, Loganberry, Oats, Parsley, Raspberry, Reed Canary Grass, Rye, Strawberry, Timothy, White Clover		
	Soil Texture			Soil Texture			Soil Texture		
	Fine	Med.	Coarse	Fine	Med.	Coarse	Fine	Med.	Coarse
4	14 (6)	11 (5)	7 (3)	9 (4)	9 (4)	4.5 (2)	11 (5)	9 (4)	4.5* (2*)
4 - 4.5	11 (5)	9 (4)	4.5 (2)	9 (4*)	7* (3*)	4.5* (2*)	9* (4*)	7 (3*)	2 (1)
4.6 - 5.0	9* (4*)	7* (3*)	4.5* (2*)	7 (3)	4.5 (2)	2 (1)	7 (3)	4.5 (2)	2 (1)
5.1 - 5.5	7 (3)	4.5 (2)	2 (1)	4.5 (2)	2 (1)	2 (1)	4.5 (2)	2 (1)	0 (0)
5.6 - 6.0	4.5 (2)	2 (1)	2 (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
6.1 - 6.4	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
6.4+	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

* Rates above this level should be split, so that for annual crops it may be applied in consecutive years. For establishing perennials, insure thorough mixing of the cultivated layer. Mix half the amount into the soil and plow under; then mix other half into the plowed surface. For established crops, never apply more than one-quarter of this rate in one year.

Table 3D

Area — Vancouver Island and Lower Mainland (Zones 1 and 2)

Lime Recommendations for Mineral Soils — Soil Group 3

pH	Lime Requirements tonnes hectare (tons acre)								
	Crop Group 1 Alliaria, Asparagus, Beets, Cabbage, Cauliflower, Celery, Lettuce, Muskmelon, Onion, Parsnip, Spinach, Sweet Clover			Crop Group 2 Alsike Clover, Barley, Brussels Sprouts, Carrots, Corn, Cucum- ber, Garden Beans, Kale, Ken- tucky Blue Grass, Kohlrabi, Orchard Grass, Peas, Pumpkin, Radish, Red Clover, Squash, Tomato, Turnip, Vetch, Wheat			Crop Group 3 Bent Grass, Blackberry, Fescue, Field Beans, Loganberry, Oats, Parsley, Raspberry, Reed Canary Grass, Rye, Strawberry, Timothy, White Clover		
	Soil Texture			Soil Texture			Soil Texture		
	Fine	Med.	Coarse	Fine	Med.	Coarse	Fine	Med.	Coarse
4	14 (6)	11 (5)	7 (3)	11 (5)	9 (4)	7 (3)	9 (4*)	7 (3*)	4.5 (2*)
4 - 4.5	11 (5)	9 (4)	4.5* (2*)	9* (4*)	7 (3*)	4.5 (2*)	7 (3)	4.5 (2)	2 (1)
4.6 - 5.0	9* (4*)	7 (3*)	2 (1)	7 (3)	4.5 (2)	4.5 (2)	4.5 (2)	2 (1)	2 (1)
5.1 - 5.5	7 (3)	4.5 (2)	2 (1)	4.5 (2)	2 (1)	2 (1)	2 (1)	2 (1)	0 (0)
5.6 - 6.0	4.5 (2)	2 (1)	2 (1)	2 (1)	2 (1)	2 (1)	0 (0)	0 (0)	0 (0)
6.1 - 6.4	2 (1)	2 (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
6.4 +	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

* Rates above this level should be split, so that for annual crops it may be applied in consecutive years. For establishing perennials, insure thorough mixing of the cultivated layer. Mix half the amount into the soil and plow under; then mix other half into the plowed surface. For established crops, never apply more than one-quarter of this rate in one year.

Table 4

All Zones

Guide for Interpreting Boron Test Results

Amount of Boron (B) to Apply kg/ha (lb/ac)				
ppm of Boron (B) in the Soil	Less Than 0.20	0.21 - 0.50	0.51 - 1.0	
Soil Test Rating	VI.	I.	M	H
Crops with high boron requirements (crop group D)	4.5 - 5.6 (4 - 5)	3.4 - 4.5 (3 - 4)	2.2 - 3.4 (2 - 3)	0 (0)
Crops with medium boron requirements (crop group C)	2.2 - 3.4 (2 - 3)	1.1 - 2.2 (1 - 2)	1.1 (1)	0 (0)
Crops with low boron requirements (crop group B)	1.1 (1)	1.1 (1)	0 (0)	0 (0)
Crops sensitive to boron (crop group A)	0 (0)	0 (0)	0 (0)	0 (0)

Table 4A

Classification of Some Crops According to Boron (B) Requirements

CROP GROUPS			
A	B	C	D
Sensitive to Boron	Low Boron Requirements	Medium Boron Requirements	High Boron Requirements
Beans, Cucumbers.	Cantaloupe, Peas, Melons, Potatoes, Wheat, Pumpkin, Squash, Cereals, Grasses.	Asparagus, Carrots, Rad- ish, Corn, Eggplant, Lettuce, Onion, Pepper, Spinach, Tomatoes, Small Fruits.	Beets, Mangels, Turnips, Cabbage, Brussels Sprouts, Broccoli, Cauliflower, Alfalfa, Clovers, Tree Fruits.

Table 4B

Percentage Equivalents and Conversion Factors for some Plant Food Boron Materials

Kind of Boron Product	% Content of		Amount of Material Required for	
	B Boron	B ₂ O ₃ Borate	1 kg B (1 lb-B)	1 kg or lb. B ₂ O ₃
Borax, fine granular	11.36	36.5	3.99 (8.80)	1.24 (2.74)
Fertilizer Borate — 46	14.30	46.0	3.17 (7.00)	0.98 (2.17)
Fertilizer — Borate — 65	20.50	65.0	2.24 (4.95)	0.69 (1.54)
Solubor	20.50	66.0	2.21 (4.88)	0.68 (1.51)

Conversion Factors — 0.3107 times the B₂O₃ content equals B (Boron).

Table 5

All Zones

Suggested Magnesium Oxide (MgO) Requirements of Several Crops and Several Soil Analysis Values

Soil Mg ppm (lb/ac)	Soil Ca, K, Mg Relations*	Crop Requirement in kg ha ⁻² (lb ⁻² ac)		
		High	Medium	Low
<49 (<99)	a	39 – 73 (35 – 65)	28 – 56 (25 – 50)	39 (35)
	b	28 – 56 (25 – 50)	17 – 39 (15 – 35)	17 (15)
50 – 99 (100 – 199)	a	28 – 56 (25 – 50)	17 – 39 (15 – 35)	17 (15)
	b	17 – 39 (15 – 35)	11 – 17 (10 – 15)	11 (10)
		Cole Crops, Celery, Corn, Potatoes, Pumpkin, Small Fruits, Root Crops.	Alfalfa, Alfalfa Grass, Beans, Bulbs, Clov- er, Clover Grass, Onions, Peas, Strawberries, Turf.	Most Grasses used for Silage or Hay.

* a = ratio of Ca:Mg > 10:1 or K:Mg > 2:1
b = ratio of Ca:Mg < 10:1 or K:Mg < 2:1
† Band lower rate and broadcast higher rate.

Table 6

All Zones

Relationship of Crop Response to Soil Salinity Expressed in Terms of Conductivity of the Saturation Extract*

(For general use in appraising effects of soluble salts on crops)

Conductivity Millimhos per Centimeter	Crop Response
0 - 2	Yield effects mostly negligible
2 - 4	Yields of very sensitive crops may be restricted.
4 - 8	Yields of many crops restricted.
8 - 16	Only tolerant crops yield satisfactorily.
16 +	Only a few very tolerant crops yield satisfactorily.

* Taken from U.S.D.A. Handbook #60 page 9.

Table 7

Areas — Okanagan, Kootenay, Kamloops, Williams Lake, and Central Interior (Zones 3, 4, and 5)

SULFUR TEST INTERPRETATIONS

Sulfur S-ppm	Rating	Meaning
Less than 3	L	Deficient range — expect response on all crops.
3 - 6	M	<i>Alfalfa</i> and <i>intensive</i> crops — response expected.
6 +	H	Sulfur response not expected.

Suggested Sulfur Application Rates

For deficient soils: cereals, grass, grass-legume hay, and pastures 17 - 22 kg/ha (15 - 20 lb/ac) of sulfur should meet plant requirements.

For alfalfa and intensive crops, 34 kg/ha (30 lb/ac) of sulfur would be sufficient to meet plant requirements.

Some Sulfur-containing Fertilizers Are Listed

Name	Analyses	Approx. % Sulfur
Urea-Ammonium Sulfate	34-0-0-11S	11
Ammonium Sulfate	21-0-0	21
Sulfate of Potash Magnesia	0-0-22-18-23S	23
Magnesium Sulfate (Epsom Salts)		14
Potassium Sulfate	0-0-50	18
Elemental Sulfur (Flowers of Sulfur, Agri-Sol, etc.)		90 - 95

Table 8

Rates of Lime to Apply on Orchard Soils

The use of fertilizer over many years can acidify the soil. The soil is most acid under the trees where the fertilizer has been applied. Soil pH values as low as 4.5 were found in a survey by the British Columbia Ministry of Agriculture. Lime applications are required to correct these low pH values.

The need for liming must be determined by a soil pH test provided by the Ministry of Agriculture at a nominal fee. Instructions can be obtained at the district horticulturists' offices.

RATES OF LIME TO APPLY

Soil pH	SOIL TEXTURE					
	Fine Clay, Silty Clay, Silty Clay Loam		Medium Silt Loam, Clay Loam, Loam, Fine Sandy Loam		Coarse Sandy, Loam, Loamy Sand, Sand	
	Tonnes/ha	Tons/Acre	Tonnes/ha	Tons/Acre	Tonnes/ha	Tons/Acre
4.0 - 4.5	14*	6*	9*	4*	4.5	2
4.6 - 5.0	9*	4*	4.5	2	4.5	2
5.1 - 6.0	4.5	2	2	1	2	1

* Divide into 2 applications.

These rates are for agricultural lime materials with a neutralizing value of calcium carbonate equivalent to 100. Rates for other materials must be adjusted according to the calcium carbonate equivalent. For example — Calcium Hydroxide (hydrated lime) as used fresh in CA storages has a calcium carbonate equivalent of 135 percent. Therefore, if fresh hydrated lime is used, reduce the amounts in the table above by 25 percent.

The lime must be broadcast evenly between the trunk and the dripline of the tree. This is the same area where the fertilizer has been spread over the years. Most cases of "measles" which occur in Red Delicious apples are caused by high manganese in the tree resulting from low pH in the soil.

Table 9

(Subzones 5.02, 5.03, and 5.04 — McBride, Prince George, Vanderhoof, Smithers)

Soil Test Interpretations for Central Interior

Soil Test Values		Nitrogen* (N) Required kg ha (lb ac)			
Nitrogen (N) ppm (lb ac)	Rating	Crops: Cereals for Grain or Forage	Potatoes Non-irrigated	Root Crops (Carrots, Turnips)	Other Vegetables
0 - 7 (0 - 15)	L -	45 (40)	56 - 100 (50 - 90)	67 (60)	56 - 100 (50 - 90)
8 - 10 (16 - 20)	L	—	—	—	—
11 - 25 (21 - 50)	M	—	—	—	—
26 - 40 (51 - 80)	H	—	—	—	—
41 + 81 +	H +	—	—	—	—
Phosphorus (P)		Phosphate (P ₂ O ₅) Required kg ha (lb ac)			
		05	06	07	08
0 - 5 (0 - 10)	L -	45 (40)	106 (95)	106 (95)	106 (95)
6 - 10 (11 - 20)	L	39 (35)	84 (75)	95 (85)	84 (75)
11 - 15 (21 - 30)	L +	34 (30)	63 (55)	84 (75)	63 (55)
16 - 20 (31 - 40)	M -	28 (25)	39 (35)	73 (65)	39 (35)
21 - 25 (41 - 50)	M	22 (20)	28 (25)	63 (55)	28 (25)
26 - 35 (51 - 70)	M +	17 (15)	28 (25)	50 (45)	28 (25)
36 - 70 (71 - 140)	H	11 (10)	28 (25)	28 (25)	28 (25)
70 + (140 +)	H +	11 (10)	0 (0)	0 (0)	0 (0)
Potassium (K)		Potash (K ₂ O) Required kg ha (lb ac)			
		36	37	38	39
0 - 50 (0 - 100)	L	45 (40)	112 (100)	112 (100)	112 (100)
51 - 75 (101 - 150)	L +	34 (30)	90 (80)	95 (85)	95 (85)
76 - 100 (151 - 200)	M -	28 (25)	67 (60)	84 (75)	84 (75)
101 - 125 (201 - 250)	M	22 (20)	56 (50)	67 (60)	67 (60)
126 - 175 (251 - 350)	H	0 (0)	34 (30)	34 (30)	34 (30)
175 + (350 +)	H +	0 (0)	0 (0)	0 (0)	0 (0)
Magnesium (Mg)		Magnesium (MgO) Required kg ha (lb ac)			
0 - 75 (0 - 150)	L	34 (30)	34 (30)	34 (30)	67 (60)
76 - 100 (151 - 200)	M	0 (0)	0 (0)	0 (0)	0 (0)
100 + (200 +)	H	0 (0)	0 (0)	0 (0)	0 (0)
		Sulfur (S) Required kg ha (lb ac)			
0 - 3 (0 - 6)	L	22 (20)	22 (20)	34 (30)	34 (30)
3.1 - 6 (6.1 - 12)	M	0 (0)	0 (0)	22 (20)	22 (20)
6 + (12 +)	H	0 (0)	0 (0)	0 (0)	0 (0)

* The nitrogen requirements are based on field trials. Soil nitrate levels and nitrogen application rates are now under study.

Table 9A

(Subzones 5.02, 5.03, and 5.04 — McBride, Prince George, Vanderhoof, Smithers)

Soil Test Interpretations for Central Interior

Soil Test Values		Nitrogen* (N) Required kg ha (lb ac)			
Nitrogen (N) ppm (lb/ac)	Rating	Crops: Intensive Pasture Silage: Two Cut	Hay, Pasture, Silage, Single Cut		
			Legume 0 — 10%	Legume 10 — 49%	Legume 50 — 100%
0 — 7 (0 — 15)	L —	82 (70) 56 (50)	82 (70)	56 (50)	34 (30)
8 — 10 (16 — 20)	L	—	—	—	—
11 — 25 (21 — 50)	M	—	—	—	—
26 — 40 (51 — 80)	H	—	—	—	—
41 + (81 +)	H +	—	—	—	—
Phosphorus (P)		Phosphate (P ₂ O ₅) Required kg ha (lb ac)			
0 — 5 (0 — 10)	L —	Phosphate requirements depend on percent legumes. Use columns under 10%, 10 — 49% and 50 — 100% legumes.	56 (50)	56 (50)	82 (70)
6 — 10 (11 — 20)	L		45 (40)	45 (40)	67 (60)
11 — 15 (21 — 30)	L +		34 (30)	34 (30)	56 (50)
16 — 20 (31 — 40)	M —		22 (20)	22 (20)	45 (40)
21 — 25 (41 — 50)	M		11 (10)	11 (10)	34 (30)
26 — 35 (51 — 70)	M +		0 (0)	0 (0)	22 (20)
36 — 70 (70 — 140)	H		0 (0)	0 (0)	0 (0)
71 + (141 +)	H +	0 (0)	0 (0)	0 (0)	
Potassium (K)		Potash (K ₂ O) Required kg ha (lb ac)			
0 — 50 (0 — 100)	L	Potash requirements depend on percent legumes. Use columns under 10%, 10 — 49% and 50 — 100% legumes.	56 (50)	56 (50)	82 (70)
51 — 75 (101 — 150)	L +		45 (40)	45 (40)	67 (60)
76 — 100 (151 — 200)	M —		34 (30)	34 (30)	56 (50)
101 — 125 (201 — 250)	M		22 (20)	22 (20)	45 (40)
126 — 175 (251 — 350)	H		0 (0)	0 (0)	0 (0)
175 + (350 +)	H +		0 (0)	0 (0)	0 (0)
Magnesium (Mg)		Magnesium (MgO) Required kg ha (lb ac)			
0 — 75 (0 — 150)		34 (30)	34 (30)	34 (30)	67 (60)
76 — 100 (151 — 200)		0 (0)	0 (0)	0 (0)	34 (30)
100 + (200 +)		0 (0)	0 (0)	0 (0)	0 (0)
Sulfur (S)		Sulfur (S) Required kg ha (lb ac)			
0 — 3 (0 — 6)		22 (20)	22 (20)	34 (30)	34 (30)
3.1 — 6 (6.1 — 12)		0 (0)	0 (0)	22 (20)	22 (20)
6 + (12 +)		0 (0)	0 (0)	0 (0)	0 (0)

* The nitrogen requirements are based on field trials. Soil nitrate application rates based on soil test levels are now under study.

Table 10

(Zone 6)

Recommended Nutrient Application for Selected Crops Based on Soil Test Values for Peace River Area

Nitrogen (N)		Nitrogen (N) Required kg/ha (lb/acre)		
Soil Testing Value ppm (lb/acre)	Rating	Crop		
		Wheat, Oats, Barley	Greenfeed, Cereal, Silage	Winter Wheat Fall Rye
0 - 5 (0 - 10)	L -	56 (50)	45 (40)	67 (60)
6 - 7 (11 - 15)	L	45 (40)	34 (30)	56 (50)
8 - 10 (16 - 20)	L +	34 (30)	22 (20)	45 (40)
11 - 15 (21 - 30)	M -	22 (20)	11 (10)	34 (30)
16 - 20 (31 - 40)	M	11 (10)	6 (5)	22 (20)
21 - 25 (41 - 50)	M +	11 (10)	6 (5)	11 (10)
26 - 30 (51 - 60)	H -	6 (5)	6 (5)	6 (5)
31 - 40 (61 - 80)	H	6 (5)	6 (5)	6 (5)
41 + (81 +)	H +	6 (5)	6 (5)	6 (5)
Phosphorus (P)		Phosphate (P ₂ O ₅) Required kg/ha (lb/acre)		
		12	13	14
0 - 5 (0 - 10)	L -	50 (45)	28 (25)	50 (45)
6 - 10 (11 - 20)	L	39 (35)	17 (15)	39 (35)
11 - 15 (21 - 30)	L +	34 (30)	17 (15)	34 (30)
16 - 20 (31 - 40)	M -	28 (25)	11 (10)	28 (25)
21 - 25 (41 - 50)	M	22 (20)	11 (10)	22 (20)
26 - 35 (51 - 70)	M +	17 (15)	11 (10)	17 (15)
36 - 45 (71 - 90)	H -	11 (10)	11 (10)	11 (10)
46 - 65 (91 - 130)	H	11 (10)	11 (10)	11 (10)
65 + (131 +)	H +	11 (10)	11 (10)	11 (10)
Potassium (K)		Potash (K ₂ O) Required kg/ha (lb/acre)		
		43	44	45
0 - 25 (0 - 50)	L -	45 (40)	34 (30)	22 (20)
26 - 50 (51 - 100)	L	34 (30)	17 (15)	22 (20)
51 - 75 (101 - 150)	L +	28 (25)	17 (15)	11 (10)
76 - 100 (151 - 200)	M -	22 (20)	11 (10)	11 (10)
101 - 125 (201 - 250)	M	17 (15)	11 (10)	0 (0)
126 - 150 (251 - 300)	M +	0 (0)	0 (0)	0 (0)
151 - 200 (301 - 400)	H -	0 (0)	0 (0)	0 (0)
201 - 300 (401 - 600)	H	0 (0)	0 (0)	0 (0)
300 + (600 +)	H +	0 (0)	0 (0)	0 (0)

Table 11

(Zone 6)

Recommended Nutrient Application for Selected Crops Based on Soil Test Values for Peace River Area

Nitrogen (N)		Nitrogen (N) Required kg/ha (lb/acre)		
Soil Testing Value ppm (lb/acre)	Rating	Crop		
		Flax	Mustard Rapeseed	Grass for Seed (Except Creeping Red Fescue)
0 - 5 (0 - 10)	L -	22 (20)	56 (50)	45 (40)
6 - 7 (11 - 15)	L	11 (10)	45 (40)	34 (30)
8 - 10 (16 - 20)	L +	11 (10)	34 (30)	22 (20)
11 - 15 (21 - 30)	M -	11 (10)	22 (20)	0 (0)
16 - 20 (31 - 40)	M	0 (0)	11 (10)	0 (0)
21 - 25 (41 - 50)	M +	0 (0)	11 (10)	0 (0)
26 - 30 (51 - 60)	H -	0 (0)	0 (0)	0 (0)
31 - 40 (61 - 80)	H	0 (0)	0 (0)	0 (0)
41 + (81 +)	H +	0 (0)	0 (0)	0 (0)
Phosphorus (P)		Phosphate (P ₂ O ₅) Required kg/ha (lb/acre)		
		15	16	17
0 - 5 (0 - 10)	L -	22 (20)	22 (20)	34 (30)
6 - 10 (11 - 20)	L	17 (15)	17 (15)	22 (20)
11 - 15 (21 - 30)	L +	11 (10)	11 (10)	11 (10)
16 - 20 (31 - 40)	M -	6 (5)	6 (5)	0 (0)
21 - 25 (41 - 50)	M	6 (5)	6 (5)	0 (0)
26 - 35 (51 - 70)	M +	0 (0)	0 (0)	0 (0)
36 - 45 (71 - 90)	H -	0 (0)	0 (0)	0 (0)
46 - 65 (91 - 130)	H	0 (0)	0 (0)	0 (0)
65 + (131 +)	H +	0 (0)	0 (0)	0 (0)
Potassium (K)		Potash (K ₂ O) Required kg/ha (lb/acre)		
		46	47	48
0 - 25 (0 - 50)	L -	22 (20)	34 (30)	45 (40)
26 - 50 (51 - 100)	L	22 (20)	28 (25)	34 (30)
51 - 75 (101 - 150)	L +	11 (10)	22 (20)	22 (20)
76 - 100 (151 - 200)	M -	11 (10)	17 (15)	0 (0)
101 - 125 (201 - 250)	M	0 (0)	11 (10)	0 (0)
126 - 150 (251 - 300)	M +	0 (0)	0 (0)	0 (0)
151 - 200 (301 - 400)	H -	0 (0)	0 (0)	0 (0)
201 - 300 (401 - 600)	H	0 (0)	0 (0)	0 (0)
301 + (601 +)	H +	0 (0)	0 (0)	0 (0)

Table 12

(Zone 6)

Recommended Nutrient Application for Selected Crops Based on Soil Test Values for Peace River Area

Nitrogen (N)		Nitrogen (N) Required kg/ha (lb/acre)		
Soil Testing Value ppm (lb/acre)	Rating	Crop		
		Creeping Red Fescue Seed	Grass for Hay-Pasture (to 10% legume)	Grass-legume (11-25% legume)
0 - 5 (0 - 10)	L -	34 (30)	82 (70)	56 (50)
6 - 7 (11 - 15)	L	22 (20)	56 (50)	34 (30)
8 - 10 (16 - 20)	L +	11 (10)	39 (35)	22 (20)
11 - 15 (21 - 30)	M -	0 (0)	22 (20)	11 (10)
16 - 20 (31 - 40)	M	0 (0)	22 (20)	11 (10)
21 - 25 (41 - 50)	M +	0 (0)	22 (20)	11 (10)
26 - 30 (51 - 60)	H -	0 (0)	0 (0)	0 (0)
31 - 40 (61 - 80)	H	0 (0)	0 (0)	0 (0)
41 + (81 +)	H +	0 (0)	0 (0)	0 (0)

Phosphorus (P)		Phosphate (P ₂ O ₅) Required kg/ha (lb/acre)		
Soil Testing Value ppm (lb/acre)	Rating	Crop		
		Creeping Red Fescue Seed	Grass for Hay-Pasture (to 10% legume)	Grass-legume (11-25% legume)
0 - 5 (0 - 10)	L -	22 (20)	39 (30)	39 (35)
6 - 10 (11 - 20)	L	17 (15)	22 (20)	28 (25)
11 - 15 (21 - 30)	L +	11 (10)	11 (10)	17 (15)
16 - 20 (31 - 40)	M -	0 (0)	0 (0)	17 (15)
17 - 25 (41 - 50)	M	0 (0)	0 (0)	0 (0)
26 - 35 (51 - 70)	M +	0 (0)	0 (0)	0 (0)
36 - 45 (71 - 90)	H -	0 (0)	0 (0)	0 (0)
46 - 65 (91 - 130)	H	0 (0)	0 (0)	0 (0)
65 + (131 +)	H +	0 (0)	0 (0)	0 (0)

Potassium (K)		Potash (K ₂ O) Required kg/ha (lb/acre)		
Soil Testing Value ppm (lb/acre)	Rating	Crop		
		Creeping Red Fescue Seed	Grass for Hay-Pasture (to 10% legume)	Grass-legume (11-25% legume)
0 - 25 (0 - 50)	L -	45 (40)	45 (40)	45 (40)
26 - 50 (51 - 100)	L	34 (30)	34 (30)	34 (30)
51 - 75 (101 - 150)	L +	22 (20)	22 (20)	22 (20)
76 - 100 (151 - 200)	M -	0 (0)	0 (0)	0 (0)
101 - 125 (201 - 250)	M	0 (0)	0 (0)	0 (0)
126 - 150 (251 - 300)	M +	0 (0)	0 (0)	0 (0)
151 - 200 (301 - 400)	H -	0 (0)	0 (0)	0 (0)
201 - 300 (401 - 600)	H	0 (0)	0 (0)	0 (0)
300 + (600 +)	H +	0 (0)	0 (0)	0 (0)

Table 13

(Zone 6)

Recommended Nutrient Application for Selected Crops Based on Soil Test Values for Peace River Area

Nitrogen (N)		Nitrogen (N) Required kg/ha (lb/ae)		
Soil Testing Value ppm (lb/ae)	Rating	Crop		
		Grass-legume (26-50% legume)	Legume for Seed Hay, Pasture (51-100% legume)*	Alfalfa for Seed, Hay Pasture
0 - 5 (0 - 10)	L-	34 (30)	11 (10)	11 (10)
6 - 7 (11 - 15)	L	22 (20)	11 (10)	11 (10)
8 - 10 (16 - 20)	L+	22 (20)	11 (10)	11 (10)
11 - 15 (21 - 30)	M-	0 (0)	0 (0)	0 (0)
16 - 20 (31 - 40)	M	0 (0)	0 (0)	0 (0)
21 - 25 (41 - 50)	M+	0 (0)	0 (0)	0 (0)
26 - 30 (51 - 60)	H-	0 (0)	0 (0)	0 (0)
31 - 40 (61 - 80)	H	0 (0)	0 (0)	0 (0)
40+ (81+)	H+	0 (0)	0 (0)	0 (0)
Phosphorus (P)		21 Phosphate (P ₂ O ₅) Required kg/ha (lb/ae) 22 23		
0 - 5 (0 - 10)	L-	50 (45)	63 (55)	63 (55)
6 - 10 (11 - 20)	L	39 (35)	39 (35)	39 (35)
11 - 15 (21 - 30)	L+	28 (25)	28 (25)	28 (25)
16 - 20 (31 - 40)	M-	17 (15)	17 (15)	17 (15)
21 - 25 (41 - 50)	M	0 (0)	17 (15)	17 (15)
26 - 35 (51 - 70)	M+	0 (0)	0 (0)	0 (0)
36 - 45 (71 - 90)	H-	0 (0)	0 (0)	0 (0)
46 - 65 (91 - 130)	H	0 (0)	0 (0)	0 (0)
65+ (131+)	H+	0 (0)	0 (0)	0 (0)
Potassium (K)		52 Potash (K ₂ O) Required kg/ha (lb/ae) 53 54		
0 - 25 (0 - 50)	L-	56 (50)	67 (60)	67 (60)
26 - 50 (51 - 100)	L	34 (30)	45 (40)	45 (40)
51 - 75 (101 - 150)	L+	22 (20)	34 (30)	34 (30)
76 - 100 (151 - 200)	M-	0 (0)	22 (20)	22 (20)
101 - 125 (201 - 250)	M	0 (0)	0 (0)	0 (0)
126 - 150 (251 - 300)	M+	0 (0)	0 (0)	0 (0)
151 - 200 (301 - 400)	H-	0 (0)	0 (0)	0 (0)
201 - 300 (401 - 600)	H	0 (0)	0 (0)	0 (0)
300+ (601+)	H+	0 (0)	0 (0)	0 (0)

Table 14

(Zone 6)

Recommended Nutrient Application for Selected Crops Based on Soil Test Values for Peace River Area

Nitrogen (N)		Nitrogen (N) Required kg/ha (lb/acre)		
Soil Testing Value ppm (lb/acre)	Rating	Crop		
		Alsike, Red Clover for Seed, Hay, Pasture	Potatoes (non-irrigated)	Potatoes- Irrigated (Tex 1 and 2)
0 - 5 (0 - 10)	L -	11 (10)	100 (90)	190 (170)
6 - 7 (11 - 15)	L	11 (10)	82 (70)	180 (160)
8 - 10 (16 - 20)	L +	11 (10)	82 (70)	168 (150)
11 - 15 (21 - 30)	M -	0 (0)	45 (40)	157 (140)
16 - 20 (31 - 40)	M	0 (0)	39 (30)	140 (125)
21 - 25 (41 - 50)	M +	0 (0)	22 (20)	123 (110)
26 - 30 (51 - 60)	H -	0 (0)	11 (10)	106 (95)
31 - 40 (61 - 80)	H	0 (0)	0 (0)	90 (80)
40+ (81+)	H +	0 (0)	0 (0)	56 (50)
Phosphorus (P)		Phosphate (P ₂ O ₅) Required kg/ha (lb/acre)		
		24	25	26
0 - 5 (0 - 10)	L -	63 (55)	106 (95)	196 (175)
6 - 10 (11 - 20)	L	39 (35)	84 (75)	180 (160)
11 - 15 (21 - 30)	L +	28 (25)	62 (55)	162 (145)
16 - 20 (31 - 40)	M -	17 (15)	39 (35)	146 (130)
21 - 25 (41 - 50)	M	17 (15)	28 (25)	129 (115)
26 - 35 (51 - 70)	M +	0 (0)	28 (25)	112 (100)
36 - 45 (71 - 90)	L -	0 (0)	28 (25)	73 (65)
46 - 65 (91 - 130)	L	0 (0)	17 (15)	45 (40)
65+ (130+)	L +	0 (0)	0 (0)	0 (0)
Potassium (K)		Potash (K ₂ O) Required kg/ha (lb/acre)		
		55	56	57
0 - 25 (0 - 50)	L -	67 (60)	112 (100)	90 (80)
26 - 50 (51 - 100)	L	45 (40)	90 (80)	82 (70)
51 - 75 (101 - 150)	L +	34 (30)	67 (60)	67 (60)
76 - 100 (151 - 200)	M -	22 (20)	56 (50)	56 (50)
101 - 125 (201 - 250)	M	0 (0)	45 (40)	45 (40)
126 - 150 (251 - 300)	M +	0 (0)	34 (30)	39 (35)
151 - 200 (301 - 400)	H -	0 (0)	0 (0)	28 (25)
201 - 300 (401 - 600)	H	0 (0)	0 (0)	0 (0)
300+ (600+)	H +	0 (0)	0 (0)	0 (0)

Table 15

(Zone 6)

Recommended Nutrient Application for Selected Crops Based on Soil Test Values for Peace River Area

Nitrogen (N)		Nitrogen (N) Required kg/ha (lb/acre)		
Soil Testing Value ppm (lb/acre)	Rating	Crop		
		Potatoes Irrigated (Tex. 3, 4 and 5)	Sugar Beets (Irrigated)	Sweet Corn
0 - 5 (0 - 10)	L -	157 (140)	67 (60)	82 (70)
6 - 7 (11 - 15)	L	146 (130)	56 (50)	67 (60)
8 - 10 (16 - 20)	L +	134 (120)	45 (40)	56 (50)
11 - 15 (21 - 30)	M -	123 (110)	34 (30)	45 (40)
16 - 20 (31 - 40)	M	100 (90)	22 (20)	22 (20)
21 - 25 (41 - 50)	M +	90 (80)	11 (10)	11 (10)
26 - 35 (51 - 70)	H -	67 (60)	11 (10)	11 (10)
36 - 40 (61 - 80)	H	56 (50)	0 (0)	0 (0)
40 + (80 +)	H +	22 (20)	0 (0)	0 (0)
Phosphorus (P)		Phosphate (P ₂ O ₅) Required kg/ha (lb/acre)		
		27	28	29
0 - 5 (0 - 10)	L -	162 (145)	84 (75)	73 (65)
6 - 10 (11 - 20)	L	146 (130)	73 (65)	62 (55)
11 - 15 (21 - 30)	L +	129 (115)	62 (55)	50 (45)
16 - 20 (31 - 40)	M -	106 (95)	50 (45)	39 (35)
21 - 25 (41 - 50)	M	95 (85)	39 (35)	28 (25)
26 - 35 (51 - 70)	M +	73 (65)	28 (25)	17 (15)
36 - 45 (71 - 90)	H -	39 (35)	17 (15)	0 (0)
46 - 65 (91 - 130)	H	6 (5)	0 (0)	0 (0)
65 + (130 +)	H +	0 (0)	0 (0)	0 (0)
Potassium (K)		Potash (K ₂ O) Required kg/ha (lb/acre)		
		58	59	60
0 - 25 (0 - 50)	L -	90 (80)	45 (40)	45 (40)
26 - 50 (51 - 100)	L	67 (60)	34 (30)	34 (30)
51 - 75 (101 - 150)	L +	56 (50)	22 (20)	22 (20)
76 - 100 (151 - 200)	M -	45 (40)	0 (0)	0 (0)
101 - 125 (201 - 250)	M	34 (30)	0 (0)	0 (0)
126 - 150 (251 - 300)	M +	0 (0)	0 (0)	0 (0)
151 - 200 (301 - 400)	L -	0 (0)	0 (0)	0 (0)
201 - 300 (401 - 600)	L	0 (0)	0 (0)	0 (0)
300 + (600 +)	L +	0 (0)	0 (0)	0 (0)

Table 16

(Zone 6)

Recommended Nutrient Application for Selected Crops Based on Soil Test Values for Peace River Area

Nitrogen (N)		Nitrogen (N) Required kg/ha (lb/acre)	
Soil Testing Value ppm (lb/acre)	Rating	Crop	
		Peas Beans	Carrots Turnips
0 - 5 (0 - 10)	L -	45 (40)	82 (70)
6 - 7 (11 - 15)	L	34 (30)	67 (60)
8 - 10 (16 - 20)	L +	22 (20)	62 (55)
11 - 15 (21 - 30)	M -	11 (10)	56 (50)
16 - 20 (31 - 40)	M	11 (10)	45 (40)
21 - 25 (41 - 50)	M +	0 (0)	34 (30)
26 - 30 (51 - 60)	H -	0 (0)	22 (20)
31 - 40 (61 - 80)	H	0 (0)	11 (10)
40+ (80+)	H +	0 (0)	0 (0)

Phosphorus (P)		Phosphate (P ₂ O ₅) Required kg/ha (lb/acre)	
		30	31
0 - 5 (0 - 10)	L -	73 (65)	106 (95)
6 - 10 (11 - 20)	L	62 (55)	95 (85)
11 - 15 (21 - 30)	L +	50 (45)	84 (75)
16 - 20 (31 - 40)	M -	39 (35)	73 (65)
21 - 25 (41 - 50)	M	28 (25)	62 (65)
26 - 35 (51 - 70)	M +	17 (15)	45 (40)
36 - 45 (71 - 90)	H -	0 (0)	28 (25)
46 - 65 (91 - 130)	H	0 (0)	28 (25)
65+ (130+)	H +	0 (0)	28 (25)

Potassium (K)		Potash (K ₂ O) Required kg/ha (lb/acre)	
		61	62
0 - 25 (0 - 50)	L -	56 (50)	112 (100)
26 - 50 (51 - 100)	L	56 (50)	95 (84)
51 - 75 (101 - 150)	L +	56 (50)	84 (75)
76 - 100 (151 - 200)	M -	34 (30)	67 (60)
101 - 125 (201 - 250)	M	34 (30)	56 (50)
126 - 150 (251 - 300)	M +	34 (30)	39 (35)
151 - 200 (301 - 400)	H -	0 (0)	28 (25)
201 - 300 (401 - 600)	H	0 (0)	0 (0)
300+ (600+)	H +	0 (0)	0 (0)

Table 17

(Zone 6)

Sulfur Test Interpretations for Peace River Area

Sulfur (S) ppm	Crop	Suggested Sulfur Application Rates kg ha (lb ac)
Less than 3	Grasses	11 (10)
	Cereals, Legumes, Rapeseed	11 (10)
3.1 - 5.0	Rapeseed	11 (10)
	Cereals, Legumes, Grasses	0 (0)
5.1 +	All crops	0 (0)

These interpretations are based on Alberta correlation work for the Peace River area.

Table 18

Soil Test Interpretations for Most Greenhouse Crops

Nitrogen (N) ppm		
0 - 25	Low	Add extra nitrogen.
26 - 75	Normal	Continue regular feeding program.
75 +	High	Reduce rate of nitrogen in feeding program until level normal.
Phosphorus (P) ppm		
0 - 30	Low	Add extra phosphorus.
31 - 65	Normal	Continue regular feeding program.
65 +	High	Reduce rate of phosphorus in feeding program until level normal.
Potassium (K) ppm		
0 - 200	Low	Add extra potash.
200 - 300	Normal	Continue regular feeding program.
300 +	High	Reduce rate of potash in feeding program until level normal.
Calcium (Ca) ppm		
650 +	Normal	
Magnesium (Mg) ppm		
100 +	Normal	
Salts (Conductivity mmhos/cm)		
0 - 1.50	Low	Check nitrogen and potash levels.
1.50 - 3.50	Normal	Continue feeding program.
3.50 - 7.50	High	Check fertilizer levels and reduce where possible.
7.50 +		Leach regardless of other soil test levels.

Table 19

(Zone 6)

Nutrient Adjustments to Tables 10–16 for Previous Crops for Peace River Area

	NUTRIENT ADJUSTMENTS (lb/ac) kg/ha		
	N	P ₂ O ₅	K ₂ O
(a) Previous crops: legumes, grass legume, time of plow down			
1. Early (Before June 30)	(0) 0	(0) 0	(0) 0
2. Mid-season (July 1–Aug. 30)	(-10)–11	(0) 0	(0) 0
3. Late (After September)	(-25)–11	(0) 0	(0) 0
(b) Previous crop			
1. Stubble	(0)	(0) 0	(0) 0
2. Fallow	(-15)–17	(0) 0	(0) 0
(c) Cereal crops underseeded with:			
1. Grasses	(-15)–17	(0) 0	(0) 0
2. All grass–legume mixtures	(-20)–22	(0) 0	(0) 0
3. Legumes	(-20)–22	(0) 0	(0) 0

Crop
late.

CONVERSION FACTORS FOR METRIC SYSTEM

Imperial units	Approximate conversion factor	Results in:	
LINEAR			
inch	$\div 25$	millimetre	(mm)
foot	$\div 30$	centimetre	(cm)
yard	$\times 0.9$	metre	(m)
mile	$\times 1.6$	kilometre	(km)
AREA			
square inch	$\div 6.5$	square centimetre	(cm ²)
square foot	$\times 0.09$	square metre	(m ²)
acre	$\times 0.40$	hectare	(ha)
VOLUME			
cubic inch	$\div 16$	cubic centimetre	(cm ³)
cubic foot	$\div 28$	cubic decimetre	(dm ³)
cubic yard	$\div 0.8$	cubic metre	(m ³)
fluid ounce	$\div 28$	millilitre	(mL)
pint	$\times 0.57$	litre	(L)
quart	$\times 1.1$	litre	(L)
gallon	$\times 4.5$	litre	(L)
bushel	$\times 0.36$	hectolitre	(hL)
WEIGHT			
ounce	$\div 28$	gram	(g)
pound	$\times 0.45$	kilogram	(kg)
short ton (2000 lb)	$\times 0.9$	tonne	(t)
TEMPERATURE			
degree Fahrenheit	$^{\circ}\text{F} - 32 \times 0.56$ (or $\text{F} - 32 \times 5/9$)	degree Celsius	(°C)
PRESSURE			
pounds per square inch	$\times 6.9$	kilopascal	(kPa)
POWER			
horsepower	$\times 746$	watt	(W)
	$\times 0.75$	kilowatt	(kW)
SPEED			
feet per second	$\times 0.30$	metres per second	(m/s)
miles per hour	$\times 1.6$	kilometres per hour	(km/h)
AGRICULTURE			
bushels per acre	$\times 0.90$	hectolitres per hectare	(hL/ha)
gallons per acre	$\times 11.23$	litres per hectare	(L/ha)
quarts per acre	$\times 2.8$	litres per hectare	(L/ha)
pints per acre	$\times 1.4$	litres per hectare	(L/ha)
fluid ounces per acre	$\times 70$	millilitres per hectare	(mL/ha)
tons per acre	$\times 2.24$	tonnes per hectare	(t/ha)
pounds per acre	$\times 1.12$	kilograms per hectare	(kg/ha)
ounces per acre	$\times 70$	grams per hectare	(g/ha)
plants per acre	$\times 2.47$	plants per hectare	(plants/ha)

Examples: 2 miles $\times 1.6 = 3.2$ km; 15 bu/ac $\times 0.90 = 13.5$ hL/ha