

A&L Canada Laboratories Inc.

A STEP BEYOND TRADITIONAL LAB ANALYSIS

March 2022 NEWSLETTER

IN THIS ISSUE

- Agronomy Update
- FAQ: Soil Sampling
- INFOGRAPHIC: Understanding Your Soil Test Report
- Enhanced Disease Diagnostics with Next Generation Sequencing (NGS)
- A&L Soil Fertility Workshops Online (Zoom)
- A&L Training Videos “On the Go”
- Upcoming Events & Contact

Agronomy Update

It seems like every year in agriculture there are new challenges to overcome, and 2021 was no exception. A&L Canada's agronomists received many inquiries on the interpretation of soil reports. This may have been prompted by the new era of progressive farming, the rise in fertilizer prices, or the vast disparity in precipitation across the country. A&L's agronomists discovered that many of the inquiries this year were based on four key soil nutrients. These nutrients include sulfur (S), nitrate (NO_3), potassium (K), and magnesium (Mg).

Sulfur

In 2021, many customers in western Canada were perplexed by high levels of sulfur reported on their soil test results. These elevated levels are not uncommon; though, they can be highly variable. There are a couple viable reasons for these results.

One possible explanation is that certain subsoils found in western Canada contain naturally occurring gypsum or calcium carbonate layers. These subsoil layers can contain high quantities of sulfur, often as co-precipitates with calcium carbonate. Solubility of this sulfur is typically reduced due to being bound to calcium ions; however, it can still contribute to plant requirements if it exists within the root zone. Soil experts should note that the depth of the topsoil and sulfur rich subsoil varies greatly across fields. This means that seedlings with small root systems may not be able to immediately access this sulfur, resulting in deficiencies. Total sulfur amounts (organic and sulfate) commonly increase from upper to lower slope positions.

The high sulfur results in western Canadian soils could also be linked to high levels of salts. These salts tend to occur in areas with high evaporation and low precipitation. These salts contain high levels



of sulfur and can be left over from ancient sloughs, marshes, and bogs. Two prevalent salts in western Canadian soils include sodium sulfate and magnesium sulfate. Soil experts should note that it is possible for one or two soil cores taken from areas of high salinity to skew sulfur results. This could depict high levels of sulfur when much of the field is deficient.

When sulfur is found in the conditions stated above, it can be assumed that the solubility is reduced. Sulfur that is bound by sodium, magnesium, or calcium is not immediately available; meaning that additional sulfur may need to be applied to meet crop requirements. A&L Canada has recently adjusted its sulfur recommendations to account for this tie up.

Nitrate

Nitrate is always a topic of discussion with many of A&L Canada's western clients. This year, with fertilizer prices rising and potential shortages in the spring, farmers wanted assurance that they were making the best decisions for the 2022 season. Many soil experts noted higher than normal nitrate levels following their 2021 crop. This was likely due to drought conditions experienced in western Canada. These conditions caused reduced leaching as well as plant uptake. A&L Canada's clients found connections between specific crops and residual

nitrates left in fields. Canola tended to yield higher residual nitrates than wheat and barley. Many farmers had reservations about whether these residual nitrates should be accounted for in their fertility program for 2022.

The consensus at A&L Canada is that these residual soil nitrates should be accounted for; however, due to the nature of nitrate in soil, farmers must be cautious of over and under application. A&L Canada offers various soil nitrogen analyses as well as plant tissue analyses that can be used to fine tune nitrogen applications. Please reach out to your local A&L Canada sales agronomist for further information:

www.alcanada.com/content/contact/our-team

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PRECISION AG

Potassium

Like nitrate, the drought in western Canada had an influence on the potassium values found on certain soil reports. These reports experienced lower than normal potassium results due to a significant decrease in soil moisture. This caused the fixation of potassium on select clay soils.

Montmorillonite, Illite, and smectite clays exist in many soils across Canada. When these clays dry out – during drought conditions – they have been proven to fix potassium. This fixation occurs when the lattice structure of the clay collapses due to the loss of water molecules. This causes the potassium to become trapped between the collapsed layers.

Typically, once the soil is rehydrated, the fixed potassium is released; though, this could take years depending on climate and precipitation.

Soil mainly composed of these types of clays would theoretically require more potassium due to the temporary fixation between clay layers – especially during drier times of the growing season. Some farmers have taken to banding potassium fertilizers to limit contact with clay and thereby limit potassium fixation. Research has generally shown greater response to potassium fertilization during dry years.

Magnesium

Soil experts in certain locations around the world are challenged with high magnesium soils. A&L Canada typically classifies soils as having high magnesium when the base saturation of magnesium exceeds 20%. This classification corresponds with Dr. William Albrecht's target of 10 to 20% base saturation for magnesium.

To understand how to deal with excess magnesium, we must first revisit the attraction between soil particles and cations. Soil particles are negatively charged, whereas cations – such as calcium, magnesium, potassium, and sodium – are positively charged. It should be noted that these cations are not all equally charged. Calcium has the highest charge and, therefore, is bound the most tightly to soil particles. Sodium has the weakest charge and is easily “knocked off” the soil particle by other cations. The strength of these charges can be organized as follows:



For a farmer to decrease the saturation of magnesium in their soil, they must replace the magnesium cations with calcium cations. This can be accomplished with any source of calcium – such as

gypsum or calcitic lime. Hesitance to use calcitic lime is a reasonable response from farmers with high pH soils. However, what many soil experts fail to consider is that magnesium carbonate, pound for pound, raises pH 1.7 times more than calcium carbonate. By adding calcitic lime and displacing magnesium ions with calcium ions, the soil pH should remain the same or could in fact decrease. Gypsum, on the other hand, is finer than calcitic lime which provides more surface area and therefore a quicker reaction. Consequently, this means that the displacement of magnesium is short-lived in contrast to the use of calcitic lime. Gypsum, also referred to as calcium sulfate is a beneficial source

of sulfur. This additional sulfur is helpful for farmers with sulfur deficiencies as well as farmers with excess sodium. It can help in the solubilization and precipitation of excess sodium.

A&L Canada’s agronomists look forward to using new and established lab and field techniques to progress agriculture as well as help farmers overcome any challenges that arise in 2022. Please do not hesitate to inquire if any assistance is needed on the interpretation of your reports. We have representatives in your area as well as experts who can be contacted over the phone or by email.

Spring sampling season is upon us – are you ready?

FAQs	SOIL SAMPLES	Nematodes in SOIL
<p>How do I take a sample?</p> <p>For more information please consult the Soil Sampling Guide on our website</p> <p>www.alcanada.com</p>	<ul style="list-style-type: none"> • Take 10 to 20 soil cores or shovel scoops from a depth of 0-6 inches and mix in a plastic bucket • Empty bucket into A&L provided soil bag and fill to sample line • Different depths are sometimes needed depending on the crop and nutrient to be analyzed • Label bag and submission sheet with desired sample name 	<ul style="list-style-type: none"> • Collect 10 to 20 cores from a depth of 0-6 inches • Dump cores into a bucket and mix thoroughly • Place two cups of mixed soil in a soil sampling bag or plastic zippered bag and label with permanent marker • Label bag clearly with “nematode analysis” • Store in a cool, dark place until shipped to soil lab (nematode soils must remain damp and cannot dry out)
<p>How much do I need?</p>	<ul style="list-style-type: none"> • Approximately 2 cups • For additional analysis – such as texture or VitTellus Soil Health – please fill the bag (about 4 cups) 	
<p>How do I send a sample?</p>	<ul style="list-style-type: none"> • Please label all bags and containers with grower information and sample ID • Paperwork should be included with all samples • Submission paperwork can be found on www.alcanada.com • Samples can be dropped off Monday to Friday 8 am to 5 pm – after hours, samples can be placed in the shed located between buildings (next to the receiving door) • Samples can also be shipped via courier to: 2136 Jetstream Rd, London, ON N5V 3P5 	
<p>Do I need to do anything special to the sample for shipping?</p>	<ul style="list-style-type: none"> • Soils can be left to air dry (unless you are sampling for nematodes) • Wet samples can be placed in Ziplock bags along with the submission sheets to preserve labels and paperwork 	<ul style="list-style-type: none"> • Nematode soils should be kept moist • Coolers and ice packs can be used to reduce evaporation during shipping
<p>How long will it take to get my results?</p>	<ul style="list-style-type: none"> • Standard soil analysis is completed within 3 business days of the lab receiving the sample(s) 	
<p>How can I access my previous tests?</p>	<ul style="list-style-type: none"> • Results are sent to email contacts on file for the account submitting the sample • Use your account number to access previous results through the DataWeb • Recommendations can also be changed on the DataWeb 	

UNDERSTANDING YOUR A&L SOIL TEST REPORT

Sample Report

A&L Canada Laboratories Inc.



To:

For:

Field:



SOIL TEST REPORT

Reported Date: Printed Date:

Sample Number	Lab Number	Organic Matter	Phosphorus - P ppm		Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	Sodium Na ppm	pH		CEC meq/100g	Percent Base Saturations				
			Bicarb	Bray-P1					pH	Buffer		% K	% Mg	% Ca	% H	% Na
1	29530	2.1	15 L	25 L	86 M	161 H	830 M	9 L	6.8	6.9	6.9	3.2	19.4	59.9	17.1	0.6
2	29531	2.4	15 L	38 L	121 M	110 M	550VL	7 L	6.4	6.8	6.4	4.9	14.3	43.0	37.3	0.5
3	29532	2.3	13 VL	25 L	153 M	153 H	930 M	10 L	6.8	6.9	7.5	5.2	16.9	61.6	15.7	0.6
4	29533	2.2	15 L	21 VL	122 M	147 H	1130 M	10 L	7.2		7.6	4.1	16.2	74.6	4.5	0.6

Sample Number	Sulfur S ppm	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Boron B ppm	Soluble Salts ms/cm	Saturation %P	Aluminum Al ppm	Saturation %Al	Nitrate Nitrogen NO3-N ppm	K/Mg Ratio	ENR	Field ID
2	13 M	2.2 L	7 L	57 VH	0.3 L	0.1 VL		4 VL	1383	1.9 G		0.34	36	
3	10 VL	2.3 L	20 M	77 VH	0.7 M	0.1 VL		3 VL	1019	0.4 G		0.31	35	
4	9 VL	3.5 L	42 H	72 VH	0.9 M	0.1 VL		4 VL	730	0.1 G		0.25	34	

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

Organic Matter

- Provides structure to your soil
- Indication of moisture holding capacity
- Presented in %
- Measurement of plant and animal residue in the soil
- Acts as a reserve for many essential nutrients, especially nitrogen

Cation Exchange Capacity (CEC)

- Measures the soils ability to hold nutrients such as K, Ca, Mg and other cations like H, Na
- Reported as meq/100g
- The lower the CEC, the sandier the soil
- CEC is a very important factor to consider when it comes to nutrient recommendations

Balance Cation Ratios

Desirable Ranges for Cations

Cation	Range
Calcium	65% - 80%
Magnesium	10% - 20%
Potassium	3% - 7%
Hydrogen	5% - 15%
Sodium	0% - 1%
Aluminum	Less than 1%

Calcium

- Enhances proper root development
- Reduces soil acidity, decreasing the risk of toxicity from certain micronutrients
- Increases the microbial activity
- Important in cell structure

% Ca

- Optimum levels range from 60-80%
- Can be used as a target for lime application, as opposed to pH

Phosphorus

- Main function is to provide energy to the crop important for: root development cell formation, seed formation, crop maturity
- Phosphorus uptake can depend on other nutrients such as magnesium, zinc & other factors such as soil pH and temperature
- Reported in ppm as P, not P2O5

% Saturation of Phosphorous

- Takes into account high aluminum levels

% Phosphorus

Cation Exchange Capacity (CEC)	< 9	10-13	14-17	>18
VERY LOW	0-4	0-3	0-2	0-1
LOW	5-9	4-6	3-4	2-3
MEDIUM	9-12	7-9	5-6	4-5
GOOD	12-15	10-12	7-9	6-7
HIGH	16+	13+	10+	8+

ENR

- Bacterial activity releases some of the nitrogen stored in Organic Matter
- ENR is an estimate of the amount of nitrogen that will be released over the season

Sodium

- Reported in ppm and % Na
- High exchangeable sodium may prevent the growth of plants

Sulfur

- Measure sulfate sulfur, which is readily available and preferred for plant uptake
- Has become more important to monitor due to decreased acid rain
- More susceptible to leaching in sandy soil

Potassium

- Important for photosynthesis, respiration, water metabolism, and protein synthesis
- Plant avail. decreases as pH decreases
- Reported in ppm as K, not K2O
- Measure of available potassium
- Optimum level ranges from 90-150 ppm

Cation Saturation, or %K

- Optimum level is 2-5%

Magnesium

- Completes the formation of chlorophyll
- Regulates crop maturity
- Activator & compnt. of many plant enzymes
- Important in the uptake of phosphorous
- Reported in ppm
- Also reported as %Mg
- Optimum levels range from 10-20%

K/Mg Ratio

K/MG Ratio	VERY LOW	LOW	MEDIUM	OPTIMUM	HIGH	VERY HIGH	EXCESSIVE
	<0.08	0.08 - 0.15	0.15 - 0.25	0.25 - 0.35	0.35 - 0.50	0.50 - 0.80	0.80 +

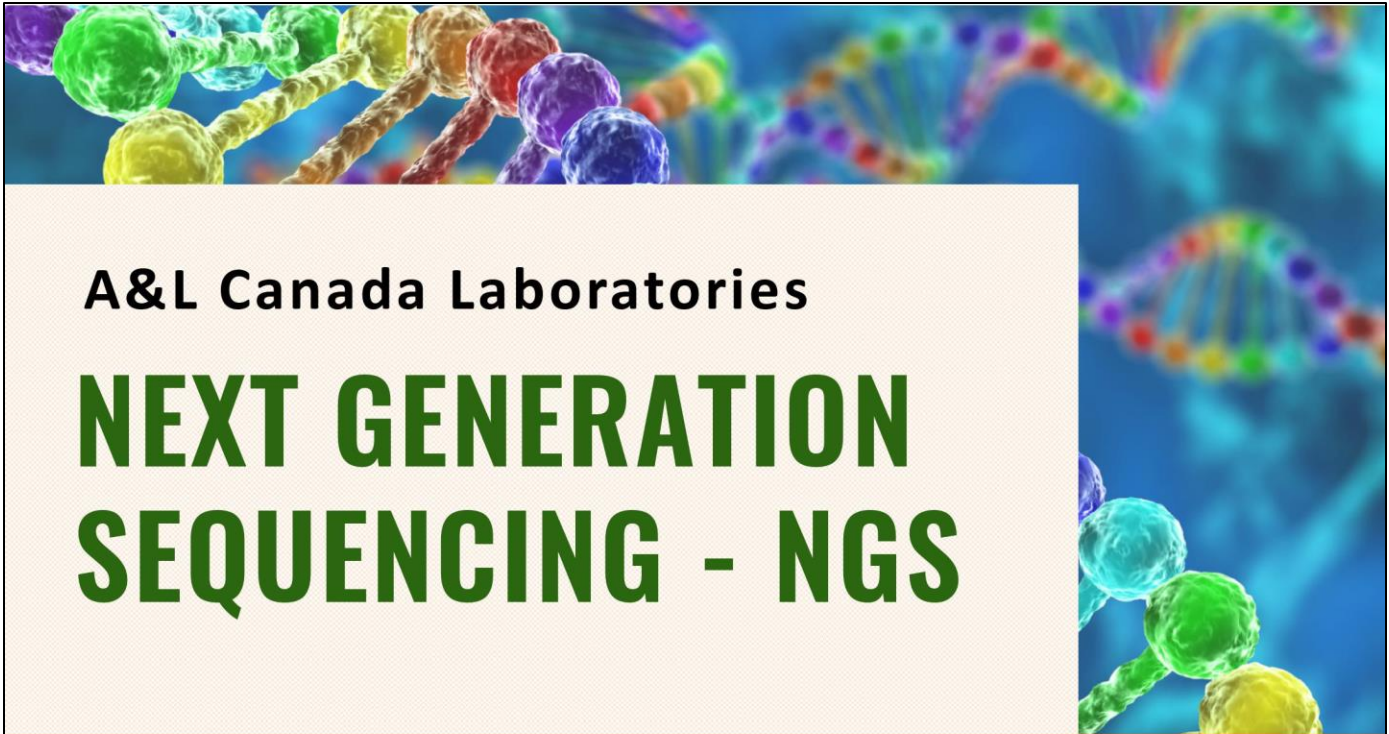
- A&L research has shown, in some cases, correlation with yield and crop performance
- Increased nutrient efficiency

pH

- Good soil pH key to good yield & quality
- Increased uptake of plant nutrients, development of root nodules, water uptake, weed control
- Most plant nutrients have reduced availability below pH 6
- Potential for nutrient toxicity at low pH
- Measures active soil acidity or alkalinity
- Buffer pH is used to determine the amount of lime to apply
- Buffer pH is more stable than pH

MicroNutrients

- Zinc, manganese, iron, copper, boron



A&L Canada Laboratories

NEXT GENERATION SEQUENCING - NGS

ENHANCED DISEASE DIAGNOSTICS SERVICES



TAT
10 business days

PRICE
Please contact A&L for pricing

SUBMISSION CODE
Please refer to chart on service and sample volumes

SUBMISSION FORM
Submission forms can be found on the A&L website

@alcanadalabs
www.alcanada.com
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NSG Enhanced Disease Diagnostic Services

Enhanced Disease Diagnostic analysis is a new service from A&L Canada Laboratories Inc. utilizing high throughput gene sequencing technology.

Next Generation Sequencing (NGS) provides comprehensive analysis of plant pathogens and viruses allowing for mitigation of biological risk to crop production.

This service will focus on microbial, fungal and viral identification and quantification. The assessment will enable clients to better identify all biological risks to their production and implement measures to remedy or mitigate negative crop impact and losses.

SERVICES:	1 BACTERIA OR FUNGAL COMMUNITY ANALYSIS	2 FULL BACTERIA OR FUNGAL GENOME SEQUENCING	3 VIRUS IDENTIFICATION
Description	All species identified and quantified	Complete genome of specific Bacteria or Fungus	Complete identification of Virus
Sample Volume	Fee Code	Fee Code	Fee Code
1	BNGSM1	BNGSB1	BNGSV1
2 - 5	BNGSM2	BNGSB2	BNGSV2
6 - 9	BNGSM3	BNGSB3	BNGSV3
10 - 40	BNGSM4	BNGSG4	BNGSV4
40 - 96	BNGSM5	BNGSB5	BNGSV5



Turn-around time for service will be 10 business days with summary report provided. A sample volume of 10g is required.

A&L Canada Laboratories Inc.

NSG – NEXT GENERATION SEQUENCING

NSG ENHANCED DISEASE DIAGNOSTICS SERVICES – SAMPLE REPORT

REPORT NO. C21343-48000
A & L Canada Laboratories Inc.
 ACCOUNT NUMBER 2130 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664
 TO [REDACTED]
 ATTN: Quality Assurance
 Phone [REDACTED]



IDENTIFICATION OF MICROORGANISMS

PAGE: 1 / 3

Microorganisms	Percentage (%)	Method
Plectosphaerella oratosquillae	24.29	NGS
Alternaria alternata	21.22	NGS
Septoria SP.	17.42	NGS
Cladosporium delicatulum	9.53	NGS
Gibberella intricans	4.42	NGS
Plectosphaerella cucumerina	2.77	NGS
Alternaria SP.	2.34	NGS
Golovinomyces sp	2.3	NGS
Alternaria arborescens	1.99	NGS
Epicoccum nigrum	1.92	NGS
Golubevia pallescens	1.89	NGS
Tilletiopsis washingtonensis	1.81	NGS
Plectosphaerella sp.	1.01	NGS
Cercospora agavicola	0.89	NGS
Bullera alba	0.87	NGS
Sampaiozyma ingensiosa	0.42	NGS
Moesziomyces aphidis	0.41	NGS
Fusarium sp	0.31	NGS
Hannaella cryzae	0.26	NGS
Plectosphaerella melonis	0.25	NGS
Cladosporium sp.	0.2	NGS
Euoidium mutisiae	0.2	NGS
Fusarium sporotrichioides	0.19	NGS
Mycosphaerella tassiana	0.19	NGS
Symmetospora coprosmae	0.17	NGS
Lectera colletotrichoides	0.16	NGS
Fusarium cyanostomum	0.15	NGS

The results of this report relate to the sample submitted and analyzed. Results Authorized By: Keri Wang, Microbiology Manager

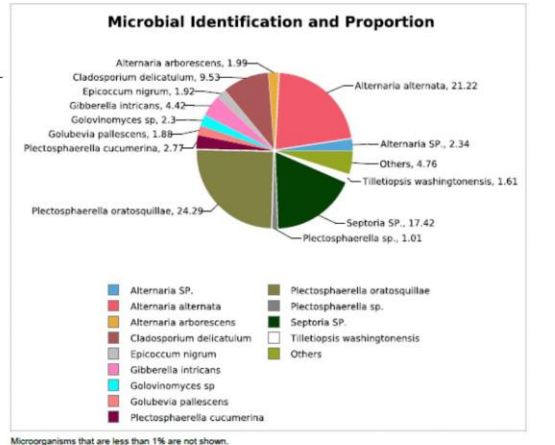
A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.aal.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO. C21343-48000
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 ATTN: Quality Assurance
 Phone [REDACTED]



IDENTIFICATION OF MICROORGANISMS

PAGE: 3 / 3



Microorganisms that are less than 1% are not shown. Results Authorized By: Keri Wang, Microbiology Manager

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Contact us for more information:
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ABOUT A&L: We are an innovative, research driven technology company focused on sustainable development. Through leading expertise, modern laboratory facilities and strong customer focus, A&L serves a wide range of industries including Agriculture, Environmental, Food & Pharma – globally. A&L has been conducting research over the last 35 years, & with the establishment of the A&L Biologicals Research Division 10 years ago, we are bringing products to market that benefit the sustainability of the agriculture industry. We are deeply committed to continue the investment in bringing next-generation products to the marketplace.

Soil Fertility Workshops Online for 2022

Join us in February and March of 2022 as A&L Canada Laboratories offers its Soil Fertility Workshops online with weekly education sessions:

- Each webinar will be held on Thursday and will be 1 ½ hours long, beginning at 1:30 pm EST starting on February 3, 2022
- CEUs will be offered in Crop Management for Certified Crop Advisers
- Registration is required with a nominal \$40 CAD fee for NEW programming, \$30 CAD for current programs
- For full workshop descriptions [click here to learn more](#)
- For all registrants, a video link to the webinar will be provided after the session and available for viewing 7 days after the original event
- If registrants are unable to attend but have paid for the session, they will still receive copy of the video for viewing


Register for the remaining Winter 2022 A&L Soil Fertility Workshops on Zoom:

For full workshop descriptions [click here to learn more](#)

Week #5: March 3 **Sulfur and the Micronutrients** | [Register on Zoom](#)

Week #6: March 10 **Plant Tissue Nutrient Analysis and Interpretation** | [Register on Zoom](#)

30 Plus Years • 1,000s Trained • Canada Wide



A&L Canada Laboratories Inc.

SOIL FERTILITY WORKSHOPS

- Six weeks | Thursday afternoons
- Feb 3 to Mar 10, 2022 | 1:30 - 3:00 pm EST
- CEU credits available
- Registration required
- Nominal fee: \$40 CAD fee for NEW | \$30 CAD fee for others*



INFO • DISCOUNT • REGISTER: www.alcanada.com/workshops

QUESTIONS? Email alcanadalabs@alcanada.com

NEW Cover Crops	pH, CEC Optimum Nutrient Levels by Soil Type*	NEW Soil Health Research Update	Potassium & K/Mg Ratio*	Sulfur & the Micronutrients*	Plant Tissue Nutrient Analysis & Interpretation*
WEEK #1 - FEB 3	WEEK #2 - FEB 10	WEEK #3 - FEB 17	WEEK #4 - FEB 24	WEEK #5 - MAR 3	WEEK #6 - MAR 10



A&L Training Videos “On the Go” – Visit the A&L YouTube Channel:
<https://www.youtube.com/user/alcanadalabs>

Upcoming Events

Pending schedule changes or cancellations, find A&L at these 2022 Farm Shows & Events:

FEB/MARCH ONLINE	A&L Canada Laboratories Soil Fertility Workshops	Click here to register & learn more www.alcanada.com/workshops	VIRTUAL
MARCH 22	2022 March Classic	https://gfo.ca/about/march-classic-2022/	London, ON
MARCH 30-31	International Potato Tech Expo	www.potatoexpo.ca	Charlottetown, PE
MARCH 31 – APRIL 2	Pacific Agriculture Show	www.agricultureshow.net	Abbotsford, BC
JUNE 21-23	Canada’s Farm Show	www.canadafarmshow.com	Regina, SK
JULY 19-21	Ag in Motion	https://aginmotion.ca/	Saskatoon, SK
AUG 30 – SEPT 1	Expo-champs	https://salondelagriculture.com/expo-champs/	Saint-Liboire, QC
SEPT 13-15	Outdoor Farm Show	www.outdoorfarmshow.com	Woodstock, ON
OCT 5-6	Canadian Greenhouse Conference	www.canadiangreenhouseconference.com	Niagara Falls, ON
NOV 28 – DEC 3	Canadian Western Agribition	www.agribition.com	Regina, SK

We are here to help – at A&L, our commitment is to drive positive outcomes!



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