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PRECISION AG UPDATE

By Brandon Yott byott@alcanada.com
Strategy & Business Development Manager, Precision Ag

MERITS OF A GOOD SAMPLING PROGRAM

- Start with a strong foundation...you cannot create a sound nutrition program guessing or based on a hope and a prayer!
- An intensive sampling program helps you identify and quantify the variability of all your essential nutrients across your field; variability can rob farmers of yield and profitability
- To get the most out of your input dollars, you need to know where they are needed most and where they are not

"When commodity prices are HIGH, additional yield is a LUXURY.

When commodity prices are LOW, additional Yield is a NECESSITY"

- Dr. Fred Below







BULK, ZONE, AND SITE-SPECIFIC SOIL SAMPLING PROGRAMS

| l | | E-21 EGILIC 2011 24ML | LING I ROUNAMO |
|------------------|--|--|--|
| | BULK OR COMPOSITE | ZONE OR POLYGON BASED | SITE SPECIFIC OR GRID / SMART GRID |
| OVERVIEW | The traditional method for sampling soils but is considered imprecise because it does not adequately account for differences in soil variability Involves taking samples in a random pattern across a field (avoiding problem soil areas) and blending them into one 'average' sample | Zone sampling divides a field into smaller production areas based on utilizing other map/data layers (such as yield or biomass (NDVI) imagery) to create these zones This approach assumes that soil variability within a field can be easily identified Sampling points are georeferenced so changes can be tracked over time | For grid sampling, the field is divided into small areas or blocks of equal size and a sample location within each block is sampled to a georeferenced point Typical grid sizes range from 0.5-acre blocks to 5-acre blocks, with 2.5-acre blocks being a standard unit for analysis In general, the smaller the sampling unit, the greater the accuracy Results may then be used to determine the fertilizer application rate(s), or they may be entered into a mapping program that uses geo-statistics to draw fertilizer application boundaries |
| MOST APPROPRIATE | For smaller fields / blocks that have been uniformly cropped in the recent past and have little natural variation Used where a single fertilizer recommendation will be applied across a field | Primary focus is on mobile nutrients because relative levels of a mobile nutrient are frequently related to fixed soil properties Relatively low rates of fertilizer have been applied in recent years There is no history of manure application History of the field is known and can be used to divide the field into smaller units | Use when non-mobile nutrients are the primary concern (e.g. phosphorus) Soil test levels in the field range from very high to very low with substantial acres in both categories There is a history of manure use For use when small fields have been merged into large The field history is not known |
| PROS | Relatively inexpensive | Lower sampling costs than grid sampling; a more accurate judgment / nutrient recommendation is made when multiple data layers are used in the analysis | More intensive soil sampling often provides a different picture of a field than do conventional sampling procedures Ability to georeference samples and track nutrient change over time Ability to scale down to really identify infield variability For use with A&L's TerraSiteRx Data Analytics Platform www.TerraSiteRx.com TerraSiteRx |
| CONS | No info. about nutrient variability | May still overlook nutrient variability within zones, zone creation dependent on clear differences in biomass or yield data | Time and cost to sample is higher than other methods, but can provide significant return on investment (ROI) when applying prescription / variable rate inputs such as fertilizer |







OTHER BENEFITS TO SITE SPECIFIC SAMPLING

- Farmers benefit through greater profits and improved efficiency of all inputs. Properly managing soil variability instead of ignoring it means more profit. Higher yields from the acres that were being under fertilized and optimizing costs from other acres translate into profit potential. The more variable the fields, the greater the profit potential will be. The starting point is with a comprehensive soil analysis that will provide the visibility of field variability
- A&L and University lead research has shown that for corn, 2.5-acre grids only require an increase in yield of 0.3 bushels per acre over four years to pay the cost of sampling, 1-acre grids require an increase in yield of 0.65 bushels per acre over four years, and 0.5-acre grids require an increase in yield of 0.60 bushels per acre over six years.

SOIL SAMPLING - OTHER POINTS OF INTEREST

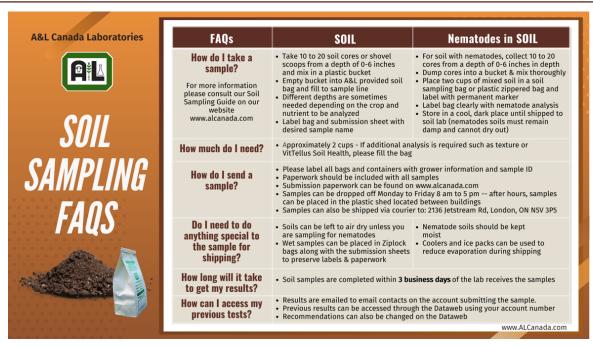
- The accuracy of a soil test depends on how well it represents the area on which a fertilizer recommendation will be made
- Natural variation arises from soil-forming processes (such as mineral weathering and erosion) that lead to accumulations or losses of nutrients at different sites

Soil sampling is the key to properly managing your fertility input costs. Learn more: Watch the recorded Soil Sampling Webinar (Zoom) online at this link:

https://zoom.us/webinar/register/rec/WN_LyaDxN_TQZaATVkujOWtcQ?meetingId=9ZNxKb_r8zUNJX43G6mjxdq8LE737aaa823cZ-voly0fySZjBVeX79B7GDMGSA5oo&playId=68Z8d_z7_T83HNDE4gSDA6B7W469KK-s1igf_vJezUeyUyFXNlbwbrJBN-Q3LdDqiW6N01ubjYrXe4ts&action=play&_x_zm_rtaid=NwV3o

This webinar was originally presented by Deveron UAS in collaboration with A&L Canada Laboratories on March 26, 2020





To serve you better, please be advised that our textural analysis capacity has been expanded to meet customer demand and for improved efficiency







SAMPLING SERVICES FROM DEVERON



A&L's partner Deveron UAS is geared up to support you this spring with staff and agents established across Canada and the US mid-west. They are ready to work with you to collect soil samples and in-season tissue samples.

DEVERON SERVICES

SOIL COLLECTION:

- Service available across Canada and US mid-west
- Rapid turnaround times from collection to analysis
- Shipping provided from collection locations directly to A&L
- A&L Certified collection specialists

TISSUE SAMPLING:

- Service available across Southern Ontario
- 24-hour guarantee from collection to lab
- Shipments in temperature-controlled environments
- A&L Certified collection specialists

DRONE DATA COLLECTION:

- Service available across Canada
- Multispectral, Thermal, RGB capabilities
- 48-hour turnaround time from capture to data delivery







TO ORDER

- Contact your local Ag Retailer
- 2. Visit A&L online at www.alcanada.com
- 3. Use the A&L Smart Submit App
- 4. Contact the A&L Canada Laboratories Office: call us toll free 1-855-837-8347, or email ALCanadaLabs@ALCanada.com



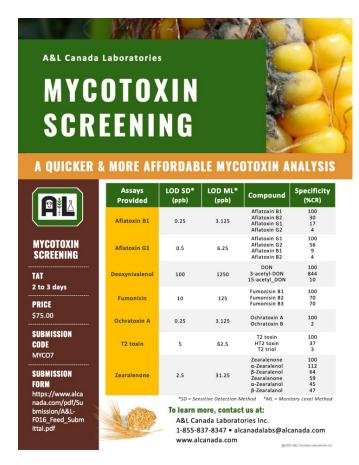






NEW TESTS AVAILABLE





TISSUE SAMPLING and HOW TO USE THE PMP PLATFORM

TISSUE TESTING SAMPLING PROCESS

1. SUPPLIES

- Submission sheets
- A sharpie marker for labeling bags and submission sheets
- An A&L sample collection bag or a brown paper lunch bag (no plastic bags)
- Flags or a GPS if the sample site is to be retested following application(s)









2. CONDITIONS

- Ensure with grower that the field is safe to enter
- With clean hands & a sample bag walk into the field a few hundred metres
- Flag or GPS locate the sampling area as to be able to return later
- Record growth stage of crop on submission form
- Begin collecting leaf samples from a representative area NOTE: Morning is best to
 prevent heat stress. Be sure to take samples at the same time of day and weather if
 trying to compare results before and after application(s)
- Collect leaves or petioles from 15 to 30 plants depending on the crop (approximately a softball size of loosely packed leaves is necessary for analysis)
- AVOID irregularities such as high or low areas of the field OR, take separate samples from these areas
- Collect the most recently mature leaves or the whole plant without the roots if in early growth stages. Ensure different application/seeding areas are sampled separately
- If a poor area of a field is being investigated for deficiencies remember to take a sample from a good area as well to compare results with the poor area

3. SAMPLING PREPARATION

- If samples have fertilizer, spray, or dust residue on them, they should be washed or wiped off as this will cause a potential bias in the lab results
- Allow samples to air dry samples in a clean area free from contamination
- Complete plant tissue submission sheets listing each individual sample
- Place samples (that are in sample bags) and sheets in boxes and send to A&L Canada Laboratories, Inc.

4. SHIP TO A&L LABS

- Send samples & information sheets via courier to: A&L Laboratories, 2136 Jetstream Road, London, ON N5V 3P5
- Samples can also be dropped off at the A&L Canada laboratories office at the same address
- It is important that samples are sent to the lab quickly to ensure the leaves do not begin to decompose

5. A&L REPORT

- Plant tissue analysis results turnaround time (TAT) are next day from the lab receiving the samples
- Once your results are finished you will be emailed or faxed a copy of your analysis or you can also log on to the A&L DataWeb to view your report online







Report Number: Account Number:

A & L Canada Laboratories Inc 2136 Jetstream Road, London, Ontario, N5V 3P5 Telephone: (519) 457-2575 Fax: (519) 457-2664

Date Received: Date Reported:

For:

Farm:

Sample ID:

Date Printed:

To:

Plant Type: Canola

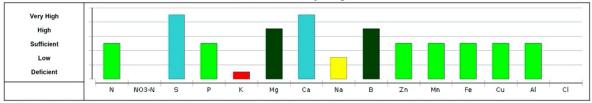
Growth Stage: pre-flower to 50% flower

Attn:

Plant Part: Most recently matured leaf 5th from the top

| <u> </u> | Grower Code: | | | | | | | | | | | | | | | |
|--------------------|---------------------------------------|-----------------|----------------------------|---------------|-------------------|------------------|------------------|----------------|---------------|----------------|---------------|--------------------|---------------|-----------------|-------------------|-----------------|
| Date Sampled | Lab Number | Nitrogen (%) | Nitrate Nitrogen (%) | Sulfur (%) | Phosphorus (%) | Potassium (%) | Magnesium (%) | Calcium (%) | Sodium (%) | Boron (ppm) | Zinc (ppm) | Manganese (ppm) | Iron (ppm) | Copper (ppm) | Aluminum (ppm) | Chloride (%) |
| 2019-08-04 2190138 | | 4.66 | | 1.68 | 0.35 | 1.94 | 0.98 | 3.90 | 0.05 | 60.34 | 34 | 98 | 193 | 6.94 | 66 | |
| Normal Range | | 3.99 | | 0.59 | 0.27 | 2.79 | 0.24 | 1.39 | 0.11 | 29 | 24 | 29 | 49 | 4 | | |
| | | 6.00 | | 0.90 | 0.60 | 5.10 | 0.82 | 3.00 | 0.20 | 60 | 70 | 250 | 250 | 25 | 300 | |
| | | | | | | | | | | | | | | | | |
| | N/S N/K P/S P/Zn K/Mg K/Mn Fe/Mn Ca/B | | | | | | | | | | | | | | | |
| Actual Ratio | | 2.8 | 2.4 | 0.2 | 103 | 2.0 | 197 | 2.0 | 646 | | | | | | | |
| Expected Ratio | | 6.7 | 1.3 | 0.5 | 93 | 7.4 | 282 | 1.1 | 489 | | | | | | | |

Nutrient Sufficiency Ratings



- These plants are deficient in POTASSIUM. Possible causes include low soil potassium levels, poor soil drainage, droughty soil conditions or compaction.
- The very high level of SULFUR in this sample may be from contamination with a spray or dust.
- A&L recommends an application when Mg, B, P, Zn or Mn are low or deficient at this plant stage. Follow the recommended product label rates.
- A&L Recommends a followup tissue sample 14 days after foliar treatment to monitor progress.

Results Authorized By: Ian McLachlin, Vice President

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The results of this report relate to the sample submitted and analyzed

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

This report is not an original A&L Canada Caracta are port. This report was printed from the A&L Data-Web, some data may have been altered by the end user.

A&L Canada is a laboratory accredited by Standards Council of Canada / CAEAL and OMAF

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A&L Canada Laboratories Inc.

UNDERSTANDING YOUR PLANT ANALYSIS REPORT

Plant Tissue Tests can help identify if an essential nutrient in the plant is within the expected normal sufficiency range for that particular stage of growth during the season. This offers the opportunity to address the deficient nutrients during the growing season, or elect to adjust next seasons fertility program

| | A&L Plant Analysis Report | | | | | | | | | | | | | | | |
|-----------------|---------------------------|-----------------|-------------------------|---------------|-------------------|------------------|------------------|----------------|---------------|----------------|---------------|--------------------|---------------|-----------------|-------------------|-----------------|
| Date Sampled | Lab Number | Nitrogen (%) | Nitrate Nitrogen (%) | Sulfur (%) | Phosphorus (%) | Potassium (%) | Magnesium (%) | Calcium (%) | Sodium (%) | Boron (ppm) | Zinc (ppm) | Manganese (ppm) | Iron (ppm) | Copper (ppm) | Aluminum (ppm) | Chloride (%) |
| 2019-07-05 | 188167 | 6.23 | | 1.21 | 0.40 | 2.95 | 0.66 | 2.16 | 0.30 | 35 | 26 | 67 | 95 | 7 | 21 | |
| Normal Range | | 3.99 6.00 | | 0.59 0.90 | 0.27 0.60 | 2,79 5.10 | 0.24 0.82 | 1.39 3.00 | 0.03 | 29 60 | 24 70 | 29 250 | 49 250 | 4 25 | 300 | |
| | | N/S | N/K | P/S | P/Zn | K/Mg | K/Mn | Fe/Mn | Ca/B | Plan | t analysi | s findings ar | o usoful | in dotor | mining if th | no soil |

 N/S
 N/K
 P/S
 P/Zn
 K/Mg
 K/Mn
 Fe/Mn
 Ca/B

 Actual Ratio
 5.1
 2.1
 0.3
 153
 4.5
 440
 1.4
 620

 Expected Ratio
 6.7
 1.3
 0.5
 93
 7.4
 282
 1.1
 489

Plant analysis findings are useful in determining if the soil fertility level and applied fertilizer program were sufficient in meeting the needs of the crop requirements

Actual Nutrient Analysis

- This is the actual nutrient content measured in the plant at the time the sample was taken
- Note that the major (macro and secondary) are reported in % due to higher concentration in the plant. The micronutrients are lower in concentration, so reported in ppm

N:S Ratio

- The main goal of plant analysis and nutrient ratio balancing is to be as close to the expected ratio
 as possible at the particular plant growth stage
- When reviewing ratios, it's important to first understand the crops nutrient requirements to grow high yields and better product qualities
- The N:S ratio tells us the balance between these two nutrients. If out of line, too much of one nutrient to the other could lead to reduced yields and further problems

Normal Rang

- · Based on research, nutrients should be in a particular range at certain growth stage
- Plant growth stages must be identified on the submittal form for the report to compare with our expected ranges for the stage of growth
- If the actual nutrient analysis falls within the normal range the plant is progressing nicely. If the actual nutrient analysis falls outside the normal range, there may be environmental conditions, hidden deficiencies or excesses, which will impact both yield and quality

N:K Ratio

- The importance of the N and K relationship is well documented and researched and correlates to both improved yield and quality
- $\bullet \, \mathsf{Based} \, \mathsf{on} \, \mathsf{plant} \, \mathsf{nutrient} \, \mathsf{requirements}, \, \mathsf{we} \, \mathsf{need} \, \mathsf{almost} \, \mathsf{as} \, \mathsf{much} \, \mathsf{available} \, \mathsf{K} \, \mathsf{to} \, \mathsf{grow} \, \mathsf{a} \, \mathsf{bushel} \, \mathsf{as} \, \mathsf{we} \, \mathsf{do} \, \mathsf{N}$
- Having this balance in the plant is tremendous. Full season plant tissue monitoring (A&L PMP report) allows early deficiency detection, and any nutrient balance issues can be corrected as needed

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A&L PLANT MONITORING PROGRAM (PMP)

To optimize productivity of your next crop, plan now to make plant tissue analysis part of your fertility monitoring procedure and enhance your nutrient program. This tissue monitoring data combined with your soil test or media test data will ensure you set your crop up for success.

A&L PMP Program:

https://www.alcanada.com/content/references/pdf-content?pid=Plant%20Monitoring%20Program(PMP)

Contact your input supplier or A&L Canada Laboratories to learn more about our Plant Tissue analysis and plan for success this year.

YIELD IMPROVEMENT PROCESS



Alt Connect autom

COMPOST CORNERSOLUBLE SALTS (EC) AND SODIUM (NA) FOR COMPOST

By Kelly O'Connor, CCA, Customer Service Agronomist, A&L Canada Laboratories

Soluble salt or electrical conductivity is a measurement of the total salt content in a material. This is a measure of "good" salts like potassium, calcium, nitrate and ammonia as well as "bad" salts like sodium and chloride.

Total EC can be high due to "good" salts like potassium or calcium, which, if diluted can be a good source of both nutrients. Electrical conductivity due to sodium or chloride can be more challenging to dilute since it is not required in significant amounts. Below is a table of uses for material based on the soluble salt (EC) level found on page 7 of our Compost Guide. It is important to check both EC and sodium on your Soil Suitability Report.

| Table 1. Uses for materials based on electrical conductivity (soluble salts) ratings and blending recommendations. | | | | | | | | |
|--|----------|---|--|--|--|--|--|--|
| Rating | EC ms/cm | Uses for Material | | | | | | |
| Very Low | < 0.75 | May be used in a planting media directly, will require some nutrient addition for plant growth | | | | | | |
| Acceptable | 0.75-2.0 | May be used directly as a media for small plants and seeding | | | | | | |
| Medium | 2.0-3.5 | May be used for transplant. Tender plants may need to be diluted with 25 to 50% soil | | | | | | |
| Medium High | 3.5-5 | Good for topdressing on established plants or blending as a soil amendment 2-1 to 5-1 soil to compost | | | | | | |
| High | 10-May | Used as a soil amendment blended 4-1 up to 10-1 soil to compost | | | | | | |
| Very High | > 10 | Only use for low application rate to areas with more salt tolerant planting | | | | | | |







Injury from salts (both good and bad) may first occur as mild chlorosis and progress to necrosis of leaf tip and margins. You may recognize this as "leaf burn". Root injury is more difficult to see but results in poor uptake of nutrients and water uptake. Plants are wilted and have poor growth. This can predispose plants to a wide range of root diseases like Pythium and Fusarium.

Our Soil Suitability Compost Report shows the available nutrients, Soluble Salts and Sodium giving you a better opportunity to blend your material to within safe levels for growth. Compost is best applied in the fall to reduce the potential for plant injury and increase the available nutrients.

| Reported D Printed D | ate:2017-06-13 ate:Jun 20, 201 | 3 17 | | СОМ | POST REP | ORT | | | | Page:1/ | | |
|-----------------------------|-----------------------------------|---------------------------|--------------------|------------------|-----------------------|-------------------------|-------------------------------|--------------------------|----------------------------|---------------|---------------------|-------------------|
| Sample Lab Number Number | | r pH | pH Lime Index | | | | Available Organic Matter % | | | um n | Magnesium Mg ppm | Calcium Ca ppm |
| | 1835 6.9 | | 7.0 | | 23.0 | 408 194 | | 3 | 521 | 6210 | | |
| Sulfur S ppm | Zinc Zn ppm 23.3 | Manganese Mn ppm 24 | Iron Fe ppm | Copper Cu ppm | Boron B ppm 4.8 | Sodium Na ppm 236 | Nitrate-N NO3-N ppm | Soluble Salt ms/cm | Nitrogen (Total) (%) | Moisture % | | |
| | | | | IN | ITERPRETATION | ı | | | | | | |
| CEC meq/100g % BS % K | | | ent Base Saturatio | n % Na | Proj K | oortional Equival | ents (meq) Ca Na | a M | Cation Ratio | C/N Ratio | | |
| 41.3 | 100.0 | 12.05 10. | 36 75.10 | 2.48 | 4.98 | 4.28 3 | 1.05 1.0 | 3 1 | :1 7:1 | | | |
| | | | | | | | | | | | | |

CONGRATULATIONS!

A&L Labs has new Certified Crop Advisors and 4R certification!

Congratulations to:

- Kelly O'Connor (4R)
- Saveetha Kandasamy
- · Richard (RJ) Robbins

Proud to have them as part of our team, and now officially registered CCAs!



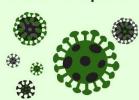








COVID-19 Update



A&L Canada Laboratories **COVID-19**

March 20, 2020

To our valued clients:

I am reaching out to share with you how A&L Canada Laboratories is managing through the current COVID-19 public health situation. For our company, there is no higher priority than the safety of our customers, employees and communities which we serve. The novel coronavirus has impacted all of us in some way and we continue to monitor the situation very closely.

I want to assure you that A&L Canada Laboratories will continue with our daily operations in all departments. Due to the severity of this health emergency we have implemented a range of precautions at our facility to ensure the safety of our valued customers, employees and their families. Through guidance from the respective authorities we have equipped our laboratory and offices with additional cleaning supplies, disinfectant wipes, and sanitizers. All our employees have been advised to follow a safety protocol of regular handwashing, ongoing cleaning of surfaces, and avoiding physical contact. In the event a staff member feels unwell, we are asking such employees to stay home and seek appropriate medical attention according to the Ontario Ministry of Health guidelines.

For clients bringing samples to the lab, we encourage using the drop box or delivering to the front foyer of the office. Shipping by courier remains a very good means of delivering samples and minimizing physical proximity with others.

Our field representatives have also been asked to refrain from visiting your facilities but remain fully available by phone to service your requests and needs should you have any. A&L is fully dedicated to follow and implement all required public health protocols as they arise. All of us at A&L appreciate your business and are doing our best in this time of crisis to meet your needs as always. Please feel free to contact us at 1-855-837-8347, email at alcanadalabs@alcanada.com, or any of our field representatives if you have any concerns or requirements.

Sincerely.

Greg Patterson CEO and Founder

A&L Canada Laboratories Inc.

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UPCOMING EVENTS AND CONFERENCES – ON HOLD

A&L Canada appreciates the opportunity to speak with stakeholders in the industry about the crop production challenges they face and how A&L can help

Please reach out if you have a question!!

A&L CANADA LABORATORIES CONTACT INFORMATION

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