ALP
Proficiency
Testing Services

Robert Miller and Chris Czyryca

Celebrating 10 years of Service

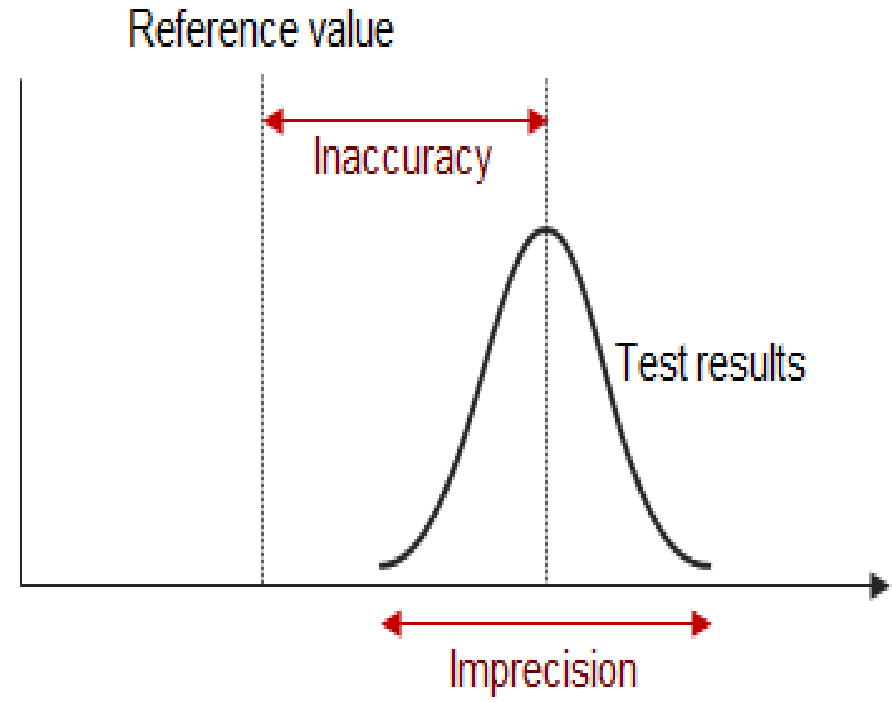
Laboratory Proficiency Testing

Objective: to assess the performance of an individual laboratory or a group of laboratories as whole, and improve analytical quality.

Accuracy: generating a result close to the “true value”. Evaluation of bias.

Precision: ability to generate the same measurement result.

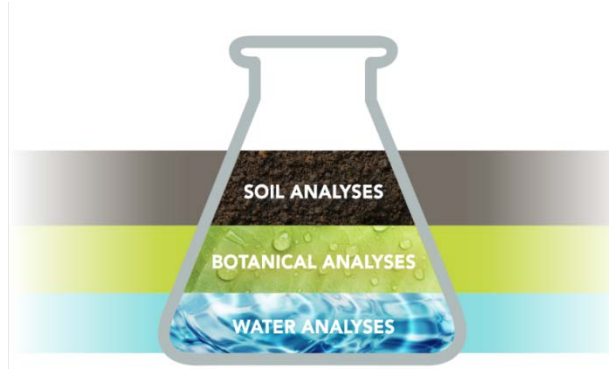
An analytical measurement can be accurate, but imprecise.



Miller and Czyryca, 2016

ALP Program

Setting the Standard of Proficiency Testing



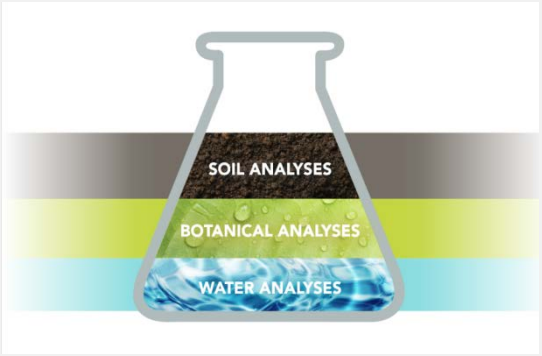
Professional Experience: **Collaborative Testing Services (CTS), 44 years, multiple PT programs. Technical Director, 23 years experience coordinating lab proficiency services.**

Actionable Data: **Meaningful PT reports: inter-lab and intra-lab method performance; and individual lab bias and precision.**

Accredited: **The only accredited proficiency provider for agricultural laboratory testing in North America, ISO/IEC 17043 by ANAB, 2014-2016.**

Miller and Czyryca, 2016

ALP Program



The ALP Team

Chris Cyzryca: Program Director, CTS

Robert Miller, PhD: Technical Director

Byron Vaughan, PhD: Technical Advisor

Larry May, PhD: Materials Manager

Irene Venteicher: Distribution/Shipping Coordinator

Collyn Miller: Student Assistant

***Program Operation*:** Tri-annually, 5 PT soils selected representing 4 US regions and Canada, 4 botanical and/or 3 water samples. Labs select from 147 standard methods, each performed in triplicate. Data compiled and reports provided on analytical performance, bias and precision.

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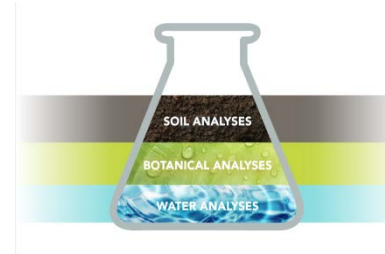
ALP Program



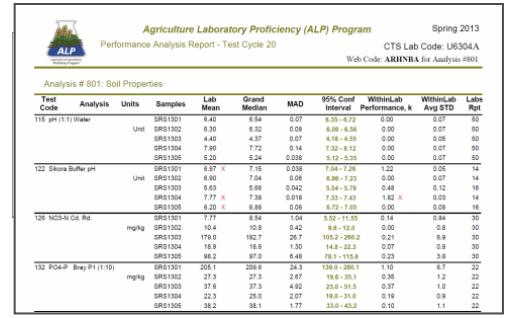
Setting the Standard of Proficiency Testing

Soil. PT soils are offered in 0.4 and 1.1 kg sizes and identified as to the country, state and county of collection.

USDA-APHIS requirements are rigorously followed and soils collected from control areas identified on the label for appropriate disposal.

Botanical. PT samples represent a diverse range of Ag species, and nutrient levels. Professionally packaged, 20 g of material.

Data Analysis. PT data is compiled and evaluated by an experienced PT statistician (4 decades), lab reports generated for those test methods reported.



Agriculture Laboratory Proficiency (ALP) Program — Spring 2013

Performance Analysis Report - Test Cycle 20

CTS Lab Code: U6304A

Web Code: ARHNBA for Analysis #801

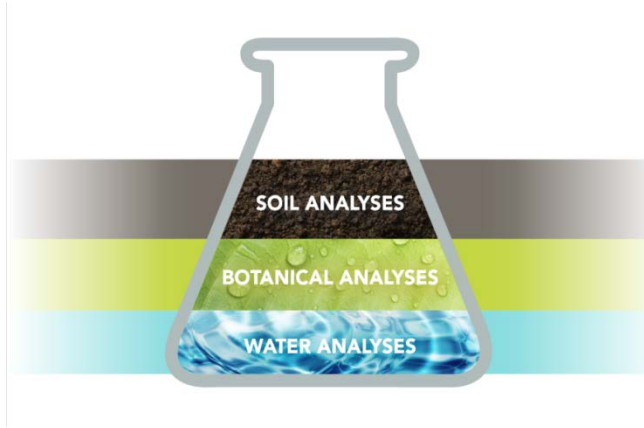
Analysis # 801: Soil Properties

Test Code	Analysis	Units	Samples	Lab Mean	Grand Median	MAD	95% Conf Interval	WithinLab Performance, k	WithinLab Avg STD	Labs Rpt
115	pH (1:1) Water		SRS1301	6.40	6.54	0.07	6.33 - 6.72	0.00	0.07	60
		Unit	SRS1302	6.30	6.32	0.06	6.08 - 6.56	0.00	0.07	60
			SRS1303	4.40	4.37	0.07	4.18 - 4.55	0.00	0.05	60
			SRS1304	7.90	7.72	0.14	7.32 - 8.12	0.00	0.07	60
			SRS1305	5.20	5.24	0.036	5.12 - 5.35	0.00	0.07	60
122	Sikora Buffer pH		SRS1301	6.97 X	7.15	0.038	7.04 - 7.26	1.22	0.05	14
		Unit	SRS1302	6.90	7.04	0.06	6.86 - 7.23	0.00	0.07	14
			SRS1303	5.63	5.66	0.042	5.54 - 5.78	0.48	0.12	16
			SRS1304	7.77 X	7.38	0.018	7.33 - 7.43	1.82 X	0.03	14
			SRS1305	6.20 X	6.88	0.06	6.72 - 7.05	0.00	0.08	16
126	NO3-N Cd. Rd.		SRS1301	7.77	8.54	1.04	5.52 - 11.55	0.14	0.84	30
		mg/kg	SRS1302	10.4	10.8	0.42	9.6 - 12.0	0.00	0.8	30
			SRS1303	178.0	182.7	26.7	105.2 - 260.2	0.21	6.9	30
			SRS1304	18.9	18.6	1.30	14.8 - 22.3	0.07	0.8	30
			SRS1305	98.2	97.0	6.48	78.1 - 115.8	0.23	3.8	30
132	PO4-P Bray P1 (1:10)		SRS1301	205.1	209.6	24.3	139.0 - 280.1	1.10	6.7	22
		mg/kg	SRS1302	27.3	27.3	2.67	19.6 - 35.1	0.38	1.2	22
			SRS1303	37.6	37.3	4.92	23.0 - 51.5	0.37	1.0	22
			SRS1304	22.3	25.0	2.07	19.0 - 31.0	0.19	0.9	22
			SRS1305	38.2	38.1	1.77	33.0 - 43.2	0.10	1.1	22

Miller and Czyryca, 2016

ALP Program

Setting the Standard of Proficiency Testing



Recognized by NCRS for 590 requirements.
State certification by Minnesota Dept Ag and Illinois Soil Testing Association.

2016 Upgrades:

- UDY Cyclone mill for botanical preparation.
- New 2500 sq ft soil warehouse facility, 162 soils in storage, (51 tons).
- New soil jaw crusher.

ALP Program

With growth of ALP, necessity to prep 800-1500 lbs of each individual PT soil.

Fritsch Jaw crusher capable of crushing 240 kg hr^{-1} of soil, from minus 2.0 mm – 0.3 mm.

Will reduce “over grinding” of PT soil samples, minimize dust processing emissions. Delivery July 2016.

Fritsch Pulverisette

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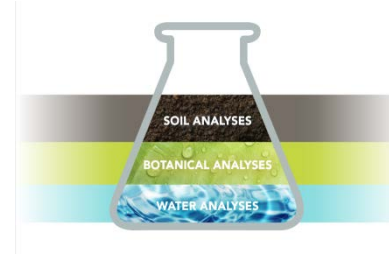
ALP Program



Setting the Standard of Proficiency Testing

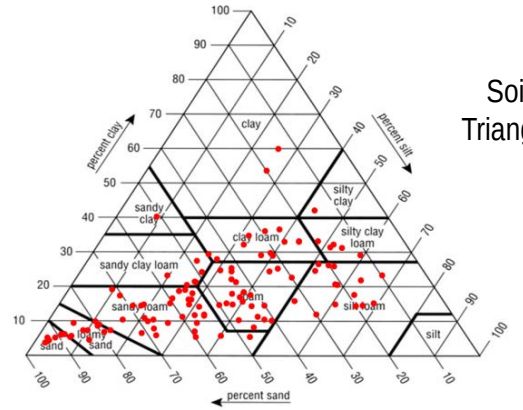
Proficiency Soils: 312 agricultural soils collected since 2005 from 49 US states and 8 Canadian provinces.

150 proficiency soils (148 unique) have been evaluated, representing: 11 USDA textures; pH 4.1 - 9.0; Mehlich 3 phosphorus 1.7 – 672 mg kg^{-1}, and SOM 0.2 - 16.5%.

Preparation: soils are dried; pulverized; blended; homogeneity tested; professionally packaged.

Soil Collection
South Dakota 2015

Severance
Warehouse 2016



Soil
Triangle

Miller and Czyryca, 2016

ALP Soil Homogeneity

The only PT program that pre-test and reports soil homogeneity each cycle.

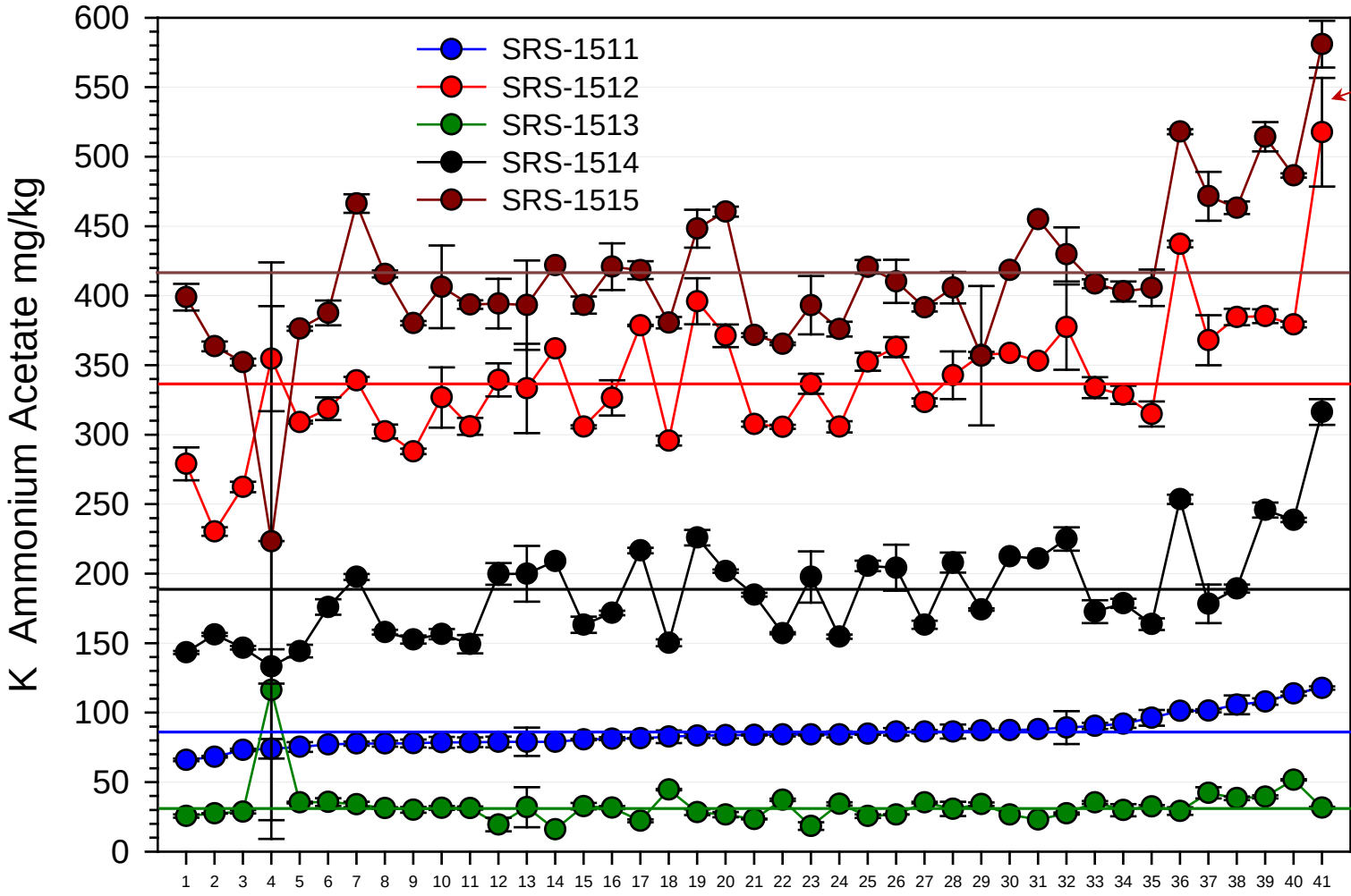
Soil ID	St/Prov	pH (1:1) H_2O [1]		NO_3-N (mg/kg)		Bicarb-P (mg/kg)	
		Mean	*Std*	*Mean*	*Std*	*Mean*	*Std*
SRS - 1506	CT	5.94	*0.04*	42.2	*1.3*	31.7	*1.2*
SRS - 1507	NE	7.98	*0.03*	127	*2.4*	36.7	*2.8*
SRS - 1508	AZ	8.10	*0.02*	56.1	*1.6*	8.6	*0.6*
SRS - 1509	BC	6.75	*0.03*	3.9	*0.2*	24.3	*1.7*
SRS - 1510	SC	5.33	*0.02*	43.2	*1.0*	15.4	0.7

[1] 2015 Cycle 27, five replicate soil jars, each analyzed in triplicate.

Miller and Czyryca, 2016

ALP Program

ALP Ranking Plot: Cycle 28, soil K



High bias and In-precise

Results show high inter-lab consistency for K < 100 ppm, but lack there of for higher testing soils.

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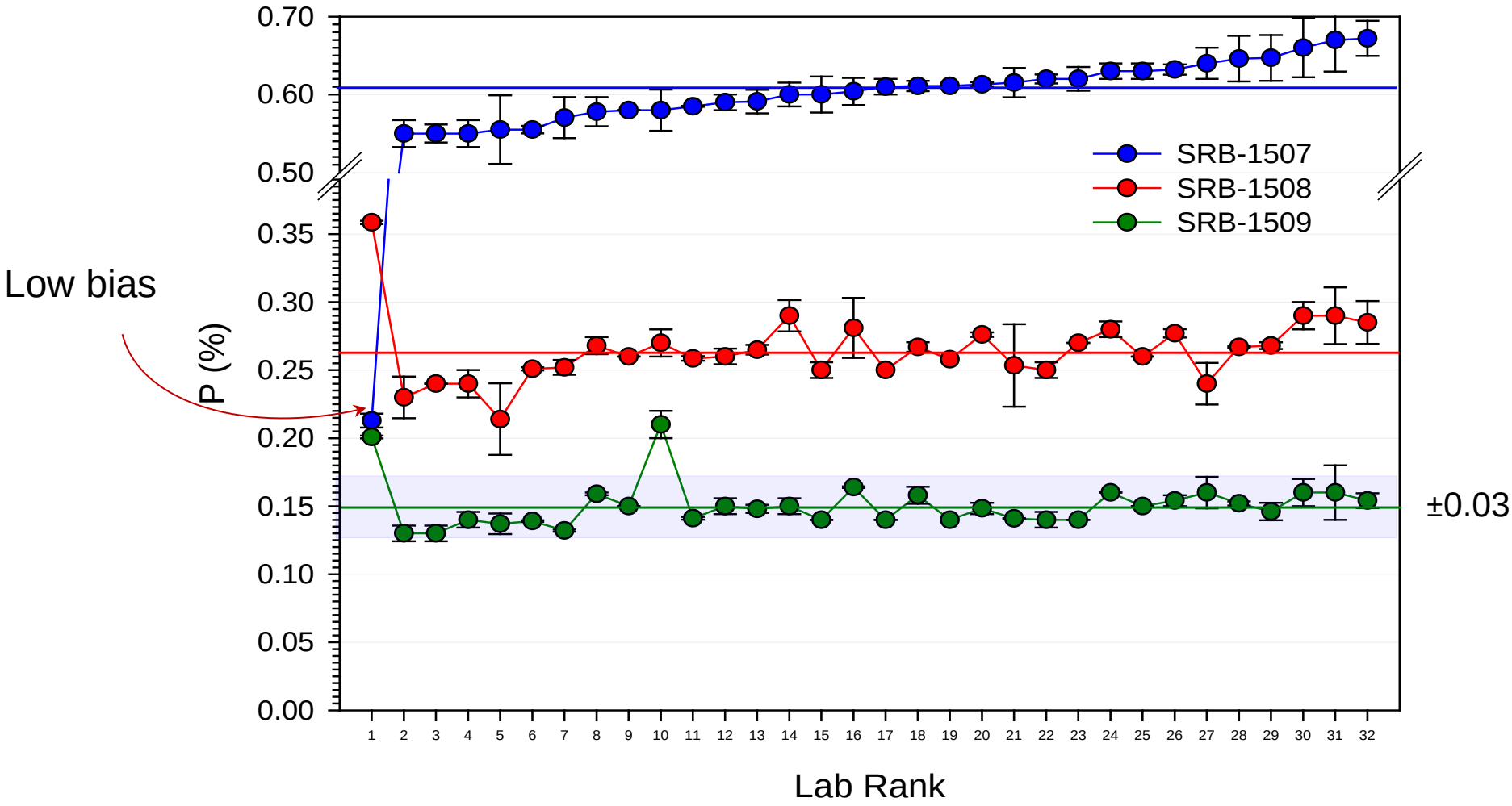
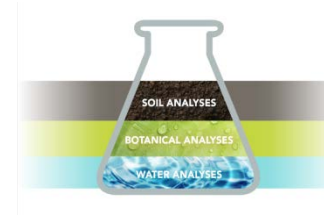
ALP Program

ALP Ranking Plot: Cycle 28, botanical Phosphorus



Miller And Czyryca, 2016

ALP Program



Publications

Miller, R.O. and D. Kissel. 2010. Comparison of soil pH methods on soils of North America. SSSAJ. 74:310-316.

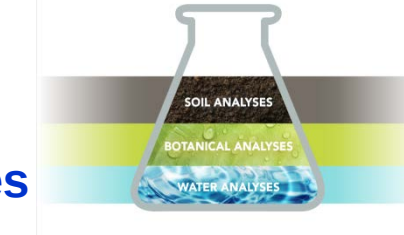
Miller, R.O., S. Jones and M. Lindaman. 2012. Pulverizing soils for laboratory analysis. Comm. Soil and Plant Anal. 44:440-444.

Miller, R.O. 2013. Reliability of soil and plant analyses for making nutrient recommendations. Western Nutrient Management Conference. March 7-8th 2013, Reno NV, USA.

Ghabbour, G.A., G. Davies, N.P. Cuozzo and R.O. Miller. 2014. Optimized Conditions for Determination of Total Soil Organic Matter by Mass Loss on Ignition (LOI) by J. Plant Nutr. Soil Sci. 177: 914-919.

Miller, R.O., C. Cyzyrca and B. Vaughan. 2016. Comparison of soil extractable phosphorus methods utilized in North America. (submitted).

ALP Collaborations



ALP has numerous associations with Instrument vendors, Ag companies Consultants and Laboratories [1].

LECO Corporation
Timberline Instruments
Foss Corporation
FIA Labs
LogiAg of Quebec
Winfield Solutions
360 Yield
Climate Corp
Helena Chemicals
Unibest
Wonderful Farms
The Tremont Group
Stanford Research Group - CA
Southwest Research Institute - TX
USDA-ARS

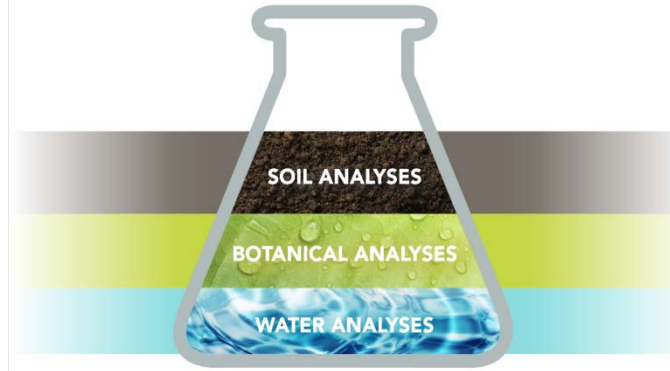
Ag Source (4 locations)
Ag Laboratory and Consulting
Agate Labs (5 locations)
ALS Labs (3 locations)
American Analytical Lab
Best Test Laboratory
BLGG Labs – The Netherlands
Kuo Testing
Maxxam Labs (3 locations)
Motzz Laboratory
MTVL – Minnesota
Rock River Laboratories
Spectrum Labs
Sure Tech Laboratories
Ward Laboratories
USI Laboratory

[1] Abbreviated list 2015-2016

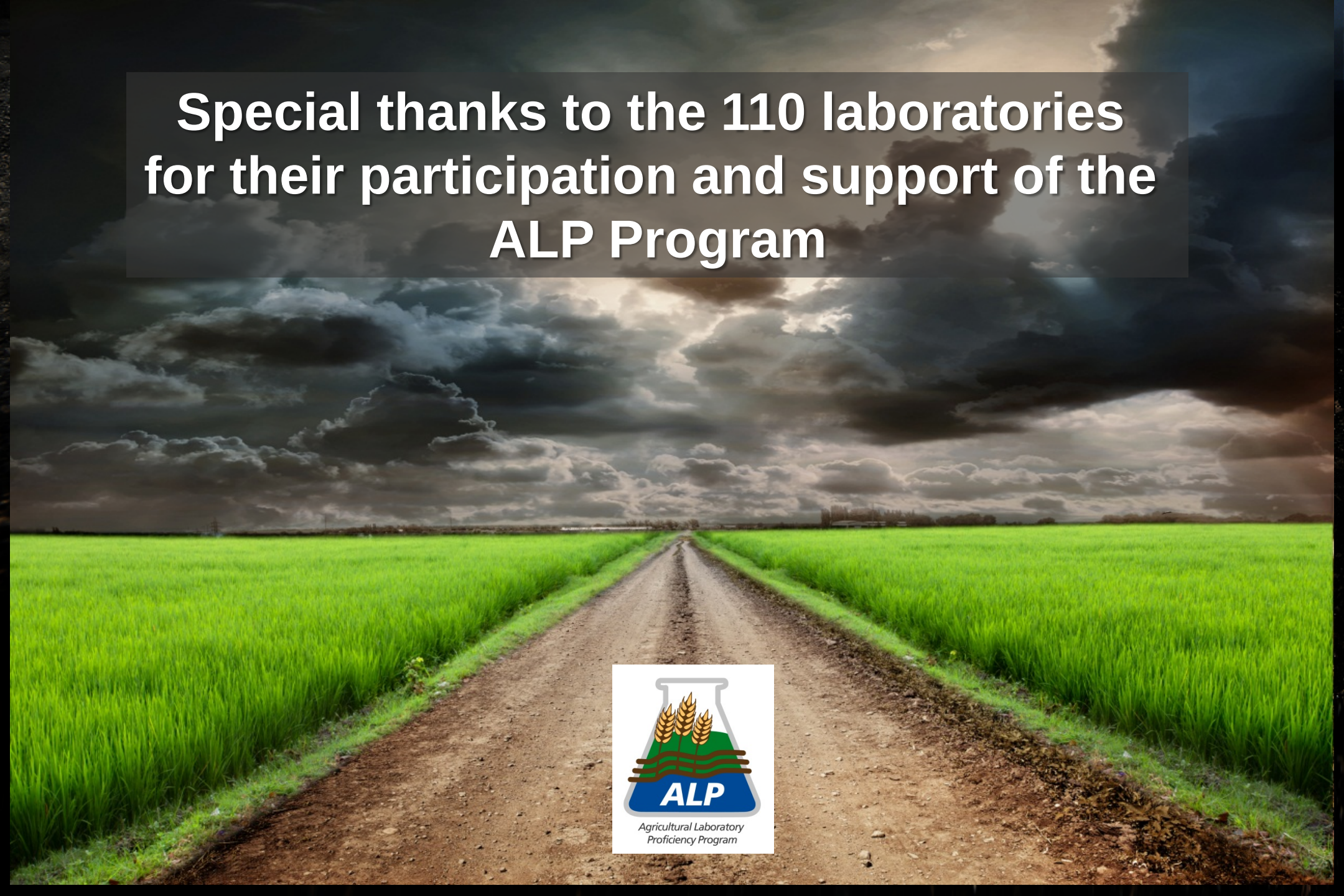
Miller and Czyryca, 2016

ALP Program

Setting the Standard of Proficiency Testing



- **<u>One hundred ten</u> labs enrolled for 2016, 8% increase.**
- **New Methods: Sat Paste K; 0.33 and 15 bar soil moisture; Botanical program EPA 503 metals (As, Cd, Mo, Ni, Pb, Sr).**
- **2017 ALP will add horticulture media and nutrient solutions.**
- **Midwest Ag Laboratory Tour, August 30 - Sept 1, 2016.**


Special thanks to the 110 laboratories for their participation and support of the ALP Program
ALP
Agricultural Laboratory Proficiency Program

SPAC Activities

Journals: **Communications in Soil and Plant Analysis and Journal of Plant Nutrition,** Discounted subscription rates (40%).

Soil Scoops for purchase**: 0.5, 1.0, 2.0, 4.0, 5.0, 10.0, 15.0 g size scoops**.

Laboratory Certification**. SPAC** is developing a lab certification program for botanical analysis. President elect Dr. Hailin Zhang of OSU is overseeing the project, launch September 2016.

Czyryca and Miller, 2015

The 15th International Symposium for Soil and Plant Analysis

May 14-19, 2017

Nanjing, China

Institute of Soil Science, Chinese Academy of Sciences

State Key Laboratory of Soil and Sustainable Agriculture

Soil and Plant Analysis Council, Inc.

Soil Science Society of China

Chinese Academic of Sciences

About the Conference

After 14 successful meetings in North America, Africa, Europe Australia and New Zealand, we invite you to the 15th ISSPA in Nanjing, the first one in China.

This symposium emerges as a premier event for highlighting achievements in soil and plant testing and intergrading new scientific knowledge into nutrient management.

We hope the symposium provides the opportunity for international scientists to exchange knowledge, develop collaboration, and advance the discipline of soil and plant analysis.

We look forward to seeing you in the beautiful Nanjing, China.

Conference themes

The roles of soil and plant analysis in food security and environmental quality

Major topics:

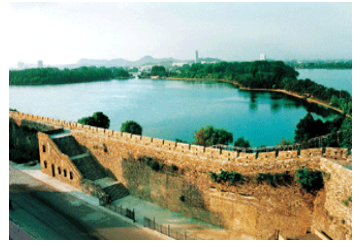
- Soil testing and interpretations in different regions of the world: North America, South America, Europe, The Pacific, Africa, Asia
- Advances in soil sampling techniques
- Soil testing to improve crop yields and quality
- Soil testing to protect air and water quality
- Soil health measurement and interpretations
- Laboratory management and quality control
- Other topics

Important Dates

Deadline for Submission of Abstracts	March 15, 2017
Deadline for Early Bird Registration	March 15, 2017
Deadline for Registration	May 1, 2017


RUSSIA
KAZAKHSTAN
MONGOLIA
Harbin
Shenyang
NORTH KOREA
Urumqi
KYRGYZSTAN
Beijing
Dalian
SOUTH KOREA
Dunhuang
IKISTA
Qingdao
PAKISTAN
Lanzhou
Xi'an
Suzhou
Nanjing
Shanghai
Wuhan
Hangzhou
Chengdu
Yichang
Chongqing
Everest Base Camp
Lhasa
Taibei
NEPAL
BHUTAN
Guilin
Taiwan
Lijiang
Kunming
Guangzhou
HongKong
INDIA
BANGLADESH
BURMA/ MYANMAR
VIETNAM
LAOS
Hainan

Conference Venue



The symposium will be held in the International Conference Hotel of Nanjing. This hotel is located in the beautiful Zhongshan Hill Scenic Area with many famous landmarks nearby.
Nanjing is the capital of Jiangsu Province, which is located in the golden Yangtze River Delta. Nanjing has served as the capital of
China for six different dynasties. With its majestic landscapes and epic history and cultures, it is one of the most beautiful cities of China, which attracts millions of tourists every year. May is the most confortable time of the year.

Preconference tour

Two days excursion in Beijing, attendees will meet in Beijing and take train (Chinese Railway High-Speed, about 4 hours) to Nanjing after the tour. The price is about 500 USD per person including train ticket to Nanjing

Mid-conference tour

One day excursion in Suzhou, attendees visit Lingering Garden (Liuyuan Garden), Xishan Island, Taihu Lake and Jinmanting Agriculture Park.

Registration Fees

Registration includes full access to all sessions of the symposia, welcome reception, coffee breaks, meals, proceedings (abstract book) and other conference materials, as well as one day Mid-conference tour.
Companion registration includes welcome reception and mid-conference tour.

Category		Early Registration before March 15, 2017	After March 15, 2017 and On Site
International participant	Participants	500 USD	600 USD
	Students	300 USD	350 USD
	Companion	150 USD	200 USD
Domestic participant	Participants	2000 RMB	2600 RMB
	Students	1200 RMB	1600 RMB
	Companion	700 RMB	1000 RMB

Conference Contacts:

Institute of Soil Science, Chinese Academy of Sciences
No. 71 East Beijing Road, Nanjing, China
Tel: +86 025 86881028
Fax: +86 025 86881538
E-mail: ISSPA2017@issas.ac.cn
Website: under construction…

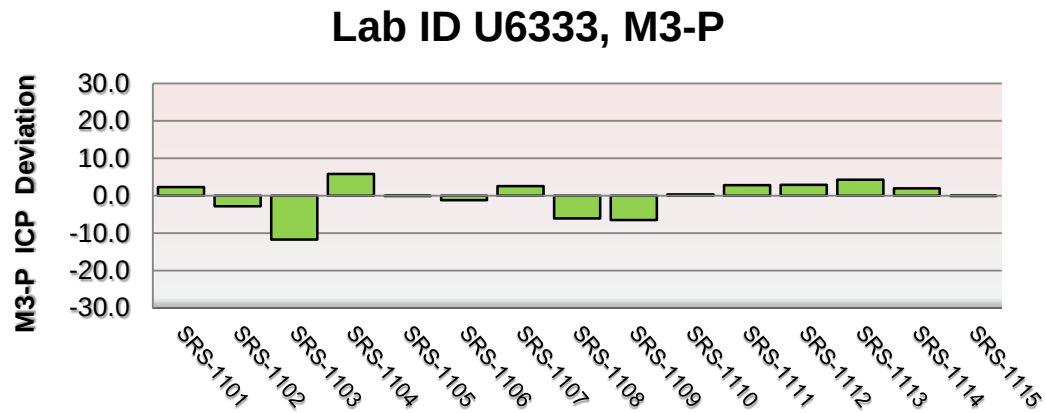
Inter Lab Performance - ALP

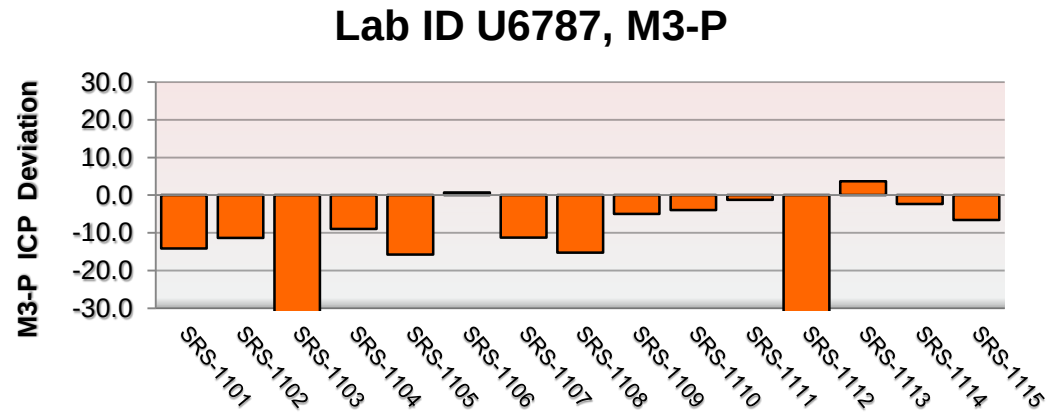
Annual track of individual lab bias - two labs

Individual laboratory bias can be attributed to method deviation(s).

Although it may occasionally be a specific soil, often it can be attributed to chronic method bias.

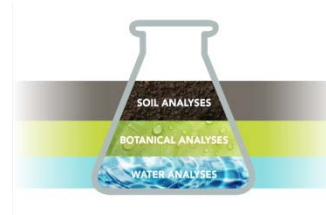
Method bias (deviation) often is associated with instrument calibration.





Miller and Czyryca, 2015

ALP Program



PT Soil Diagram

Soil Selection

- Region
- pH
- NO_3-N
- M3-P
- Texture
- EC
- M3-K
- SOM

Selection of soils utilized in the ALP is based on region, texture and six chemical properties.

Soils pre-evaluated for properties, processed

Air Dried (90 F)

Pre-Eval Soil Test

Pulverized / Sieved minus 0.7 mm [1]

Bulk blending 30 minutes

Homogeneity Eval

Packaging

Miller and Czyryca, 2016


Name of presentation
Company name

ALP Program

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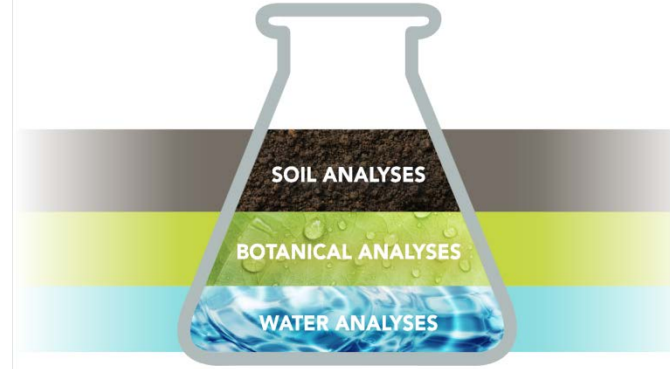

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Actionable Data: **Meaningful PT reports: inter-lab and intra-lab method performance; and individual lab bias summary.**

Service: **Participants receive technical support and discount on standard reference materials. ALP sponsors: workshops; symposiums; and lab tours.**

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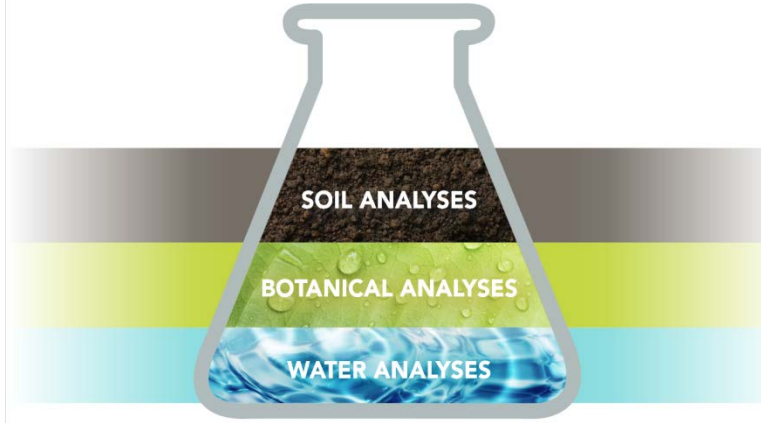

2016 Accomplishments

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Recognized NCRS 590 proficiency provider. State certification by Minnesota Dept Ag and Illinois Soil Testing Association.

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