

## ASPAC Digest – October 2015

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*5th Edition, October 2015*

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## Greetings from the Chair



Craig Newman – Chairman ASPAC Executive, Tasmanian Representative

It's been a busy few months for ASPAC since the last newsletter.

ASPAC have continued to strengthen their relationship with other Soil and Plant Science institutions, providing sponsorship to the West Australian soil science conference.

In August a Soil Analysis Workshop was held in Melbourne, with an array of topics relating to soil analysis covered in the two-day course. Special thanks go to Nutrient Advantage who kindly allowed participants a tour of their facilities and particularly Janice Trafford for organising the workshop. It's only through the hard work of dedicated people that we can continue to deliver.

As usual around this time of year, certification certificates are finalised and will be issued. This year we are about to make changes to the website to make it much easier to find certification information relating to a laboratory.

This has been a long and difficult task requiring close collaboration with our partners at Global Proficiency and our various subcommittees. Special thanks must be given to Roger Hill, George Hill, Jules Marsh and Warren Webber who have made this possible.

ASPAC was founded in 1990 which makes 2015 the 25th year of our operation. To celebrate we are hosting an anniversary dinner in Brisbane on November 27. More details will be available shortly so clear a spot in your calendar and come along to help us celebrate. There will be food, awards and a special guest speaker!

ASPAC exists to serve the needs of its many varied members. Shortly you will receive an offer to participate in an online survey about ASPAC. It is important that you take the time to complete the survey so that we can better understand your needs as members.

Please take a few moments out of your day to complete the survey to help us help you.

## Survey of Members

Shortly, members of ASPAC will be receiving an email inviting them to participate in the 2015 member survey. The member survey will be sent to all member organisations to allow ASPAC to:

- Gain an understanding of the satisfaction levels of member organisations with the services offered by ASPAC;
- Investigate whether there are additional services, not currently provided, that would be valued by member organisations.

Whilst feedback is encouraged at any time, a survey is a formal way to ensure that feedback is captured, trends are identified and actions are developed to address the feedback in a systematic way.

The invitation email will be sent to the nominated contact for corporate members and individual members as they appear in the ASPAC database. You will be asked to confirm your participation in the survey by sending a brief reply. If the person receiving the invitation is not the most appropriate person to participate, can you please provide the details of the appropriate contact.



The member feedback survey will be a short quantitative and qualitative census undertaken using an online survey tool (Survey Monkey®), based in the United States of America (USA). To address privacy issues under the Information Privacy Act 2009, you will be allocated a unique code to access and complete the online survey, to ensure that no identifying personal information will be stored on an overseas database.

While responses will be shared with ASPAC management to look for opportunities to improve members experience with ASPAC, they will be treated confidentially and will be depersonalised for reporting purposes.

## 2015 Training

### 4th Soil Analysis Workshop

Up and coming lab technicians and early career researchers gathered at Werribee Victoria in August for ASPAC's annual technicians training workshop. New Zealand and almost every Australian state and territory was represented in this exchange of proven experience and new ideas about soil analysis.

Brian Daly kicked things off with an introduction to lab Quality Control. This gave the technicians more understanding of how their lab benefits from the QC samples they work on, including the samples from the ASPAC inter-lab proficiency program. Trends in the data for the ASPAC proficiency samples were then presented by Paul Kennelly and some problem methods identified for the workshop to troubleshoot. Exchangeable aluminium 15G1, Bray-P, hot CaCl<sub>2</sub> boron, DTPA iron and soluble chloride were all inspected, procedures compared and root causes debated. In another 'hands-on' component of the program, Craig Newman led a workshop that used exchangeable cations data to highlight how significantly test results depend on selecting the right method.

The host of this year's workshop, Paul Kennelly of Nutrient Advantage, invited the technicians to tour their laboratories and showed his energy and enthusiasm for each and every instrument. As for this author, it's a privilege to grow up yet still get to play with cool toys! Paul's team continued the informative momentum of the host, sharing their knowledge with presentations on ICP-OES analysis and phosphorus extractions. The group was also given an insight to how their lab results are used in recommendations to farmers by agronomist Nigel Bodinaar.

In closing, workshop organiser Janice Trafford was commended by the ASPAC chair for having developed such a vital event for the association. The excellent atmosphere generated by this workshop was evident in the reluctant parting. Strangers two days prior were now arranging car-shares to the airport and attendees had to be dragged away to avoid missing flights home. Next year will be a new group of young technicians (as this workshop is a 'rite of passage' for ASPAC first-timers) but the same collaboration to improve soil analysis will continue.

Matthew Dore

Matthew is a Senior Analyst / Laboratory Manager at SESL Australia in Sydney and was a guest presenter at the Soil Analysis Workshop.

If you are interested in future workshops please keep an eye for notices on the ASPAC website.

## Report from Laboratory Proficiency Committee

Roger Hill, George Rayment & Dave Lyons

ASPAC's Laboratory Proficiency Committee (ASPAC-LPC) held the most recent of its regular meetings in late July 2015. A Technical Advisory Group meeting between ASPAC-LPC and key members of Global Proficiency Limited also occurred (24 July 2015), with Ms Lana Pears, Global's (new) Programme Leader - Agricultural Programmes attending for the first time.

Importantly, a new (Proficiency Service) "Supply Contract" between ASPAC and Global Proficiency Limited was signed, with an end date of 30/12/2018. This provides operational security for both parties well into the future.

ASPAC-LPC members, particularly Dave Lyons and George Rayment, continue to make good progress in completing annual proficiency program reports. Completed reports are being uploaded onto the ASPAC public web site as pdf files.

Other matters presently before the ASPAC-LPC include:

- new arrangements and costs for future Acid Sulfate Soils Inter-laboratory Proficiency Programs;
- changed arrangements for the certification of low-level plant Si and Se tests;
- new Code 6B5 for soil carbon;
- membership of ASPAC-LPC going forward; and possible introduction of proficiency testing for measurements of soil physical properties.

It was agreed that Dr Leigh Sparrow, a former ASPAC Chairperson from Tasmania, would join the Committee and would attend the next in-person meeting, expected in an early month of 2016.

## The Methods Committee

The Methods Committee would like to encourage members to contribute to the ASPAC Digest. We have included the following article as an example that potentially could be published in the Digest. A chance to get those notes and tweaks made to methods out of Lab books and into the industry domain to possibly engender discussion and the sharing of experience.

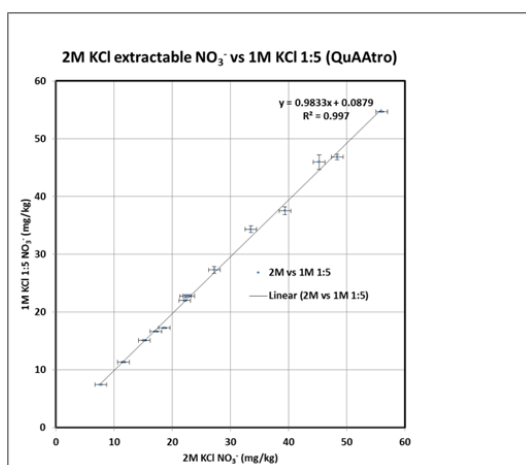
### Comparison of extractant, extractant concentration and extraction ratios in determining mineral Nitrogen concentration of Soil.

Mineral N is traditionally extracted with 2 M KCl (1:10 1 h), and mineral P with 0.002 M CaCl<sub>2</sub> (Rayment and Lyons 2011), then commonly analysed by a segmented flow auto-analyser system. It was envisaged that a 1 M KCl extractant (utilising a 1:5 extraction ratio and 1 h shake) could be used to simultaneously analyse for nitrate- and ammonium-N, as well as mineral P. The 1:5 ratio was selected, at least in part, to give better sensitivity for soils with low levels of available phosphorus. With the purchase of a new 4-channel (SEAL QuAAtro) instrument by the Chemistry Centre, there was the potential to run a single extract simultaneously for nitrate, ammonium and phosphorus. Further thought was given to using K<sub>2</sub>SO<sub>4</sub> as an extractant as this is routinely used for the determination of soluble organic carbon. For this report the focus is on the results obtained in the determination of mineral nitrogen.

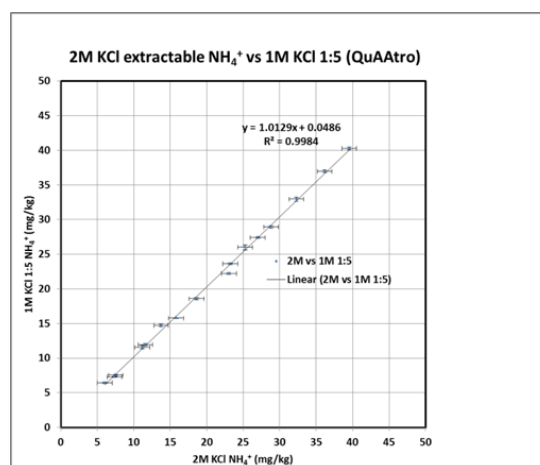


Fourteen agricultural soils (that had not recently been amended with nitrogenous fertiliser), with natural nitrate and ammonium concentrations in the range of interest (i.e. 0–60 mg N/kg) and spanning a wide range of soil properties (e.g. clay content ranged from 3 to 63%, sand from 21 to 90%, CEC from 2 to 73 cmol+/kg, EC from 0.01 to 0.59 dS/m, Walkley & Black organic carbon from 0.6 to 3.4%, Colwell P from 2 to 89 mg/kg, and BSES P from 2 to 255 mg/kg) were selected to compare 1 h extractions (at 20–25°C) for mineral N using 2 different extractants (i.e. K<sub>2</sub>SO<sub>4</sub> and KCl). For the KCl extractant, the effect of concentration (1 M or 2 M) was investigated, and for 1 M KCl, the effect of extraction ratio (either 1:5 or 1:10) was also explored. The single K<sub>2</sub>SO<sub>4</sub> extraction treatment used a 1 M solution and a 1:10 extraction ratio.

The 2 M KCl ‘reference method’ (Rayment and Lyons Method 7C1) employs a 1:10 extraction ratio with 10 g of soil. The K<sub>2</sub>SO<sub>4</sub> extraction procedure used a 1 M solution and a 1:10 extraction ratio. All four treatments used 10 g of soil and each of the treatments the soils were replicated (n = 3). Extract solutions were analysed on the day they were extracted using the Seal-QuAAtro multi-channel auto-analyser.



Graph of nitrate-N extracted by 2M KCl (1:10) vs 1M KCl (1:5). (Points are the average of three replicates, Error bars are +/- 1 s.d.)



Graph of ammonium-N extracted by 2M KCl (1:10) vs 1M KCl (1:5). (Points are the average of three replicates, Error bars are +/- 1 s.d.)

The following tables summarise all of the results

### Statistical data for nitrate-N

NITRATE	Slope	Lower 95% CI	Upper 95% CI	Intercept	Lower 95% CI	Upper 95% CI	R <sup>2</sup>
2M KCl vs 1M KCl	0.997	0.967	1.027	-0.293	-1.260	0.673	0.998
2M KCl vs 1M KCl 1:5	0.981	0.943	1.020	0.158	-1.096	1.411	0.997
2M KCl vs 1M K <sub>2</sub> SO <sub>4</sub>	0.966	0.907	1.025	0.534	-1.363	2.431	0.993
1M KCl vs 1M KCl 1:5	0.985	0.962	1.008	0.442	-0.277	1.161	0.999
1M KCl vs 1M K <sub>2</sub> SO <sub>4</sub>	0.971	0.929	1.012	0.786	-0.525	2.098	0.997
1M KCl 1:5 vs 1M K <sub>2</sub> SO <sub>4</sub>	0.986	0.954	1.017	0.343	-0.663	1.349	0.998

### Statistical data for ammonium-N

AMMONIUM	Slope	Lower 95% CI	Upper 95% CI	Intercept	Lower 95% CI	Upper 95% CI	R <sup>2</sup>
2M KCl vs 1M KCl	1.019	0.999	1.038	0.042	-0.411	0.495	0.999
2M KCl vs 1M KCl 1:5	1.016	0.990	1.041	-0.032	-0.633	0.570	0.998

2M KCl vs 1M K <sub>2</sub> SO <sub>4</sub>	0.963	0.944	0.982	0.794	0.349	1.240	0.999
1M KCl vs 1M KCl 1:5	0.996	0.968	1.025	-0.058	-0.737	0.621	0.998
1M KCl vs 1M K <sub>2</sub> SO <sub>4</sub>	0.945	0.930	0.959	0.760	0.412	1.109	0.999
1M KCl 1:5 vs 1M K <sub>2</sub> SO <sub>4</sub>	0.947	0.926	0.968	0.845	0.349	1.341	0.999

The study showed no statistical difference in the concentrations of mineral N (nitrate) measured using 1M KCl (1:5), 1M KCl (1:10), 2M KCl (1:10) and 1M K<sub>2</sub>SO<sub>4</sub>. It also showed no statistical difference in the concentrations of mineral N (ammonium) measured using 1M KCl (1:5), 1M KCl (1:10) and 2M KCl (1:10). It did however show a small but significant difference between 1M K<sub>2</sub>SO<sub>4</sub> and all the various KCl extractant combinations for ammonium. There is opportunity for this work to be extended to soils with higher mineral N levels (e.g. those that have been recently been fertilised), and to those with a wider range of properties, although it is expected that similar results would be obtained.

Dr Angus McElnea

For a more detailed report or further discussion contact Dr Angus McElnea, Senior Chemist, Chemistry Centre, Queensland Department of Science, IT and Innovation. [angus.mcelnea@dsiti.qld.gov.au](mailto:angus.mcelnea@dsiti.qld.gov.au)

## ASPAC NEWS

### New Features for Certified Labs on our Website

Two important functions of ASPAC are:

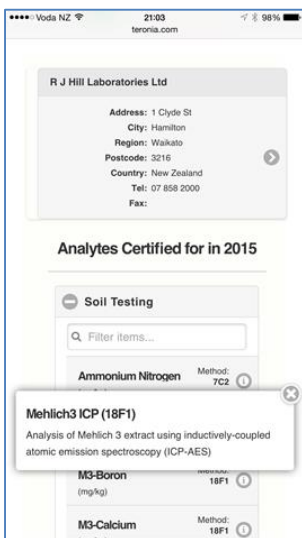
- to design and administer our Inter-laboratory Proficiency Programs; and
- to certify laboratories who have demonstrated proficiency in performing the various tests.

Hard copy certificates have been awarded to laboratories since the Programs started in the early '90's, but since 2007, ASPAC also displays the names and contact details of certified labs on our website on an annual basis.

The Website's underlying software is no longer supported. Accordingly, the ASPAC Executive decided to commission an update and make improvements at the same time.

Good progress has occurred, much of it 'behind the scenes'. Three new features, based on membership feedback and input from members of ASPAC's Laboratory Proficiency Committee and ASPAC's proficiency service provider (Global Proficiency Limited) are:

- When selecting or looking at an analyte, the Rayment & Lyons Method Code now has an 'i' button below it, which enables you to view details of the actual method. Method codes have also been included for Plant tests, which can also be similarly expanded.
- The ability to now search for a laboratory that is certified for a group of analytes, not just one analyte at a time. This is sensible as a customer looking for a laboratory will normally be interested in more than just one test.





- This new software is 'mobile enabled', i.e. it can be accessed through your mobile phone or tablet. This is very much the way the world is going today.

Other enhancements to the ASPAC Website are being planned, and will be rolled out in the future. The initial focus has been on the Certified Labs section, and these will 'go live' later this year..

Roger Hill

## **ASPAC sponsors South East Asian labs in 2016 Soil Inter-laboratory Proficiency Program**

Phil Moody, Queensland Department of Science, Information Technology and Innovation, was successful in attracting funding from the Crawford Fund to undertake a training/planning workshop at Phetchaburri in Thailand on 'Soil fertility assessment by quality-assured soil testing laboratories'. The workshop participants had attended the International Soils Conference 2015 in Cha Am, Thailand, and remained the extra time in Thailand to attend the workshop. Participants were lab managers from regional soil testing labs in Thailand, Cambodia, Lao and Indonesia.

Phil approached the ASPAC Executive to value-add to the workshop by sponsoring some of the labs to participate in the 2016 Soil ILPP so that they could aim for certification in the following key soil fertility measurements: pH, EC, exchangeable K, Walkley-Black and /or total organic C, and extractable P using Bray-P2 and Olsen-P. The Executive agreed to provide corporate membership for five labs for the initial first year and a contribution of \$2,000 to defray ILPP participation costs. This sponsorship was used to leverage funding from other sources, enabling the participation of soil testing labs from Thailand, Lao, Philippines, Vietnam and Indonesia in the next round starting January 2016.

These regional labs already have an inter-laboratory sample exchange program under the auspices of SEALNET (South East Asian Laboratory Network) organised by the central lab of the Thai Land Development Department. However, participation of the labs in the ASPAC ILPP will give them valuable experience in a much larger laboratory population, with the added incentive of achieving certification if they implement the necessary QA/QC processes that underpin reproducible and accurate soil test results. Results obtained by these laboratories from participation in the ASPAC program may also be used to assess and hopefully validate the regional SEALNET program. The opportunity also exists for the SEALNET program to include one of their soils in the ASPAC program.

Interestingly, power outages preclude undertaking the long extraction period required by Colwell-P. Despite major variations between labs in time of extraction and soil:extractant ratio, Bray-P2 remains the soil P 'method of choice' in the region, despite very limited and questionable interpretation guidelines. Attempts will be made to encourage those labs not currently undertaking Olsen-P to try it, and compare results with their Bray-P2 results.

Dr Phil Moody

Dr Phil Moody is the Science Leader of the Soil Processes group of the Queensland Department of Science, IT and Innovation.

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