

Hot off the block



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Looking Back on 2011

This year has zoomed by with a few good things happening for WAS.

Matthew and Lyn have worked hard to write up our OH method for publication, and it is available for viewing from the website (under Research / WAS Research papers).

Matthew was also invited to give a paper about Zinc contamination issues to the 3rd Annual Zinc Symposium in Hyderabad. There are some extracts from his presentation following.

Lyndon once again assisted in the ASPAC (Australasian Soil and Plant Analysis Council) Plant Workshop. This program is aimed at improving the performance of laboratories by training the people who actually do the work. The program is well received, participants being quite gob-smacked at the systems WAS has in place to ensure high quality results for our clients.

WAS has strengthened the ties with FoodPlus with Lyndon and Matthew joining forces with David Apps to form the Analytical Oversight Team, perhaps we shall call them the "A-Team". There will be mutual support and training between WAS and the Fatty Acids Laboratory.

Hopefully we will get a new digestion laboratory in 2012. This will be upstairs from the current position and will help us to better manage "biological" samples, such as blood. Teresa, Lyn and Matthew will move into the larger "half" of LG11, so we will still be easy to find for sample delivery.

End of Year

The end of year is nearly upon us.

The laboratory will be closed from December 26th to January 3rd. The last receival day for "consultant" samples to be reported before Christmas is Friday 16th December. Samples received after that will be reported next year. Dried research samples can be submitted any time.

Nutrition of Sweet Potato and Cassava, Papua

**By Dr Graham Lyons
School of Agriculture, Food and Wine**

Having been trained in Public Health, Graham takes a keen interest in human nutrition and has been especially interested in Selenium and Vitamin A. Graham is

in this issue

Nutrition of Sweet Potato and Cassava, Papua

Did You Know? From Matthew Wheal's presentation at the 3rd Annual Zinc Symposium in Hyderabad

Warning About Tungsten In Grinders

Why people choose WAS

Season's Greetings

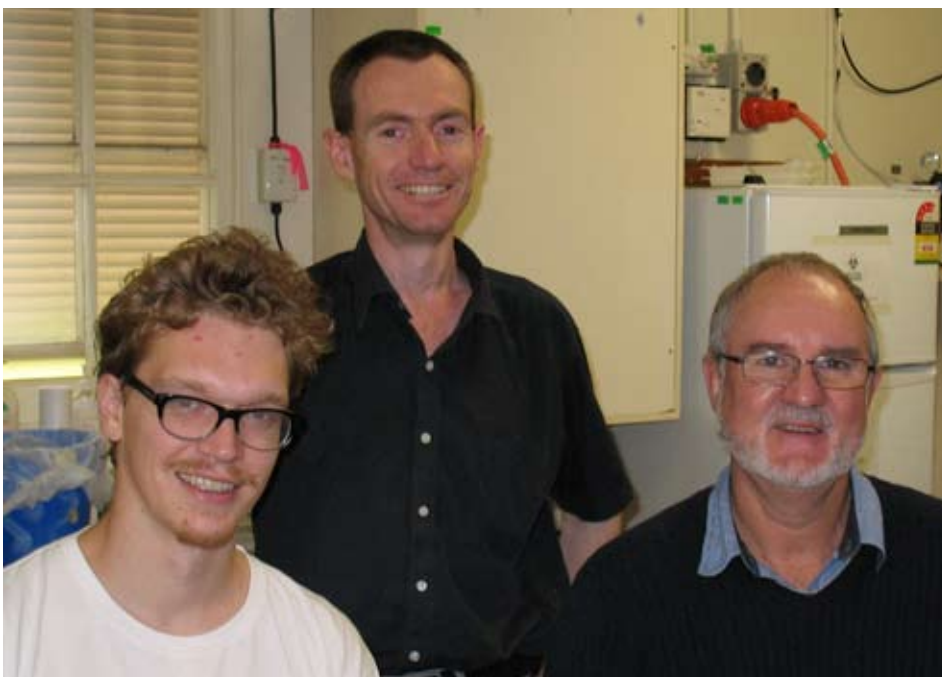
convinced that poor Selenium nutrition contributes to poor health outcomes including an increased risk of many of the cancers that plague affluent western societies.

As part of the ACIAR pig-sweet potato food system program in Papua, Indonesia, WAS analysed sweet potato leaves and storage roots and some cassava leaves from the two places we are working in. They indicated that the SP in the Arfak Mountains (near Manokwari, West Papua) and in the Baliem Valley (in the mountains in the heart of Papua...you have to fly in to get there) were adequate for N, P, S, Ca, Mg, Zn, Mn, Cu, but a bit low in K (around 2.5%) in both areas, and low in B in Arfak (17ppm, v 32 ppm in Baliem).

The biggest difference, however, was for selenium. This was analysed to provide information on human and animal nutrition, whereas it has negligible effect on plants. Arfak was revealed as a typical low-Se area, with mean leaf levels around 35 ppb (i.e. 0.035 ppm), whereas Baliem had quite high levels: 84-650 ppb, mean around 300 ppb. Certainly, the health of the people is generally better in Baliem; indeed the health stats in Arfak are the worst I have ever encountered.

From the representative sample of 80 families we surveyed, most had either one or no children under 15 years (most do not make it to weaning) and hardly anyone is over 45 years...most have succumbed to infectious diseases, exacerbated by the typical low-protein diet, which would also be low in Fe, Zn, Se, vitamin A and B vitamins.

Pigs are not as numerous as in Baliem (like the people, they have high pre-weaning



The A-Team: David Apps, Matthew Wheal & Lyndon Palmer (left to right).

mortality), and they are rarely eaten, but viewed largely as money in the bank. Our aim is to improve pig husbandry (including housing) to reduce diseases and improve nutrition, introduce suitable poultry, and improve the sustainability and nutritive value of the SP food system, by growing Vetiver grass (for K), Mexican sunflower (for P) and various legumes like pigeon pea, lablab, Sundaleka (for N) on improved fallows. Then the SP can theoretically be grown continuously on the same land (year after year) by using composted mounds (much of the compost coming from the improved fallow).

Currently in Arfak, SP is grown for one year only (straight into the ground with no mounds), followed by around 5 years' fallow. Yields are low and the system is wasteful and unsustainable. In addition, pigeon pea, winged bean and mung bean and several other vegetables are being trialled, in an effort to improve the diets of both people and pigs. Interestingly, the government does not allow the use of inorganic fertilisers here, and in any case they would usually be too expensive for subsistence farmers. This increases the imperative to use deep-rooted plants like Vetiver, Mexican sunflower and pigeon pea to increase the supply of nutrients from the subsoil to the topsoil for shallow-rooted crops like SP. Root crops generally have a high demand for K, thus



An Arfak family



Dani boy

Vetiver, one of the few plants that can make extra K available for adjacent crops, is an important part of the proposed system. SP should not have too much N or vines will proliferate at the expense of storage roots.

As an aside, whenever Se is analysed, there is likelihood of an interesting, even anomalous, finding.

In this case it was the highest levels of 400-650 ppb occurring in SP leaves grown on low pH soil (4.9 H₂O pH) at Timia, Baliem Valley. Generally Se is at its

most plant-available in high pH soils. This sort of surprising result is what makes Se (in my humble opinion) the most interesting of micronutrients!

The cassava leaves analysed by WAS from Baliem had, as usual, more Zn than the SP leaves: 110 ppm v 25 ppm. I have found cassava leaves to have the highest Zn concentration of any crop I have analysed in Africa, Melanesia and Colombia...and this is testing different crops grown together in the same soil/garden. Cassava storage roots, on

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the other hand, are usually low in Zn (and other minerals and protein). I am not sure how bioavailable the Zn in cassava leaves is...someone should study this. They are high in protein and carotenoids as well. I am afraid I am a sceptic of the attempt by the Danforth Centre in the US (funded by around \$20m of Gates money) to develop (by GM) a "complete food" cassava root: surely it's better to work with the existing strengths of the plant: roots for CHO, leaves for everything else!

In conclusion, WAS is/are vitally important in the work I have done/am doing in various countries in identifying the most critical nutritional deficiencies and monitoring improvements provided by biofortification and increased food diversity.

Thanks, Graham, for volunteering this article. WAS wishes you well for your project, not only for your sake, but for improved health outcomes to the beautiful people represented by your photos.

Did You Know?

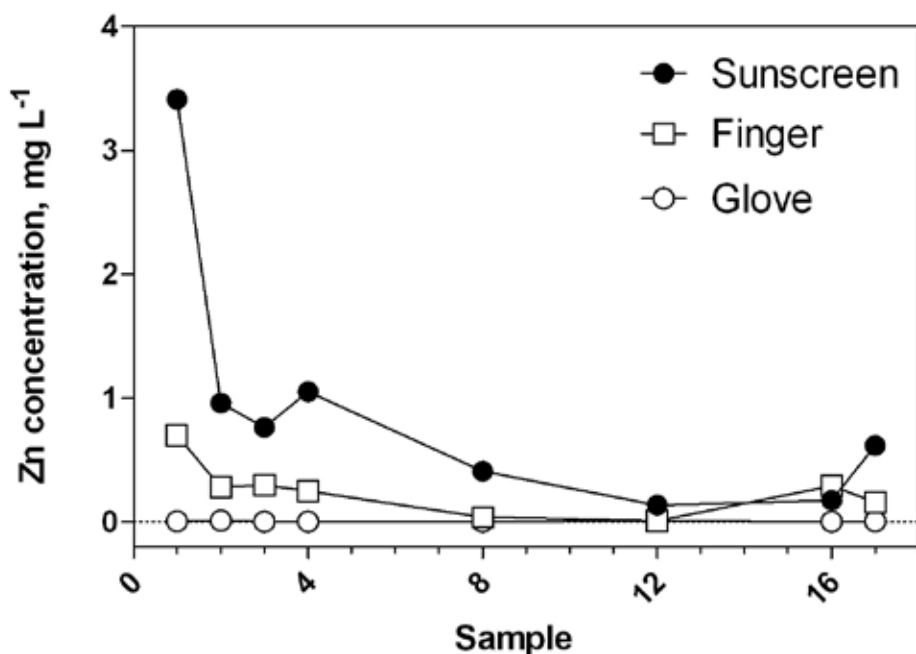
From Matthew Wheal's presentation at the 3rd Annual Zinc Symposium in Hyderabad.

Zn is present in many common materials. A lot of sunscreens contain zinc oxide (ZnO) at levels up to 25% w/w and are often designated as "water-resistant" and "long-term". Similarly, calamine lotion (anti-itch cream) has 11-13% Zn w/w. Some gloves, even if designated "un-powdered" can still contaminate with zinc from the latex.

The graph below shows the degree of contamination of clean 4% HNO₃ from bare fingertips and fingers after applying 6% ZnO sunscreen compared to the high quality gloves used by WAS. A reading of 3 mg L⁻¹ from the initial sunscreen sample translates to approximately 250 mg kg⁻¹ in a leaf sample. The residual effect lasted for 16 consecutive samples and could be increased by actively agitating the samples (sample 17). Gloves showed essentially zero Zn in all samples.

The take home message is: read the label, and think about all possible sources of contamination.

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Graph: The degree of contamination of clean 4% HNO₃ from bare fingertips and fingers after applying 6% ZnO sunscreen compared to the high quality gloves used by WAS.

Warning About Tungsten in Grinders

We routinely monitor two wavelengths for most elements of the Standard Plant Suite. This helps to identify contamination etc.

A batch of samples we analysed recently had significant differences between the comparison lines for several elements. Further investigation indicated that the interfering element was Tungsten.

When we talked to our client, he confirmed that the samples had been ground in a tungsten ball-mill. Time permitting, we may have more to say about this in the next newsletter.

WAS has a bulk rice sample that we use to check for metal wear in our grinders and we are happy to send some to clients to check their mills before grinding precious research samples.

Why people choose WAS

I like to think the reason people choose WAS is our high quality analytical results and good customer service.

We spend a lot of time talking to clients to ensure they get the best results possible

for their samples. Back in July, we were considering the digestion method options for a new consignment from Irene Waters, from the Department of Agriculture and Food Western Australia (DAFWA), so we revisited an old result file and found there had been an error in calculations. We re-calculated the results and sent Irene an amended report and humble apology. We were a little surprised by her response...

"The ongoing critical review of your methods and results are the exact reason we have confidence in analysis that we have done by you".

In this instance we had already fixed the systems error that caused the problem and checking similar jobs came up with no further problems, much to our relief.

Season's Greetings

The Staff of Waite Analytical Services thank you for your support in 2011 and extend the compliments of the season to all of our clients and friends.



Your Stories

If, like Dr Graham Lyons, you have a story about how WAS has helped your research project, we welcome articles from anyone who wishes to share their work and insights with other WAS clients. Just email your story to teresa.fowles@adelaide.edu.au

Your Feedback

What do you think of the WAS newsletter 'Hot off the block'?

Do you find it useful, interesting and enjoyable? Do you have any feedback to share with us?

Or would you like to share the benefits of WAS analyses to your work?

I'd love to hear your feedback, so send me an email at teresa.fowles@adelaide.edu.au



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