

Focus on the future with soil testing



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When the cotton has been picked and the season is over, what's next?

Many growers will be looking for an opportunity to wipe the slate clean and look ahead to next season.

Soil testing is a great way to focus on the potential productivity of the future.

This year it may even provide some welcome news, revealing higher starting nitrogen reserves than expected where lower yielding crops have not used all of the nitrogen supplied.

A complete post-harvest soil testing program will give you a better understanding of the soil nutrient status and the confidence to develop precise fertiliser strategies.

Soil testing is a valuable tool - when it is done well.

The following tips provide some guidance to establishing effective post-harvest soil testing programs with your cotton growers.

Sample collection

The key to good results from soil testing is a planned and consistent soil sampling program.

Aim to perform the soil sample collection at the same time of year for consistency of results in long-term fertility monitoring programs.

Any time from April to August is fine, but for easier access to fields and meaningful results, wait until some ground preparation, cultivation and incorporation of residues has occurred.

When it comes to sample collection, there are two schools of thought. Both can be successful, depending on your objective with soil testing.

The most common strategy is to throw all the samples from the same depth in a bucket together for a composite snapshot of the paddock.

A thoroughly mixed and homogenous composite sample can provide an effective snapshot in time.

The other option is to consistently return to physically marked or georeferenced positions within fields.

With this method, you can compare areas and potentially diagnose growth or yield problems.

The samples may be from proven high, average or poor performing areas, or areas where some change in practice has been imposed that you are trying to measure. Where areas are to be compared, the samples need to be kept separate.

A representative sample

You will not get accurate results from soil testing unless you take the right amount of samples, from the right areas, at the right depths.

For a standard post-harvest soil testing program where the aim is to establish a fertiliser program for next season's cotton crop and monitor fertility longer term, a representative sample is required and variability should be avoided.

If there are significant areas of different soil types in the paddock, these should be sampled separately. Consider potential sources of variability for diagnostic testing if required.

Otherwise, the main area of variability in cotton systems is likely to be in the previous fertiliser bands.

The formula for the number of samples taken within the previous band and the number to be taken outside this band is to multiply the row width (cm) by 0.262. This gives the number of cores to be taken away from the band (for every core taken in the band) for accurate phosphorus and potassium results.

This is particularly important in dryland cotton, wide row or skip row configurations where the location of the fertiliser bands depends on the crop in the rotation and where minimal soil mixing occurs due to reduced or minimum tillage practices.

The recommended number of samples for a single comprehensive surface 0-10 cm or 0-30 cm soil test is 30 to 40 cores. This is the same for deep cores or surface in dryland systems. (Peverill, Sparrow & Reuter, 1999)

For irrigated cotton crops, consider the sample number recommendations outlined in Nutripak. Whichever system you follow, keep your own protocol consistent and repeatable.

If this seems like a lot consider how much soil there is in the paddock - a rough guide is 1300 tonnes per hectare (based on the top 10 cm of soil with a bulk density of 1.3). At the laboratory, a small sub-sample of your sample will be tested.

Figure 1: Obtaining a representative sample



A representative paddock sample can be taken on a zig zag pattern across the paddock, on a transect line, from paddock zones, in a cluster or from a grid pattern. The pattern of sampling needs to be rigorous and repeatable, and statistically, the transect is the most practical method.

Sample for the full suite of analyses in the top of the profile, where wetting and drying cycles occur more frequently and root systems proliferate or grow past.

The next layer down can be sampled intermittently (every five to seven years) for immobile nutrients like phosphorus and potassium.

The lower depths of the profile can be sampled for mobile nutrients and the presence and depth of any subsoil constraints.

The following guide shows the recommended sample depths for a range of nutrients.

Annual snapshots of ammonium, nitrate, sulphur, chloride and electrical conductivity should be the minimum.

Because less mobile nutrients and subsoil constraints change less readily, they should be taken at depth increments that align with previous samples.

Table 1: Suggested sample depths for dryland and irrigated cotton

Dryland Cotton	
0-10cm	Nitrogen, phosphorus, potassium, sulphur, zinc, organic carbon, salinity, sodicity
10-30cm	Nitrogen, phosphorus, potassium, sulphur, salinity, sodicity
30-60cm	Nitrogen, sulphur, salinity, sodicity
60-90cm	Nitrogen, salinity, sodicity
Irrigated Cotton	
0-30cm	Nitrogen, phosphorus, potassium, sulphur, zinc, organic carbon, salinity, sodicity
30-60cm	Nitrogen (phosphorus, potassium optional) sulphur, salinity, sodicity
60-90cm	Nitrogen, salinity and sodicity

Source: Adapted from Bell & Lester, 2015, GRDC "The what where and why of soil testing in the northern region"

Selecting tests

A post-harvest soil testing program will often be a comprehensive program, including all of the macro nutrients.

Consider Colwell P for plant available phosphorus and BSES P for slower release soil phosphorus reserves and any build-up of fertiliser phosphorus.

Also include exchangeable K ammonium acetate, MCP-S for sulphur and 2M KCl extractable mineral N for nitrate nitrogen and ammonium nitrogen.

Other tests which can aid in your interpretation include PBI (this is included with Colwell P at Nutrient Advantage Laboratory Services), organic carbon and total soil nitrogen in the surface sample (as a guide to mineralisation potential), EC for soil salinity and chloride and other exchangeable cations.

Micronutrients are better assessed with leaf testing.

Keep it clean

Anything that the soil comes in contact with is a potential source of contamination for the soil sample.

Keep all the sampling equipment clean and place the samples directly into clean buckets and sample bags. Keep your hands clean too.

Sampling probes should never be made of galvanised steel as this will contaminate the soil samples.

A quality laboratory

The Nutrient Advantage® laboratory offers quality soil testing for cotton advisers.

It is a NATA accredited and ASPAC certified laboratory for quality results at industry-leading turnaround times. Soil test results are completed within five business days of receiving the sample.

Because any variations in soil sample temperature or moisture will affect the results, a quick despatch to the laboratory is paramount.

Ideally, put the soil in a cooler or fridge to transport it back from the farm. Use a courier that will provide rapid delivery of samples to the laboratory and avoid sending samples over the weekend.

Further information

It's all about planning, so take the time to research your soil testing approach before heading out to see growers about post-harvest soil testing.

The following are excellent resources:

- NUTRIpak
<http://www.cottoninfo.com.au/sites/default/files/documents/NUTRIpak.pdf>
- CottonInfo
<http://www.cottoninfo.com.au/sites/default/files/documents/Soil%20nutrient%20sampling%20guidelines%20for%20cotton.pdf>

For more information, feel free to contact me on 0417 896 377 or bede.omara@incitecpivot.com.au.

For more information about soil testing contact Nutrient Advantage Laboratory Services on [Nutrient Advantage Laboratory Services](#) on 1800 803 453.



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