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Sampling for Analysis

Analysing plant tissue, soil, growing media, water and hydroponic solutions produces numerous benefits to the grower: a proven process to achieve much healthier and stronger crop growth with higher yields and added disease resistance; production becomes more efficient as growth improves due to less plant stress and less disease control measures; and minimised crop loss. The key to effective analysis is timing and knowing how and what to sample in order to optimise the amount of fertiliser/ameliorant required for a specific growth stage. A prompt return of test results will allow the corrective measures to be applied on time instead of weeks later when less than ideal growth has occurred or problems have compounded.

Analysis results provide:

- Environmental and cost saving measures by eliminating fertiliser overuse.
- Diagnosis of nutrient deficiencies, toxicities and imbalances (measured against recognised crop specific guideline levels).
- A monitoring system of current practices and subsequent effectiveness.
- Predictive fertiliser usage and depletion.
- Added profits with improved yield.

Sampling for Analysis



2. Taking Samples

There are essentially two strategies when sampling for analysis: (1) diagnostic; and (2) monitoring. Diagnostic samples are taken when an area of a crop has obvious (or suspected) good and poor growing zones whereas a monitoring sample is used to assess and correct the whole crop. In both strategies, samples are taken according to a planned route and submitted to the laboratory for analysis.

All samples need to be correctly labeled. This ensures the sample can be uniquely numbered, identified and tracked within the laboratory and the results can be correlated to the areas submitted for analysis. The details for each sample need to be completed on an Analytical Request Form and corresponding sample container (bag or bottle). Phosyn Analytical will supply the following free of charge: Analytical Request Forms, plant tissue sampling bags, soil sampling bags and bottles for water and hydroponic samples.

2.1 Plant Tissue

The health of a crop can be assessed by measuring the nutrients within a specific part of the plant. Each crop has a normal range and this range is different for each nutrient and crop type. Plants will exhibit signs of deficiency but the visual symptoms may only appear when nutrient levels have reached a point well below the normal range, (as shown in the table below) and may have already inhibited growth.

When taking your plant tissue samples you need to determine which

plant part to take and when. This can be the youngest mature leaf, leaf stem /petiole, or even fruit/fruitlet or tuber – it depends on the season, plant growth stage and where the nutrients are currently being stored. The whole plant, including roots may be required for seedlings. Each species is unique but generally it is the youngest fully matured leaf or its subtending petiole that is used. This plant specific information can always be obtained by contacting the laboratory. You should not take

Ornamental Plant Leaf Guidelines

	Nitrogen (%)	Phosphorus (%)	Potassium (%)	Calcium (%)	Magnesium (%)
Azalea	2.0 - 2.3	0.3 - 0.5	0.8 - 1.0	0.20 - 0.30	0.17 - 0.33
Carnation	3.0 - 5.0	0.25 - 0.45	2.5 - 4.0	1.0 - 2.0	0.20 - 0.50
Geranium	3.3 - 4.8	0.40 - 0.65	2.5 - 4.3	0.81 - 1.20	0.20 - 0.52
Rose	3.2 - 4.5	0.20 - 0.30	1.8 - 3.0	1.0 - 1.5	0.25 - 0.35

or include samples that are dusty, have soil on them, or have been sprayed with pesticides or foliar nutrients within the last 3-5 days, as this will affect the results of the tests. Also avoid diseased, dying and insect or mechanically damaged plant parts where possible.

Collect plant parts that are a good representation of your crop using clean tools. Generally, fill the bag to $\frac{1}{2}$ to $\frac{3}{4}$ full, or two good handfuls of fresh plant material for each sample required.



A representative amount of plant material needed to undertake analysis

2.2 Soils and Growing Media

Most nutrients used by plants are derived from the soil/growing media, therefore analysis of the soil/growing media provides a starting point to calculating your crops nutrient needs.

Soils, potting mix, peat, compost, coir, manures and mulches can all be analysed. To take your soil/media samples you will need an auger and hand trowel or spade with a plastic bucket to combine the cores. Your tools should be clean and preferably stainless steel or chromium plated.

To sample from pots, take a core from top to bottom, and equidistant from the centre and edge of the pot. If sampling a new batch of growing media before potting simply ensure that the media is thoroughly mixed and send a representative portion.

When sampling to monitor a crop, the

individual sub-samples should be taken along a carefully planned route across the paddock. The “W-pattern” sampling plan is adaptable to most shapes of field, nursery bed or area of potted plants.

Choose a start position and move away from this point, avoiding all areas which are not representative of the area such as fences, hedges, tracks, and patches of poor growth. It is recommended at least twenty sub-samples be taken at regular intervals along this sampling path. Around twenty sub-samples are required even from small paddocks or areas.

At each of the twenty sub-sampling points, take a sample to a depth of 10cm for most agricultural/nursery crops, and place in a bucket. Thoroughly mix the combined sub-samples with your trowel, avoiding spillage. Fill the sample bag with soil from the bucket, and seal securely. Label the bag. As a general

guide, a $\frac{3}{4}$ filled bag will weigh about 500g.

Avoid taking samples immediately after applying any additives such as lime, gypsum, fertilizers or chemical conditioners and it is best to allow saturated soils/media to naturally drain before attempting to take samples. Soils that are very rocky can have a low amount of soil compared to the rock component. Once sieved there may be insufficient sample to carry out analysis. Remove any larger particles of rocks, leaves and roots to avoid this happening. Samples of growing media, mulch and other similar materials with larger particle size generally weigh less than the same volume of soil. Therefore it is important to ensure that there is enough sample in the bag and that it does not predominantly consist of large particles such as rocks or twigs.

2.3 Water & Hydroponic Solutions

Many irrigation sources are “unknown substances” in that they can contain hidden elements. As some irrigation waters are taken from natural catchments there are soil leached nutrients to be accounted for with the possibility of nutrients reaching toxic levels.

Your water may be used for irrigation/fertigation, as a chemical spray diluent,

and as potable water for human consumption or livestock. Water analysis results are beneficial in: determining the suitability for the proposed use (additional biological testing is required when analyzing for human consumption.); complimenting soil and plant tissue analyses: and providing assistance in environmental monitoring.

Water samples should be submitted in bottles supplied by the laboratory or recycled plastic water bottles, eg: Mt Franklin Spring Water bottle. The bottles must be triple rinsed before filling with the sample being submitted for analysis. Use the same water that is to be analysed for rinsing ensuring it is not returned to the bulk supply. An amount of 200ml is sufficient for analysis.

3 Packaging Samples

The main concern for packaging your samples correctly is to have them arrive at the laboratory in excellent condition. An appropriate clean bag or container must be used for your samples.

When placing plant tissue samples into paper bags, take note whether the sample is holding excess moisture which may result in the bag disintegrating and losing its' contents. This is of particular concern if more than one sample is packaged; the potential for the samples to become mixed or contaminated may increase. This can be overcome by placing packing material around

the bags to prevent movement during transportation; double bagging the laboratory bags into paper bags; and ensuring that your samples are not wet from rain or overhead watering.

Plastic bags are provided for the soil/ growing media samples as they are stronger. The plastic soil bags also contain dust and small particles easily and will not disintegrate with any moisture held in the soil sample. Only 500 grams of soil per sample is required.

Water and hydroponic samples need to have lids tightly secured and taped if necessary to prevent leakage.

4 Posting Samples

Samples are best posted in express post bags or sent by overnight courier. If samples are collected on a Friday, store in the refrigerator at 4°C until Monday for dispatch.

When sending a large number of samples they can be packaged in cardboard boxes. A shipment of soil/ media and water samples may be quite heavy so it could be necessary to reinforce the packaging with tape to keep the box intact.

Another factor to consider is sending too much sample – excess weight and size to the packages increases your freight costs.

An Analytical Request Form top copy should be packaged and sent with all samples.

5 Receiving your Results

Phosyn Analytical guarantees your results within 5 working days of receiving the samples at the laboratory and they are usually sent to you as an email attachment for quick and easy access.

Where available and at no additional charge, the results will include crop specific guideline levels for each nutrient analysed in your sample. This information is collated to give a rating of your level; (e.g. Within the normal range, high, low etc.) Data only reports are also issued where requested. These reports will only contain the sample readings.



Laboratory supplied sample containers and Analysis Request Form

6 Sampling for Analysis example for Rosa sp

- 1 Collect plant samples; youngest mature compound leaf with petiole.
- 2 Collect soil/media samples.
- 3 Collect water samples.
- 4 Check samples are correctly labelled.
- 5 Package samples with Analytical Request Form.
- 6 Send to laboratory without delay.
- 7 Receive the results within 5 days.
- 8 Apply analysis interpretation to your crop.



Rose cutting and separate compound leaf with petiole



Clear, concise reports

7 Conclusion

When sampling for analysis, timing is critical in undertaking diagnostic testing or regular monitoring of your crop. Sample analysis is a cost effective measure aiding in superior crop growth, yield and production with added benefits of improved plant health, a reduction in time spent attending to poorly performing crops and increased profitability.

Main points to note when taking samples:

- Sample at the appropriate time.
- Samples should be representative, clean and uncontaminated.
- Label samples correctly.
- Package samples securely.
- Include Analysis Request Form.
- Send to the laboratory by quickest method possible.

Acknowledgments

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Sample analysis is a cost effective measure aiding in superior crop growth, yield and production

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