

# Sampling Instructions

EVERYTHING YOU NEED TO KNOW ABOUT  
HOW TO TAKE AND SEND SAMPLES



## **Microbiology Laboratories Australia provides world-class commercial microbiology analyses for agriculture, forestry and the environment.**

Our aim is to empower farmers, agronomists, natural resource managers, fertiliser manufacturers and Government to make informed decisions about the use and management of microbiology in soil, water, compost, fertilisers and other media by providing:

- Reliable and affordable microbiological analyses
- Support to assist in the use and interpretation of analyses
- Education and training
- Advice, and research and development consulting services
- Quality assurance services to industry and Government

We are committed to bringing proven, scientific, research-based technology to our customers in a clear, concise, no-nonsense manner to help them make informed decisions and increase productivity.

We believe that this will also help to develop and refine the use of microbiology in agriculture, natural resource management and fertiliser production to the benefit of our primary industries, productivity, health, technology and environment.

## Summary Checklist

**Detailed information on each of the steps below can be found further on in this document.**

1. Plan how many samples you need to take (see *Sampling*, page 7).
2. Order your Sampling Kits (from [www.microbelabs.com.au/sampling-kits/](http://www.microbelabs.com.au/sampling-kits/) or agents).
3. The idea is to keep the samples as cold as possible after sampling. Ideally, take an esky containing some ice bricks with you when you sample (see *How to Prepare Samples*).
4. For soil, compost and other solid materials, fill the supplied sampling bags to within a couple of cm from the top. For liquids, only three-quarters fill the sampling jars to prevent damage when freezing (see *How to Prepare Samples*).
5. For roots, collect sub-samples in the field into the disposable sampling bags before washing later. Only 10 mL of roots are needed for the final sample sent into the lab so it is not necessary to collect large quantities (see *How to Prepare Samples*).
6. For roots, wash off as much soil as possible in the disposable root sampling bags before placing a 10 mL sample of roots into the supplied vials, and refrigerate (do not freeze) root samples before sending to the lab (see *How to Prepare Samples*).
7. Consult Table 2 for how to treat your samples after sampling. For samples that need freezing, freeze at -18°C for at least 24 hours before sending to the lab. The freezer compartment of a domestic refrigerator should achieve this.
8. Freeze the supplied ice packs along with your samples.
9. Complete and print an Order Form on your PC or mobile device (download from [www.microbelabs.com.au/order-forms/](http://www.microbelabs.com.au/order-forms/)). Manual order forms are acceptable but incur an admin fee.
10. Place samples into the supplied large zip-lock bag along with the frozen ice packs. Place the zip-lock bag into the insulated bag and seal it (see *Posting your samples*). Don't put documents into the zip-lock or insulated bags as they can be damaged.
11. Place the insulated bag, the completed order form and the included Certificate of Accreditation into the supplied Express Post satchel. Sign the declaration on the front of the satchel and complete your contact details on the back.
12. Post the Express Post satchel in the yellow Express Post boxes, or lodge over the counter at a post office (see *Posting your samples*, page 11). Post no later than Wednesday to avoid weekend delays. If using a courier advise that delivery hours are from 9.30am.

## Overview

Taking samples for Microbe Labs microbiology tests is much the same as taking samples for nutrient and other types of tests in that the aim is to obtain representative samples that, once analysed, tell you what you want to know. You should also decide whether you want to test broadly across a wide area (general sampling) or investigate specific areas, such as soil types, 'problem zones', areas with different fertiliser, crop rotation or soil biology treatments (specific sampling). The information below will help you to follow a sampling pattern and to decide whether you want to undertake general or specific testing. Information on what and how much you need to sample is also provided, along with a general description of each test, what it is used for, and examples of why you may want to use it.

One difference between soil and microbiology samples is that in most cases **microbiology samples need to be kept cold or in most cases frozen (not roots)** as soon as possible after sampling (see How to Prepare Samples, page 6).

## Labelling

Work out in advance how you are going to identify your samples (for example, by paddock name, soil type, variety, etc.) and stick to it. Remember to label every container with your name and sample identification. This is the only way you will know which results belong to which sample.

## When is the best time to sample?

Use Table 1, opposite, to work out the best time to sample. You can sample at any time, depending on what 'question' you are asking. Otherwise, the best times to sample for each type of test are shown in Table 1. Try to avoid weather extremes (for example, very hot, cold or wet). Try to sample on a Monday so that the samples will arrive at the laboratory the same week. If you intend to sample periodically over time try to sample at regular intervals (e.g., the same time each year) and for samples that are best taken during the growth of crops try to sample at the same growth stage each time.

## How much material do you need?

Use Table 2, opposite, to work out how much material you need to sample.

**Table 1 – The best time to take samples for different Microbe Labs microbiology tests.**

Test	Best time to sample
Microbe Activity Wise	At any time.
Microbe Activity Wise Plus N Wise, P Wise & C Wise Microbe Wise Forecasts CropSaver VAM Wise for Soil VAM Forecasts Pre-Plant	Before planting. Allow enough time to receive the results and use them to make management decisions.
VAM Forecasts 3 week	Three (3) weeks after plant emergence.
VAM Wise for Plants	When plants have been actively growing for between 4-12 weeks. Record the number of weeks on the order form.
Microbe Wise All other agriculture tests	When the crop is at its maximum growth/activity rate. For example, for cereals, early boot stage. <b>Important: Sample from the root zone.</b>
Compost, fertilisers and liquids	When it best suits the information you need
All other tests	When it best suits the information you need

**Table 2 – Quantities of sample materials needed for Microbe Labs microbiology tests.**

Sample material	What	How much
Soil	Microbiology tests (except Nem Wise)	500 g bag (freeze)
	Nem Wise	500 g bag (do not freeze)
	Nutrients	500 g bag (freeze)
Compost	Microbiology tests	500 g bag (freeze)
	AS4454	≈ 15 L (see AS4454 sampling instructions)
	Nutrients	500 g bag per test (freeze)
Liquids	All (except nutrients)	≈ 200 mL in 250 mL sample jar (freeze)
	Nutrients	≈ 200 mL in 250 mL sample jar (freeze)
Roots	All	Half of 1 × 25 ml root vial (do not freeze)
Other materials	All	Please contact us to discuss

# How to Prepare Samples

## Sampling kits

We strongly recommend the use of Microbiology Laboratories Australia Sampling Kits. The sampling kits contain everything necessary to take and send up to five complete samples, including:

- Soils and other solid materials: 500 g sterile sampling bags (5).
- Soils + VAM Wise for Plants (roots): 500 g sterile sampling bags (5) + field root sample bags (5).
- Liquids: 250 mL sterile sampling jars
- Gloves (5)
- Order form (1)
- Express Post back to the lab (3 kg) (1)
- Certificate of Accreditation (1)
- Ice pack (1)
- Insulated bag (1)
- Insulated bag liner (1)

*Note:* extra root vials can be ordered for kits.

By using the sampling kit and following the instructions you will take the samples correctly and they will arrive at the lab in the best possible condition. This will ensure that you get the most accurate results. It will also help to ensure that you are compliant with interstate quarantine regulations. Samples received in containers other than those in the sampling kit may incur an additional fee to cover extra preparation time.

## Quarantine

Quarantine is a serious matter and all clients must abide by the relevant State quarantine regulations. A Certificate of Accreditation is included in the Microbe Labs Sampling Kits, which allows you to send sample materials to the lab in accordance with the quarantine regulations. Microbe Labs Test Agents outside of South Australia know how to export soil and plant matter from their State to Microbe Labs.

If you are unsure of the regulations that apply to you or find it difficult to comply with them, please contact a Microbe Labs Microbiology Test Agent that services your area who can assist you to send your samples (see [www.microbelabs.com.au](http://www.microbelabs.com.au)). Alternatively, please contact Microbe Labs directly: [info@microbelabs.com.au](mailto:info@microbelabs.com.au) or 08 7127 8982. It is the responsibility of the sender of soil and plant matter to ensure that quarantine regulations are followed.

# Sampling

## How many samples?

Soil: Aim to take at least 20 sub-samples (see *What is a sub-sample*, below) from each area you want to sample (for example, each paddock, glasshouse or compost pile) and mix them into one combined sample. To sample areas:

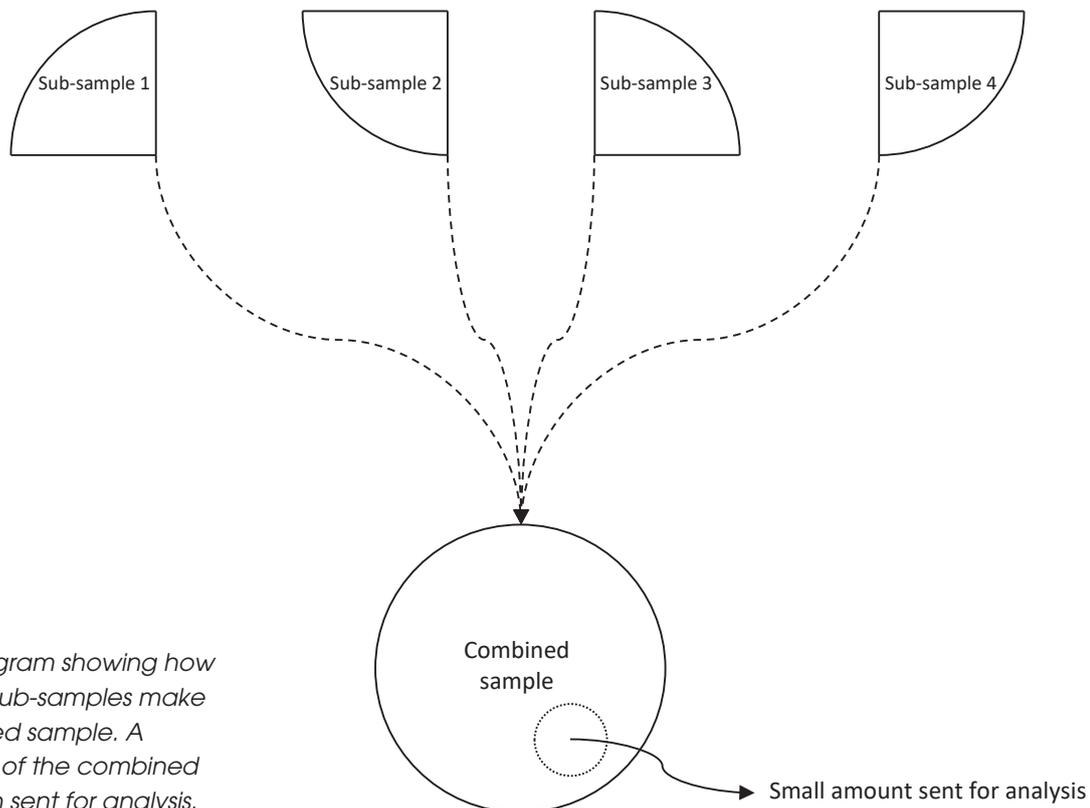
- greater than 20 ha, such as broad-acre paddocks, aim to take at least one sub-sample per ha
- less than 20 ha, such as vegetable plots and glasshouses, aim to take at least five sub-samples per hectare, with a minimum of 20 sub-samples in total.

Compost, aim to take:

- at least one sub-sample per 10 m row length or 10 m<sup>3</sup>, with a minimum of 20 sub-samples in total
- if sampling to AS 4454 and you are unfamiliar with the procedure please contact us at Microbe Labs to receive a free copy of our user-friendly guide for the AS 4454-2012 sampling procedure.

## What is a sub-sample?

A sub-sample is one part of a combined sample. A number of sub-samples are taken and mixed together to make a combined sample. A small amount of the combined sample is then sent for analysis (*Figure 1*).



*Figure 1 – Diagram showing how a number of sub-samples make up a combined sample. A small amount of the combined sample is then sent for analysis.*

# Soil Sampling

## **Always take a control sample**

We recommend that you always take a control sample from the same untreated or 'normal' area every time you sample. Microbiology changes relatively rapidly in response to temperature, moisture, humidity, fertiliser applications, crops, and other factors. Microbiology also differs between soil types, pH, and other edaphic factors. This means that it is impossible to devise absolute ideal levels for your particular situation or to compare results over time without a relatively stable reference point – a control. Good places to locate control sample areas are next to fence lines (provided there are no chemical residues, e.g., from treated posts), inside fenced off areas, or in corners not subject to traffic.

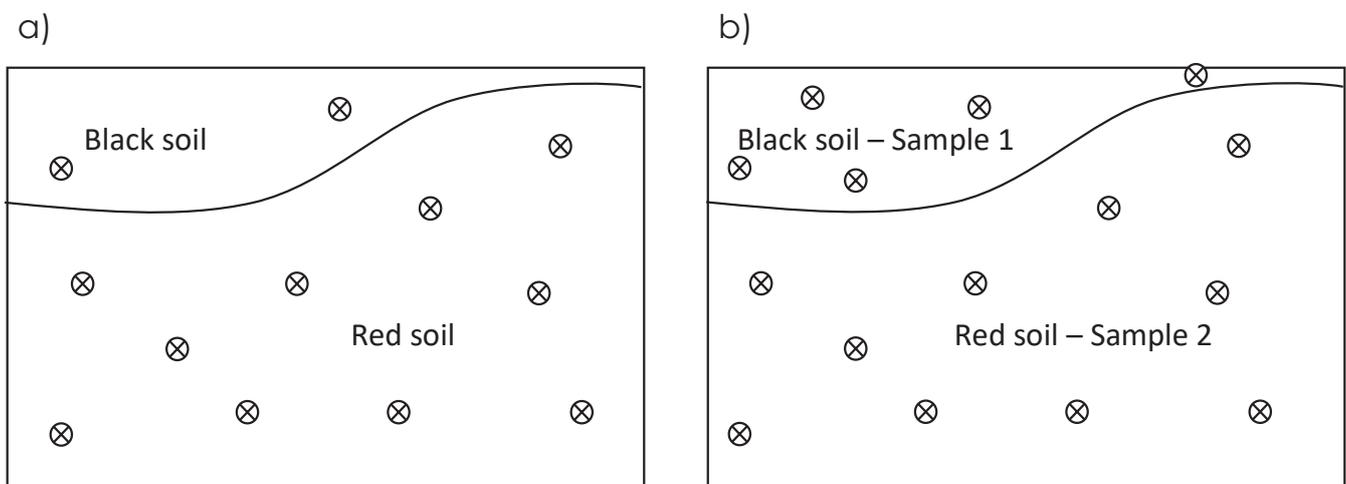
Having a control sample means that next time you sample you have a reference result for comparison between controls, and can determine whether your other results have moved up or down in comparison. For example, hypothetically, if both your control and field sample were '10' before sowing and, your control was '20' and your field sample was '30' mid-way through the season, you could conclude that your field sample had increased more than the control, and therefore more than was due to the normal influences of temperature, moisture etc. affecting both sample areas. Conversely, if both your control and field sample were '20' mid-way through the season, you could conclude that the microbiology in your field sample had not increased more than was due to temperature, moisture etc. The ability to make such comparisons will assist you greatly when interpreting your results.



## What type of sampling do I want to do - General or Specific?

### General sampling

When you want to test across a wide area, such as an entire field or glasshouse, try to take sub-samples from different areas, such as different soil types (*Figure 2*). Try to distribute the number of sub-samples from each area according to the proportion that it makes up of the total area. E.g., if 20 % of your 100 ha paddock is black soil and 80% red soil, aim to take 4 sub-samples from the black soil and 16 from the red soil.



*Figure 2 – Examples of a sub-sampling distributions for general (a) and specific (b) sampling. a) General sampling: 4 sub-samples are taken in the black soil area (20% of total area) and 16 sub-samples in the red soil area (80% of total area) to make one combined sample. b) Specific sampling: 20 sub-samples are taken in the black soil area to make one combined sample and 20 sub-samples are taken in the red soil area to make another combined sample, resulting in two, separate combined samples. Crossed circles represent proportionate sub-sample locations.*

### Specific sampling

When you want to test specific areas, such as problem zones, areas with different fertiliser, crop rotation or soil biology treatments, or different soil types, identify these specific areas and test them separately (*Figure 2*). This can help you to answer specific questions, such as:

- Is a problem zone caused by poor soil biology?
- Have different fertiliser applications improved soil biology?
- Do I need different strategies to improve soil biology on different soil types?

For example, if 20 % of your 100 ha paddock is black soil and 80% red soil; take five sub-samples from black soil areas, and, separately, eight sub-samples from the red soil areas. Mix the black soil sub-samples together into one combined sample, and the mix the red soil sub-samples into another combined sample.

## What soil sampling pattern should I use?

Try to take sub-samples in either a random, zigzag or systematic diagonal pattern across the sample area (Figure 3). Avoid taking sub-samples in concentrated clusters and along bed lines.

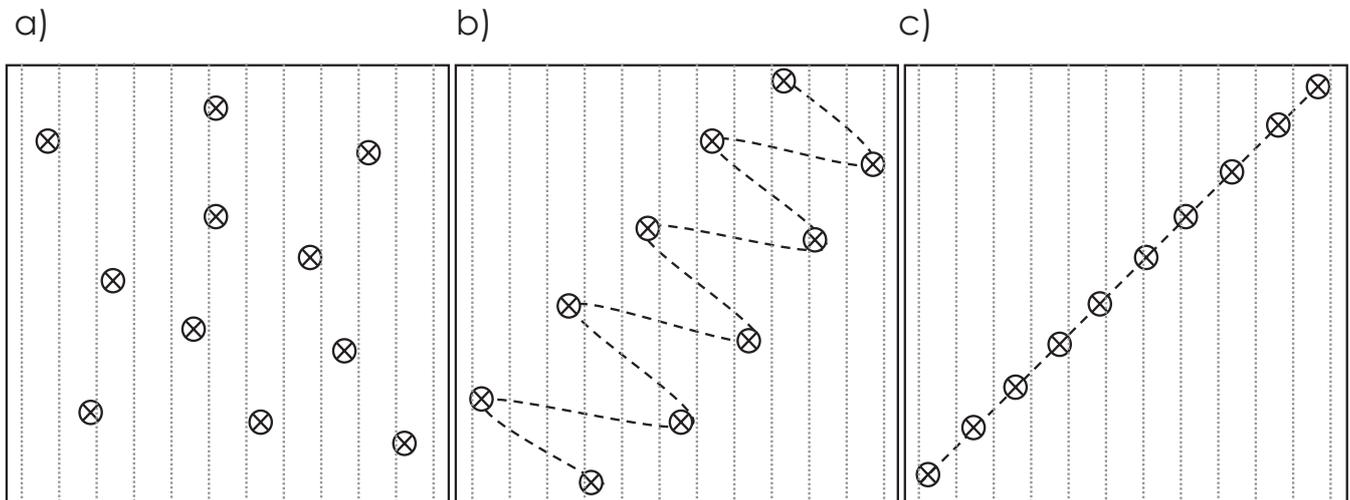


Figure 3 – Examples of sub-sampling patterns that will help to produce a representative sample: random (a), zigzag (b) and systematic diagonal (c). Crossed circles represent sub-sample locations. Black dashed lines represent a suggested pattern of travel while sampling. Grey dashed lines represent crop rows.

## Taking the soil sample

If you are testing the soil in a crop it is crucial that you sample soil from the root zone. For field crops the best location is within a few centimetres of where the main stem enters the soil. For vine and tree crops it will generally be underneath the canopy or around the canopy drip line (you may need to test with a spade). Be consistent across sub-samples and over time. You should see some roots in your soil sample, if not you are probably not sampling in the root zone and need to try another spot.

Use a soil auger, spade or trowel to scrape off the top few cm of soil and dig a 15 cm (6 inch) deep hole. Other sampling depths (e.g., 10 cm, 20 cm, etc.) are OK, just be consistent. If using a soil auger the captured soil is your sub-sample. If using a shovel or trowel take a sub-sample from one face of the hole, from top to bottom. Place the sub-sample in a clean container large enough to hold all the sub-samples for the combined sample. Repeat at each sub-sample location until you have taken enough sub-samples. Mix the combined sub-samples thoroughly (for about 2 minutes). Fill a sample bag with the mixed soil (approximately 500g).

Always wear clean gloves (such as those provided in the sampling kit) when taking or mixing soil samples to avoid sample contamination. Your test may not be accurate if you do not wear gloves.

Consult Table 2 for how to treat your samples after sampling. For samples that need freezing, freeze at  $-18^{\circ}\text{C}$  for at least 24 hours before sending to the lab. The freezer compartment of a domestic refrigerator should achieve this.

## Plant roots sampling

Depending on plant type, plant roots can be sampled in two ways:

- 1. Annual plants** - remove each sub-sample plant from the ground and shake as much soil as possible from the root system. Remove several pinches of roots from random locations within the root system. This can be done by hand or using a cutting implement. Place the sub-samples in the root sample bag.
- 2. Annual and Perennial plants, and trees** (can also be used for crops) – a soil sample containing roots can be collected from the root zone of the plants by digging down to a depth of 20 cm using, e.g., a trowel or spade, or by using a soil corer. Pick pinches of root sub-samples from the soil and place them in the root sample bag.

Use whichever method you find most convenient. Remember that only about 10 mL of roots are needed for the final sample sent to the lab so it is not necessary to collect large quantities of roots.

Once you have entirely completed your sampling, remove the root sub-samples from the root sample bag and wash off as much of the remaining soil as possible. Mix the sub-samples well. Take a 10 mL sample of the mixed roots and place it in a supplied plant root vial containing 10 mL 24% ethanol. Apply the cap firmly (do not over-tighten) and test that it is properly sealed by shaking vigorously for a few seconds.

Place the filled vials in hot (54° – a properly functioning domestic hot water service should deliver water at this temperature) water for 5 mins, then refrigerate them away from food and children until you send them to the lab. **Do not freeze** plant root samples.



## Compost sampling

Compost is best sampled using the procedure described in the Australian Standard 4454-2012 for compost, mulches and soil conditioners. If you are unfamiliar with this procedure please contact us at Microbe Labs to receive a free copy of our user-friendly guide for the AS 4454-2012 sampling procedure.

Always wear clean gloves (such as those provided in the sampling kit) when taking or mixing compost samples to avoid sample contamination. Your test may not be accurate if you do not wear gloves.



## Water and liquids sampling

Taking liquid samples for Microbe Labs microbiology tests is much the same as taking samples for other water and liquids tests in that the aim is to obtain representative samples that, once analysed, tell you what you want to know.

Approximately three-quarters fill a new 250 mL sample jar with the liquid (to allow room for liquid expansion during freezing). Do not over-fill the jar. Always wear clean gloves (such as those provided



in the sampling kit) when taking or mixing liquid samples to avoid sample contamination. Your test may not be accurate if you do not wear gloves.

Once you have entirely completed your sampling freeze all liquid samples at  $-18^{\circ}\text{C}$  with the ice pack for at least 24 hours before sending to the lab. The freezer compartment of a properly functioning domestic refrigerator should achieve this. Ensure the samples are separated from food and out of the reach of children.

## Posting your samples

Complete and print an Order Form on your PC or mobile device (download from [www.microbelabs.com.au/order-forms/](http://www.microbelabs.com.au/order-forms/)). Manual order forms are acceptable but incur an admin fee. Place the samples into the supplied zip-lock bag, seal it, place the sealed zip-lock bag inside the supplied insulated bag and seal it. Do not place documents inside the zip-lock or insulated bags as they may be damaged by moisture. Place the insulated bag in the Express Post satchel provided. Place the order form and Certificate of Accreditation in the Express Post satchel. Complete the sender's contact details on the satchel.



Remember to sign the 'No Dangerous Goods' declaration on the front of the satchel before posting or your samples may not arrive. Seal the satchel and post it in the special 'Gold' (yellow) Express Post boxes. If Express Post is not available in your area lodge the satchel in person over the counter at the Post Office to ensure that it arrives as soon as possible. Post the samples early in the week (no later than Wednesday) to help ensure they arrive at the laboratory the same week. If using a courier advise them that delivery hours are from 9.30 am to 5.30 pm Mon-Fri.

## Remember

If you get stuck, help is only a phone call away. Call your local Agent (the person who supplied you with these sampling instructions) or contact Microbiology Laboratories Australia using the contact details on the back. Contact details for Agents and Microbe Labs can also be found on our website [www.microbelabs.com.au](http://www.microbelabs.com.au).







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