PAAG
Professional Agricultural Analysis Group

PAAG soil sampling guide

Routine soil samples

Principles of sampling

Samples of soil might be taken for advisory or diagnostic purposes. Either way, the sample must be small enough for the laboratory but representative of the field or area sampled. A sample of a few grammes used for analysis must be as representative as possible of several thousand tonnes of soil. Care taken in sampling is never wasted and is essential if laboratory results are to be useful.

Routine soil sampling for pH, P, K, Mg

Why sample?

Routine soil samples are taken to show soil pH and levels of available phosphorus, potassium and magnesium that are the basis for lime and fertilizer recommendations. Sometimes, other nutrients, for example zinc, boron or copper, or organic matter are measured on the same samples.

How often should samples be taken?

Soil P, K and Mg Indices (or, in Scotland soil status) do not change rapidly despite fertilizer applications so sampling every 3-5 years is adequate. Soil pH can change more rapidly so, if there is concern about possible acidity, more frequent samples can be taken for pH only and tested in the field or in a laboratory.

When should samples be taken?

Samples should not be taken during the four months after fertilizer or lime or base fertilizer application. This allows time for the lime or fertilizer to be incorporated and to mix with the soil on arable land and to wash into the soil in grassland. Incorporation and mixing are important as surface applied lime or fertilizer can remain in a restricted layer if ploughed down. For example, a sample taken to 15 cm depth will not detect properly a layer of lime that has been ploughed down to 25 cm (sudden changes in measured Indices or pH often are due to these cultivation effects). There is some evidence that soil pH and measured nutrient concentrations can be affected by soil conditions especially moisture content. For all these reasons, it is best to have a consistent policy of always sampling at the same time of year and at the same point in the rotation.

How should samples be taken?

The area sampled should be reasonably uniform in soil type and history. If a field includes two different soil types, each type should be sampled separately provided it can be treated differently with fertilizer or lime. Small areas known to differ from the main crop area, for example gateways and surrounds to water troughs or feeders, should be avoided.

The sample should be made up from 20-25 soil cores taken across the field. To ensure representative coverage, the cores should be taken in a 'W' pattern with 5-6 cores along each leg of the W. A grid pattern also could be used but generally the W is easiest. The cores should be collected in a clean plastic bag to form one bulked sample of about 0.5 kg that is sent to the laboratory.

On arable land, samples usually should be taken to 15 cm using a straight sided gouge corer ('cheese-corer') type sampler or a soil auger. The plough layer is about 23 cm deep but provided the soil in this layer is mixed, the 15 cm sample will be representative. However, if the land is min-tilled, phosphate and potash will tend to accumulate near the soil surface and a 15 cm sample will over-estimate nutrient concentrations to normal plough depth. In this case, samples are better taken to about 23 cm.

On grassland, cores should be taken to 7.5 cm using a straight sided gouge corer. Recent dung patches should be avoided.

For diagnostic purposes where there is an apparent crop problem, samples of soil should be taken from good and, separately, from poor areas of crop growth. Each area should be sampled as indicated above for full fields. The comparison of laboratory results from good and poor areas can be much more useful for diagnosis than the results for the poor area only.

How should samples be submitted?

Most laboratories supply kits of packaging and labels for submitting samples for analysis. These should be used wherever possible to ensure the laboratory receives all necessary information and the sample is packaged securely. Whatever packaging is used, the sample must be clearly identified and securely labelled.

Further information

PAAG laboratories can provide detailed information on soil and plant tissue sampling and many show instructions at their web sites. The following might also be useful:

Defra *Fertiliser Manual (RB209). Appendix 3: Sampling for soil pH, P, K, Mg and Na*. http://www.defra.gov.uk/publications/2011/03/25/fertiliser-manual-rb209/ .

Potash Development Association. *Potash News: Soil sampling and different methods of arable cultivation*. www.pda.org.uk.