



# Best Practice Nutrient Management

Sheet 31.0a

## Soil Nutrient testing

### Why change?

Our soils contain valuable nutrient reserves. Good nutrient management aims to make the most of these reserves, minimise application of mineral fertilisers, and reduce nutrient losses. Know the nutrient reserves in your soils and benefit from:

- cost savings due to decreased inputs of mineral fertilisers
- improved crop yields and quality
- reduced risk of watercourse pollution, legal costs and fines
- reduced carbon footprint
- improved habitat and fishery quality.



Soil testing is a simple tool to reduce input costs

### Steps to Success

- 1. Review the current situation** by increasing your awareness of the nutrient status of the soils on your farm. Look at the nature and frequency of your soil nutrient testing programme, and the extent to which you account for soil nutrient reserves when assessing levels of manure and fertiliser inputs.
- 2. Identify potential opportunities** for an improved programme of soil nutrient testing on your farm. If you do not assess your soil nutrient status regularly or include soil nutrient reserves in your nutrient management plans, you could benefit from reduced inputs and costs whilst protecting the environment. Be aware that soil testing is mandatory on a 4-year rotation under **Farming Rules for Water** legislation.
- 3. Calculate the cost-benefit** of these opportunities by estimating the value of the nutrients in your soils, and the potential for reducing your use of manures and mineral fertilisers.
- 4. Develop an action plan** to make the most of soil nutrient reserves on your farm:
  - know the physical properties of your topsoil and subsoil, as well as their variation across the farm. Factors such as texture, organic matter, potential rooting depth, and parent material underpin soil pH, nutrient status, leaching and uptake of nutrients in the long term
  - develop a soil testing programme to assess nutrient levels and pH on a regular basis. Be aware that if a large variation in soil type exists within a field you will need to account for this in your programme. Keep map-based records on a field-by-field basis
  - assess Soil Nitrogen Supply (SNS) annually on a field-by-field basis, enabling appropriate 'top-up' inorganic Nitrogen fertiliser additions to be calculated for the next crop growth. Use DEFRA publication RB209 to check SNS
  - sample soils approximately every four years for nutrients such as Phosphate P, Potassium K and Magnesium Mg. Develop a sampling strategy that enables comparison between four-year cycles, e.g. by taking samples at the same point in the rotation, and with respect to recent applications and cultivations
  - use soil nutrient data to determine manure and fertiliser needs by calculating the nutrient requirement of the crop and subtracting the value of the soil nutrient reserves. Supplement soil nutrient reserves only when necessary
  - if your farm lies within a Nitrate Vulnerable Zone (NVZ) observe mandatory guidelines for application of organic manures and fertilisers, calculations and record keeping. NVZ and **cross compliance helpline 0845 345 1302**.
- 5. Check** your soil nutrient reserves in addition to your routine sampling strategy whenever a major change in land use is proposed.

## Soil nutrient testing - practical examples

### (Assessing Soil Nitrogen Supply (SNS))

The SNS is the amount of nitrogen (kg/ha N) in the soil that becomes available for uptake by the crop from establishment to the end of the growing season, taking account of nitrogen losses.

Calculation of the SNS requires the estimation of three separate components of nitrogen supply: Soil Mineral Nitrogen (SMN), total crop nitrogen and mineralisable nitrogen.

The SNS index can be estimated using field assessment based on previous cropping, fertiliser and manure use, soil type and winter rainfall. Use RB209 for reference.

Alternatively, soil sampling and analysis for SMN is recommended where high or uncertain amounts of soil nitrogen are expected, particularly where organic manures have been used in recent years.

### Sampling for Soil Mineralisable Nitrogen

- Take samples from medium textured deep silty or clay soils in the autumn or spring.
- Take samples from shallow or light sand soils, or in high rainfall areas, during late winter or early spring.
- Sample up to a maximum of 90cm (depending on the rooting depth of crops) at 2-3 depths.
- Take a minimum of 10 samples to represent each different area under examination, ideally using a 1m long mechanised gouge auger. Avoid contamination if using a series of hand augers.
- Keep samples refrigerated and transport to the laboratory as soon as possible.
- Refer to the Defra Fertiliser Recommendations (RB209) handbook for further information.

### Fertiliser savings

Regular testing of soils (and manures) helps to reduce fertiliser costs.

In this worked example, soil testing of 10ha of grass silage land, which is manured each year, showed a phosphate and potash index over three. Using existing soil reserves for two cuts of silage saved 75kg of P/ha and 175kg of K/ha.

The soil testing of 10ha for Phosphate P, Potassium K, and pH (on a 4-5 year rotational basis) cost some £25/year assuming the farmer collects the samples.

Lower mineral fertiliser costs (P 75 kg/ha x 0.58p/kg and K 175 kg/ha x 0.41p/kg) saved £115.25/ha. On 10 ha, the saving was £1,152.50 a year (less the cost of soil testing) with a payback of less than one year



Use a soil auger to take samples

### Remember

- Know the physical properties and nutrient value of the soils on your farm.
- Balance soil nutrient status with crop needs, and only apply fertilisers and manures when necessary.
- Develop a soil-testing programme. Test soils on a regular basis and keep records for each field.