

Best Practice Information Sheet

Nutrient management

Sheet 30.0a

Soil nutrient testing

Why change?

Your 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
- improved habitat and fishery quality.



Soil testing is a simple tool to help 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.
- 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** for soil nutrient testing 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, stone content 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 fertiliser N additions to be calculated for the next crop growth
 - sample soils approximately every four years for nutrients such as P, K and 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
 - do not apply more than 250kg/ha of Nitrogen on grassland or 170 kg/ha on arable land in any one year
 - 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

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Sheet 30.0b

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.

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 SMN

- 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 P, K, and pH (on a 4-5 year rotational basis) cost some £75/year assuming the farmer collects the samples.

Lower mineral fertiliser costs (P 75 kg/ha x 0.40p/kg and K 175 kg/ha x 0.36p/kg) saved £93/ha. On 10 ha, the saving was £930 a year (less the cost of soil testing) with a payback of less than one year.



Fertiliser savings can be made using soil nutrient testing

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.

For further information: Defra (www.defra.gov.uk), Environment Agency (www.environment-agency.gov.uk), ECSFDI (<http://www.defra.gov.uk/foodfarm/landmanage/water/csf/delivery-initiative.htm>), Natural England (www.naturalengland.org.uk), Cross Compliance Helpline 0845 345 1302 (www.crosscompliance.org.uk) and ART (www.associationofrivertrusts.org.uk)



This information sheet is part of a series providing farmers with advice on land management practices to protect water bodies, produced by Association of Rivers Trusts with support from the England Catchment Sensitive Farming Delivery Initiative. The advice will also enable farmers to use farm resources more efficiently and help meet Nitrate Vulnerable Zone and Soil Protection Review requirements under Cross Compliance and environmental regulation.



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