Chapter B10. Does my soil need fertiliser?

PURPOSE OF THIS CHAPTER

To describe how to work out whether your soil needs fertiliser

CHAPTER CONTENTS

- five ways to determine nutrient requirements
- soil sampling
- soil testing

ASSOCIATED CHAPTERS

- D3 ‘Chemical tests’
- E1 ‘Key checks for productive irrigated soils’

DOES MY SOIL NEED FERTILISER?

Paddock records of crop and pasture rotations, fertiliser use and plant yields are useful to help estimate plant nutrient requirements.

Fertiliser can supply some of the plant nutrients needed by a crop or pasture. Nutrients can also come from other sources: from the decomposition of soil organic matter, from the weathering of soil mineral matter, and from nitrogen fixed from the air by legumes and by free-living organisms.

FIVE WAYS TO DETERMINE NUTRIENT REQUIREMENTS

Use a combination of these five ways to estimate the nutrient requirements for a paddock:

- for a cropping paddock, review the yield and quality of previous crops
- set a yield goal and increase plant nutrients to achieve that goal
- be alert to signs of poor productivity
- observe plant symptoms for possible nutrient deficiencies
- send soil samples or plant tissue to a laboratory for chemical testing, and use test strips of fertiliser in the paddock to confirm the results of these tests.

Regular soil testing combined with paddock history and the information you gain from test strips is the best way to predict plant nutrient requirements. Observing plant symptoms and plant tissue are generally of no use for the current crop, but can help to predict nutrient requirements for the following crop.

SOIL TESTING

Soil testing (chemical analysis of soil samples) helps to identify nutrient deficiencies and toxicities, and to estimate soil nutrient requirements. Interpret the results in conjunction with other methods of estimating fertiliser requirements, for example test strips of fertiliser (useful when you are considering not to apply fertiliser because you have high nutrient levels).

Soil testing is useful for:

- showing the availability of the major plant nutrients (nitrogen, phosphorus, potassium, sulfur, calcium and magnesium)
- problems related to sodicity
- problems related to acidity
- problems related to salinity.

Soil testing is not a good indicator of trace elements—plant tissue testing is better.

SOIL SAMPLING

Soil testing is only as good as the samples of soil that the laboratory receives. Errors introduced by sampling, and by the way that you treat the samples, are usually bigger than any laboratory error. One cause of errors in sampling is the variability in the soil across a paddock.

Do not take samples from areas that are obviously different from most of your land. Divide your property into sampling areas with similar soil types, landscapes and paddock histories. Avoid obviously unusual areas such as stock camps, around trees, wet areas, gateways and fence lines.

Another cause of errors in sampling is the way in which soil can vary with depth. Sample all soil horizons separately, or, if horizons are not obvious, sample by arbitrarily fixed depths.

On cultivated ground, sample to the depth of cultivation. In no-till cropping paddocks, sample at 0 to 15 cm.

When you are sampling to estimate available soil nitrogen you will need deeper samples. Various farm advisers and laboratories have different opinions on the necessary depth. A minimum depth of 30 cm is advisable.

Take 20 to 30 small cores from each sampling area, at points scattered over the area. Mix the samples together, keeping the depths separate if appropriate.

If you are sampling to help solve a problem, identify ‘good’ and ‘poor’ areas and sample separately. The comparison between ‘good’ and ‘poor’ greatly helps to determine whether or not soil is causing the problem.

For further advice contact your soil testing laboratory or farm adviser.

Caution: Leaving soil samples in a warm, damp condition stimulates the growth of soil micro-organisms that convert soil nitrogen from one form to another, with grave consequences for the soil test result. Chilling the samples below 4°C, or freezing them, stops microbial activity. They must be kept cool until reaching the laboratory. Alternatively some people prefer to put soil samples into paper (not plastic) bags so that they can begin drying immediately. Whatever bags you use, air-dry the samples as soon as possible. Crumb the samples and spread them out in trays or on newspaper. Leave them in a well-ventilated place to dry before sending them to a laboratory.

Also, do not dry soil samples above 40C. Excessive heat changes the solubility of certain nutrients, affecting the measurement of nutrient availability.