

# The answer lies in the

# SOIL

(or so they say...)

**B**ut to get the answer, it is first necessary to understand the question. We need also to know where to go to get the information. Even when we have the answer, will we know how to put our new found knowledge into practice?

The need to analyse a soil's nutritional state is without question a vital tool to good turf management practice. Soil conditions change constantly, and with increasing wear and tear and intensive turf management methods, soil conditions can alter very quickly, often without warning. Without the accurate monitoring of what is happening in the soil, the practice of turf management will always be based on guesswork not facts.

Natural Resource Management Ltd (NRM), based in Berkshire, has been unravelling the mysteries of the soil since 1930 when the laboratory was first set up by ICI. Originally the operation provided independent technical support for the company's Agricultural Division.

Originally better known colloquially by the name of its geographical location, Jealotts Hill, NRM relocated to its present site in 1991 following a management buyout by Michael Eustace and Christine Collins.

This change of ownership, brought about by ICI's decision to sell-off its agricultural fertiliser interests, was the beginning of a major expansion of business in the field of soil analysis and an increase in associated spin-off activities.

Operating on a 10 hectare site the new laboratory complex covers 15,000 square feet and contains state of the art equipment valued in excess of £2,000,000. Opened in 1993 by the then Minister of State, John Redwood, the company's client base has expanded considerably and the company undertakes work for a wide and diverse range of organisations. These include Multi-national companies, Consultants, Universities, Land reclamation businesses, River Authorities, Foreign & Commonwealth countries and companies involved in Satellite mapping.

The Miracle Professional Soil Analysis service provides the professional turf manager with essential information on the nutrient status of the soil and, more impor-

tantly, what is required to improve the balance.

On arrival at the NRM laboratories, samples are coded and set out in trays, together with "Standard" samples of soil to ensure extremely high levels of accuracy. For every 30 soils received, no fewer than 16 chemical and actual soils are used for every sample. The ADAS method of analysis is practised throughout to provide the most reliable estimate of available nutrients.

The next part of the analytical process involves the drying stage. The samples are dispensed into metal trays and dried at a temperature of 33 degrees Celsius and then finely ground to a consistent 2mm crumb. To prevent cross contamination the grinding mill is cleaned out between samples with sand.

From this point, the samples are submitted to a number of analytical stages that takes place in a series of dedicated laboratories, each equipped with specialist equipment to analyse specific areas of interest.

From a soil management point of view, the major nutrients of nitrogen, phosphorous, potassium,

together with magnesium and pH are probably the most important for the well being of turf. However, being aware of the sulphur content in the soil is also becoming more important, due to the fact that sulphur is required to convert nitrogen into proteins that can be used by the plant.

To measure the major nutrients, the dry ground sample is subjected to three different chemical processes to assay the nutrients that are available to the plant. These tests use special extractants and are conducted under tightly controlled conditions in air conditioned laboratories.

The next stage in the analytical process is the test for pH values. A sub-sample of the ground soil is taken and automatically stirred in a container with de-ionised water. This is then measured potentiometrically against two buffer standards of pH 4 & 7.

A computer programme analyses the readings of the test and a print out indicates the resultant values.

To measure for phosphorus, a further sub-sample of the ground soil is measured under Olsen's

method. A Sodium bicarbonate reagent is used and the available phosphorus extracted is then measured colorimetrically using a Spectrometer.

For measuring potassium and magnesium an additional sub-sample is mixed with an ammonium nitrate solution. The resultant extract contains available potassium which can be measured using a Flame Photometer that measures the intensity of light generated by the potassium present. The magnesium content of the extract is assessed using an Atomic Absorption Spectrometer.

Each sample sent into the NRM laboratories under the scheme is tested against known standards in batches of 30. The results of all the samples analysed are retained on record for 10 years in NRM archives.

Of course, knowing the results of the soil analysis is just the start. From the laboratory findings, an advanced computer software programme audits the analysis results and provides the turf manager with a printed recommendation. This recommendation will detail the soils immediate and medium term nutritional requirements in terms of which fertilizers are recommended and what units are required to bring the soil back into balance.

The scheme is already in its eighth year and will continue to operate in association with NRM. Today, the laboratory employs 30 staff, all highly trained graduate material with a focused attention to detail and an over riding desire to achieve extremely accurate results.

NRM currently undertakes a large part of the UK's total requirement for a diverse range of soil analysis undertakings. From Multi-national commercial ventures to Universities providing a few samples for research, from farming groups managing thousands of acres to helping a greenkeeper with the analysis of samples taken from his golf greens.

"At the end of the day, we are driven by customer demand," states Michael Eustace NRM's Managing Director. "We are continuing to invest for the future in analytical techniques, new business areas and international perspectives."

As the saying goes, the answer lies in the soil, but you have to ask the right questions.



Soil analysis under rigorous clinical conditions