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Soil analysis of nearby area of Kaliasote dam Bhopal (M.P.), India

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Abstract : The aim of this study was to analyze the soil nutrients with time on the area of Kaliasote Dam during season 2006-2007. A total of 10 samples were taken from different sites of Bhopal (M.P.) The soil parameters analyzed included the soil pH, electrical conductivity, water holding capacity, total nitrogen, organic carbon and phosphorous. Results showed that soil parameters varied a little during the whole year.

Key words: Soil nutrients, Bhopal, Kaliasote dam, Soil testing , water holding capacity, organic carbon, pH .

Introduction

The term "soil testing" refers to the full range of chemical, physical and biological tests that may be carried out on a submitted sample of soil, though in the present context only nutritional aspects will be considered. Soil testing has a long history in Australian agriculture, and has contributed significantly to the development of modern scientifically-based production systems. More recently, it has become an important, but all too often a misused, tool for turf producers and turf managers. The present paper explains the principles on which good soil testing is based, how the results should be interpreted, and what can realistically be expected of a soil test in turf situations.

Why Test Soil?

Soil testing may be carried out for various purposes. Its main uses include:

1) Assessment of land capability for various forms of agriculture,

2) Identifying and quantifying soil constraints (e.g. salinity),

3) Monitoring of soil fertility levels.

4) Providing guidelines as to the type and amount of fertiliser to be applied for optimum plant growth on the particular site and

5) As a diagnostic tool to help identify reasons for poor plant performance.

Basic Requirements

There are three basic steps that must be followed if meaningful results are to be obtained from soil testing. These are:

1) To take a representative sample of soil for analysis,

2) To analyze the soil using the accepted procedures that have been calibrated against fertiliser experiments in that particular region and

3) To interpret the results using criteria derived from those calibration experiments.

Soil analysis provides information which can be used to improve soil fertility through management. The extent to which soil fertility can be improved depends on the inherent properties of the site – soil texture, mineralogy, slope and climate. Soil structure is also key to plant performance as it affects the ability of plant roots to access available nutrients. Soil analysis is important in organic farming for nutrient management planning (e.g. rotational plans, making best use of manures, fertilizer application), to prevent long term nutritional and health problems (crop and livestock), prevention of pollution and for derogations for use of restricted inputs.

A one-off soil analysis simply provides a snapshot of nutrient availability at a particular time.

Soil analysis should be repeated at regular intervals to identify trends in nutrient availability and adjust nutrient management accordingly. The soil analysis itself is only the first step. Specialist interpretation and recommendations are equally important. Soil analysis should be interpreted in rotational context. Large quantities of nutrients can be exported when selling a single crop, e.g. potash in potatoes. Interpretation should take account of the local conditions and crop; it may not be cost effective to set the same targets for lowland as for upland sites. Use annual soil analysis from one or two representative fields alongside nutrient budgets to track soil fertility changes over time.

Taking a Representative Sample

Sampling is possibly the most neglected step in soil testing, and the greatest source of error in the whole process. To appreciate just how crucial it is to ensure that a representative sample is submitted for analysis, consider the fact that a hectare of soil to a depth of 10 cm weighs roughly 1500 tonnes, while the sample submitted for testing typically amounts to about 0.5 kg (or about 0.00003% of the surface soil on 1 ha – just 1 part in 3 million). If such a tiny fraction is to be representative of the target area, then your sampling needs to be spot on. Otherwise, the test results will be of little or no value.

How do we take a representative sample when the actual soil can vary tremendously across what might look like a uniform area topographically? First, take a minimum of 10-15 soil cores across the defined area in a random pattern, each to the required depth (usually 0-10 cm). These should then be bulked, making up a composite sample from that area. Any parts of the area that are obviously different (e.g. a gully, a low moist depression, an area where the growth is visibly different, or a raised area with shallow soil) should each be sampled separately. These sampling areas should be clearly defined and recorded for re-sampling to establish trends in future years. Bulking areas that are obviously different to save money may simply generate results that are worthless.

Soil samples are usually drawn from the surface 0-10 cm, but it needs to be kept in mind that this may not always be the best approach. For example, in the case of a shallow soil with two distinct layers in the surface 0-10 cm, more meaningful results would be obtained if each layer were sampled separately rather than taking a two-layer composite sample. In other cases, we may want to know something more about what is happening (e.g. salinity levels, pH) at greater depths in the soil, in which case those deeper layers should be sampled separately.

Essential Nutrients : In addition to carbon, hydrogen and oxygen which form the basis of all organic compounds, healthy turf grass requires sufficient amounts of 14 essential nutrient elements. These essential elements are divided into **macronutrients** (required in larger quantities because of their structural roles in the plant) and **micronutrients** (required in smaller quantities because they tend to be involved in regulatory roles in the plant). Nitrogen (N), phosphorus (P) and potassium (K) are the primary macronutrients, and the ones most often in short supply in soils. The elements N, P and K are therefore the most likely to require replenishment in the form of applied fertiliser. Deficiencies of the secondary macronutrients—calcium (Ca), magnesium (Mg) and sulphur (S)—are less commonly encountered. The micronutrients required are iron (Fe), manganese (Mn), zinc (Zn), copper (Cu), molybdenum (Mo), boron (B), chlorine (Cl) and nickel (Ni); but in practice the main micronutrient deficiencies that concern us with turf grasses are iron and manganese.

Any of the above essential elements may also be present in excessive amounts, which can result in toxic effects (e.g. B and Mn). Other elements or groups of elements (e.g. sodium, bicarbonate) may also contribute to the toxic effects seen, for example, in saline or sodic soils. Sodium (Na) has been demonstrated to be an essential element for some plants with a special photosynthetic pathway, but in practice problems result from excessive amounts of Na, not deficiencies.

Results and discussion :

Pre monsoon during 2006-07

S.No	Parameters	SAMPLING STATIONS									
		1	2	3	4	5	6	7	8	9	10
1	Soil pH	5.5	5.8	5.9	5.9	5.6	5.7	5.8	5.4	5.4	5.1
2	Electrical Conductivity	0.17	0.10	0.18	0.19	0.15	0.12	0.18	0.16	0.17	0.16
3	Water holding capacity	36	34	15	20	16	18	16	19	18	16
4	Total Nitrogen	0.10	0.09	0.13	0.16	0.18	0.16	0.14	0.13	0.14	0.16
5	Org. Carbon	0.4	0.8	0.15	1.7	1.2	0.59	1.4	1.5	1.7	1.5
6	Phosphorous	0.17	0.16	0.15	0.18	0.15	0.14	0.16	0.13	0.12	0.18

During Monsoon 2006-07

S.No	Parameters	SAMPLING STATIONS									
		1	2	3	4	5	6	7	8	9	10
1	Soil pH	5.3	5.6	5.7	5.7	5.4	5.5	5.6	5.2	5.2	4.9
2	Electrical Conductivity	0.18	0.18	0.19	0.20	0.16	0.14	0.19	0.17	0.18	0.17
3	Water holding capacity	33	31	14	18	15	19	15	17	17	15
4	Total Nitrogen	0.16	0.13	0.12	0.15	0.17	0.17	0.13	0.12	0.13	0.15
5	Org. Carbon	0.39	0.9	0.13	1.6	1.3	0.63	1.3	1.4	1.6	1.4
6	Phosphorous	0.16	0.15	0.14	0.17	0.14	0.15	0.15	0.12	0.12	0.17

Post Monsoon during 2006-07

S.No	Parameters	SAMPLING STATIONS									
		1	2	3	4	5	6	7	8	9	10
1	Soil pH	5.4	5.7	5.8	5.8	5.5	5.6	5.7	5.3	5.4	5.0
2	Electrical Conductivity	0.20	0.21	0.23	0.22	0.21	0.19	0.21	0.19	0.18	0.17
3	Water holding capacity	34	32	14	19	15	17	15	18	17	15
4	Total Nitrogen	0.15	0.15	0.13	0.16	0.17	0.16	0.14	0.13	0.14	0.16
5	Org. Carbon	0.32	0.7	0.1	1.6	1.2	0.60	1.4	1.5	1.6	1.5
6	Phosphorous	0.18	0.18	0.15	0.17	0.15	0.14	0.16	0.13	0.12	0.17

Sampling Stations

1. Near Guest House
2. At down site of Kamla Nagar
3. At downhill towards MANIT
4. At sluice gate
5. Near temple site
6. Near spill of Kaliasote dam
7. Near middle centre of reservoir
8. Near Barkheri Khurd
9. Near Bhoj University site
10. Near spill of reservoir

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