



Soil Chemistry Analysis

Client: Sample Greens
 Site: Turf
 Soil Classification: Loamy Soil

Sample Rec'd: 3-Mar-20
 Plant/Crop: Turf
 Sample ref: XXX020320

Nb: Laboratory analysis conducted by the NATA accredited Environmental Analysis Laboratory at Southern Cross University Lismore NSW. Guidelines based on Albrecht and Reams methods

	Ideal level	Result	% of Optimal	Nutrient Status			Comments
				Low	Optimal	High	
pH 1:5 Water	6.3	8.44	134.0				Higher than ideal
CEC	7	2.11	30.2				Lower than ideal
Organic matter	>3.5	0.77	22.1				Low for this soil type
Conductivity dS/m	0.120	0.065	54.6				Low salt levels
Key Ratios							
Calcium:Magnesium	4.3 : 1	2.64	61.2				Calcium is low relative to Magnesium
Potassium:Magnesium	1:1	0.78	77.9				Potassium is low relative to Magnesium
Phosphorus:Sulphur	3:1	7.87	262.2				Phosphorus is high relative to Sulphur
Phosphorus:Zinc	10:1	30.12	301.2				Phosphorus is high relative to Zinc
Potassium:Sodium	3:1	1.59	53.1				Too low - will induce Sodium uptake
Iron:Manganese	1:1	3.36	336.4				High will affect Manganese availability
Plant Available Nutrients							
Plant Available Calcium (ppm)	375	288.48	76.9				Below optimal
Plant Available Magnesium (ppm)	60	34.14	56.9				Below optimal
Plant Available Potassium (ppm)	60	50.00	83.3				Below optimal
Plant Available Phosphorus (ppm)	10	9.37	93.7				Slightly below the minimum required
Nutrient levels							
Nitrate Nitrogen (ppm)	10	1.3	12.6				Low
Ammonium Nitrogen (ppm)	15	3.8	25.3				Low
Total Nitrogen	25	5.1	20.2				Total Nitrogen is very low
Phosphorus (Bray 2) (ppm)	48	39.1	81.5				Total P is low and only 24% is plant available
Sulphur (ppm)	8	5.0	62.1				Significantly higher than optimal
Cation Volume							
Calcium (ppm)	1000	279.7	28.0				Below optimal
Magnesium (ppm)	145	64.2	44.3				Below optimal
Potassium (ppm)	150	50.0	33.3				Below optimal
Sodium (ppm)	50.6	15.9	31.4				Below optimal
Aluminium (ppm)	40.5	1.0	2.5				Low but OK
Hydrogen (ppm)	4.5	1.0	22.2				Low but OK
Cation Balance							
Calcium (%)	69.00	66.02	95.7				Slightly low relative to other Cations
Magnesium (%)	16.00	25.00	156.2				High relative to other Cations
Potassium (%)	5.00	5.21	104.2				OK relative to other Cations
Sodium (%)	3.00	3.27	108.9				OK - but high in relation to Potassium
Aluminium (%)	5	0.50	10.1				Low - OK
Hydrogen (%)	4	0.00	0.0				Low - OK
Trace Elements							
Zinc (ppm)	4	1.30	32.5				Low
Manganese (ppm)	18	4.54	25.2				Low will affect plant function
Iron (ppm)	18	15.29	84.9				Low - but high in relation to Manganese
Copper (ppm)	1.6	0.17	10.6				Low
Boron (ppm)	1.4	0.19	13.9				Low will affect plant function
Silicon (ppm)	40	4.53	11.3				Low
Chloride estimate (ppm)	65	41.91	64.5				Low
Sundry							
Carbon:Nitrogen ratio	10 - 12	21.00	190.9				High being driven by the low N level

Key Issues and General

This soil is best described as hungry, there are a number of deficiencies and some issues with nutritional balance which will be impacting nutrient availability and plant health. The amendments suggested in the following are designed to correct and improve nutrient balance, availability and ultimately plant health. Depending on budget constraints, steps taken within the theme of these recommendations will improve plant health.

The **pH level (8.44)** is well above the optimal level and will have a negative influence on nutrient availability. **Soil Organic Matter (0.77%)** is very low for this soil type and will also have a negative influence on nutrient retention and biological activity.

Cations, Cation Exchange Capacity (CEC) and Cation Balance.

The level of nutrition in terms of **Cation Exchange (CEC 2.11)** is quite low, reflecting low levels of most Cations.

Cations are in a reasonable balance, although **Magnesium** is dominant and high relative to other Cations.

Adjusting the volume of Cations will offset the issues with balance and improve both Cation availability and pH.

The **Potassium to Sodium ratio (currently 1.59 : 1.00)** is of some concern however, when the level of **Potassium** is close to or **below the level of Sodium** the plant has increasing difficulty distinguishing between them and can take up Sodium as readily as Potassium, having a negative impact on plant health. To offset this, soil amendment and a regular foliar application of Potassium is required to ensure sufficient Potassium is available within the plant.

Major Nutrients Levels

Looking at the pool of major nutrients, Both **Nitrate** and **Ammonium Nitrogen** are **low**. The level of **'Total Phosphorus'** is also lower than optimal as is **Sulphur**.

In addition to being slightly low, **76% of 'Total Phosphorus'** is tied-up and not plant available. At this point, **'Plant available' Phosphorus** is also below the **minimum level required** and will need amending to ensure an ongoing supply of 'available' P to the plant.

Trace Element Levels

All trace elements are below ideal levels. Of most concern are the low levels of **Boron** because it plays an important role in Carbohydrate mobilisation within the plant, and **Manganese** because of its critical importance in carbohydrate production and the potential for it to be tied-up by high Iron levels.

All Trace elements have significant roles to play in plant function (ATP production, carbohydrate production and transfer etc. Consequently we would suggest foliar applications will be required, at least in the short term, to ensure availability to the plant.

Biological Remediation

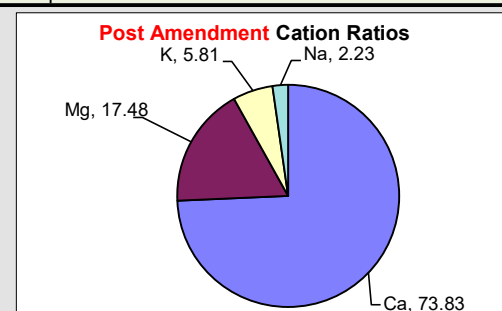
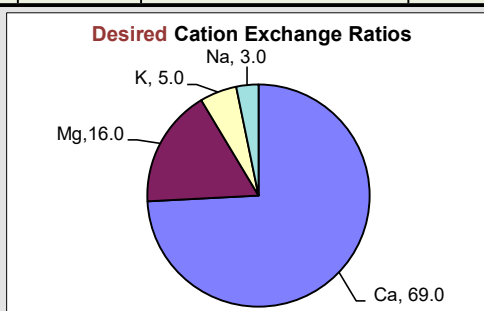
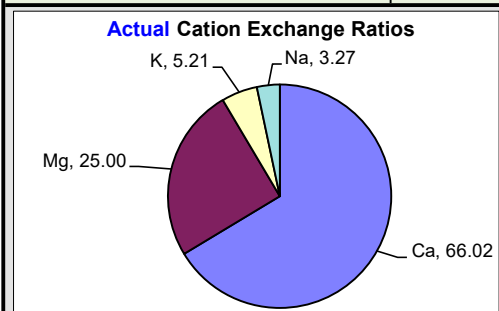
The regular addition of 'diverse' biological stimulant, such as **Soil and Plant Tonic (SPT)** will ensure optimal nutrient availability and strong resilient plants. **SPT** will also assist with the **breakdown and stabilisation of organic matter** and will also assist release of **'tied-up' Phosphorus** (as will periodic additions of a quality **FulVik Liquid**).

Whilst plants can tolerate a wide variation of management styles and nutrient regimes, a soil analysis essentially compares the existing nutrient status and program with optimal levels. As a result, the following attempts to correct as many of the deficiencies and imbalances as possible. In practice however, and depending on budgets and work loads, any and all steps taken along the lines outlined below will achieve some improvement in the current situation.

In terms of soil amendments, where possible we have selected mineral based products, which will be less prone to leaching in sandier profiles.

Soil Remediation (nutrient amendments) - estimate of rates and volume (based on known and familiar materials).

Product	Rate(kg)/1000m ²	App Type	Frequency	Pack Size	Analysis
Granular Rock Phosphate	15	Soil	At renovation	25kg	N0.2, P11.2, K1, Ca21.5, Mg0.76, S1.6, Fe1.86, Si23
Lime	90	Soil	Max 800kg/app & 5t annually	25kg	Ca38.8
Boron Granules	7.5	Soil	Once only	25kg	B3.23, HA57.2
Manganese Sulphate	10	Soil	Divided into 3 - 4 monthly apps	25kg	Mn31, S19
Potassium Nitrate	8.5	Soil	Divided into 2 -3 monthly apps	25kg	N13, K38
Soilsafe Greens Bio Mineraliser	25	Soil	At renovation	25kg	16.N, 5.3P, 7.5K, 9Ca, 1.1Mg, 4.2S, 1.2Fe, 10Si, 0.019B, 0.08Zn, 0.03Cu, 0.51Mn, 0.005Mo, 0.042Co



Nutrient maintenance program - Suggested remediation inputs post renovation and during active growth.

Product	Rate(kg)/1000m ²	App Type	Frequency	Pack Size	Analysis
Maintain Foliar Complex	1.5	Foliar	Monthly in growing season	20lt	3.3N, 2.3P, 1.2K, 4.7Ca, 0.9Mg, 1.1S, 0.5Fe, 0.5Fe, 0.05Si, 0.7B, 0.3Zn, 0.1Cu, 2Mn, 0.02Mo
Soil & Plant Tonic	10	Drench	Monthly	20lt	Biological Innoculant
BioGrow	0.50	Drench	Monthly	20lt	Biological stimulant
RootMax (Super Kelp)	0.75	Drench	Monthly	20lt	Biological and Plant stimulant

Our aim is to provide an accurate picture of the current status of your soil, however it is a summary of soil status at a point in time, consideration should always be given to current soil management, soil amendments and fertilizer practice as well as that which has occurred over the recent past. The results will also reflect seasonal conditions and the rate of recent plant growth.

The information, data and recommendations set forth herein are believed by Soilsmart NSW to be accurate. Soilsmart NSW however makes no warranties, either expressed or