

SOIL ANALYSIS
NUTRIENTS AVAILABLE TO PLANTS
 (Determined by Carbon Dioxide (CO₂) Natural Extraction Method)

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SOIL-WATER-PLANT ANALYSIS & AGRICULTURAL CONSULTING

Name: DESERT VIEW GOLF COURSE

Field: Anywhere, TX
 Crop: TURF

Date: 2/08/2010 Lab #: 6761-66



SEE REVERSE SIDE FOR RATING GUIDE

										* SALT CATIONS - PPM				Ratio		Crop Removal Rates		Total Nutrient Plant Uptake (Lbs/1000 sqft)				FERTILIZER GUIDELINES IN Lbs/1000 sqft Recommendation - For MEY									
		% OM		Salts		lbs per ac		Potassium		Sodium		Calcium		Magnesium		Na/	INa/	Crop	Yield	N	P ₂ O ₅	K ₂ O	Mg	Gypsum	Lime	Sulfur	N	P ₂ O ₅	K ₂ O	Mg	
Field	Text.	Humus	CO ₃	pH	E.C.	NO ₃	P ₂ O ₅	H ₂ O CO ₂	H ₂ O CO ₂	H ₂ O CO ₂	H ₂ O CO ₂	Ca	Mg	Ca	Mg																
1	Tees F9	5	0.85	H+	7.7	2.30	16	69	67	131	239	403	157	1266	23	176	3	15	Bermudagrass	Max	5.00	1.35	4.00	0.35				5.60	0.70	2.00	
2	Tees B9	5	0.73	VH	7.9	1.78	16	74	52	114	236	383	98	1251	17	151	4	23	Bermudagrass	Max	5.00	1.35	4.00	0.35				5.75	0.55	2.50	
3	Fwy's F9	5-	1.25	H+	7.7	7.92	19	95	104	152	334	1085	496	1291	116	301	2	9	Bermudagrass	Max	5.00	1.35	4.00	0.35				5.45			
4	Fwy's B9	5	1.40	H	7.7	8.35	24	46	99	204	670	1447	615	1295	104	372	2	14	Bermudagrass	Max	5.00	1.35	4.00	0.35				5.30	1.20		
5	Drive Tees	3+	0.55	M-	7.7	0.38	19	52	25	45	49	113	69	690	8	54	2	13	Bermudagrass	Max	5.00	1.35	4.00	0.35			2-3X	5.60	1.00	4.36	0.10
6	Drive Range	5-	0.73	H+	7.7	4.92	54	58	77	136	537	895	276	1218	39	185	3	22	Bermudagrass	Max	5.00	1.35	4.00	0.35				4.80	0.90	1.94	
Optimal-General		2.8-4.8		6.3-6.8		0.18-1.00		35-90		50-100		75-100		80-125		< 100		< 175		60-120		300-800		13-20		60-100		1-2		5-9	

* SALT CATIONS: H₂O = Immediately Available (Water Soluble Extract) ; CO₂ = Available Reserve (Carbonic Acid Extract). [Plants' roots give off CO₂] - CO₂ Natural Extraction calibrates well to plant uptake (availability). These values are the nutrients available in the sample analyzed in our lab. **IS THIS A COMPOSITE SAMPLE, representative of your plants major root zone?** Availability ratings (see reverse) have been calibrated by multiple plant analysis (crop logging) during a growing season. Calibrated by numerous crops on hundreds of fields covering thousands of acres both domestic and foreign. By comparison, stronger extraction methods did not calibrate, especially on the major nutrients (P-K-Ca-Mg). TPSL is guided by "Ask The Plant" with precision sampling and lab methods. TPSL leads the field in applying sound scientific research principals on an applied practical & profitable basis. Rev.2005/10

Fertilizer Recommendations (N-P-K) are adjusted to reflect efficiency of recovery by crop and Estimated Nitrogen Release from Organic Matter. ENR estimates a 60% mineralization with optimum microbial activity, moisture and temperature.

MICRONUTRIENTS

DTPA Extraction								* or Equivalent					FERTILIZER GUIDELINES IN Lbs/1000 sqft Recommendation - For MEY																		
PARTS PER MILLION													ZnSO ₄ *	FeSO ₄ *	MnSO ₄ *	CuSO ₄ *	B														
FIELD	ZINC	IRON	MANGANESE	COPPER	SULFUR-SO ₄	CHLORIDE	BORON																								
1	Tees F9	3.46 H	8.24 M	4.61 M	1.6 H									0.10-0.25	0.10-0.25																
2	Tees B9	3.8 H	11.35 H	5.71 M	2.09 H										0.10-0.25																
3	Fwy's F9	7.03 VH	16.62 H	7.99 M	4.09 EH										0.10-0.25																
4	Fwy's B9	11.18 EH	17.15 H	7.75 M	7.49 EH										0.10-0.25																
5	Drive Tees	2.02 M	18.56 VH	3.61 L	0.59 L									0.10-0.25			0.25-0.30	0.25-0.30													
6	Drive Range	2.71 M	4.99 L	11.03 H	1.53 H									0.10-0.25	0.25-0.30																
Optimal		3.00-6.00		11.00-21.00		10.00-20.00		1.20-2.40		25-55		20-200		1.00-2.00																	

VL - Very Low; L - Low; M - Medium; H - High; VH - Very High; EH - Extremely High
 TPSL uses standard DTPA strong extraction chemical as used by most labs. This method is not calibrated by plant uptake as are TPSL natural extraction methods used for standard soil tests. Recommended rate is for sulfate sources. --- Other sources may be more effective (Chelated). Read manufacturers info for equivalent amounts of more available sources.

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SOIL ANALYSIS REPORT

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DESERT VIEW GOLF COURSE

TURF - TEES & FAIRWAYS

02/08/10
#6761-66

RECOMMENDATIONS: *assume this soil sample is REPRESENTATIVE of the soil in the ROOT ZONE from the MAJORITY of the area tested. Rates are for MAXIMUM ECONOMIC YIELDS using all BEST MANAGEMENT PRACTICES. ADJUST for your field conditions & yield goal by CONFERRING with your Consultant and/or Local Supplier for products that can supply these generic recommendations for your plants & soils need, since we have no knowledge about your area, products or suppliers available.*

FERTILIZER GUIDELINES

Crop: Turf

Yield Goal: Max

Rec Units: lbs/1000 sq.ft.

Gypsum	Lime	N	P ₂ O ₅	K ₂ O	Mg	S	Zn	Fe	Mn	Cu	B
		4.80-5.75	0-1.20	0-4.36	0-0.10	2.00	0-0.25	0-0.30	0-0.30	0-0.30	

Detailed Recommendations & Comments:

FOR THIS SOIL TEST, use the following corrective measures and then maintain with general formulations.

Major need is Humus / N, some P, some K, some S, Zn, Fe, Mn and

ALL except Drive Tees: Soil test indicates excessively high extractable (CO₂ Na) Sodium that needs soil treatment and thorough leaching of harmful Sodium. --- Source? Test Water.

Soluble Sodium Salts must physically move thru soil profile to prevent salty soils. This requires drain outlets or good deep tilth (physical condition/ structure) down several feet, use humus products, Soil Inoculants, and Energy (Sugars/Amines).

INTERNAL DRAINAGE is the major requirement for leaching salts. Take an in depth 4' soil profile in 1' increments for soil suitability determination for natural percolation or if drainage tiles are needed. An outlet is needed for drain water. --- Each subsoil tests costs about 1/2 of the topsoil test when received and run in sequence.

- SOIL TILTH -- (Condition/structure) affects water & root penetration for Maximum Economic Yields (MEY) and quality. Subsoil tilth is improved by biological activity when fed humic substances and energy (sugar & amines); soil inoculants help to solubilize Calcium, Sodium, and Magnesium to aid cation exchange and leach harmful salts thru subsoils and break-up hard pans.

SOIL INOCULANTS of naturally occurring beneficial soil microorganisms, enzymes, humus, and polymers have increased water efficiency, nutrient release, salt amelioration, and/ or disease reduction.

SOIL INOCULANTS-Activators (in the absence of adequate soil humus or in sterile conditions) of **SOIL INOCULANTS / COMPOST TEAS** containing naturally occurring beneficial soil micro-organisms and/or enzymes, hormones, polymers, wetting agents and Carboxyls may improve nutrient uptake and the soil's physical condition (tilth) for better plant performance, possibly disease resistance and salt leaching. Feeding microbes with humic substances, carbohydrates, and other organic materials aid soil tilth and releases soil nutrients while helping some bacteria fix atmospheric N. [A combination of products may be best --Follow product labels on your own test plots for the most effective products.]

Soil microbes need food (humates/humus etc.) and energy (sugars and/or proteins) molasses or fish products among many.

Apply a Soil Inoculant (Microbes) at the label recommended rate for the 1st application + 1 qt/ac Humic Acid + 1 qt/ac Molasses (energy) and/or fish follow on a 4-6 week schedule with ½ or ¼ of above rates. Use Good Water Management by soaking thoroughly but as infrequently as possible to physically push salts down away from the major root zone. Deep watering can help prevent surface salt build up by leaching soluble salts from previous irrigation.

ORGANIC MATTER the available humus fraction (slow release nitrogen) is the foundation of any soil fertility or plant nutrition program. Our tests measure only the humic (well decomposed - available) portion. To build O.M. is a long-term process. Use manure, composts, humates and other humus products for fast results in the soil-building program. Supplemental products such as Organic Formulas, humic/lignin products, soil inoculants, compost teas, fish products, vegetable meals, etc should also be beneficial.

- Build and maintain humus (slo-release N supply) with composts, humates, humus products, vegetable meals, fish products and/or soil inoculants for better tilth and nutrient supply. – (Granular Humates can be blended with dry fertilizer and there is an activated humate for faster release.)

NITROGEN: Apply 4.80 to 5.75 lb/ac of actual N annually in split applications.

For part of the Nitrogen, Ammonium Sulfate, and Ammonium thiosulfate or other N/S compounds are good source for N and Sulfur also. The sulfur helps release nutrients and improves the soil physical condition for water & root penetration.

The best way to tell when and how much more N and/or other nutrients are needed is to use regular petiole (sap or leaf) tests - most crops respond to foliar N if needed.

PHOSPHATE and Micronutrients tie up rapidly in highly calcareous soils.

FWYs Front 9 - Phosphate tests adequate at this time. Keep P soluble (available) with Sulfur and/or Humic Acid (1% Solution) + Soil Inoculant (Microbes – according to label rates). Some starter P with Micronutrients and above combination near root zone should be beneficial at planting, especially in alkaline and/or cold soils.

OTHERS - Use 0.55 to 1.20 lb/1000 sq.ft. of P₂O₅

SULFUR, placed in a band with the PHOSPHATE in alkaline soils, can increase the availability to and uptake of P by the roots. Any amount of S can be beneficial and there may be increasing benefits above the 1:1 S: P Ratio.

Humic Substances such as Humic acid with the P can increase uptake, Soil inoculants (conditioners) might also be beneficial.

Soil Inoculants (of naturally occurring beneficial soil microorganisms) may aid the uptake of plant nutrients.

POTASH: Apply as much K₂O as N as many crops including grasses use more K₂O than N and will mine the subsoils, then yields and quality decline.

Fairways F9 & B9 test adequate now

OTHERS - Use 1.94 to 4.36 lb/1000 sq.ft. of K₂O - Drive Tees could benefit from the use of K-Mag for beneficial Magnesium or use of Magnesium Sulfate (Epson Salt)

Many crops can mine the subsoil POTASH for a time, then yields, quality and health decline.

POTASH improves the over all health of the plants and with moisture stress helps to get better water use efficiency for better quality and yield.

POTASH uptake is harmed by high soil and/or water sodium levels.

ZINC: Use 0.10 to 0.25 lb/1000 sq.ft. of Zinc Sulfate or equivalent on Drive Tees and Range only

COPPER may be applied to the soil as equivalent of Copper Sulfate, 0.25 to 0.30 lb/1000 sq.ft.

Test F9 and Drive Range - Use 0.10 - 0.30 lb/1000 sq.ft. of Iron Sulfate or equivalent

Manganese - Use 0.10 - 0.30 lb/1000 sq.ft. of Magnesium Sulfate or equivalent

MICRONUTRIENTS: Plant Analysis is the best way to determine when and how much micronutrients are needed and they can be applied foliar or in the water and soil.

DRIVE TEES ONLY - **SULFUR** use up to 80 lb/ac (2 lbs/1000 sq. ft. of area) it is best when used 2 or 3 times a year. (S effect lasts only 45-90 days in most cases.) Sulfur improves the physical condition (tilth) of the soil for better water and root penetration and increase nutrient availability. Sulfur activates Ca & Mg by solubilizing them to the available water (H₂O) soluble form. Soluble Ca helps sodium to leach. S can also release P & Micronutrients.

USE GOOD WATER MANAGEMENT - soak thoroughly but as infrequently as possible. Allow roots to get proper aeration between waterings. P & Fe in petiole (Leaf) tests can indicate problems with too much or too little water. Deep watering can help prevent surface salt build up by leaching soluble salts from previous irrigation. ---During fast drying days use light irrigations til subsoils aerate but, do not let subsoils get too dry.

INTERPRETATIONS

TEST SHOW AVAILABLE NUTRIENTS - RATINGS CALIBRATED BY PLANT ANALYSIS, see guide sheet.

Soil Status – six standard topsoil analysis with micronutrients - for turf

Textures – #5 and 6 Tests medium, with fair internal drainage, water holding and cation exchange capacity of about (15-25) - ALL OTHERS Tests medium heavy with slow internal drainage, high water holding & high cation exchange capacity of about (20-35).

Total Soluble Salts – (can cause a major tilth problem, usually Sodium (Na) is the major culprit of the toxic big 3 (Na, NO₃ & K). Is the Na soluble? Is it attached to the soil particle? Sodium must be solubilized so it can leach thru the soil profile with good internal drainage (tilth)? This requires adequate soluble Ca for a low Na/Ca ratio.) – #3-4-6 Tests too high for healthy plants - must have leaching and treatment for normal growth – identify which salts are high as most plants can Tolerate more Ca and Mg soluble salts than Na – NO₃ or Cl salts. #1 Test is high enough to cause severe problems. It needs deep flushing and treatments before plants can grow properly. #2 Tests a little high; will affect some plants - needs leaching and/or treatment. --Na (CO₂) is main concern. #5 Tests very favorably low.

Sodium - (high Na can interfere with nutrient uptake and should be managed for leaching) – #5 Tests in upper low range; of minor concern now. ALL OTHERS Tests too high - treatment and deep flushing with good internal drainage needed before plants can grow properly.

Calcium - (adequate soluble (H₂O) Ca is needed for available nutrients and good soil physical condition) – ALL Tests very high Calcium, which rapidly ties up P and micronutrients. Use Sulfur (in a band) with Phosphate and in irrigation water if possible. #5, soluble Calcium (available H₂O Ca) needs increasing. Use acidification or other soil conditioners such as humus and microbial products. OTHERS Soluble Ca tests extremely high - needs leaching --- this may indicate need for internal drainage and water management --- can interfere with nutrient balance - need to determine source and check internal drainage with deep subsoil test @ each 2' - 3' & 4' levels.

Magnesium – (vital as nucleus of the chlorophyll formation site of photosynthesis for essential starches and sugars production, must be available (H₂O/Mg) with Na/Mg Ratio below 10 for sugar crops.) – #5 Levels are low - more should be beneficial. OTHERS Mg tests so high, it may adversely affect availability of other nutrients.

Organic Matter - (*Humus fraction - slow release N at reasonably good levels is the foundation of any good soil fertility - plant nutrition program - This test determines only the Humic (well- decomposed - available) portion.*) – #3 and 4 tests low - Needs improving to improve nutrient up take and soil tilth (condition/structure). ALL OTHERS tests very low - needs improving for better tilth (soil condition/structure) and nutrient uptake.

pH – (*pH should not be used as an absolute recommendation as it is a very nebulous dynamic measurement at best--too many factors influence a soil test pH measurement for it to be a reliable representation of the natural soil pH in the field that affects plant root growth---TPSL measures and evaluates Ca levels four different ways*) – ALL Tests alkaline. Use Sulfur when needed to maintain good soluble Ca/Mg levels for good physical condition for water and root penetration.

Nitrate – (*the most essential nutrient. Too much too early can be as harmful as too little to late. Feed plants as they show need – TPSL's exclusive 'Ask the Plant™' program.*) – #6 fair residual - tests medium; should be enough to get plants started unless there is leaching from rains or irrigation. #4 tests upper low range - shows some residual, more should be needed soon. OTHERS some residual - but test is low -- - needs more readily available N.

Phosphate – (*along with Ca is the backbone of all plants and animals especially important at germination and root formation as P in the sap of plants indicates root activity for future growth and production*) – #3 tests in low high range - use low rates of P for maintenance. #1 and 2 tests medium - shows good residual - use medium rates of P. OTHERS tests low medium - shows fair residual. Need to improve reserves.

Potash – (*the quality element of cell walls for cold and drought tolerance and vital enzyme functions.*) – #5 tests very low availability - needs good rates - most plants use as much K₂O as N and feed on the subsoil. #2 tests high medium should be adequate, only Plant Analysis can tell for sure with high K requiring crops and/or high soil sodium. #1-3-6 tests high - only plant analysis can tell for sure if plants have an adequate supply, especially with high soil Sodium. #4 tests very high should be adequate when soluble levels are good. High soil sodium can interfere with plant uptake.

Micronutrients – Vary from low to very high - Refer to Soil Micronutrients sheet for details

Respectfully Submitted
Noel Garcia, CCA
Certified Crop Adviser