



INTERPRETATION GUIDE TO SOIL TEST REPORTS

TPSL® CONTINUALLY UPGRADES ANALYTICAL PROCEDURES SO THAT THE MOST ACCURATE RECOMMENDATIONS CAN BE MADE. The CO₂ Method works with all types of soils and is the most accurate in the industry. WE PARTICIPATE IN CHECK SAMPLE PROGRAMS.

Our Inductively-Coupled Argon Plasma instrument and Atomic Absorption Spectrophotometers accurately determines available (H₂O) and extractable (CO₂) minerals in the soils. These natural methods, along with a detailed soil history of treatments, yields and goals allow for more reliable recommendations.

TEXTURE Ranges from: 1-Sand through 3-Loam to 6-Heavy Clay.

CEC (Cat-ion Exchange Capacity) - **TEXTURE** determines CEC.

TEX 1 = 3 - 8; ranges through 6 = 30 - 50 CEC. O.M. (**Humus Fraction**) increases CEC. (About 3.5 for each percent increase in Humus.)

O.M. (Humus %) Organic Matter improves CEC, tilth (soil physical condition), water and nutrient holding capacity (AVAILABILITY) ---- the more the better.

SOIL TEXTURE	1	2	3	4	5	6
SOIL CEC RANGE	3 - 8	6 - 12	10 - 20	15 - 25	20 - 35	30 - 50+
IDEAL HUMUS %	2.8	3.1	3.6	4.1	4.5	4.8

CO₂ NATURAL EXTRACTION - Plants Produce Natural Carbonic Acid in the root zone, therefore **TPSL**® mimics the same extraction to obtain nutrient values that are more realistic and calibrate to actual plant uptake. Most labs extract with much stronger reagents, thus usually report much higher numbers with no calibration.

NO₃ (N) This highly soluble nitrate ion moves easily up and down with water and is a constantly changing value. Plant uptake is rapid. Excess can be toxic.

P₂O₅ (P) Extracted with CO₂ - amount reported in lbs. per acre for the top foot of soil. Amount reported is **available** to a crop in a normal growing season. Responses can be expected below 40 lbs. per acre and high requiring crops may respond to additional phosphate up to 200 lbs. per acre test.

K Extractable Potassium (CO₂) -- is the amount available to the crop in a growing season. 80 PPM minimum and up to 120 PPM for crops with high potash needs. Soil availabilities vary with texture, soil moisture conditions, interference from Sodium levels & ratios of Na to Ca and to Mg.

pH Acidity measurement is variable. Most crops prefer 6.5 - 7.3. Neutral is 7.0 -- above is alkaline, below is acid. **TPSL**® air dries soil at **ambient temperature** to avoid altering soil chemistry for best accuracy. pH is a nebulous, dynamic determination - highly variable.

EC SALTS A measure of Total Water-Soluble Salts expressed as mmhos/cm.

EC = Electrical Conductivity X 640 = Total Suspended Solids in ppm.

SALT CATIONS H₂O -Water-soluble cations determined on ICAP Spectrophotometer. Calcium important - should exceed 100 PPM. CO₂ - Extractable (Carbonic Acid equivalent), same as the plant root process. **SODIUM** is the main extractable harmful element, should be below 180 PPM. The amount of extractable **CALCIUM** reserve in the soil is also reported and must be known to properly manage excess salts.

SAR **Sodium Absorption Ratio** is the relationship between Sodium and soluble Calcium. A high SAR requires the addition of large amounts of soluble Calcium.

Na (CO₂) / Ca (H₂O) These ratios help evaluate salt problems and are indicators of the soil's physical condition for **Na (CO₂) / Mg (H₂O)** water and root penetration.

Na/Ca ratio should be less than 6.

Na/Mg ratio should be below 20 for regular crops and below 10 for sugar producing crops of melons, citrus, sugar cane, etc...

TPSL® EXPERIENCED PROFESSIONALS IN CHEMISTRY, AGRONOMY, HORTICULTURE AND PLANT PHYSIOLOGY are at your service to help you maximize profits.

**RATING GUIDE TO TPSL® SOIL TEST REPORTS
CALIBRATED AGAINST PLANT ANALYSIS (ACTUAL UPTAKE)**

NITRATE NO₃ - N lb/ac 12" Sample: ppm = lb/ac ÷ 4 6" Sample: ppm = lb/ac ÷ 2	1 - 9	very low	PHOSPHATE P₂O₅ - P lb/ac ppm P x 2.291 = P₂O₅ CO₂ Extraction	1 - 10	very low
	10 - 19	low		11 - 19	low
	20 - 29	upper low		20 - 39	upper low
	30 - 59	medium		40 - 59	low medium
	60 - 89	high medium		60 - 79	medium
	90 - 139	high		80 - 139	low high
> 140	high -- caution, seedling injury possible	140 - 199	high	> 200	extremely high - Micros may tie up.

POTASSIUM K - ppm 12" Sample: lb/ac = ppm x 4 6" Sample: lb/ac = ppm x 2 ppm K x 1.205 = K₂O	H₂O Extraction	CO₂ Extraction	Rating
	1-39	1-59	very low
	40-59	60-79	low
	60-79	80-99	medium
	80-99	100-119	high medium
	> 100	> 120	high

CALCIUM Ca - ppm	H₂O Extraction	CO₂ Extraction	Rating	MAGNESIUM Mg - ppm	H₂O Extraction	CO₂ Extraction	Rating
	< 19	< 149	very low		< 9	< 39	very low
	20 - 69	150 - 249	low		10 - 12	40 - 59	low
	70 - 89	250 - 399	marginal		13 - 14	60 - 79	marginal
	90 - 119	400 - 599	medium		15 - 17	80 - 99	medium
	> 120	> 600	high		> 18	> 100	high

Electrical Conductivity EC SALTS EC X 640 = ppm TSS	mmhos/cm★	Rating	TEXTURE	CEC
	< 0.49	very favorably low	1	3 - 8
	0.50 - 0.99	low	2	6 - 12
	1.00 - 1.59	slight accumulation	3	10 - 20
	1.60 - 1.99	medium - little problem - caution.	4	15 - 25
	2.00 - 3.99	high - affects many crops, treatment needed.	5	20 - 35
> 4.00	affects most crops, treatment essential.	6	30 - 50	

★ mmhos/cm = dS/m

CO₃ Free Carbonates - Mostly Ca & Mg - Rated 0 = None - EH = Extremely High

SODIUM H₂O Na should be over 50% of the CO₂ Na so it can leach through the soil profile.

Na - ppm The solubility of the Na is affected by Sulfur (acidity) and soluble Calcium.

When the H₂O Na is over 50% of the CO₂ Na and the EC (total soluble salt) is high this indicates that better internal drainage is needed. Subsoils need testing.

When CO₂ Na is high (>180) and the H₂O Na is less than 50% this indicates need for chemical treatment to increase soluble Na so it will leach. Also, test soil for soluble (H₂O) cations especially Ca and Na to determine best salt management treatment.

THE MOST ACCURATE WAY TO PREDICT THE AVAILABILITY OF SOIL NUTRIENTS IS BY USING THE TPSL® NATURAL METHOD OF EXTRACTION WITH CARBON DIOXIDE (CO₂).

Even this is still an estimate of availability which is influenced by many field (environmental) conditions.

CO₂ WORKS BEST ON ALL SOILS - ACID OR ALKALINE - SANDS OR CLAYS.

PLANT ANALYSIS - *Ask The Plant*® is the only way to determine what nutrients the plants actually get (UPTAKE).

PLANT NUTRIENT REQUIREMENTS change with the age and development of the plants.

ADEQUATE FIELD INFORMATION IS NEEDED FOR PROPER INTERPRETATIONS OF THE ABOVE INFORMATION TO ALLOW THE MOST EFFICIENT USE OF THE FERTILIZER MONEY.

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"Guiding You To Highest Yields"