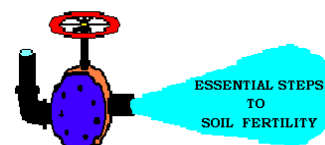


CCS Pipeline™



BALANCED SOIL FERTILITY - PART I

Balanced soil fertility is essential if maximum crop production is to be achieved. Soil is a complex mixture of sand, silt, clay and organic material. The texture is defined by the percentages of sand, silt and clay. Organic material or humus can greatly modify the texture and properties of soil. Florida soils for the most part are sand modified by organic material. Many areas of the state have organic soils and in the central to upper part of the state clay is found at higher levels.

The CEC range for sandy soils would be from < 1 to 12. This range is attributed to the organic matter and/or clay content. Sand soils would be on the low end and clay-organic-sand soils on the higher end. Organic soils have CEC from 18 to >44 . These soils are found in areas where organic matter has build-up over hundreds and thousands of years. These organic (Histosols) form a layer from a few inches to several feet. Crops grown on high organic matter soils (muck) require little or no additional nitrogen application. Clay exists in the center of the state toward the north and contributes to higher CEC of these soils.

A thorough understanding of the physical and chemical properties of soil in a cropping system is essential if maximum yields are to be expected. Soil testing combined with experience with various soil types will provide a template around which a fertility program can be based. A good soil test is representative of the soil and will be a combined sample of at least 15 - 20 subsamples from a field. A rule of thumb to follow is to have 40 acres as the maximum size of a test area, and to divide fields if different soil types or drainage patterns are present.

The soil root zone may extend from a few inches to several feet depending upon soil type, depth to restrictive layers (rock, water or other barriers) and crop. Generally for most row and field crops the top six (6") inches represents the nutrient zone. For trees and other deep rooted plant species a deeper zone may be required.

If a deeper zone is required it is recommended to split the soil by depth (top 6", first 12", second 12", etc.). This segregation will show how nutrients are moving through the root zone. In field or row crops it is a good idea to conduct this deeper soil testing at least once every three years. This will show the extent that nutrients leach past the root zone and will indirectly show uptake efficiency or lack thereof.

A soil reaction plan will provide a starting point when establishing a fertility program. It is a crop fertility flow chart. If each area is understood many problems will be avoided.

(Materials listed below each nutrient above are typically used in fertility programs)

Texture	pH	Irrigation	Ca	K	P	(Mg, Fe, Mn, Zn)	N	S	B	Cu
1	2	3	4	5	6	7	8	9	10	11
CEC	Basic	Quality	Gypsum	Pot. Sul.	DAP	Sulfate	AmSul	Elemental	Acid	Sulfate
Soil Type	Acid	Soluble Salts	CaL Nit.	KCl	MAP	Oxide	AmNit	Sulfate	Borate	Oxide
Drainage		Bicarbonate	CaL. Chl.	Pot. Nit.	TSP	Chloride	Pot. Nit.	pHAST-S		
Horizon		Carbonate	Hi. CaL	SPM	APP	Nitrate	APP	TIGER 90		
		Sodium	Dolomite	KOH	MKP	Chelated	DAP			
		Nutrients	pHAST-CAL	MKP	P. Acid	Complexed	MAP			
		Rain		K ₂ CO ₃			Urea			
		Method					N-Control			
							Ureaform			
							Nutralene			
							IBDU			
							Poly coat			
							SCU			
							Organic			

When putting a fertility or cultural program together always approach problems or seek solutions from left to right in the chart above. Soil testing, irrigation suitability, drainage and site peculiarities must be taken into consideration early in the planning stage for the season. Other materials than those listed may be used. This information is for training and planning purposes only. Pathway Pantry™ will enhance crop performance and result in better disease resistance.

SOIL REPORT

When reading a soil report remember to convert the units to pounds per acre in the top six (6") inches. For example if the results are reported in ppm, then multiply them by two (2). Soil has an approximate weight of **1,000,000 per three inches**; therefore we need to be concerned with the top six (6") inches and must multiply **ppm x 2** to have a number for the top six (6") inches.

Basic cations Ca, Mg, & K are represented in pounds per acre or ppm (or some other unit), and are also shown as a percentage of base saturation. The best way to balance them is to insure they are at levels so the **base saturation percentage** would follow these ranges for most cropping systems:

Ca 60 - 70 % - Mg 10 - 14 % - K 2 - 5 %

(Ideal range for most non-muck soils with CEC from < 1 to < 20)

The table below provides information on nutrients that can be used when building a fertility program. If nutrients fall into the range for the CEC indicated below few problems will occur, however, some conditions may require modification of the table. A Certified Crop Advisor or other professional should be consulted when planning a fertility program.

TARGET RANGE FOR NUTRIENTS IN POUNDS PER ACRE (TOP 6" SOIL) ADEQUATE FOR CROP PRODUCTION FOR MOST NON-MUCK SOILS NUTRIENTS ARE IN POUNDS PER ACRE

CEC	P	K *	Mg *	Ca *	S	B	Zn	Mn	Fe	Cu
1 - 5	80 - 100	80 - 100	100 - 120	400 - 600	36 - 40	0.8 - 1	4 - 6	20 - 24	16 - 20	0.5 - 0.8
6 - 10	100 - 110	100 - 120	120 - 140	600 - 800	40 - 50	1 - 1.2	6 - 7	24 - 28	20 - 24	0.8 - 1.1
11 - 15	110 - 130	120 - 140	140 - 160	800 - 1000	50 - 60	1.2 - 1.5	7 - 9	28 - 32	24 - 28	1.1 - 1.4
16 - 20	130 - 150	140 - 160	160 - 180	1000 - 2000	60 - 70	1.5 - 3	9 - 11	32 - 36	28 - 32	1.4 - 1.7

*(% Base Saturation is best method) (Certain crops may require different levels)

Note: Remember to convert P and K to P_2O_5 and K_2O for fertilizer application.
Conversion formula: $P \times 2.29 = P_2O_5$ and $K \times 1.2 = K_2O$

Most soil labs will make a recommendation, and in addition to reporting nutrients in ppm or pounds per acre will show the nutrient status either by graph or using : E = excessive, H = high, M = moderate, A = adequate, L = low, D = deficient, VL = very low. The range to us as a target is **Moderate or Adequate**. Either extreme of the range can cause problems.

Muck soils have different characteristics and will be covered in another Pipeline.

Fertilizer placement, timing of application, rate of application and other nutrient application methods (foliar, T-tape, fertigation, etc.) vary from crop to crop. The different growth stage of plants requires different nutrient strategies. IFAS provides crop fertility recommendations for most crops grown in Florida and these recommendations should be strongly considered.

For information on soil and fertility considerations, call Creech Crop Services, LLC.

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