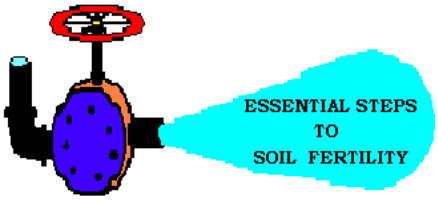
CCS Pipeline™

PIPELINE



BALANCED SOIL FERTILITY - PART II

Organic soils (muck or Histosols) contain large amounts of nitrogen. During a growing season, only 1 - 4% of this potential nitrogen is available. The nitrogen content in the organic matter, temperature, moisture, acidity and aeration all impact microbial activity; thus, govern the amount of "N" that is released.

Warm temperature favors nitrogen release (soil temperature above 60 ° *f*) and cool soil temperatures (< 55 ° *f*) reduce nitrogen release. During cool months when soil temperature is less than 65 ° *f* supplemental nitrogen will help crop growth. Starter fertilizers or sidedress fertilizers would normally contain nitrogen at rates between 5 - 15 lb N/acre and help young plants develop vigorous root systems that can mine microbial released nitrogen pools.

Anaerobic or waterlogged conditions reduce nitrogen release from organic materials and have a negative affect on root growth. Nutrients in waterlogged anaerobic soil become reduced and unavailable for uptake by plant roots. If these conditions last for longer than three or four days extensive root damage can occur depending upon crop. Supplemental nitrogen application may help. Rates for supplemental N application after anaerobic conditions would range from 10 - 30 lb N/acre. In some instances aerial application can be used to accomplish this. Good materials to consider would be calcium nitrate or potassium nitrate. Both calcium and potassium can have a positive influence on root growth and subsequent nitrogen uptake.

Liming or gypsum use should be considered if pH is very low or if base saturation calcium levels are below 55%. Liming improves availability of phosphorus in mineral soils but can decrease its availability in organic soils that are low in iron and aluminum. If phosphorus levels are low plant growth will be retarded and nitrogen use efficiency will drop. If calcium levels on the base saturation fall below 50% root growth will be negatively affected, thus all nutrient uptake will be reduced. (If a root is not growing - root hair and subsequent nutrient uptake is reduced).

Potassium is usually low in organic soils because unlike mineral soils heavy organic soils do not fix nor do they strongly adsorb potassium. Potassium is very mobile and can leach readily. This is true of both low CEC and heavy organic (muck) soils. Potassium levels on heavy organic (muck) soils should be applied at rates to replace crop removal and to insure the base saturation of potassium is ~ 2%. Potassium levels on low CEC and sandy soils should be maintained at levels to replace crop removal, and a good target for base saturation "K" would be 3 - 5%.

Low or inadequate potassium levels can negatively affect nutrient flow in the xylem, and thus, nitrogen uptake as well as other nutrient uptake and availability in all soils could be negatively affected.

Salinity can be a problem on organic soils. The low pH or organic soils can release liberal rates of fertilizer nutrients. Soil electric conductivity ECe and irrigation conductivity ECw should be closely monitored, especially for salt sensitive crops. If sodium levels are greater than 3% of base saturation irrigation rate/timing, calcium levels and potassium levels should be watched very closely.

The science of soil fertility is very complex. Understanding the relationship between the different nutrients, temperature, water and soil chemistry is critical if maximum crop performance is to be achieved.

Estimation of nitrogen release can be tricky. Experience with a particular field and soil type coupled with an understanding of conditions that affect nitrogen release will help accurately predict nitrogen release. Most vegetable crops will require at least an initial starter band of nitrogen and possibly one additional side-dressing. Rates of application are crop specific. The chart below will help.

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

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ORGANIC MATTER ENR (lb/ac)

% ORGANIC MATTER	CLAY LOAM	SILT LOAM	SANDY LOAM
0.0 - 0.3	VL 0 - 30	VL 0 - 45	VL 0 - 55
0.4 - 0.7	VL 31 - 40	VL 46 - 55	L 56 - 65
0.8 - 1.2	VL 41 - 50	L 56 - 65	L 66 - 75
1.3 - 1.7	L 51 - 60	L 66 - 75	M 76 - 85
1.8 - 2.2	L 61 - 70	M 76 - 85	M 86 - 95
2.3 - 2.7	M 71 - 80	M 86 - 95	H 96 - 105
2.8 - 3.2	M 81 - 90	M 96 - 105	H 106 - 115
3.3 - 3.7	M 91 - 100	H 106 - 115	VH 116 - 125
3.8 - 4.2	H 101 - 110	H 116 - 125	VH 126 - 135
4.3 - 4.7	H 111 - 120	VH 126 - 135	VH 136 - 145
4.8 - 5.2	H 121 - 130	VH 136 - 145	VH 146 - 155
5.3 - 5.7	VH 131 - 140	VH 146 - 155	VH 156 - 165
5.8 - 6.2	VH 141 - 150	VH 156 - 165	VH 166 - 175
6.3 - 6.7	VH 151 - 160	VH 166 - 175	VH 176 - 185
6.8 - 7.2	VH 161 - 170	VH 176 - 185	VH 186 - 195
7.3 - 7.7	VH 171 - 180	VH 186 - 195	VH 196 - 205
7.8 - 8.2	VH 181 - 190	VH 196 - 205	VH 206 - 215
8.3 - 8.7	VH 191 - 200	VH 206 - 215	VH 216 - 225
8.8 - 9.2	VH 201 - 210	VH 216 - 225	VH 226 - 235
9.3 - 9.8	VH 211 - 220	VH 226 - 235	VH 236 - 245
9.9 +	221 +	236 +	246 +

Organic matter (OM) contains about 5% nitrogen. A 9% organic matter soil (considering an acre foot to weigh ~ 4,000,000 lbs.) would contain about 18,000 pounds of nitrogen per acre-foot of soil (Heavy muck soils would contain ~ 65% of this amount as they weigh~35% less than non-muck soils).

Only 1 - 4% of the total nitrogen in the organic faction in the soil will become available during a growing season. Drainage and temperature problems can cause deviations to available nitrogen levels.

Example calculation: (Assume 9% OM)
9.0% x 4,000,000 x .65 = 234,000 lb OM/acre ft.
234,000 x 5% (OM = 5% N) = 11700 lb N/acre ft. of muck.
Average release (1 - 4%)…we use 2.0%.
11700 x 2.0% = 234 lb released during growing season.
This number is within ranges listed in the table above.