



# Understand your Agro-One Soil Test Results

## 1. Check the crop and soil name

Agro-One uses the soil name and cropping plans you report on your submission form to generate fertilizer recommendations specifically for your field, so it's important that they're accurate. Look up your soil's name on the Web Soil Survey, [websoilsurvey.nrcs.usda.gov/](http://websoilsurvey.nrcs.usda.gov/), and don't leave the future crop plan blank on the form. If you're not sure what you're going to grow, at least list "mixed vegetables" as the upcoming crop. Also remember that the recommendations are only as good as the sample you took in your field. Your sample should be composed of a mixture of at least ten 8-inch soil cores from around the field.

## 2. Look at the soil pH

pH is a measure of soil acidity and affects the availability of most soil nutrients. For most crops, a pH between 6.0 and 7.0 gives the best nutrient availability. If the pH is too high or too low, adding more fertilizer won't fix the resulting nutrient deficiency. pH must first be corrected by adding lime (to raise pH) or sulfur (to lower pH). Check the fertilizer recommendations to see how much lime to add to your field. pH adjustments take time, up to a year, so amend the soil well in advance.

## 3. Major nutrients: P, K, Ca, and Mg

The soil levels of these nutrients are reported in pounds per acre (lbs/A). If you prefer to use parts per million (ppm), convert by dividing in half ( $\text{ppm} = \text{lb/A} \div 2$ ). The **relative levels** of the soil nutrients to the right of the lbs/A results are the most important to notice, since the same nutrient lb/A may be high for one soil type or crop while for another it is medium. "High" is considered to be a good level and may not generate a fertilizer recommendation. A "medium" level is considered to be adequate for the short term but nutrient supplementation may be recommended to maintain or build soil test levels for the future. Note that due to differences in extractants and lab procedures, the lbs/A nutrient levels are not comparable between labs. However, the relative levels of nutrients (high, medium, or low) should be similar between different labs.

Grower's name and address	Lab Sample ID: 70655040		F
	Field/Location: STRAWB 2010		
	Date Sampled: 08/05/2010		
	Date Tested: 09/09/2010		
	Statement ID: Grower's name		
	Description:		
	County: Tompkins		

  

Element	lbs/acre*	Very Low	Low	Optimum	High	Very High
Phosphorus (P)	6	[Bar chart showing level in 'Very Low' range]				
Potassium (K)	123	[Bar chart showing level in 'Optimum' range]				
Calcium (Ca)	3,897	[Bar chart showing level in 'High' range]				
Magnesium (Mg)	802	[Bar chart showing level in 'High' range]				

  

Element	Value	Element	Value	Element	Value
Soil pH	5.8	Iron (Fe), lbs/acre	6.8	Aluminum (Al), lbs/acre	78.1
Buffer pH	5.8	Manganese (Mn), lbs/acre	18.0	% OM	4.4
HWS Boron (B), lbs/acre	0.9	Zinc (Zn), lbs/acre	0.5		

  

Sample Information Summary	
Soil Name: Castile	Crop Code: STS
Sample Depth: Subsurface	Type: Maintenance
Ground Cover: No	

  

Soil Fertilizer Recommendations (1=current yr, 2=next yr, etc.)		tons / acre	lbs / acre
Year	Crop	Lime	N Range P2O5 Range K2O
1	Strawberries, Spring	2.00	100 30 30.00

  

Comments - Improve yield and plant quality as well as protect the environment with proper fertilization.  
\* Modified Morgan analysis results reported in pounds per acre. Nutrient recommendations provided by Cornell University.

For assistance interpreting your report, contact your local Cooperative Extension office at 807-272-2292 or <http://coe.cornell.edu/Pages/Default.aspx> for a complete list of Cornell Cooperative Extension offices.  
These are general comments. Always consult with your crop adviser for recommendations specific to your farm.

8 Apply 80 lbs/acre of N in July, and another 20 lbs/acre the first of September. Do not apply N in early spring except on sandy soils.  
Apply fertilizer uniformly around the plants or through drip irrigation. Do not allow granules to remain on leaves. Do not fertilize when leaves are wet.

- The best time to apply potassium and phosphorus fertilizers is in the fall before mulch is applied.
- Use both a soil test and leaf analysis to adjust nutrient levels.
- Lime rate is for 100% ENV. To calculate actual rate: rate to use = recommended rate/ENV (of lime source) x 100.
- Apply lime only at bed renovation or during fall of year.

### pH details

pH can be measured using different methods, but for most samples, "water" extraction most closely mimics what plant roots feel. Calcium chloride is sometimes used to measure pH in very sandy soils, and is available for an extra fee. "Buffer pH" is the measure the lab uses to calculate how much lime your particular soil needs, since heavy soils have more buffering capacity and need more lime to change their pH than sandy soils.

### "Morgan" versus "Mod Morgan"

Agro-One will use one of two chemicals to extract the nutrients in your soil sample before they are measured, either "Morgan" solution or "Modified-Morgan" solution. Cornell field crops experts prefer the Morgan solution because it reports P levels that correlate more accurately with recommendation database when soil P is low, allowing for more accurate P fertilizer recommendations for field crops. For fruits, vegetables, lawns and gardens, the more economical Modified Morgan solution will be used because the nutrient recommendations are, in almost all cases, identical to those based on the Morgan test.

**4. Nitrogen:** Nitrogen is not routinely reported on soil tests because it cycles quickly between chemical forms (ammonium, nitrate, nitrite, organic N), and is very sensitive to weather changes and leaching. Measuring nitrate-N (using a pre-sidedress nitrogen test) gives a snap-shot of plant-available nitrogen on the day the soil was sampled, but does not predict the season-long nitrogen supply. The nitrogen recommendation at the bottom of the test is the amount of nitrogen normally applied to grow the crop you listed on the submission form. You can reduce the nitrogen application by the amount of N you expect to get from soil organic matter (see sidebar at right) and from previous crops such as legumes. Leaf tests can be used to determine if your fertilizer program is adequate during the season.

#### Estimating soil-supplied N

You can expect 10-20 lbs of plant-available N to be released during the growing season for each percentage organic matter, depending upon temperature and moisture.

Remember that past cover crops, manures and composts contribute nitrogen.

**5. Organic Matter:** Though it makes up only a small percentage of the soil, the organic matter (made of molecules that contain carbon) is critical for healthy soil function. High organic matter feeds soil microbes and leads to good soil structure, nutrient cycling and retention, improved water holding capacity, and other perks. Low organic matter means soil organisms are hungry and less active, leading to less nutrient cycling and a structurally degraded soil. How much organic matter a soil is capable of maintaining depends largely on the soil texture (inherent to the soil) and on past tillage (management). Soil organic matter increases, albeit slowly over many years, with compost/manure applications, long term cover crops, and reduced tillage.

#### Soil Organic Matter (%)

	High	Medium	Low
<b>Sand</b>	> 3.2	2.3-3.2	1.8-2.3
<b>Silt</b>	> 3.3	2.6-3.3	2.2-2.5
<b>Clay</b>	> 4.5	3.2-4.5	2.6-3.1

From Cornell's Soil Health Manual

**6. Other nutrients: Na, Al, S, Zn, Mn, Fe, Cu, B, Mo.** Agro-One routinely reports only Al, Zn, Mn, and Fe, but does not interpret the results as "high, medium, or low." The other nutrients can be tested upon request, for an additional fee. For fruit crops, the normal soil range for most of these nutrients is unclear, and B is best assessed with a leaf test. For vegetables only Zn and B have established levels. Soil test levels of Fe, Al and Mn are more useful for diagnosing a toxicity problem than for developing fertilizer recommendations. If  $Mn + Fe + Al = >150$  lbs/acre, plant toxicity could result.

#### Zn and B levels for most vegetable crops (lbs/A)

	High	Medium	Low
<b>Zinc</b>	> 1.0	0.5-1.0	<0.5
<b>Boron</b>	> 0.75	0.35-0.75	< 0.35

**7. Fertilizer recommendations:** These are generated by the Cornell Recommendations Engine using the major nutrient results at the top of the test. The recommendations are in pounds of nutrient, *not pounds of fertilizer*. For instance, 10-10-10 (N-P-K) fertilizer is only 10% nitrogen by weight, so to apply 100 lbs of nitrogen, you need  $100/0.10 = 1000$  lbs of fertilizer. In this example you also get 100 lbs of phosphate ( $P_2O_5$ ) and 100 lbs potash ( $K_2O$ ), which you may or may not need. Choose nutrient sources that minimize over-applying nutrients that you have in ample supply.

#### Fertilizing small areas

For areas less than an acre, you can convert the recommendations to fit your needs.

There are 43560 ft<sup>2</sup>/A

**8. Comments:** These are important to read, as they will contain nutrient recommendations related to the minor elements, as well as instructions on application timing.

**9. Additional tests:** Some tests are not routinely done but are available upon request. Soluble Salt level is generally used as a diagnostic tool if road salt injury or high salinity due to fertilizers is suspected. No Till pH focuses on the pH in the top inch of soil, since all nutrients and herbicides are applied to the soil surface. Na, S, Cu, B, and Mo can be requested for an additional fee, see "other nutrients" above.

**10. Missing information:** If the major nutrient soil test levels chart or the fertilizer recommendations are missing it is because the soil name or this year's crop was missing on your submission form. Call the lab and make the correction so an amended report can be generated.

**11. More information:** Soil science is complicated and this fact sheet only scratches the surface. For more information, see the Cornell Nutrient Spear Program's extensive fact sheet collection at <http://nmsp.cals.cornell.edu/guidelines/factsheets.html>