Exercise 1. Reading and Understanding a Soil Test Report for Phosphorus

Due to changes over time in soil testing processes and reporting there are a number of ways that soil test level phosphorus is expressed on reports. While a bit confusing, a quick look for three key items can make the soil test understandable and a recommendation can confidently be determined.

The three items to identify are:

1) Is P reported as **elemental P** or some other form?

   Fortunately the majority of soil test (99%) will be reported as "P" or "Phosphorus" which indicates the elemental form.

   If you see a reported value as "P_2O_5" do not use this value with recommendation charts. Stop and call the lab for a corrected copy expressed as Elemental P.

2) What **Units** are used with the P value?

   Common report units with a soil test are:
   a. Pound per acre expressed as "lb/A", "lbs/A", "pounds/A" or other expression.
   b. Parts per million expressed as "ppm", "PPM" or "mg/kg"

   To convert pounds per acre to parts per million:

   60 pounds per acre ÷ 2 = 30 parts per million

   To convert pounds per acre to pounds per acre:

   30 parts per million X 2 = 60 pounds per acre

3) What **Extractant** is being used to express the P value?

   There are two common extractants which are solutions mixed with the soil to determine the phosphorus content. While both are good test, they do not result in equal soil test values.

   a. Bray P1 expressed as "P1", "P-P1" or "Bray P1".
   b. Mehlich III expressed as "P-M3", "M III", "Mehlich 3" or "Mehlich III".
   c. If other terms are used that are not Bray P1 or Mehlich III call the lab.

As you review your soil test reports, if you cannot identify the information in 1-3 above, call the lab for clarification.

Use the four example soil test reports below to identify the phosphorus units and extractant reported. Complete the table on page 2 with your results.

Sample Reports- Number 1

Soil Test Labs Inc.
4555 Buckeye Dr.
Buckeye, OH 55555
Phone: 555-555-3400

Report Number: 1002
Account Number: ABC-102

To: Buckeye Farmer
Corn-Soybean Rd
High Yield, OH 99999

Date Received: 5/28/2015 Date: Reported 06/02/2015

Soil Test Report

Sample Number	1
Lab Number	68816
Organic matter %	2.7
Phosphorus, P-M3, ppm	22
Phosphorus, P2, ppm	
Potassium, K-M3, ppm	126
Magnesium, Mg-M3, ppm	265
Calcium, Ca-M3, ppm	1787
Sodium, Na-M3, ppm	
Soil pH	6.6
Buffer pH	6.9
CEC meq/100g	12.7
% K	2.6
% Mg	17.4
% Ca	70.5
% H	9.5

Sample Reports- Number 2

Quality Soil Test Labs Inc.
USA Street
Brutus, OH 55567
Phone: 555-555-2110

Soil Analysis Report
Date Reported: 5/27/2015
Customer: FAOE22990123

Lab Number: 12-7861
Sample Id: 1

Buckeye Farmer
Corn-Soybean Rd
High Yield, OH 99999

Item		Units	Test Result
pH			6.6
Lime Test Index			69
Organic Matter		%	2.7
Phosphorus	M3	lb/a	44
Potassium	K	lb/a	252
Magnesium	Mg	lb/a	530
Calcium	Ca	lb/a	3574
Sodium	Na	lb/a	
Soluble Salts		mmho/cm	
Cation Exchange Capacity	CEC	meq/100g	12.7
Base Saturation		%	
Potassium		%	2.6
Magnesium		%	17.4
Calcium		%	70.5
Sodium		%	
Hydrogen		%	9.5

Sample Reports- Number 3

State Lab Services
Industrial Parkway
Main Town, OH 55589
555-555-5520

Soil Test Report for:
Buckeye Farmer
Corn-Soybean Rd
High Yield, OH 99999

Date	Lab#	County	Field Id	Acres
5/26/2015	S12-42265		1	

Soil Nutrient Levels

[1] Soil pH	6.6
[2] Phosphorus P ppm	10
[3] Potassium K ppm	126
[3] Magnesium ppm	265
[3] Calcium ppm	1787
CEC meq/100g	12.7
% Saturation of CEC	
K	2.6
Mg	17.4
Ca	70.5
Organic Matter %	2.7
Test Methods: [1] 1:1 soil:water, [2] Bray P1, [3] Mehlich 3 (ICP)	

Sample Reports- Number 4

Report Number 228.040

Soil Testing Labs LLC

Send to:
Buckeye Farmer
Corn-Soybean Rd
High Yield, OH 99999

Lab Number	13919
Sample Id	1

Organic matter %	2.7
Phosphorus, Bray P1, lbs/A	20
Phosphorus, P2, lbs/A	
Potassium, K, lbs/A	252
Magnesium, Mg, lbs/A	530
Calcium, Ca, lbs/A	3574
Soil pH	6.6
Buffer pH	6.9
CEC meq/100g	12.7
% K	2.6
% Mg	17.4
% Ca	70.5
% H	9.5

Use the four example soil test reports on the previous page to identify the phosphorus units and extractants reported to complete the table below. Put an X next to the Extractant and units used then fill in the soil test number value.

Exercise 1 Summary Table:

Measure	Report 1	Report 2	Report 3	Report 4
Bray P1				
Mehlich III				
Parts per million				
Pounds per acre				
Soil test number				
Once complete notice that the 4 numbers you see all represent the same P soil test value if all the conversions are done. They all convert to a 10 ppm soil test value.				
Just taking a soil test value to a recommendation table, and not recognizing the differences in the values, can give you the wrong recommendation resulting in added cost or more critical a yield loss. If we take the soil test values above directly to Table 13 and use the nutrient recommendation for 170 bushel corn. We get the following recommendations…				
Recommendation:	65	0	90	65

Table 13. Fertilizer (P_2O_5) Recommendations for Corn. (adapted from Tri-state Fertilizer Recommendations for Corn, Soybeans, Wheat and Alfalfa)

Soil Test Level (expressed as P) and Method		Realistic Yield Goal (bu/acre)					
Bray P1 Colorometric	Mehlich III-ICP	120	145	170	200	225	250
PPM	PPM	lbs P_2O_5/acre recommended					
5	16	95	105	115	125	135	145
10	22	70	80	90	100	110	120
15-30	28-46	45	55	65	75	85	95
35	52	20	25	30	40	40	45
40	58	0	0	0	0	0	0

Exercise 1 Summary Table: Answer Key and Explanation

Measure	Report 1	Report 2	Report 3	Report 4
Bray P1			X	X
Mehlich III	X	X		
Parts per million	X		X	
Pounds per acre		X		X
Soil test number A	22	44	10	20
Use Bray P1 column on Table 13 (Below) for 170 bushel corn.				
Recommendation: B	65	0	90	65

A The Soil Test report values here represent the same soil test level once all the conversion are done to a Bray P1 standard reporting in PPM.

B If the soil test numbers are taken directly to the chart without consideration of the units or the extractant reported you could have 3 different fertilizer rates for a recommendation when the actual soil test value is the same. The zero recommendation has a high risk of reduced yield.