

APP-5

Factors for Converting Soil Test Results from Other Laboratories to University of Delaware Fertility Index Values

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5.1 Converting Soil Test Results from Other Laboratories to University of Delaware Fertility Index Values.

Nutrient recommendations are based upon soil test calibration studies which relate the probability of a profitable plant response to nutrient addition to the plant nutrient concentration in the soil as measured by a soil test. However, the concentration of a soil nutrient measured by a specific soil test extracting solution is a function of the chemical composition of extracting agent and the forms of the nutrient present in the soil. Consequently, the concentration of a plant nutrient measured on a particular soil sample will vary with the soil test extracting solution used.

At the University of Delaware, nutrient recommendations are based on the *Mehlich 3* soil test. Results for **P, K, Ca and Mg** are reported in *Fertility Index Values* or *FIVs*. Results for **Mn, Zn, S and B** are reported in *lbs/ac*. In order to prepare nutrient recommendations using soil test results obtained from a different soil extract, it is necessary to first convert those values to the equivalent *UD-FIVs* or *M3-lbs/ac*.

NOTE: Nutrient recommendations prepared from this handbook, which are made directly from the results of soil tests from other laboratories without first converting to equivalent UD results, may be completely inaccurate and could result in either under- or over-application of the required nutrient and subsequent loss of yield or unnecessary expense.

To convert soil test results from other laboratories to their *UD-FIV* equivalent, determine the soil test extractant used and refer to the appropriate table below.

- **Table 5-1** should be used for results from laboratories using the *Bray P1 and ammonium acetate soil extracts* (A&L Eastern Agricultural Laboratories, Inc.).
- **Table 5-2** should be used for results from laboratories using the *Mehlich 3 soil extract* (A&L Eastern Agricultural Laboratories, Inc., Penn State Agricultural Analytical Services Laboratory, Rutgers, Brookside Laboratories, Inc, Spectrum Analytical Laboratories) .
- **Table 5-3** should be used for results from laboratories using the *Mehlich 1 soil extract* (Waters Laboratories) .

NOTE: Some laboratories offer multiple extractants (e.g., A&L). Confirm extractant used before selecting conversion table.

Each table contains conversions for calculating the equivalent *UD - Mehlich 3 soil test value in Fertility Index Values or lbs/ac* from the results shown on the soil test report. These conversions are based on correlation studies between *Mehlich 3* and the other extracts using 300 Delaware soil samples. A sample calculation is given below each table.

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Conversions to UD FIVs

Table 5-1. Conversions for soil test results from laboratories using the *Bray P1*, *Ammonium Acetate* and *0.1N HCl* Extracts.

Nutrient	Reported Units	Conversion Equation
P	ppm P	P- FIVs = (1.23 X Bray P1-P) + 6.07
	lbs P/ac	P- FIVs = (0.61 X Bray P1-P) + 6.07)
K	ppm K	K-FIVs = (0.55 X AmmAc-K) - 0.31
	lbs K/ac	K-FIVs = (0.27 X AmmAc-K) - 0.31
Ca	ppm Ca	Ca-FIVs = (0.12 X AmmAc-Ca) - 5.60
	lbs Ca/ac	Ca-FIVs = (0.06 X AmmAc-Ca) - 5.60
Mg	ppm Mg	Mg-FIVs = (0.84 X AmmAc-Mg) - 0.13
	lbs Mg/ac	Mg-FIVs = (0.42 X AmmAc-Mg) - 0.13
Mn	ppm Mn	Mn-lbs/ac = (1.45 X HCl-Mn) + 14.61
	lbs Mn/ac	Mn-lbs/ac = (0.73 X HCl-Mn) + 14.61
Zn	ppm Zn	Zn-lbs/ac = (1.91 X HCl-Zn) + 1.22
	lbs Zn/ac	Zn-lbs/ac = (0.96 X HCl-Zn) + 1.22

Calculation 5.1:

$$UD-P-FIVs = 1.23 \times (BrayP1-Value) + 6.07$$

where:

UD-P-FIVs = UD Mehlich 3 P FIV value

BrayP1-Value = Bray P1 soil test result from the soil test report

Example 5.1:

Bray P1-P = 75 lbs ppm P

UD--FIVs = (1.23 X 75 ppm P) + 6.07 (From Table 5-1)

= 98 FIVs

Table 5-2. Conversion equations for soil test results from laboratories using the *Mehlich 3* soil extract.

Nutrient	Reported Units	Conversion Equation
P	ppm P	UD-P-FIVs = 1.00 X M3-P
	lbs P/ac	UD-P- FIVs = 0.50 X M3-P
K	ppm K	UD-K-FIVs = (0.55 X M3-K)
	lbs K/ac	UD-K-FIVs = (0.27 X M3-K)
Ca	ppm Ca	UD-Ca-FIVs = (0.10 X M3-Ca)
	lbs Ca/ac	UD-Ca-FIVs = (0.05 X M3-Ca)
Mg	ppm Mg	UD-Mg-FIVs = (0.76 X M3-Mg)
	lbs Mg/ac	UD-Mg-FIVs = (0.38 X M3-Mg)
Mn	ppm Mn	UD-Mn-lbs/ac = (2.0 X M3-Mn)
	lbs Mn/ac	UD-Mn-lbs/ac = (1.0 X M3-Mn)
Zn	ppm Zn	UD-Zn-lbs/ac = (2.0 X M3-Zn)
	lbs Zn/ac	UD-Zn-lbs/ac = (1.0 X M3-Zn)

Calculation 5.2:

$$UD-K-FIVs = 0.55 \times M3-K-ppm$$

where:

UD-K-FIVs = UD Mehlich 3 K FIV value

M3-K-ppm = Mehlich 3 K result in ppm from the soil test report

Example 5.2:

Mehlich 3-K = 182 ppm

UD-K-FIVs = (0.55 X 182 ppm K) (From Table 5-2)

=100.1 FIVs

Table 5-3. Conversion equations for soil test results from laboratories using the *Mehlich 1* soil extract.

Nutrient	Reported Units	Conversion Equation
P	ppm P	UD-P-FIVs = 2.00 X M1-P
	lbs P/ac	UD-P- FIVs = 1.00 X M1-P
K	ppm K	UD-K-FIVs = (0.72 X M1-K)
	lbs K/ac	UD-K-FIVs = (0.36 X M1-K)
Ca	ppm Ca	UD-Ca-FIVs = (0.12 X M1-Ca)
	lbs Ca/ac	UD-Ca-FIVs = (0.06 X M1-Ca)
Mg	ppm Mg	UD-Mg-FIVs = (0.90 X M1-Mg)
	lbs Mg/ac	UD-Mg-FIVs = (0.45 X M1-Mg)

Calculation 5.3:

$$UD-K-FIVs = 0.36 \times M1-K-lb/ac$$

where:

UD-K-FIVs = UD Mehlich 3 K FIV value

M1-K-lb/ac = Mehlich 1 K result in lbs K/ac from the soil test report

Example 5.3:

Mehlich 1-K = 282 lbs K/ac

UD-K-FIVs = (0.36 X 282 lbs K/ac) (From Table 5-3)

=101.5 FIVs

