Midwest Laboratories®
13611 B Street, Omaha, Nebraska 68144 (402) 334-7770 FAX (402) 334-9121 www.midwestlabs.com

HOW A SOIL CAN INFLUENCE HERBICIDE RECOMMENDATIONS

A soil test is a guideline and a management tool. There are no absolutes. We can't say a given C.E.C. has the same effect on chemical availability in all parts of the country, or that a given % organic matter has the same influence in all soils. Many interacting factors govern the effectiveness of herbicides. Below are some ways to use your Midwest soil report as a guide to better weed control management.

I. Where herbicide performance is good or bad. Ask why?

1. Compare soil C.E.C., % O.M., P_1P_2 ratios, % Ca and pH's.

2. Where soil patterns relate to specific herbicide responses, identify soil test values and develop trends.

3. Trends become guidelines for making adjustments in herbicide selection and/or herbicide rates.

II. Cation Exchange Capacity

1. C.E.C. is a relative guide to how heavy a soil is or how much absorption capacity it has.
2. In reality C.E.C. numbers relate to soil conditions. A low number being a well drained coarse textured soil. As the number increases, the soil's capacity to adsorb nutrients and hold moisture increases. See Capsule #102.

III. Soil Texture Analysis

1. The C.E.C. is a guideline. The texture analysis gives actual percentages of sand, silt and clay providing a more accurate reference point for herbicide rates.

2. Types of clay vary in their holding capacity. The vermiculites adsorption capacity is 14 times greater than the highly weathered kaolinites. In the upper Midwest, the Montmorillonites predominate and have an adsorption capacity ten times greater than the kaolinites.

IV. Organic Matter

1. O.M. is important because of its capacity to attract and hold a variety of molecules, including herbicides, by a process called adsorption.

2. Its adsorption capacity is four to six times greater than the Montmorillonite clays.

3. Because of the difference in adsorption capacity between sands, silts, clays, and O.M. on low C.E.C. soils, a 1/2% difference in O.M. has a much greater influence on herbicides than it does on high C.E.C. or heavy soils.

4. Long-term uses of no-tillage or heavy manure application results in increased organic matter content of the surface soil.

5. As crop residue levels increase, higher gallonage per acre of the carrier liquid improves weed control. Impregnation on fertilizer granules may also reduce tie up.

6. Soil temperature is closely related to O.M. levels. Remember a 10º increase in soil temperature doubles the chemical activity so increasing soil temperature from 45º to 65º gives four times the chemical available for weed control.

V. P_1:P_2 Ratios

1. A normal range is 1:1-1:2.

2. As the spread between P_1 and P_2 widens, it indicates an increasing amount of free cations, usually Ca, in the soil system.

3. A wide ratio like 1:6 or 1:10 and/or % Ca greater than 75% relates to a soil condition where we can have carryover and/or crop injury from the Triazines.

4. Some of the problems with the Dinitroanilines also relate to the wide P_1:P_2 ratio.

VI. Soil pH

1. Soil pH's most favorable to herbicides are 6.5 to 7.3.

2. It is necessary to adjust the pH zone of greatest herbicide activity (top 3").

3. Soil pH most directly effects the chemical decomposition and biological degradation of herbicides.

4. Microbes are most active at a neutral soil pH and are the primary means by which most of the non-ionic herbicides are degraded (i.e., Treflan, Toban, Lasso, Dual, CIPC).

5. As pHs drop below 6.5, the Triazines act as a base and become less effective.

The activity of any herbicide is usually the greatest at the moment it is applied. In general, only those herbicide molecules dissolved in soil solution are available for control of weeds. Some herbicides are vaporized into soil pore spaces. Herbicides establish an equilibrium between the soil solution and soil solids (O.M. and clay) in the same manner as do fertilizer.

The soil is a complex, ever-changing system that has a unique combination of properties that are important in determining herbicide rates.