



TECHNICAL NOTES

U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE MICHIGAN

Agronomy #15

SUBJECT: Agronomy: The Influence of Organic
Matter on Herbicide Reaction

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To: All Offices

From: Robert R. Ditson, State Resource Conservationist

One of the factors influencing the success of no-till farming is the effectiveness of herbicides in controlling weeds. This effectiveness is influenced by many factors which includes, but are not limited to: time of application, temperature, moisture, sunlight, type of weed, growth stage of weed, soil type, percent of clay and percentage of organic matter in the soil.

The information included here is taken from several sources including a variety of MSU Extension Bulletins, an article by Dr. T. A. Fretz and Dr. E. M. Smith of Ohio State University, "Why Herbicides Fail," and an article by G. F. Warren - "Action of Herbicides in the Soil - Effected by Organic Matter."

More than any other soil constituent, soil organic matter content determines the activity of herbicides in the soil. If organic matter is ignored some erratic results from herbicides may occur. When attempts are made to use herbicides on soils with over 10 percent organic matter, different techniques must be employed.

The importance of organic matter lies in its capacity to attract and hold a variety of molecules through the process of absorption or more simply the "sticking" of the chemical to the surface of the organic matter so that the molecule is not free to move in the soil solution, and as thus, less available to be taken up by the plants.

The relative absorption by organic matter of some of the common herbicides is shown in the following table:

Relative Absorption of Herbicides by Organic Matter

<u>Absorption</u>	<u>Herbicide</u>
None	Dalapon (Dalpon), paraquat
Weak	CDAA (Radox), propachlor (Ramrod), chloramben (Amiben)
Moderate	2, 4-D
Strong	Alachlor (Lasso), diphenamid (Dymid or Enide), dichlobenil (Casoron), EPTC (eptam), simazine (Princep), terbacil (Sinbar)
Very Strong	Duron (Karmex), Linuron (Lorox), chlorpropham (CIPC), DCPA (Dachal), trifluralin (Treflin)

The herbicides that are not absorbed by the plant or the soil may be leached into the ground water. Weakly absorbed herbicides are largely in solution phase of the medium and are also readily leached out of the root zone, while the strongly absorbed herbicides give the longest period of weed control because of their strong absorption to the soil organic matter.

Often the strongly absorbed herbicides in high organic matter soils work to the detriment of good weed control, because application rates may be so high they either become uneconomical or exceed the legal limits shown on the product label.

For example, Treflan must be increased in its rate of application in order to achieve weed control in soils that have high amounts of organic matter.

Rate of Treflan Required to Achieve Desired Weed Control in Soils of Varying Organic Matter*

<u>Organic Matter Percent</u>	<u>Treflan Required/Acre (Lbs./Active Ingredient)</u>
1	1/4
2	1/2
3	3/4
4	1
6	1 1/2
8	2
16	4

Herbicide rate recommendations by MSU in their Bulletins are currently given for medium-textured soils with greater than 3 percent organic matter.

Organic matter content changes slowly and may need to be checked only every 4 years.

No-till, on muck soils, is difficult due to the limited herbicides approved for use that are effective on muck. As herbicides used on mucks have limited acreage application, many herbicide suppliers are reluctant to expend the funds needed for product development and approval.

*(Reprinted from Warren, G.F., 1973, Action of Herbicides in Soil...Affected by Organic Matter, Weeds Today. Vol 4(2):10-12.)