

HERBICIDE DETECTION IN LANDSCAPE SOILS

by Dirk W. Muntean, M.A., Consultant, Soil & Plant Laboratory, Inc., Bellevue, WA

BACKGROUND

More and more frequently, we are faced with determining whether or not herbicides exist in landscape soils for various projects. In some instances, the asphalt and gravel of a previous parking lot is removed, exposing soils which may have been treated with soil sterilants which may be inorganic in nature, such as Monobor-chlorate. Other types of preemergent organic herbicides (such as Casoron or Norsac) may be present which have been placed for control of germinating seeds. Such preemergent herbicides may also have been present in wood residue mulch layers and can present problems, particularly if the mulch material is going to be incorporated into the mineral soil below prior to landscape renovation.

When attempting to detect whether or not herbicides exist in such situations, it is not so important to know exactly what herbicide is present as it is to know whether the herbicide is a soil sterilant or a preemergent herbicide, or even a postemergent herbicide. It is very costly to have soils or mulches tested for any particular herbicide unless one knows exactly what herbicide is present. Since there are hundreds of herbicides in use, trying to identify the particular herbicide present can become extremely cost prohibitive.

GROWTH TRIALS

In instances where herbicide residues are suspected, consideration should be given to appropriate sampling for growth trial studies. Such growth trial studies can determine:

1. whether an herbicide is present.
2. whether the herbicide is inorganic or organic in nature.
3. whether the herbicide is preemergent or postemergent.
4. whether the herbicide can be neutralized without costly removal of contaminated soil.

Since the majority of organic herbicides adhere tightly to organic and colloidal particles in the soil, they usually are present in the upper few inches of soil. In instances where herbicides have been employed in wood residual mulches, they may be present in both the mulch layer and the first few inches of mineral soil below the mulch. Preparing for growth trial studies begins with proper sampling of the soil. Usually, three gallons of soil are collected in a representative manner from numerous locations within the boundaries of the questionable area. The uppermost few inches of soil are taken and composited together. In instances where mulch has been utilized, it is best to obtain two samples: one from the mulch layer and one from the first few inches of soil below the mulch layer.

In the laboratory, the sample is split into two portions, with one portion serving as the control and other portion treated with activated carbon at a rate that would normally tie up organic herbicide residues. Each of these samples (control and treated) are then seeded with indicator plants representative of the two major flowering plant groups (monocots and dicots). The control and treated soils are then provided optimum germination conditions and observed for a period of four weeks.

If no germination occurs in control and treated soils, there is a good likelihood that a soil sterilant of non-organic nature has been employed. Further testing of these soils for the presence of inorganic soil sterilants such as Monobor-chlorate can then be undertaken. Based on results, a determination can be made as to whether or not soil can be treated or if removal is necessary.

In instances where germination has occurred in the carbon-treated soil but no germination has occurred in the control soil, the herbicide present is of an organic nature, and one which can be potentially neutralized. In some instances, germination will take place in both control and treated soils, but toxicity develops later during the growth trial in only the control group. In this type of situation, the herbicide present does not affect germination, but must be accumulated over a period of time by plant material before toxicity expression develops (post emergent herbicide).

If it has been shown that the organic herbicide can be neutralized, then use rates for activated carbon can be extrapolated from growth trials and used appropriately to pre-treat landscape soils and/or mulch prior to planting.

SUMMARY

It has been with greater frequency that new landscape projects result in renovation of older sites or sites which previously had been covered by parking lot asphalt or roadways. Performing growth trial studies in such questionable locations can save a considerable amount of time and money and help insure a successful landscape planting.