MONTANA STATE UNIVERSITY EXTENSION
Urban IPM

URBAN IPM Newsletter

VOLUME 2, ISSUE 2 1May 2012

Herbicide Contamination of Soil and Compost

Commercial and home gardeners have reported damage to vegetable and flower crops after applying horse or livestock manure, compost, hay and grass clippings to the soil. The symptoms reported include: poor or absence of seed germination; death of young plants; twisted, cupped and elongated leaves; misshapen fruit; and reduced yields. These symptoms can be caused by numerous biotic and abiotic factors including: diseases, insects, extreme temperature change and herbicide drift. Another possibility for the source of these crop injuries could be the presence of herbicide residue in manure, compost, grass, hay or grass clippings applied to the soil.

This residue may be from a class of herbicides known as plant growth regulators. Examples include 2,4-D, aminopyralid, clopyralid, picloram, 2,4-D, aminocyclopyrachlor and dicamba. They are registered to target broad leaf plants on numerous sites such as pastures, rangeland, small grain crops, nonresidential and residential lawns, certain vegetables and fruits, and roadsides. When these herbicides are applied to hay fields, pasture, or rangelands, the forage can be safely consumed by horses and livestock— including livestock produced for human consumption. The herbicides can pass through the animal's digestive tract unchanged and are excreted as active herbicides in urine and manure. These materials can remain active in the manure even after it is composted. Depending on the herbicide properties, the herbicide residue and breakdown can take months to years to fully decompose, depending on the specific herbicide and its properties.

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Before acquiring or using manure – fresh, aged or composted — ask what the animals were fed, the origin of the hay and which, if any, herbicides were used on the hay, pasture or rangeland. Some livestock owners may suggest the manure is "safe" because their animals have not been affected; however, all of the herbicides discussed are safe for animal consumption and the livestock owner may not know if herbicide products were used or the origin of the hay they may be selling or brokering. If you don't know which, if any, herbicides were used, make use of the bioassay described below to test for the presence of t these herbicides. Do not use the manure or compost to grow sensitive crops without knowing its herbicide history or testing to see that it is safe.

Pine needles exhibiting symptoms of damage by a growth regulator-type herbicide.

This article is excerpted from the Montana State University Bulletin "Herbicide Carryover: Hay, Manure, Compost" available at: http://www.pesticides.montana.edu/PAT/Coordinators/non-target%20plant%20toxicity/Montana%20Herbicide%20Carryover%20Booklet%2011-2011%20LO-RES.pdf

Hilary Parkinson

Herbicide Contamination Bioassay

Some laboratories can test for the presence of these herbicides, but the tests are expensive and not as sensitive as a plant bioassay that you can perform yourself. The simple pot and field bioassays involve growing cucumbers, beans or peas, which are very sensitive to the presence of these herbicides, in the manure, compost or soil. First, take a number of random, representative samples (small shovelfuls) from throughout the manure, compost or soil, being sure to get deep inside of the piles. Mix samples thoroughly. If there are separate sources of manure, compost or soil, conduct individual assays for each. Prepare three-to-six small (4- to 5-inch) pots with a 2:1 mix of the manure, compost or soil with uncontaminated soil. Also prepare one pot with uncontaminated soil as the "control" pot. Put saucers underneath each pot, or position the pots far enough apart so water running out of the bottom of the pots will not reach another pot. Plant three cucumber, pea or bean seeds in each pot, water and let them grow for two to three weeks, until there are three sets of true leaves. If the peas or beans in the control pots grow normally and the ones in the pots with manure, compost or soil do not, you can assume the manure, compost or soil is contaminated with a herbicide that will adversely affect sensitive plants. If they all grow normally, it would be reasonable to assume the manure, compost or soil is fine. Keep in mind, however, that the test will be only as good as the samples you take. It would be better to err on the side of too many samples than too few (at least 20 per pile). You can create a similar test for hay or grass clippings by filling the pot with commercial potting mix and spreading a thick layer of the hay or grass clippings on top or mixing in the soil medium. This bioassay is explained in detail on the Washington State University **website**: www.puyallup.wsu.edu/soilmgmt/Pubs/CloBioassay.pdf.

Pea plants showing slight and severe damage, 3 weeks after planting. WSU Whatcom County Extension..

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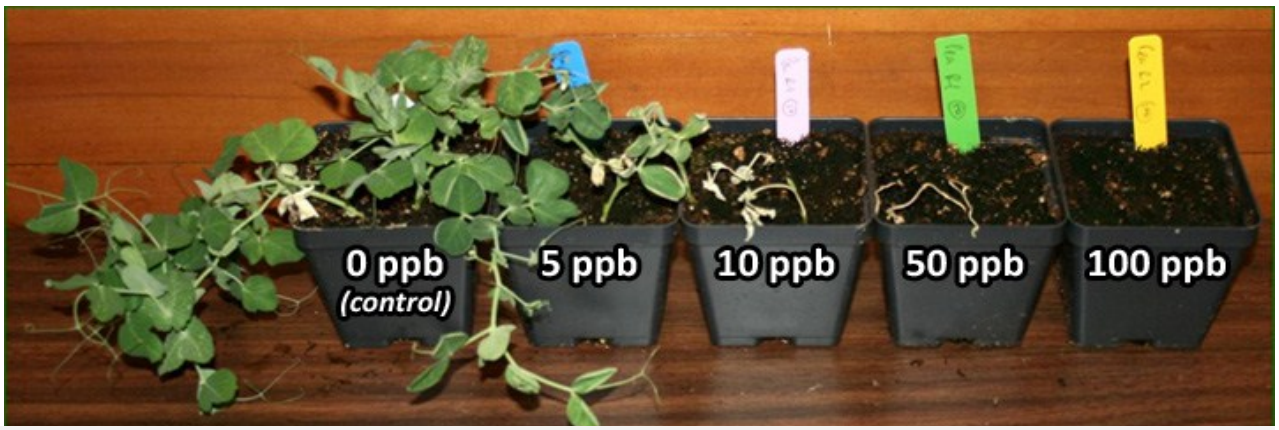

Results of a bioassay with known concentrations of aminopyralid. Plants shown are at six weeks after planting. Note leaf curling on plant grown in 5ppb (parts per billion) aminopyralid and death of plants at higher levels. WSU Whatcom County Extension

Cold Temperature Injury in the Landscape

Many locations across Montana experienced freezing or near freezing temperatures over the weekend. Due to our early spring, many plants were at a susceptible stage to frost injury. In the case of flowering trees, spring frosts are usually most damaging to flower buds, flowers and young fruit. Affected trees and shrubs may produce no flowers or fruit but will otherwise look healthy. The good news is that snow or ice on the buds and flowers helped protect tender tissues.

Freeze damage on Cavalier sweet cherry.

The amount of damage on plants is determined by the actual temperature and the number of hours at that temperature as well as the plant species' natural tolerance to cold. Tightly closed or partially closed flowers or leaves tend to sustain less damage than those that are open and unfurled, although very low temperatures can entirely kill leaves or flowers. Edges of leaves or petals will be burned and turn brown, or they may drop off the tree.

Individual plants will react differently to frost. Damage may appear quickly or over several weeks. Some will continue to unfurl flowers or leaves that are already present (and partially burned), while other will abort them and produce a new flush of growth.

Lilacs are an excellent example of easily damaged plants. Often, people are unaware there was frost. Yet days or weeks later they notice blackened leaves or leaf margins and become worried about "blight". Even later in the season, leaves will looked cupped or ragged leading people to suspect herbicide injury. It is very common that tattered and ragged leaves on maple and aspen are notice later in the spring or summer. At that time people mistakenly suspect insect damage or diseases.

The first step to take after a frost event is to do nothing. Allow the plant to regrow for several weeks before performing any pruning. About ten days ago I received a call from a panicked out-of-state homeowner. The newly emerging leaves on all the trees in her condo complex were turning yellow and brown and seemed to be dying.

I assured her this was likely frost damage and to wait. Yesterday I received this message: *"A few days ago all those half-formed, half-dead leaves fell off and blew around the neighborhood. Now the trees are leafing out in lovely new green. What a relief. That many dead trees would have been terrible!"*

Frost injury on lilac. Notice the curled and misshaped leaves.

Bottom line: Be patient and don't forget frost damage when you look at plants all through the growing season.

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Urban IPM Program

The objectives of the Urban IPM Program

- Establish an IPM certification program for urban landscape and turf professionals.
- Develop resources for using IPM methods in the urban landscape.
- Train landscape professionals to be First Detectors for invasive pests.
- Educate homeowners/consumers in the basic principles of IPM.

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This newsletter is funded by a Pesticide Environmental Stewardship Program (PESP) Regional Grants. Established in 1994, the Pesticide Environmental Stewardship Program (PESP) is an EPA partnership program that works with the nation's pesticide-user community to promote Integrated Pest Management (IPM) practices.