

Using Compost in the Garden-It is still a good idea!

Ann Hazelrigg, Plant Pathologist
UVM Extension and Department of Plant and Soil Science

Composting can reduce the amount of waste material going into our landfills and can serve as a beneficial soil amendment used to improve organic matter and biological activity in gardens. Unfortunately, as we found out last spring, compost can also harbor things that are not so beneficial.

In June 2012, gardeners began noticing their tomatoes and other broadleaf plants were showing severe foliar curling and stunting. In some cases, seed germination was affected. After confirmation of the damage by the Vermont Agency of Agriculture, followed by several weeks of laboratory testing, 'persistent herbicides' were found to be present in very minute amounts in the bulk compost used by all the gardeners. These persistent herbicides in the compost were responsible for the damage. The compost was purchased from Chittenden Solid Waste District (CSWD). Over 500 gardens, mainly in Chittenden County, were affected. The Chittenden Solid Waste District and the Vermont Agency of Agriculture, Food and Markets have worked diligently, testing dozens of samples, to understand this complicated problem and propose solutions to address this contamination.

Herbicides are a class of pesticides that kill unwanted plants. Some herbicides are designed to remain active and effective in the field for up to a full growing season. A group of these herbicides are used to control broadleaf weeds and can be present in human food (vegetables and grains) and food waste and grass clippings, livestock feed crops (hay, molasses, sugar beets and oats) and livestock bedding (straw). These herbicides can pass through animals into manure, urine or bedding, and can remain unaltered after the grasses have been eaten. These herbicides are used legally in other states and the products containing the herbicides may be shipped to Vermont in animal feed. Many farmers do not know which herbicides have been used on purchased feed or bedding materials. The wide use of these herbicides as well as the lack of a tracking system or chain of custody for the products makes it difficult to determine how these herbicides enter a particular composting system. A smaller group of these herbicides can withstand the heat and moisture in the composting process. These herbicides remain intact and are called persistent herbicides. These persistent herbicides have a significant impact on sensitive garden plants at very low parts per billion (ppb) concentration range in finished composts. The four primary persistent herbicides that can impact compost operations are picloram, clopyralid, aminopyralid (Dow AgroSciences) and aminocyclopyrachlor (DuPont). All are registered for legal use in Vermont, but have been classified as "Restricted Use" making them only available to licensed applicators. The Vermont Agency of Agriculture is now requiring a special permit to apply these herbicides. Applicators must follow a list of guidelines developed by the state to ensure the proper management of the crops that have been sprayed with the materials, including any manure generated from ingestion of the sprayed crops. All four of these persistent herbicides have very low toxicity to mammals, fish, amphibians and fowl.

After several weeks and thousands of dollars of testing, the persistent herbicides clopyralid and aminopyralid were found in the CSWD compost. Clopyralid is an endemic problem and appears to be present in most composts and likely has been for many years. The amounts found in CSWD compost (and other Vermont composts that were tested) were below the 10 ppb threshold, a level generally regarded as necessary to harm or cause symptoms in plants. The amounts found were also too low to cause human health concerns. Clopyralid will break down during the normal compost curing process. The presence of aminopyralid is more problematic because it is active at a lower concentration causing

plant damage at levels above .2 ppb. This is the persistent herbicide linked to the plant damage seen in gardens last year.

This herbicide is believed to be associated with the horse manure in the compost. Horse manure is a common component of many commercial composts. Testing the compost has been very complicated and difficult. There is no "standard method" for testing for persistent herbicides in complex matrices like composts and manures at the low part per billion concentration range where symptoms in plants are apparent. The manufacturers of the pesticides in question (Dow and Dupont) are the only labs able to do this testing at this time. The absence of quick, reliable, comparable test results has slowed the process for understanding the problem. Both Dow and Dupont have indicated they are working to develop universal testing methods and will share the protocols with other labs.

Aminopyralid has the ability to remain in compost for up to a year, but will breakdown more readily when mixed with soil. Last year, many of the affected plants had begun to grow out of the damage. Soil microorganisms, sunlight and precipitation all contribute to the breakdown of the herbicides. Unfortunately, checking each batch of compost for possible persistent herbicides is costly and is not feasible. Bioassays (plant growth tests) are the best means we have right now to assure the quality of compost. Most commercial composters are incorporating these tests into their production protocols to help ensure their products do not contain levels of the persistent herbicides that would cause damage to plants, however, no test can be 100% representative of an entire batch of compost. Diluting compost is a good strategy to protect sensitive plants. Compost should be applied to achieve a minimum of 80% dilution rate-meaning that one inch of compost should be mixed with a minimum of 4 inches of soil or one bucket of compost to four buckets of soil.

Gardeners can also do a simple bioassay before using compost or planting in gardens that may contain contaminated compost. To do this bioassay, collect samples from garden soil where the compost was applied or from the actual compost pile (mix the compost 50:50 with potting mix). Put in clean pots or flats and plant indicator seeds like tomatoes, peas or beans. Grow the plants under lights or in full sun for 4 weeks to see if any twisting or curling symptoms emerge. Before purchasing compost this next growing season, ask your compost supplier if they have done their own bioassay.