

# Herbicide Carryover in Hay, Manure, Compost and Grass Clippings

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Many farmers 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 seed germination; death of young plants; twisted, cupped, and elongated leaves; misshapen fruit; and reduced yields. These symptoms can be caused by other factors, including diseases, insects, and herbicide drift. Another possibility for the source of these crop injuries should also be considered: the presence of herbicides in the manure, compost, hay, or grass clippings applied to the soil.



## The Herbicides of Concern

Aminopyralid, clopyralid, fluroxypyr, picloram, and triclopyr are in a class of herbicides known as pyridine carboxylic acids. They are registered for application to pasture, grain crops, nonresidential lawns, certain vegetables and fruits, and roadsides. They are used to control a wide variety of broadleaf weeds, including several toxic plants that can sicken or kill animals that graze them or eat them in hay. Based on USDA/EPA and European Union agency evaluations, when these herbicides are applied to hay fields or pasture, the forage can be safely consumed by horses and livestock – including livestock produced for human consumption. These herbicides pass through the animal's digestive tract and are excreted in urine and manure. They can remain active in the manure even after it is composted. They can also remain active on hay, straw, and grass clippings taken from treated areas. The herbicides leach into the soil with rainfall, irrigation, and dew. As with many other herbicides, they can remain active in the treated soil for up to 5 years.

The chemicals of greatest concern are picloram, clopyralid, and aminopyralid because they can remain active in hay, grass clippings, piles of manure and compost for an unusually long time. These herbicides eventually break down through exposure to sunlight, soil microbes, heat, and moisture. Depending on the situation, the herbicides can be deactivated in as few as 30 days, but some field reports indicate that breakdown can take as long as three to four years. Degradation is particularly slow in piles of manure and compost. When mulches, manures, or composts with herbicide activity are applied to fields or gardens to raise certain vegetables, flowers, or other broadleaf crops, potentially devastating damage can occur.

**Crops known to be sensitive to picloram, clopyralid, or aminopyralid are:** Beans; Carrots; Compositae family; Cotton; Dahlias; Eggplant; Flowers, in general; Grapes; Legumes; Lettuce; Marigolds; Mushrooms; Peas; Peppers; Potatoes; Roses, some types; Spinach; Sugar beets; Strawberries; Sunflowers; Tobacco; Tomatoes; Umbelliferae family; Vegetables, in general.

## **Livestock and Horse Owners**

If you buy hay for your animals, ask the farmer or seller which herbicides, if any, were used in producing the hay. Consult a copy of the herbicide label from a farmer or online. A simple indicator that these herbicides were not used in the production of hay is the presence of legumes, such as lespedeza, clovers, or alfalfa. If the hay has legumes in it, it has not been treated with any of these herbicides. The absence of legumes in hay, however, does not mean that these herbicides are present. If you do not know the herbicide “history” of the hay, do not sell or give away the manure from animals who consumed the hay for use in rowing plants or to make compost as it may contain one of the herbicides of concern. Manures that contain these herbicides can be safely spread on grass pastures or grass hayfields. Note: It takes 4 to 7 days for most animals’ digestive tracts to clear and the manure produced to be free of any herbicide residue.

## **Farmers and Gardeners Wanting to Use Manure or Compost**

Before acquiring or using manure – fresh, aged, or composted – ask what the animals were fed, the origin of the hay, and what, if any, herbicides were used on the hay or pasture. Some livestock owners can tell you this, but many might not know the products used or origin of the hay they purchased. They may suggest the manure is “safe” because their animals have not been affected. If you don’t know which, if any, herbicides were used, use the bioassay described below to test for the presence of 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. If you find yourself with a small quantity of contaminated manure or compost, spread it on a grass pasture, grass hayfield, or non-sensitive, nonfood crop area.

Great care should be taken in using contaminated manure or compost to grow commercial food crops. Consult the herbicide product label to determine if the pesticide is labeled for use (legally permitted to be applied) to that crop. If the product has already been applied to the soil, tilling it several times during the growing season, irrigating the area, and planting it into a non-sensitive cover crop for a year or two will help the herbicides break down. Conduct a pot or field bioassay, as described below, before planting any sensitive crops in the area.

## **Farmers and Gardeners Wanting to Use Hay or Grass Clippings**

If you want to use hay or grass clippings as mulch or in your compost pile, find out what, if any, herbicides were used on the field or lawn. This includes Weed-and-Fed type products. Be particularly careful about obtaining grass clippings from golf courses and other commercial turf fields where these herbicides are commonly used. If you find yourself with contaminated hay or grass clippings, spread them on non-sensitive, nonfood crop areas, burn them, or arrange to have them disposed of safely. If the hay or grass clippings have already been applied to the field or garden, remove them, till the soil, sow a nonsensitive cover crop, and let it grow for a year or two to help the herbicide break down. Conduct a pot or field bioassay, as described below, before planting any sensitive crops in the area.

## **How to Test for the Presence of Herbicides in Your Manure or Gardens**

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. This simple pot bioassay involves growing beans or peas, which are very sensitive to the presence of these herbicides, in the manure or compost.

First, take a number of random, representative samples (small shovelfuls) from throughout the pile of manure or compost, being sure to get deep inside the pile. Mix thoroughly. If there are separate sources of manure or compost, conduct individual assays for each. Prepare 3 to 6 small (4- to 5-inch) pots with a 2:1 mix of the manure or compost and a commercial potting mix with fertilizer. Fill several control pots with only the commercial potting mix. Put saucers underneath each pot, or position the pots far enough apart so that water running out of the bottom of the pots will not reach another pot. Plant three 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 or compost do not, you can assume the manure or compost is contaminated with an herbicide which will adversely affect sensitive plants. If they all grow normally, it would be reasonable to assume that the manure or compost 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. This bioassay is explained in detail on the Washington State University Web site: [www.puyallup.wsu.edu/soilmgmt/Pubs/CloBioassay.pdf](http://www.puyallup.wsu.edu/soilmgmt/Pubs/CloBioassay.pdf)

If a field or garden site has previously been treated with one of the herbicides of concern or been contaminated through the application of treated manure, compost, hay, or grass clippings, a field bioassay can be conducted. Plant peas or beans in short rows scattered throughout the affected area. If herbicidal symptoms appear, do not plant sensitive plants; plant grasses. Test again the following year. If the test plants grow normally, it should be safe to grow broadleaf crops.

*For a complete copy of this paper, go to <http://ncherb.org>*

*Sources: Dr. Jeanine Davis & Dr. Sue Ellen Johnson, North Carolina State University, Publish Date: Fall 09 Vol.1V No.4*