

## **Herbicide Carryover in Manure and Hay: Caution to Organic Farmers and Home Gardeners**

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This year there have been a number of reports from organic farmers and home gardeners of damage to vegetables following application of aged and composted horse and cattle manure to the soil. The symptoms exhibited on the crops are twisted, cupped, and elongated leaves; misshapen fruit; reduced yield; death of young plants; and poor seed germination. One possibility for the source of this crop injury is the presence of certain herbicides in manure and compost.

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, lawns, certain vegetables and fruits, and roadsides. They are used to control a wide variety of broadleaf weeds. If these herbicides are used on a pasture or hayfield, they apparently don't harm the animals grazing on the pasture or eating the hay. But some of these herbicides can be persistent and may remain active in the hay, straw, grass clippings, and manure, even after they are composted. Some of these herbicides have a half life of 300 days or more and aminopyralid has been reported to remain active in compost for several years. A problem sometimes arises when these materials, particularly manure and compost, are applied to fields and gardens to raise certain vegetables and flowers. The herbicides of greatest concern are picloram, clopyralid, and aminopyralid. The garden plants that are most sensitive to this class of herbicides are tomatoes, potatoes, lettuce, spinach, carrots, peas, beans, dahlias, and some roses.

To view the herbicides registered for use on pastures, hayfields, lawns, vegetable and fruit crops, and roadsides, please refer to the 2009 NC Agricultural Chemicals Manual (<http://ipm.ncsu.edu/agchem.html>). Some herbicides registered to control broadleaf weeds in pastures and hayfields that contain the herbicides of concern include Grazon (picloram + 2,4-D), Surmount (picloram + fluroxypyr), Crossbow (2,4-D + triclopyr), Milestone (aminopyralid), Forefront (aminopyralid + 2,4-D), Redeem R&P (triclopyr + clopyralid), Remedy and Remedy Ultra (triclopyr), PastureGard (triclopyr + fluroxypyr), and Curtail (2,4-D + clopyralid). For lawns and turf, Confront (triclopyr + clopyralid) is a recommended herbicide. Stinger (clopyralid) is registered for application to strawberries and certain vegetable crops. The labels on these herbicides contain detailed instructions for use, including animal feeding restrictions and safe manure use. Most of these herbicides have a rotational crop restriction of at least 18 months for vegetable crops. When used as directed on the labels, these herbicides should not cause these problems. The problems arise when the hay, manure, grass clippings, etc. leave the hands of the individual who applied the herbicides. Apparently, the information about the herbicide use is not always following along with the hay, manure, compost, etc.

There are things you can do to prevent this from happening to you. If you raise animals and buy hay for them ask the hay farmer which herbicides were applied to the hay. If you buy manure, fresh, aged, or composted, you should ask who produced the hay, what the animals were fed, and if the herbicides used on the hay are known. A farmer you are considering getting the manure from could probably tell you this, but someone with a few horses might not know where the hay they bought for their animals originated from. If you don't know what, if any, herbicides were used, do not use the hay, straw, grass clippings, manure, or compost to grow sensitive crops. Other options are to test the materials first or use them to grow non-sensitive crops and wait several years before planting sensitive crops in that soil.

DowAgrisciences has a website devoted to the carryover of aminopyralid, for farmers and gardeners in the United Kingdom: <http://www.manurematters.co.uk/>. There they recommend a method for testing manure for the presence of aminopyralid by growing beans in pots with a mix of manure and a commercial compost product. Make sure you take good samples from throughout the pile of manure or compost. You could create a similar test for compost, hay, straw, or grass clippings.

Animal manures are excellent sources of nutrients and organic matter for growing food crops. Soils amended with manures become dark, aromatic, fertile, and active with earthworms and beneficial insects, but growers and home gardeners must be aware of what they are applying to their soil because the results can be disastrous if one of these herbicides is inadvertently applied. Everyone should read instruction labels for all herbicides they plan to use and labels for those herbicides that have been used on the pasture or hay crops at the source of the manure they are considering on using.

Recent article from Minnesota Extension explaining the problem in hay and how to avoid it:  
<http://www.extension.umn.edu/distribution/livestocksystems/M1197.html>

This problem has been around for a number of years, as documented by these 2001 and 2003 articles from the Pacific Northwest:

<http://www.tilthproducers.org/tpqpdfs/108.pdf>

<http://www.tilthproducers.org/tpqpdfs/60.pdf>

Study from Washington State University with pictures of vegetables from a garden demonstration contaminated with clopyralid:

<http://www.puyallup.wsu.edu/soilmgmt/ClopyrGarden.htm>

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