organics

Reducing the risk of herbicides in compost

FACT SHEET

Red clover bioassay test for detecting persistent herbicides in compost.

Over 600,000 tonnes of organic material, comprising mainly garden organics, is diverted from landfill and processed into a range of valuable materials in NSW every year[1].

Most of this material is sold into a range of domestic, horticultural and agricultural markets for use as mulch and soil conditioners.

However, in recent times there has been concern over the possibility of herbicides present in raw organic material persisting through the composting process and affecting plants following application to soil. Reports of isolated contamination incidents have occurred in the USA and New Zealand, but not in Australia.

This fact sheet summarises work undertaken in NSW to determine the degradability of three herbicides, identified in a risk assessment study as being problematic: clopyralid, picloram and tryclopyr[2].

Results show that whilst tryclopyr is rapidly degraded in windrow composting, clopyralid and picloram are persistent.

To address this issue, a risk management tools package has been developed to enable processors to avoid the potential problems caused by persistent herbicides, and continue to manufacture quality product that meets the needs of consumers.

Large-scale composting trials

The degradation of clopyralid, picloram and tryclopyr was evaluated in a large-scale trial designed to simulate the windrow composting process over a 16-week period. A description of these herbicides is given below:

- **Clopyralid**: a pyridine carboxylic acid herbicide used to control annual and perennial broadleaf weeds in turf, pastures and some agricultural crops such as wheat, barley, oats, sugar beets, and mint.
- **Picloram**: a systemic herbicide used for control of woody plants and a wide range of broadleaf weeds on pastures, rangeland, reforestation programs, uncultivated areas, and along rights-of-way.
- **Triclopyr**: a pyridine compound similar to clopyralid and picloram and is a selective systemic herbicide used for the control of woody and broadleaf plants typically along rights-of-way, in forests, industrial lands, grasslands and parks.

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Figure 1. *Herbicide degradation trial site. Breakdown of herbicides was evaluated in three separate replicated treatments to assess the degradation of herbicide at differing concentration levels during the composting process. These were control (no added herbicide, left three piles), low herbicide (middle three piles) and high herbicide levels (right three piles).*

The scientific trial comprised of nine, six tonne static piles of shredded garden organics, dosed with low and high levels of the three herbicides (Figure 1).

Samples were removed from each of the piles at weeks 0, 3, 6, 9, 12, 16 and were analysed for herbicide to a threshold of detection of 1 part per billion (ppb).

Degradation of herbicides

Before composting, samples of raw garden organics contained no detectable amounts of clopyralid, picloram and tryclopyr (< 1 ppb). Following the addition of the herbicides to the piles, the concentration of the three herbicides increased to between 10 and 60 ppb.

After 16 weeks composting, clopyralid (Figure 2) and picloram (Figure 3) underwent little degradation. These results are consistent with overseas studies, which have found that clopyralid and picloram persist through the composting process, and can affect compost quality.

Tryclopyr was degraded to levels below the threshold of detection (< 1ppb) after 9 weeks composting, meaning that the composting process is effective in degrading this herbicide below levels where it can affect the growth of plants.

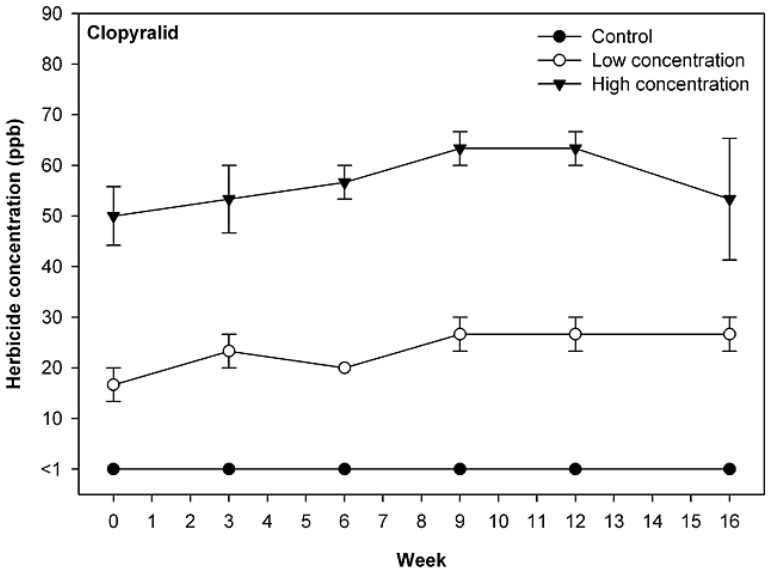

Figure 2. *Mean clopyralid concentration for each treatment for the duration of the trial. Bars represent standard error of the mean of samples from three replicates.*

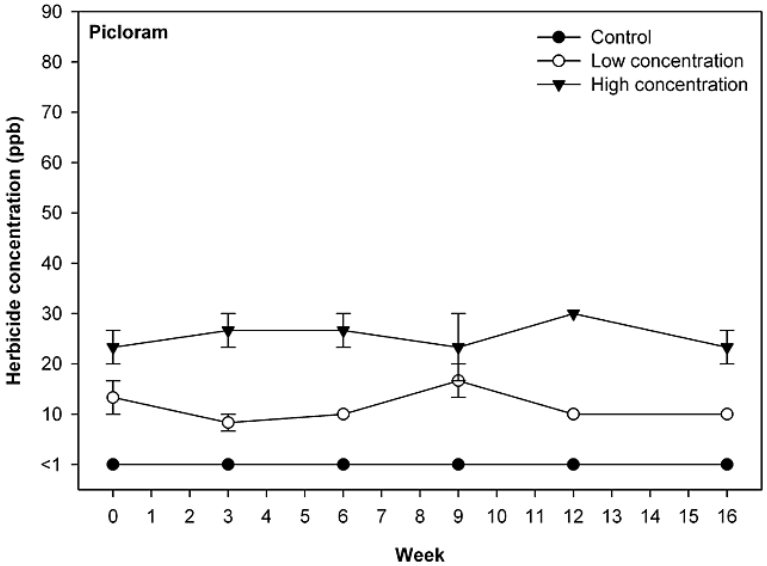

Figure 3. *Mean picloram concentration for each treatment for the duration of the trial. Bars represent standard error of the mean of samples from three replicates.*

Risk reduction tools

The study found that clopyralid and picloram are most likely to enter a composting facility in organic material sourced from agricultural, commercial / industrial and forestry operations.

There is also some potential for these herbicides to enter the municipal organics stream, though product -labeling advice recommends that plant material subject to these herbicides should not be separated and collected for composting.

To address this issue, a risk management tools package has been developed to enable processors to avoid the potential problems caused by persistent herbicides, and continue to manufacture quality product that meets the needs of consumers.

The comprehensive tools package[4] containing a bioassay test method and poster is available from the Recycled Organics Unit at The University of New South Wales, http://www.recycledorganics.com.

References

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DEC 2005/49