

SFIREG Issue Paper: **Persistent Herbicide Residues in Compost and Plant Materials and the Potential for Adverse Impact**

Priority: High

Issue: Persistent pesticide residues have caused phytotoxicity as a result of the use of compost and mulch “tainted” with the residues as well as the result of direct application of pesticide products. A number of specific concerns are associated with this issue:

- 1) Pesticide product registration and/or sub-registration of pesticide products with ornamental / turf sites and/or pasture/forage sites containing active ingredients known to cause persistent residues in compost (e.g. pyridine carboxylic acids such as clopyralid, aminopyralid, and picloram; and aminocyclopyrachlor),
- 2) The effectiveness and enforceability of label statements that appear to require “down-stream” management by individuals other than the applicator,
- 3) The adequacy of EPA environmental fate registration reviews,
- 4) The use and adequacy of bioassays in compost settings, and
- 5) The current and potential capacity of state laboratories to address the issue.

Background: Residues of certain herbicides can persist in plant-derived products such as compost, remain active and consequently can cause phytotoxicity in plants after application of the compost. The pesticide residues originate from various source materials including plant materials from areas that were treated with these persistent herbicides, such as lawn clippings, and manure from livestock that were fed with grass or hay from treated pastures. Herbicides that are known for this potential and are of greatest concern include pyridine carboxylic acids such as clopyralid, aminopyralid, and picloram. More recently, the introduction of herbicide products containing the new active ingredient aminocyclopyrachlor has drawn attention to the issue of phytotoxicity caused by persistent residues. The introduction of Imprelis™ (active ingredient aminocyclopyrachlor) and subsequent reports of damage to trees and other plants through migration from the site of application is under investigation, but the active ingredient is known to have the potential to persist in compost and therefore may pose risk to plants growing in areas having compost which contains aminocyclopyrachlor residues.

The information on the potential presence of herbicide residues in products such as compost may not always follow the compost or may not always be properly transferred or communicated with the compost. For users of the compost product, post-application guidance is needed concerning the pesticide restrictions and warnings to prevent phytotoxicity.

The potential for financial loss if a composter's product is found to be "tainted" is high. The composter's loss is not just for that year's compost but also years beyond because customers may not return even with the assurance of a negative bioassay. Because some compost users are also organic producers, not only is there the one year's crop yield loss but also the possibility of the loss of organic certification due the pesticide-related impact. The financial burden potentially includes the certification costs plus the costs associated with non-organic status transition (reduced income because of not being able to use the "organic" marketing label).

Recommendations: The SFIREG Environmental Quality Issues (EQI) Working Committee has become aware of the concern over this issue over the past few meetings through both EPA staff and EQI committee member presentations. SFIREG requests that EPA consider the following recommendations as part of the agency's response to these issues.

- 1) EPA should address the label statements requiring or requesting management by non-applicators of the treated area. Such language is unenforceable and assumes the "down-stream" individuals in the chain of use are in possession of the product label. There is need for clear definition of responsibility related to use of the pesticide product as well as the use of materials likely to be contaminated with long-lasting residues.
 - a. EPA should require on the pesticide label more specific "Label Warnings / Do Not's" to discourage "down-stream" use for those products which contain active ingredients known to cause persistent residues in compost. This is the only place the applicator might be able to control possible post-application uses on sites where vegetative material could be removed from the site and enter a compost / mulch / manure by-product.
 - b. An example of such language is "DO NOT use on any site where vegetation is removed from the application site for compost or livestock feed/bedding."
- 2) When EPA registers a Section 3 pesticide label and/or when States register a sub-registration, there needs to be more restrictive use language and uses allowed for products containing active ingredients known to cause persistent residues in compost. The area of restriction on the label would target use on certain turf sites.
 - a. As an example, in 2002, to stop a clopyralid contaminated compost issue in Washington State, restrictions were implemented by the Washington State Department of Agriculture that limited the use of clopyralid on certain turf sites. This proved to be a workable solution.

- b. In contrast, clopyralid residues in compost in the Lincoln, NE area did not decline with local/municipal campaigns targeting the turf and landscaping community about the problem following detections of clopyralid in 2003. Outreach included handouts requesting voluntary restrictions given at point of sale, commercial license recertification meetings, and web sites. These outreach efforts were deemed ineffective by local authorities. Only when the section 3 label was changed nationally to restrict the product did residues decline.
 - c. Particular interest needs to be paid to those registration submissions which incorporate active ingredients such as clopyralid or aminocyclopyrachlor into “Weed & Feed” type products which are primarily marketed towards the homeowner / residential lawn (turf) uses.
- 3) EPA should examine the present process for evaluating environmental fate as part of registration reviews. There is a need for an examination of the studies currently required and an assessment of their adequacy in determining the residues’ potential fate as well as phytotoxicity. This is particularly important in the composting situation but applies throughout the use patterns of these herbicides.
- a. An important aspect of the registration review is the determination of guideline or benchmark levels for toxic impacts to plants. States have expressed frustration over lack of a clear guideline as a means to evaluate the potential impacts and provide guidance to the composting industry.
 - b. The current guideline studies required by the EPA for the registration or registration review of pesticides may need to be modified or expanded to adequately examine the scenarios which have contributed to some of the cases of phytotoxicity “down-stream” from the site of application. The residue chemistry test guideline Nature of the Residue – Plant, Livestock (OCSP 860.1300) measures residues in three diverse crop species and in livestock (ruminants and hens) if it is intended to be applied to feed/forage crops. However, because the primary purpose of metabolism studies in goats, cattle, and hens is to characterize and quantify the residues in edible tissues (meat, milk, and eggs), these studies do not currently require the characterization of the pesticide residues in urine and feces. A greater understanding of the potential for these pesticides to remain phytotoxic in manure would be gained if these studies were expanded to require characterization of the pesticide residues in excretory products. Finally, the Environmental Fate and Effects Guidelines (OSCPP

835 Series) should be closely examined to understand why the currently required studies did not demonstrate the observed risk to non-target plants.

- 4) The composting industry has struggled with the issue of phytotoxicity of the final product. Many composting facilities across the nation have turned to bioassays as a means to ensure the safe use of the compost on sensitive plants and crops. It appears that these bioassays are utilized in a variety of ways. States have expressed concern over the adequacy of bioassays in making this determination. There is a clear need for standard protocols for such bioassay use, including clarification between bioassay sensitivity and associated pesticide residue levels.
 - a. In most cases, composting oversight and/or regulation is/are based in state agencies other than the State Lead Agency (SLA) for pesticides. This presents challenges for communication on federal, state and local levels. EPA should work both internally and externally to develop the guidance necessary for the successful implementation of bioassays and interpretation of their results.
- 5) Related to the items 3) and 4) is the question of laboratory capacity. Some states have made significant progress in the analysis for these pesticide residues in a variety of matrices including manure and plants. Unfortunately, it is unclear what the capacity might be for other states not yet examining compost and/or plant material.
 - a. A survey should be developed by SFIREG with input from EPA and interested SLAs requesting information related to analytical capacity related to the herbicides in question.
 - b. Given the national scope of this issue, EPA should work with those states with existing methods to provide verification and support for distribution of these methods. Of obvious importance is the ability of identified methods to detect and quantitate the pesticide residues in question at levels appropriate for the guidelines requested above.
 - c. Present laboratory capacity to measure aminopyralid and similar residues at trace levels in complicated matrices like manure and plant tissue is limited and insufficient. The low application rate of products containing these active ingredients and subsequent processes of plant enzymatic growth and ruminant digestion/excretion can result in very low, ultra-trace levels in difficult matrices that only a limited number of laboratories can reliably find and report. This limited capacity negatively affects investigations: when lab testing is not available or not able to

provide the measurement levels needed, investigations may be misled and/or result in inconclusive findings.

- d. Insufficient laboratory capacity is likely due to the following:
 - i. Majority of state labs do not have the expertise in LC/MS/MS technology and separation to measure reliably at the lowest MS/MS levels possible in complicated matrices such as manure and plant tissue.
 - ii. Majority of state labs do not have the time and resources to set up and implement a single compound method requiring specialized SPE clean up steps, derivitization techniques and deuterated internal standards measurements. In addition, deuterated standards are not available for purchase; they require a special ordering procedure from the registrant - not an easy system to navigate for busy labs with limited resources.