



## Clopyralid and Compost in California



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This is a brief summary of the emerging regulatory and legislative activity related to the herbicide **clopyralid** classified as a “persistent” herbicide. Recent articles in the media report detections of clopyralid at very low levels in compost in California. It has been documented also in the states of Washington and Pennsylvania.

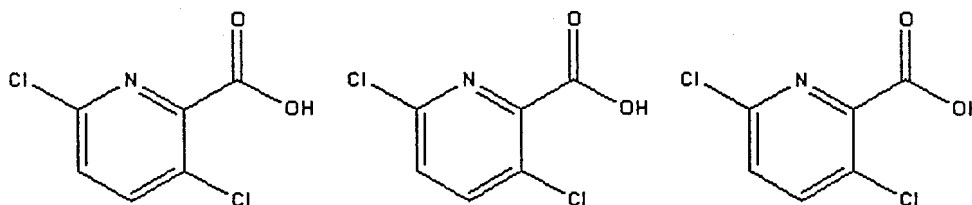
Clopyralid is a recently introduced **herbicide** that was first registered in California in 1997. It is a broad leaf (clover, dandelion, starthistle, etc.) herbicide that is popular because of its effectiveness in controlling a wide-range of weeds, the fact that it does not need to be applied as often as other herbicides (persistent- it lasts so long that one application can protect a lawn from weeds for a year), and the advantage of its low toxicity to animals, including humans. Overall has a relatively favorable health and safety profile for both people and wildlife but it does not break down efficiently during the composting process.

Clopyralid products registered for use in California	
a)	Agricultural and Natural Resources use, requiring an applicator’s permit: <ol style="list-style-type: none"> <li>1) Stinger ®</li> <li>2) Transline ®</li> </ol>
b)	General use, landscape maintenance, requires no applicator’s permit or reporting requirements: <ol style="list-style-type: none"> <li>3) Confront ®</li> <li>4) Howard Johnson’s Weed and Feed with Millennium Ultra ®</li> <li>5) Lawn Fertilizer plus Confront Weed Control ®</li> <li>6) Lebanon Proscape Fertilizer with Confront ®</li> <li>7) Lesco Momentum Premium Weed and Feed ®</li> <li>8) Lontrel Turf and Ornamental ®</li> <li>9) Millennium Ultra Selective Herbicide ®</li> <li>10) Riverdale Millennium Ultra Selective Herbicide ®</li> <li>11) Riverdale Millennium Ultra Weed and Feed ®</li> <li>12) Riverdale Trupower Selective Herbicide ®</li> <li>13) Riverdale XRM-5202 Premium Weed and Feed ®</li> <li>14) Tee Time with Millennium Ultra Herbicide ®</li> <li>15) The Anderson’s Professional Turf Products 16-4-8 with Millennium Ultra and PCSCU ®</li> <li>16) Turf Fertilizer containing Confront ®</li> <li>17) United Horticultural Supply Professional Turf Products 22-3-4 with Millennium Ultra ®</li> </ol>

Clopyralid is widely recognized as an important tool for integrated pest management (**IPM**) in the battle to control yellow starthistle (*Centaurea solstitialis*) and other noxious weeds such as Canada thistle (*Cirsium arvense*), and squarrose knapweed (*Centaurea virgata* var. *squarrosa*). It is used in roadsides, rights of way, gardens and landscape maintenance, orchards, pastureland, hay crops and other agricultural applications. Clopyralid products have been used effectively to manage weeds and to recover severely degraded rangelands and wildlife habitat. Clopyralid is also an important tool to manage hard to control weeds in recreational areas such as golf courses and parks, and in cemeteries in municipalities and cities. It also helps to fulfill regulations requiring “weed-free” straw for highway revegetation projects, and for “weed-free hay” on Federal lands or used for back packing animals into wilderness areas.

Clopyralid is the **active ingredient** (a. i.) in several commercial herbicide products (see insert). Growers, rangeland and forest managers, and commercial lawn-care or maintenance companies consider clopyralid a valuable, cost-effective weed control tool. The active ingredient is manufactured by Dow AgroSciences. In California, it is used in products made by Dow AgroSciences and the Riverdale Chemical Company and in formulated products sold by these two companies to other companies.

Clopyralid is classified as a pyridine carboxylic acid. The **mode of action** of growth-regulator type herbicides like clopyralid, 2,4-D, dicamba, picloram, etc., is by mimicking plant growth stimulant substances (hormones) called **auxins** that encourage growth to the point that the plant is destroyed. The effect of these chemicals is to cause the plant to grow abnormally. In a sense, the herbicidal effect that these compounds create is plant growth run-amuck. They are quite water soluble and mobile in soil, they break down very slowly, especially during composting. When ingested by animals, these compounds pass through into the urine rapidly, unchanged, and without significant degradation, as well as passing intact through the digestive systems into their manure. In Washington State clopyralid has been found in very high concentrations (> 1,500 ppb) in the manure of chickens and cows, likely because of their feed.



Clopyralid Chemical Formula

The most **susceptible** plant families include legumes (excellent control of weed-clovers, but reported damage on peas, beans, alfalfa, and faba beans), nightshades or solanaceous (excellent control of nightshade, but reported damage on tomato, potato, eggplant, peppers, and petunias), and the composite or aster family (excellent control of thistles and dandelions, but reported damage on sunflower, most daisy-flowered annuals and perennials -from asters to zinnias-, and herbs like chamomile and feverfew). Highly **sensitive** crops include tomatoes, peppers, eggplant, potatoes, petunias and flowering tobacco, which show symptoms at concentrations as low as 1 ppb or lower. That is right, at less than one **part per billion!** Less damage was observed in marigolds, dusty miller, parsley and pansies. A number of beneficial insects also are harmed by exposure to clopyralid, including ladybugs, lacewings, etc. To date, there have been **NO** reports in California of injury to sensitive plants from compost or mulches containing traces of clopyralid. Damage from clopyralid-contaminated compost and mulch has been only documented in the states of Washington, Michigan and Pennsylvania, and in New Zealand. In February 2002, the California Compost Quality Council (CCQC), California Organics Recycling Council (CORC), and California Refuse Remove Council (CRRC), jointly organized voluntary industry-wide testing for clopyralid in compost. Sixty-five percent of the limited compost samples (13 out of 20 samples) tested positive for clopyralid at 2-13 ppb. This is only a fraction of the 104 permitted compost operations in the state.

A rough gauge of a chemical's **persistence** is its half-life, or the time it takes the chemical to degrade to half of its initial concentration under controlled experimental conditions, for example in soil, in water, at various temperatures, etc. For a particular chemical, half-life values can vary greatly because variable experimental conditions and results. Therefore, half-life is an **indicator** but by no means a **predictor** of pesticide degradation. Because decomposition tends to slow down as it proceeds, the number of days that it takes for a chemical to practically disappear can be several times the half-life. Some reports show half-life for clopyralid in soil ranging from 40 to 70 days. Estimates from other sources range as widely as 12 to 90 days in soil. These values reflect decomposition of clopyralid in soil, not during composting. Although composting usually speeds degradation, that isn't always the case. High levels of organic matter can bind certain pesticides, slowing their decay. Furthermore, in highly degradable feedstocks, like grass clippings or straws, chemicals can become concentrated even though the chemical substantially

degrades because the feedstock decomposes faster. Clopyralid persists for up to two years in compost, and in dry soils can persist for up to four years. It remains active and potent enough to be **phytotoxic**, which means to disrupt growth in many plants at very low levels.

Pesticide **labels** are legal documents, and for most pesticides are posted on the Internet by the pesticide company. Labels for products containing clopyralid can be found at the Dow AgroSciences website. Product labels generally restrict the use of compost or mulches containing plant material treated with clopyralid and, in some cases prohibit composting (or using mulch) clopyralid-treated plant material. The label on the product states that plants treated with clopyralid should not be used for composting, which has proven to be ineffective in keeping this product out of greenwaste composting facilities around the U. S. and does not address the issue of contaminated manure at all. The labels on most other products containing clopyralid do not contain any warnings on the use of mulch or compost derived from sprayed materials. Even if clopyralid applicators are provided with an unambiguous, accurate label, there would still be a long chain of communication that must be maintained among applicators, landscape managers, home owners, land owners, harvesters of the plant residuals, haulers and the compost facility operators.

The Department of Pesticide Regulation (DPR) is one of six boards and departments within the California Environmental Protection Agency (Cal-EPA), and regulates the sale and use of pesticides to protect people and the environment. In California, DPR is the government entity solely responsible for evaluating pesticides and “registering” (i. e. licensing) their use in the state. The California Integrated Waste Management Board (CIWMB) is responsible for regulating the composting facilities that could be affected by clopyralid-containing feedstock, but it has no regulatory authority regarding pesticides in general or pesticide contamination in composting feedstock. There are no state or federal requirements to test for clopyralid in compost.

Fred Keeley, D-Santa Cruz introduced Assembly Bill AB 2356 in the California legislature and could severely restrict and ultimately ban important uses of clopyralid. The bill if approved would also require testing to determine the presence of clopyralid and other “persistent” herbicides and add to existing product registration requirements for California. Responding to this concern, the Department of Pesticide Regulation (DPR) has announced its intention to eliminate those uses of clopyralid that pose the most significant risk to compost and mulches. On March 28, 2002, DPR initiated the cancellation process for 15 of the 17 products with clopyralid that are registered for use in the California, primarily for residential, recreational and landscape uses (numbers 3 through 17 in the insert).

Local government officials are concerned about the ability of cities and counties to meet AB 939 diversion requirements should the composting industry be negatively affected or stop collecting municipal yard waste. The current situation significantly limits the management options for clopyralid-treated yard trimmings and agricultural residues. The situation likewise significantly limits the potential uses for the compost produced from these feedstocks. Treated residuals would need to be either reused on-site, or disposed in a landfill or incinerator. At least 37 states restrict the disposal of yard trimmings in landfills or incinerators. In today’s world recycling through composting is the one of the only means for responsible stewardship. The recycling and composting industries are worried that persistent herbicides might jeopardize the significant gains in public confidence regarding organics recycling, mulches and compost markets. Compost using an Ag-Bag aerated windrow system as well as the more common turned windrows system failed in the degradation of the herbicide. In addition to undermining longer-term environmental goals, disposal often poses higher short-term costs for the user: there is also a financial element. Many large composting facilities have millions of dollars invested for the public and commercial sources bring in feedstocks for composting and often purchase the compost for many uses. Most composting facilities in the U. S. produce compost in a two to six month period. Some facilities produce in as little as 20 to 40 days. Significant markets exist for products partially composted for less than a week, for example direct land application for grape, berry or rhubarb production. CIWMB

identified 104 composters and 65 processors of organic materials in the State. CIWMB defines composters as entities that actively compost organic material, and processors as entities that process material but do not intentionally or actively compost the materials they produce. During 2000, compost producers processed 3,407,000 tons and processors 2,701,000 tons.

The US Composting Council (USCC) believes that the existing system governing clopyralid and clopyralid-treated residues does not sufficiently protect compost producers and users. The conditions that can lead to clopyralid contamination of compost and mulches are beyond the control of compost/mulch producers and compost/mulch users. Aside from practical considerations, the USCC doubts that even a year's time is enough to adequately reduce the concentration of clopyralid to safe levels. First, "safe" levels for clopyralid are extremely low, since concentrations lower than 1 ppb are damaging too many non-target "sensitive" crops. Secondly, the compound is extremely slow to decompose. Though no fault of its own, a facility might lose much or all of its market for compost, be forced to sell product for less than its value and/or have to compensate customers for damage caused by clopyralid-contaminated compost. The pesticide companies that formulate these herbicides are working with DPR, CIWMB, the US EPA, the user community, and the composting industry to make appropriate label changes and expand education to address this concern. DPR and CIWMB put together a clopyralid workgroup that includes members of the compost industry, registrants, CDFA, researchers and other stakeholders. I was invited to participate in the workgroup with the objectives of gathering information on clopyralid use patterns, potential pathways of contamination, regulatory options, identify additional clopyralid use practices that can be managed to eliminate contamination potential, and identify current user education efforts and future outreach needs.

I have to emphasize that the concerns expressed are **NOT** related to human health or environmental issues, such as water contamination. Concerns have been expressed relating to the potential for levels of clopyralid in compost and mulches to affect a range of species that include several common garden plants (e. g. tomatoes, peppers and peas). The clopyralid-contamination incidents may have resulted from particular circumstances, but those circumstances are not uncommon in the composting industry. This persistent pesticide is truly threatening the compost industry as a whole and the efforts of diverting organic matter from the landfills.

Remember also that all compost is a soil **amendment**, not a soil replacement. Using too much compost can defeat its purpose by adding excessive salts, ammonia or other elements. When thoroughly mixed in soil, even if the compost is contaminated with clopyralid, there is an immediate dilution effect and also the soil microbes will continue the degradation process.

**Websites for additional information:**

CIWMB's website at <http://www.ciwmb.ca.gov/publications/Organics/44201020.doc>.

Composting regulations at: <http://www.ciwmb.ca.gov/Regulations/Title14/ch31.htm#Top>

Washington State University website at <http://css.wsu.edu/compost/compost.htm>

Department of Pesticide Regulation at: [http://www.cdpr.ca.gov/docs/pur/pur00rep/00\\_pur.htm](http://www.cdpr.ca.gov/docs/pur/pur00rep/00_pur.htm)

U.S. Compost Council field guide at <http://www.compostcouncil.org>.

Dow AgroSciences website at <http://www.dowagro.com>.