

Searchable Systemic Insecticides List (xerces.org)

Field Definitions

Active Ingredient

The name by which the insecticide active substance is commonly known, as identified on a pesticide product label.

Chemical Group

The larger chemical group to which the active ingredient belongs, usually as defined by chemical structure.

Adult Bee Toxicity (Oral LD₅₀ in µg/bee)

The dose that results in 50% of the test population dying, under an acute (short-term) oral exposure, for adult *Apis mellifera* (honey bee). The most conservative estimate (lowest value) available for oral acute toxicity is shown here. EPA uses the lowest LD₅₀ value available from the scientific literature in its modeling of risk.

Adult Bee Toxicity Group

"High" is assigned when the oral LD₅₀ value in the **Adult Bee Toxicity** field is less than 2 µg/bee, "Moderate" when the value is 2-10.99 µg/bee, and "Low" when the value is 11 µg/bee and higher. The term "Non-definitive" is assigned when oral acute toxicity was reported with a "less than" or "greater than" value. The toxicity group assigned follows the EPA's system for classifying contact acute toxicity to bees. Currently EPA does not have a classification system for oral acute

Larval Bee Toxicity (Oral LD₅₀ in µg/bee)

The dose that results in 50% of the test population dying, under an acute (short-term) oral exposure, for larval *Apis mellifera* (honey bee). The most conservative estimate (lowest value) available for oral acute toxicity is shown here. EPA uses the lowest LD₅₀ value available from the scientific literature in its modeling of risk. For many active ingredients, no value is currently available.

Persistence Half-life (days)

Where available, the most conservative (longest) estimate of terrestrial dissipation half-life, in days. If this value was unavailable, the aerobic soil metabolism half-life value used by EPA to model persistence in its most recent ecological risk assessment for this active ingredient was used. If this value was unavailable, the most conservative estimate (longest value) of aerobic soil metabolism half-life presented in the ecological risk assessment. Note that some persistence data inside plants is available, however methods for collecting this information differs, and very little persistence data is available for pollen, flowers, or nectar. Moreover, treated soil may transfer systemics to plants over a long period of time. With these considerations, the more traditional soil-based measures of persistence are presented here.

Persistence Rating

Persistence ratings are based on the National Pesticide Information Center classification of half-lives: Low (less than 16 days), Medium (16-59 days) and High (60 days or more).

Relative Index of Systemic Activity

The value indicates the predicted relative strength of systemic transport, based on a model of the active ingredient's solubility, hydrophobicity (octanol-water partition coefficient, known as K_{ow}), and acid dissociation constant (pKa). A Relative Index score of 1.0 is equivalent to the mean predicted activity of the well-known systemic neonicotinoids imidacloprid, clothianidin, and thiamethoxam (Mineau 2021). Hence, active ingredients with scores higher than one would be predicted to be more likely to translocate than these three neonics, which are well-known for their systemic activity. Active ingredients with scores lower than 1.0 would be expected to show lesser potential for movement. Value from Mineau (2021) Appendix 2 ("Best RISA Estimate Available").

Use Categories

"Agricultural" indicates current registered uses in the U.S. include one or more food agricultural uses including seed treatments. "Nursery" indicates current registered uses include one or more plant production use sites (nurseries, greenhouses, etc.). "Landscape" indicates current registered uses include one or more landscape uses such as landscape trees, landscape ornamental, uses in parks and/or residences, golf courses, turf, or other types of landscape use. "Non-crop" indicates current registered uses include one or more non-crop uses such as mosquito control (whether residential, wetland, natural or park areas, commercial/industrial etc.), structural uses, pest control on the premises of food-handling or livestock or food storage facilities, use on crops intended for livestock (such as alfalfa), and use on manure, Christmas trees, natural areas or other non-crop sites.

Registered Uses (USA)

A general summary of the insecticide's currently registered uses in the U.S, based primarily on examination of EPA registration documents. Current products and labels posted at cdms.net and <http://npic.orst.edu/NPRO/#> were also consulted. For a master list of all products and sites by active ingredient, see <https://ordspub.epa.gov/ords/pesticides/f?p=PPLS:1:>. We also conducted searches for PRIA label amendments (EPA's process for amending labels) for some chemicals to determine uses. Note that Special Local Use Authorizations or emergency use authorizations are not necessarily reflected in our list of Registered Uses. Section 18 of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) authorizes EPA to allow an unregistered use of a pesticide for a limited time if EPA determines that an emergency condition exists. To check emergency authorizations, visit <https://ordspub.epa.gov/ords/pesticides/f?p=CHEMICALSEARCH:1:>

Seed Treatment Use

Yes indicates active ingredient is currently registered in the U.S. as a seed treatment for one or more crops. No indicates no seed treatment uses.

Seed Treatment Crops

Crops for which seed treatments are currently registered in the U.S. These crops were located using the same general process as other uses described in the **Registered Uses (USA)** field definition. In some cases we searched cdms.net or used google searches to identify these. This field only addresses seed coatings and does not describe whether or not other soil application methods are available, such as in-furrow uses, soil band treatments, soil incorporations, soil injections, soil drenches, pre-plant dips, granular treatments, etc. This field may not reflect emergency use authorizations.

Further Information

As needed, selected additional information.

Systemic Reference(s)

Source(s) for confirmation of systemic movement.

Toxicity Reference(s)

Source(s) for toxicity values shown in fields **Adult Bee Toxicity** and **Larval Bee Toxicity**. In most cases the values for oral bee toxicity were drawn from U.S. EPA Ecological Risk Assessments or from the University of Hertfordshire Pesticide Properties Database (Lewis and Tzilivakis et al. 2016). In some cases, the toxicity database maintained by U.S. EPA (ECOTOX database, US EPA 2021) was the source.

Persistence Reference(s)

Source(s) for persistence value shown in field *Persistence Half-Life (Days)*. In most cases the values for oral bee toxicity were drawn from U.S. EPA Ecological Risk Assessments or from the University of Hertfordshire Pesticide Properties Database (Lewis and Tzilivakis et al. 2016).

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