

## **An IPM (Integrated Pest Management) Approach for Controlling Lily Leaf Beetle in Gardens**

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- The most important strategy is to **start in the earliest stage of the season**, as soon as the lilies break dormancy. Minimizing leaf damage prevents leaf desiccation later in the season.
- Controlling the beetles and larvae throughout the season (even if the lilies look OK) will cut down on the number of beetles that will re-infest your lilies next year.
- Although dusting the lilies (and surrounding dirt) with diatomaceous earth is mentioned in some articles as a good preventative measure, my studies have shown that it's not particularly effective. However, there's no harm done by using it; even if it kills just a few beetles/larvae, that's helpful.
- If you use **deer-repellant** on your lilies, choose one that has **clove oil** as an ingredient. Clove oil seems to have some effectiveness in killing (or at least repelling) the beetles.
- **Hand-picking** is safer than using insecticides. Even though hand-picking alone won't quash an infestation, it reduces the amount of insecticide you might use. Diligence and thoroughness are critical, especially in the first 4-6 weeks of the season; **try to hand-pick at least once a day**. This chore will lessen considerably after the middle of the season.
  - For hand-picking the beetles, there are two simple approaches:
    - 1) Turn one hand upward, and cup it slightly. Slowly slide it a few inches beneath the leaf that the beetle is on. Get as close to the stem as possible. Use the other hand to scare the beetle, and let it fall into the cupped hand. Kill the beetle by using a fingernail to snap the head.
    - 2) Fill a small cup half-way with some soapy water. Slowly move the cup underneath the leaf that the beetle is on, so that when the beetle lets go of the leaf, it falls into the cup. Cover the cup and let the beetles drown.
  - For hand-picking eggs and newly-hatched larvae (usually hidden on the underside of leaves): You can run your fingers along the leaf blade to squish them. Or, you can cut off the part of the leaf where you find the eggs/larvae, and discard it away from the lilies.
  - For hand-picking larvae: Because their fecal shield makes them hard (and disgusting) to squish, collecting them in a cup of soapy water is easier. Hold the cup under the leaf, and flick the larva into the cup. Just flicking larvae off the plant isn't always effective, because they can find lilies and crawl back from considerable distances.
- If you have a moderate-severe infestation, the "safest" and most effective insecticide is **spinosad** (or **spinosyn**), because it kills both the beetles and the larvae. Compared with many other broad-spectrum insecticides, spinosad is safer because it doesn't get absorbed into the plant and spread systemically into the plant's fluids or pollen; rather, it remains on the leaf surface, where it kills the beetles/larvae by both contact and via ingestion.
- However, one of the principles of IPM is to avoid allowing the pest to develop a resistance to an insecticide. Thus, this IPM method also calls for using **neem oil**. Even though neem oil only kills the larvae (and also repels the beetles), it's important to use neem to kill any larvae that might become resistant to spinosad.
  - About neem oil: There are two ways of extracting oil from neem seeds: alcohol extraction versus cold-pressing. The alcohol extraction method removes azadirachtin from the oil, which is the specific chemical in the oil that kills the larvae of this particular species. Thus, you need to use cold-pressed neem oil. Unfortunately, most of the common neem products (which are sold to kill mites and aphids, or as fungicides for use on roses) contain "clarified hydrophobic extracts of neem," which is the alcohol-extracted version (and thus won't kill the Lily Leaf Beetle larvae). So, make sure that you buy a product that contains **cold-pressed neem oil**, and not hydrophobic extracts of neem; it's also sometimes listed as "**pure**" neem oil.

- Neem oil is absorbed systemically throughout an entire plant when it's absorbed through the roots; but when sprayed on leaves, the plant absorbs less of it. This makes neem safer than other broad-spectrum systemic insecticides when it's used as a foliar spray.
- Both spinosad and neem kill via ingestion, and spinosad also kills via contact. **However, neither insecticide kills the insect immediately;** it might take a day or two to kill the insect. In fact, neem only kills by preventing the larvae from developing from one stage into the next stage. So even if the insect doesn't die right away, there's no need to overdose the plant with insecticide.
- As with any insecticide, **use as little as necessary. Aim directly at the lily leaves,** rather than indiscriminately dousing surrounding plants. Avoid spraying when it's windy, and **avoid spraying the flowers.** Also avoid spraying in midday sun, which can cause leaf-burn.
- At the beginning of the season (as soon as the lilies start to sprout), try to spray the lilies twice a week with spinosad. When you start seeing larvae, switch to neem once a week, and spinosad once a week. On the days without spraying, do your usual hand-picking of beetles and larvae.
- After 4-6 weeks, the beetles mostly stop laying eggs, and you should see a marked decline in the number of beetles and larvae. At this point, you can cut back on the spraying to just once a week, and just use spinosad; but if you find some grubs, you can spot-spray with neem. Keep hand-picking throughout the entire summer!
- It might take a full season (or two) to get a bad infestation under control; but once it's under control, it's not difficult to incorporate this method into your normal gardening routine.