Natular® Larvicides

Frequently Asked Questions

1.	**Q: What is the active ingredient in Natular® larvicides?** A: Spinosad. It is a naturally-derived active ingredient produced during fermentation by the soil organism, *Saccharopolyspora spinosa*. The natural metabolites produced during the fermentation process were termed "spinosyns." Spinosad is the collective term for the two most prominent and most active compounds in the fermentation broth (spinosyn A and spinosyn D). Hence the name "Spinos**ad**." Spinosad has been used since 1999 on more than 250 crops and in consumer and animal health uses in over 85 countries. Its first use in public health began in 2009, when it was introduced as the active ingredient in Clarke's Natular® brand of mosquito larvicides. Spinosad received the US EPA's Presidential Green Chemistry Challenge Award in 1999 as a novel natural insecticide that provided a new mode of action against target pests and provided a good environmental profile compared to traditional synthetic pesticides. More information about this award for Spinosad can be found at https://www.epa.gov/greenchemistry/document-green-chemistry-challenge-award-recipients-1996-2016.
2.	**Q: How is the active ingredient manufactured?** A: Spinosad is produced in a state-of-the-art fermentation facility in the United States, using natural feed-stocks to maintain the fermentation process.
3.	**Q: How does the active ingredient in Natular formulations control mosquito larvae?** A: Spinosad has a novel mode of action; it alters the function of insect nicotinic acetylcholine receptors in a unique manner. Ultimately paralysis sets in upon ingestion and contact and the mosquito larvae don't recover.
4.	**Q: What types of mosquito larvae can Natular control?** A: Natular can kill the larvae of both nuisance and disease vectoring mosquitoes, including those that can carry and transmit diseases, such as West Nile Virus, Dengue and Zika. Natular is effective on larvae from all four instar stages and spinosad has been tested on twenty of the most common vector and nuisance mosquito species.
5.	**Q: What are the inert ingredients in Natular?** A: All inert components in domestic Natular formulations are included

	in EPA's list of Minimal Risk Inert Ingredients. Inerts are non-synthetic (natural) or are synthetic components which do not contribute to mammalian or aquatic toxicity.
6.	**Q: Are Natular formulations suitable for use in organic agriculture?** A: Most formulations of Natular registered for public health mosquito control with the US EPA are listed by the Organic Materials Review Institute (OMRI) for use in and around organic agriculture.
7.	**Q**: **Is Natular safe for the environment?** A: Spinosad was the first mosquito larvicide active ingredient registered under the EPA's Reduced Risk program due to its reduced risk to human health and non-target organisms when compared to other available alternatives. Spinosad is not toxic to birds, terrestrial wildlife, or fish. While spinosad is toxic to some aquatic invertebrates, following the label use directions will minimize the risk to these organisms.
8.	**Q**: **Is Natular safe when used in areas near people and domestic animals?** A: When applied as indicated on the label for control of mosquito larvae, Natular will not endanger human or animal health. Spinosad is not toxic to mammals. Spinosad is not carcinogenic, not genotoxic, and is not a reproductive or developmental toxin. Prior to registering a product, the EPA evaluates products thoroughly to be sure it can be used safely, within minimum risk to humans, animals and the environment. Spinosad has been approved by the EPA for use in a variety of outdoor aquatic areas that breed mosquitoes, including in residential and recreational areas.
9.	**Q: What impact does Spinosad have on non-targets?** A: Spinosad is of low acute and chronic toxicity to a wide range of non-target species. Under laboratory conditions, spinosad is toxic to some aquatic invertebrates, primarily upon chronic exposure. Fortunately, the rapid degradation of spinosad in natural aquatic environments prevents the long-term exposure that would be needed for these effects to occur in real world situations.
10.	**Q: How do Natular products affect honey bees?** A: The EPA has determined that when liquid Natular products are used according to label directions, they should not pose a significant risk to honey bees or pollinators. Granular and tablet formulations of Natular will not pose a bee hazard given their application method. Spinosad in liquid form has been used extensively in more than 85 countries with over 250 registered crop uses since its first launch in agriculture without any reported adverse effects on bees.

	Studies have also been conducted to assess if and how long *residues* of liquid Spinosad on foliage and blooming plants remain toxic to honeybees. One method used to assess the toxicity of residual foliar exposure to bees is a laboratory study that determines the residual time to 25% bee mortality (referred to as the RT25, https://www.epa.gov/pollinator-protection/residual-time-25-bee-mortality-rt25-data). The RT25 has been conducted with liquid Spinosad at two different use rates: 1. The first RT25 study, applies Spinosad at a common agricultural use rate of 0.16 lbs/acre (nearly 5x the rate typically used in mosquito control). This study determined that within 3 hours of an application at this use rate, residues are non-toxic to honeybees that may forage or land on treated plants. 2. Clarke replicated the RT25 study with a third-party laboratory at 0.08 lbs/acre, which is equivalent to applying 5.0 fl oz/acre of Natular SC – more than twice the recommended rate for public health mosquito control. This study found that as soon as the product dried on the foliage (within about 10 minutes) residues were non-toxic to exposed honey bees.
11.	**Q: What about resistance?** A: The active ingredient in Natular products, spinosad, is the only active ingredient currently used for mosquito control that is designated by IRAC (Insect Resistance Action Committee) as Group 5. The benefit of this is that it has no cross-resistance with existing products – making Natular an excellent option for resistance management.