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# Mosquito Control Applications and Pollinator Impacts

Prior to registering any public health mosquito control product, the EPA evaluates the formulation thoroughly to be sure there is no significant risk to humans, animals and the environment from its responsible use. When professional, licensed applicators like Clarke use any EPA-registered product labeled for wide area adult mosquito control treatments through ultra-low volume (ULV) application equipment, there is no expectation of harm to beneficial insects like pollinators in the treatment area.

When Clarke's treatment areas coincide with sensitive, threatened, or endangered species habitats, such as the Rusty Patch Bumble Bee in the Midwest, Clarke takes additional steps to consult with the Department of Natural Resources on our application methodology. For several consecutive years, the Illinois DNR has provided feedback supportive of our operational treatment protocols for Rusty Patch Bumble Bee / pollinator protection best management practices.

There are three primary reasons why public health mosquito control applications are not considered high risk to beneficial insects like pollinators.

### 1. Application Timing

Adult mosquito control applications are designed to reduce adult, flying mosquito populations in the air at the time of treatment. Adult mosquito populations are most active around dusk and into the overnight hours when non-target insects like pollinators are typically inactive or sheltered in their hives for the night. In any area where the Rusty Patch Bumble Bee is present, Clarke takes additional precautions on application timing, and will not begin treatments for two hours post-sunset. Conducting adult mosquito control treatments overnight is a best management practice for pollinator protection.

### 2. Application Methodology

Adult mosquito control treatments are done using liquid products applied through ultra-low volume (ULV) equipment and nozzles. ULV nozzles create a spray cloud that contains millions of individual, microscopic droplets. The small size of the droplets allows them to float through the air for a short period of time and make contact with flying adult mosquitoes. The product droplet is designed to penetrate the cuticle of the mosquito, affecting its nervous system, knocking it down from the air and ultimately delivering mortality. Based on weather conditions, the spray cloud will remain active for 5 to 30 minutes in a treatment area but has no residual (ongoing) effect on

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mosquitoes once dissipated. Any dried residues within a treatment area are negligible and not toxic to mosquitoes or foraging bees and insects.

3. Application Dose

Adult mosquito control applications require a very small amount of product to be effective, and products are designed to contain a very low percentage of active ingredient. Adult mosquito control products often contain less than 5% of an active ingredient blended with its inert components, and applications put out approximately one ounce of formulated product per land acre (about the size of a football field). The dose is extremely low because it is formulated to work specifically on mosquitoes, which have a unique biology and a much small body mass than most other non-target insects. For reference, mosquitoes weigh between 2 and 10mg each. A firefly weighs at least 20mg, and the average honeybee weighs 100mg.

The environmental and regulatory agency's evaluations on pollinator risks from mosquito control have been further explored by academia with consistent results. For example, a study conducted in 2016 by Louisiana State University researched the impact of operational ULV applications for mosquito control on honeybees, one of the most important pollinating insects. In this study, several different EPA-registered mosquito control products were applied in a large treatment area that contained several cages of honeybees. This study found there were no significant risks or adverse effects on the bees following operationally-relevant mosquito control product exposures.