

COMPREHENSIVE OVERVIEW OF ALTOSID® LIQUID LARVICIDE FOR THE CONTROL OF MOSQUITO POPULATIONS WITH DISEASE-CARRYING IMPLICATIONS



Product Introduction and Mode of Action

Altosid® Liquid Larvicide (A.L.L.) is a microencapsulated liquid larvicide containing the active ingredient (S)-methoprene. It was created after extensive research into the intricacies of natural biochemical and physiological development of insects. As a unique mosquito larvicide, A.L.L.'s mode of action prevents adult mosquito emergence, including those which might transmit Zika virus, West Nile virus, chikungunya and dengue fever.

(S)-Methoprene is an insect growth regulator, or more precisely, a juvenile hormone analogue that was EPA registered in the U.S. in 1975. Rather than killing mosquitoes, it controls them by interfering with normal levels within the insect at critical development periods preventing growth and/or maturation. It is active by contact or ingestion and in some insects, such as mosquitoes, it affects eggs or female fecundity.

A.L.L., an insect growth regulator, is not a conventional pesticide in that it does not produce the nondiscriminatory rapid, directly toxic effects associated with traditional larvicides. It differs from other larvicides in the manner and timing of its action after application, and acts by inducing morphological changes that interfere with normal mosquito development. Its application results in the failure of adult mosquitoes to emerge from pupae.

A.L.L. is applied to second, third or fourth instar larvae using standard larviciding equipment. After application at the labeled rates, no visible effect on larvae will be observed. They will continue developing normally and will pupate. Pupae will appear unaffected, but will eventually die and adults will not emerge. Infrequently, some adults may be seen at the water surface but they will have abnormalities preventing flight and will not survive.

Altosid® Liquid Larvicide (A.L.L.) Benefits

The active ingredient in Altosid® Liquid Larvicide,

(S)-methoprene, is target specific and will not affect humans, fish, waterfowl, mammals or beneficial predatory insects. Additionally, (S)-methoprene degrades rapidly in sunlight, both in water and on inert surfaces, is metabolized rapidly in soil, and does not leach. It will not persist in soil or contaminate groundwater.

A.L.L. is a water-dilutable formulation for easy application in sites where mosquitoes are a problem and the microencapsulation provides both protection of the active ingredient and a time release mechanism for extended control.

It is effective independent of population density, water temperature, salinity and other factors that influence mosquito feeding behavior. It is absorbed through the cuticle or ingested, which means the larvae cannot escape treatment.

The (S)-methoprene in Altosid® Liquid Larvicide has an excellent toxicity profile – one of the lowest in the mosquito control industry. Through aerial application of the Altosid® Liquid SR-20 or SR-5 formulations, it is effective for use in urban terrestrial sites, pastures, rice, crops, intermittently flooded noncrop areas and other sites, and is appropriate for large-area applications.

Additional benefits of Altosid® Liquid Larvicide include:

- Consistent results in all population densities
- Cost-effective solution for large-area applications
- No impact on food web
- Labeled residual claim
- Superior formulation for temporary or floodwater mosquito breeding areas
- Effectively prevents the emergence of adult mosquitoes that can transmit Zika virus, West Nile virus, chikungunya and dengue fever
- Control of many mosquito larvae species
- Easy mixing and stays in solution without agitation
- Product application does not leave film on cars

Application of Altosid® Liquid SR-20 and SR-5

Altosid® Liquid SR-20, a concentrate containing 20 percent of the active (S)-methoprene, and Altosid® Liquid SR-5, containing 5 percent, are EPA-approved for aerial and ground applications, both ULV and diluted spray, for locations that require large-area coverage.

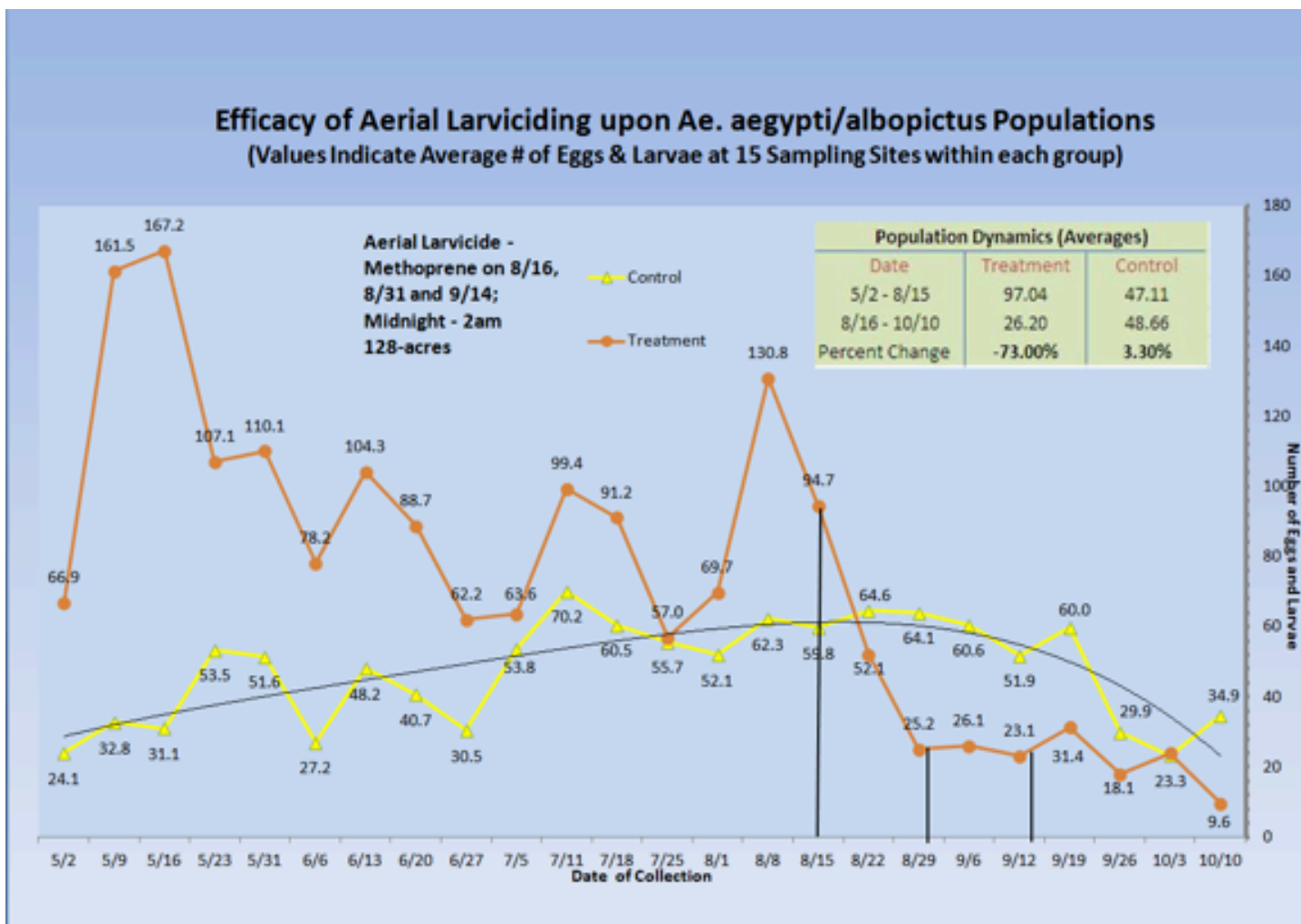
For application of Altosid® Liquid SR-20 to terrestrial sites, apply at the rate of ¾ to 1 fl. oz. of product per acre to water-holding containers and other small bodies of water that breed mosquitoes such as urban terrestrial sites, pastures, fields, freshwater swamps and marshes, woodland pools and meadows, drainage areas, ditches and other natural and man-made depressions. Altosid® Liquid SR-5 should be applied to the same sites at a rate of 3 to 4 fl. oz. of product per acre.

(S)-Methoprene Field Test and Efficacy Data

1) Altosid® Liquid Larvicide was successfully used and tested in area-wide treatments during dengue fever outbreaks

in Martin County, Fla. in 2013. In conjunction with integrated mosquito management, the applications reduced the number of properties breeding mosquitoes from 30 percent to zero percent.

2) Operational screenings with Altosid® Liquid Larvicide in two study sites with a history of high domestic (*Ae. aegypti* and *albopictus*) mosquito populations near Bradenton, Fla. Manatee County in 2011 achieved 98 percent control of larvae in backyard containers. The county measured mosquito population dynamics via 15 ovi-traps located within each of the study sites: eggs and larvae were counted weekly. In three biweekly whole-area helicopter aerial applications of Altosid® Liquid Larvicide, a reduction of ovi-trap egg and larvae counts of 73 percent was achieved. The study concluded that the practice of aerial larviciding with Altosid® Liquid Larvicide had a significant effect upon reducing *Ae. aegypti* and *albopictus* populations.



Common Questions Regarding Altosid® Liquid Larvicide as an Effective Mosquito Control Solution

Q: How does (S)-methoprene compare to Bti?

A: (S)-Methoprene and *Bti* are both effective mosquito control agents that are target specific and have favorable toxicological profiles. However, (S)-methoprene can be highly diluted and applied at a lower final dilution rate than *Bti*, and residue “black car tests” show no perceptible deposition when (S)-methoprene is sprayed within 20 ft. In addition, unlike *Bti*, (S)-methoprene has been found to be effective independent of population density, water temperature, salinity and other factors that influence feeding behavior. (S)-Methoprene can defuse throughout the water column and will affect all larvae as long as they are fourth instar when they come in contact with it. *Bti* is best suited to controlling first, second and third instar larvae.

Q: How long has Altosid® Liquid Larvicide been in use?

A: (S)-Methoprene has been used for more than 40 years to control juvenile mosquitoes, establishing a history of effectively halting populations before they become breeding, biting and disease-spreading adults. It has no significant claims of resistance or impact on non-target species, including pollinators.

Q: How does (S)-methoprene, the active ingredient in Altosid® Liquid Larvicide, work?

A: (S)-Methoprene is a unique insect growth regulator that disrupts the mosquito life cycle and effectively halts populations before they become breeding, biting and disease-spreading adults. It has an excellent toxicity profile and is approved for use in sensitive areas.

Q: Is it EPA registered?

A: Yes, Altosid® Liquid Larvicide is EPA registered and the label of Altosid® Liquid Larvicide was recently amended to include the fact that it prevents adult mosquito emergence among mosquitoes that may transmit the Zika virus.

Q: Is Altosid® Liquid Larvicide approved for aerial spraying?

A: Yes, Altosid® Liquid Larvicide is approved for aerial applications and studies have shown that this method of application is an effective way to control mosquito populations that may transmit Zika virus, West Nile virus, chikungunya and dengue fever. Aerial spraying, because of its ability to cover large areas, is the fastest way to quickly reduce the number of mosquitoes that can transmit diseases to populations.

Q: Where has Altosid® Liquid Larvicide been used?

A: Because of its low toxicity, Altosid® Liquid Larvicide can be used for a wide range of applications. It is effective when applied on pastures, fields, rice, crops,

freshwater swamps and marshes, woodland pools and meadows, drainage areas, ditches and other natural and man-made depressions. It is target specific and will not affect humans, pets, fish, waterfowl, mammals or beneficial predatory insects and may be used in sensitive areas. Additionally, the active ingredient in Altosid® Liquid Larvicide degrades rapidly in sunlight, both in water and on inert surfaces, is metabolized rapidly in soil and does not leach. It will not persist in soil or contaminate groundwater. Altosid® Liquid Larvicide has been used for more than 40 years by Mosquito Abatement Districts (MADs) and Public Health Officials throughout the United States.

Q: Can Altosid® Liquid Larvicide only be applied aerially?

A: No, there are multiple methods of application. Altosid® Liquid Larvicide can be used for the control of mosquito larvae using aerial or ground ULV spray application to labeled mosquito breeding sites, including large terrestrial sites, or as a tank mix with other registered adulticides or larvicides such as *Bacillus thuringiensis israelensis* (*Bti*). Direct spray applications can be made to sites where mosquitoes breed such as tires and tire piles, potted plants, tree holes, garbage bins, birdbaths, rain barrels, and other water-holding containers and small bodies of water. Users should closely follow all application instructions and use the proper equipment for all application methods.

Q: Does Altosid® Liquid Larvicide pose a threat to human health?

A: No, (S)-methoprene, the active ingredient in Altosid® Liquid Larvicide, has one of the lowest toxicity ratings in the mosquito control industry. Its mode of action is target specific and when applied according to label instructions, will not affect humans, pets, fish, waterfowl, mammals or beneficial predatory insects and may be used in sensitive areas. During aerial spraying, only a small amount of the active ingredient is applied and does not pose a threat to the health of humans or other non-target species. It immediately begins to degrade in the environment.

Q: Can Altosid® Liquid Larvicide be used on crops, in backyards and pastures, and other areas with vegetation?

A: Yes, Altosid® Liquid Larvicide is labeled for use and effective when applied on pastures, fields, rice, crops, freshwater swamps and marshes, woodland pools and meadows, drainage areas, ditches and other natural and man-made depressions. It is environmentally sound and has one of the lowest toxicity ratings in the mosquito control industry.