



Biology and Control of Non-Biting Aquatic Midges

Biting and Stinging Pests

Introduction

Non-biting midge flies or chironomids commonly occur in inland and coastal natural and man-made bodies of water. These midges are commonly known as “blind mosquitoes” because they are mosquito-like but do not bite. Midges are also called “fuzzy bills” because of the male’s bushy antennae (Figure 1). These aquatic insects are tolerant of a wide range of environmental conditions. Chironomid midges are found in swift moving streams, deep slow moving rivers, stagnant ditches, and in lakes and ponds that are rich in decomposing organic matter. The presence of certain chironomid midges is often used as an indicator of water quality.

Bodies of water in urban and suburban areas are subjected to intensive human use through residential, recreational and agricultural activities. Through runoff, these ponds and lakes often become exceedingly rich in nutrients. Consequently, the variety of organisms in such habitats is usually low with just a few pollution tolerant species developing large populations. Some species of chironomid midges that are tolerant of low dissolved oxygen conditions often are a major component of the bottom invertebrate organisms of urban and suburban lakes, ponds and storm water retention ponds.



Figure 1. Chironomid midge adult resting on leaf.
Matt Bertone, NC State

Beneficial Aspects and Economic Impacts

Most species of chironomid midges are highly desirable organisms in aquatic habitats. Midges are an important food source for fish and predatory aquatic insects. Larvae “clean” the aquatic environment by consuming and recycling organic debris.

In urban environments where homes are constructed adjacent to lakes and ponds, adult midges often emerge in extremely large numbers, causing a variety of nuisance and other problems for people who reside within the flight range of these insects. Adults are weak flyers and may fly or be blown ashore where they congregate on vegetation, under porch alcoves in carports and on walls of homes and other buildings. Swarms of adults may be so dense that they interfere with outdoor activities and stain walls, cars and other surfaces upon which they rest. Adults are attracted to lights and may accumulate in large numbers on window screens and around porch and street lights. The occurrence of midges promotes the growth of spiders whose unsightly webs may have to be removed frequently.

Life Cycle

There are four stages in the life cycle of chironomid midges (Figure 2). Eggs are laid on the surface of the water. Each gelatinous egg mass may contain up to 3,000 eggs depending on the species. Eggs sink to the bottom and hatch in several days to one week. After leaving the egg mass, larvae burrow into the mud or construct small tubes in which they live. Larvae enlarge their tubes as they grow. Suspended organic matter in the water and in the mud is used as food by the developing larvae. After they grow, the larvae take on a pink color and gradually turn a dark red. Consequently, mature larvae are commonly called “blood worms”. The red color results from an iron containing compound, haemoglobin, that is in the midge’s blood. The haemoglobin allows the larvae to respire under low dissolved oxygen conditions in the bottom mud. The larval stage can take from less than 2 to 7 weeks depending on water temperature. Larvae transform into pupae while still in their tubes. After 3 days, pupae actively swim to the surface, and adults emerge several hours later. Adults mate in swarms soon after emerging. Because they do not feed, adults live for only 3 to 5 days.

During summer, the entire life cycle from egg to adult can be completed in 2 to 3 weeks. In the fall, larvae do not pupate, but they suspend development and pass through the winter months as mature larvae. Pupation and emergence of adults occurs the following spring in late March or early April. Several more generations of midges will be produced throughout summer, resulting in mass emergences of adults. In each generation, adults will typically emerge in large numbers for several weeks.

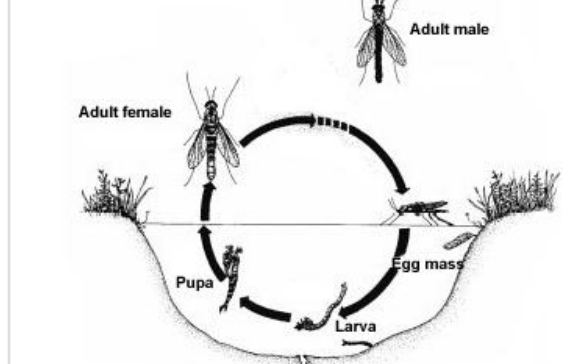


Figure 2. Midge life cycle.
Phil Koehler, University of Florida

Breeding Sites

Chironomid midges are one of the most common and most abundant organisms in natural and man-made aquatic habitats. Larvae are found in small and large natural lakes, sewage oxidation and settling ponds, residential lakes and ponds, and slow moving shallow rivers. Densities of over 4,000 larvae/square feet often occur on the bottoms of nutrient rich bodies of water (sometimes an indication of pollution due to excess nutrients). During emergence periods, it is not unusual for several thousand adults per square yard of surface to emerge on a nightly basis (Figure 3). Obviously, midges emerging from these bodies of water may cause severe nuisance and other economic problems.



Figure 3. Chironomid midges on an exterior wall near a security light.
M. Waldvogel, NCSU

Control Measures

Physical and Cultural

Nutrient reduction. Dense larval populations usually occur in nutrient rich habitats. Fertilizer run-off from residential lawns and garden, golf courses and agricultural fields are sometimes responsible for the development of nuisance populations of midges. Community awareness and education about proper use of fertilizers can avoid excess run-off into lakes, ponds and streams and can help reduce midge populations.

Winter draw down. Exposure of bottom muds by draining lakes and reservoir during winter months will kill overwintering midge larvae, reducing the size of the adult population emerging in spring. Understandably, this method may not be practical for all bodies of water.

Diversions of adults. Many lakes and reservoirs that produce nuisance populations of midges have homes and businesses constructed along the shore lines. After emergence, midge adults are attracted to shoreline lights. High intensity white light has been found to be highly attractive to adults. Keep window blinds closed and porch light off during heavy emergence periods to help reduce the number of adults attracted to residences. Strategically placed high intensity white lights may divert midges away from populated areas.

Electrocution traps. Electrocuter traps will attract and kill large numbers of midge adults. It is doubtful that a single electrocutor trap could kill a sufficient number of midge adults to appreciably reduce nuisance populations. In addition, during heavy adult activity, the trap may malfunction as a result of becoming clogged with midge body fragments.

Lighting issues. If you live in a near a pond or in a lakeside community, you might try getting advice from your local government or from a lighting consultant concerning the type of public lighting in your neighborhood. It may be possible to reduce lighting or switch from the typical metal halide streetlight to one that is less attractive to midges, such as the use of high-pressure sodium lamps. There might be a situation where you would use brighter lights in an non-occupied area to attract them away from houses or where people are active outdoors. On the personal front, reduce or eliminate exterior lighting at night around your house. Close window shades. Use subdued walkway/landscape type lighting if you wish. Don’t burn lampposts or floodlights except when needed.

Biological

Midges are fed upon by a large variety of aquatic organisms, such as dragon fly nymphs, predaceous diving beetles and a variety of fish species. Where the diversity of predaceous animals is high, the density of midge larvae is usually held below nuisance population levels. Shallow, organically rich lakes and heavily polluted habitats such as sewage waste lagoons are inhabited by few predaceous species compared to bodies of water that receive less nutrient-rich input.

Predatory fish. Chironomid midges are a major component of the diet of many fish species. In particular, bottom-feeding fishes, such as catfish and carp, consume large numbers of midge larvae. However, the feeding of these fishes has, generally, not been shown to reduce adult midge populations below nuisance levels adjacent to habitats where there were large larval populations. You might want to contact your local [NC Wildlife Resources Commission](#) office for advice on stocking ponds.

Insecticidal

Larvicides. Granular temephos (Abate®) is registered by the US EPA for control of aquatic midge larvae in standing water habitats. Application of temephos to control chironomid midge larvae should be regarded as a temporary, “stopgap” method. Although application of temephos is an effective treatment for control of chironomid midges, repeated and prolonged use of the chemical may lead to the development of resistance in midge larvae. Currently, residue tolerances for temephos in fish have not been established. Consequently, it is illegal to consume fish that are caught in bodies of water that have been treated with temephos.

The biological larvicide, *Bacillus thuringiensis* var. *israelensis* (Bti), is registered for use against chironomid midge larvae. Unlike temephos which exerts contact toxicity, Bti is toxic after being consumed by the larvae. Consequently, in waters of high organic content (which present a competing food source for the midges), Bti is only effective at high rates of application (at least 10 times the rates needed for mosquitoes), which limits the economic use of Bti to small habitats. To maximize the effectiveness of larvicides, applications should be properly timed. Accordingly, dredge samples of bottom mud should be collected, sieved, and the chironomid larvae recovered and counted. Chemical treatments should be made when the number of larvae found equals or exceeds **200 per 6 inch square bottom sample**. This treatment threshold is completely arbitrary. It is based on insecticide treatments made for the control of midge larvae in Florida and California. Without monitoring a midge population for one season, the relationship between numbers of immature midges in the bottom mud and consequent numbers of nuisance adults can not be established.

The insect growth regulator methoprene (Strike®) is registered for use in municipal wastewater treatment facilities to control midges and filter flies.

Adulticides. Many insecticides that are registered for the control of adult mosquitoes are also registered for application against non-biting midge adults. These products are listed in the [North Carolina Agricultural Chemicals Manual](#). Adulticides can be applied in the air as ultra low volume sprays or to wall surfaces or vegetation where midge adults rest. The use of insecticides against adults should be expected to achieve temporary control over heavy emergence periods, because treated areas are rapidly repopulated by midges flying in from outside the treatment zone. Application of residual insecticides to porch alcoves, carports, under the eaves of house and other similar areas should help to discourage the establishment of spiders that are associated with outbreaks of chironomid midge adults.

References

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