Mosquito Vectors of Zika Virus and Their Control

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Promoting and Protecting the Health of the Public and the Environment
Acquires virus

mosquito incubation period
7-10 days

Transmits virus

human incubation period
2-7 days

virus in bloodstream

illness
2 - 7 days

Human 1

Symptom Onset

illness
2 - 7 days

Human 2

Symptom Onset
Mosquito Vectors of Zika Virus
Ten Aedes Species in Africa & the South Pacific

• **Stegomyia** group
  – *Ae. aegypti*, *Ae. africanus*, *Ae. albopictus*, *Ae. apicoargenteus*, *Ae. hensilli*, *Ae. luteocephalus*, and *Ae. polynesiensis*

• **Aedimorphus** group
  – *Ae. vittatus*

• **Diceromyia** group
  – *Ae. furcifer*, *Ae. taylori*
Aedes aegypti
Yellow Fever Mosquito

Feeds almost exclusively on people
Breeds and rests indoors and outdoors
Near human habitation
Due to being out-competed by *Aedes albopictus*, *Aedes aegypti* is now limited to coastal regions of the southeastern United States.
Aedes aegypti Outdoor Breeding
Urban Areas Near Human Habitation

Cemetery Vase  Water Storage

Waste Containers  Bird Baths  Discarded Tires
Aedes *aegypti* Indoor Breeding

Bathroom Container

Water Fountain
Aedes albopictus
Asian Tiger Mosquito

Opportunistic blood feeder, mostly mammals
Breeds and rests outdoors
Near human habitation or rural, wooded areas
Aedes albopictus
U.S. Range
Aedes albopictus Outdoor Breeding Sites
Urban or Rural Areas

• Containers
  - Metal, glass, stone, earthenware, plastic, wood, or rubber

• Natural containers
  - Treeholes
  - Leaf axils (not common)

• Human-made containers
  - Flower pots
  - Cans
  - Buckets
  - Ornamental ponds
  - Birdbaths
  - Old tires
  - Cemetery vases
  - Clogged rain gutters
  - Pet watering dishes
Eliminate Mosquito Vectors and Avoid Exposure
Controlling Mosquito Larvae

Main Focus of Mosquito Control

- Mosquito larvae are
  - Confined to water and are easier to treat than adults
  - More vulnerable to control measures than the adults
Source Reduction
Removing sources of water that breed mosquitoes
Recycling Waste Tires

Eliminates the need using expensive EPA-registered insecticides
Community Involvement in Source Reduction

“Man breeds his own *Aedes aegypti* and sits back either in ignorance or in the hope that someone else will do the tidying up.”

J.D. Gillett

Educational Challenges

- Link larvae – “wrigglers” – with adult mosquitoes that might cause illness
- Stop dependence on government or other institutions to sustain source reduction activities
Larviciding

Process of killing mosquitoes by applying natural agents or commercial products to control larvae and pupae
Bacillus thuringiensis israelensis – Bti
Bacterial toxins paralyzes the midgut of mosquito larvae
Mosquito Control at Home

Methoprene, an Insect Growth Regulator

Methoprene mimics juvenile hormone & prevents larvae from molting into pupae.
Mosquito Repellents

EPA-Registered Active Ingredients
- DEET
- Picaridin
- IR3535
- Oil of Lemon Eucalyptus
Adult Mosquito Control – Adulticiding

- Source reduction or larviciding fails to control mosquitoes OR
- Outbreak already in progress
Ultra-Low Volume (ULV) Spraying
Use of nozzles to atomize the insecticide
Thermal Fogging
Use of heat to atomize the insecticide

Vehicle-mounted, Handheld, or Backpack versions available

Hand-held thermal fogger
Establishing a Mosquito Control Program

**ASTHO’s Recommendations**

- **Level 1 (Minimal)**
  - *Minimal or no resources.* Emphasize education, community participation, and personal responsibility.

- **Level 2 (Intermediate)**
  - *Little to moderate resources.* Combine resources with other jurisdiction. Add increased source reduction and adulticide. Map habitats. Monitor larval & adult populations.

- **Level 3 (Comprehensive)**
  - *Moderate to full resources.* Procure equipment and insecticides. Expand data collection. Build risk maps and assign priorities to areas.

When to Notify Mosquito Control Programs of Zika-Virus Positive Events

Suspect or Confirmed Patient is viremic or infectious to mosquitoes while in South Carolina

- YES

Weather/Time of Year is appropriate for mosquitoes to be present

- YES

Local exposure to mosquitoes was likely

- YES

Mosquito Control is Notified