IMVCA Small Bites of News

THE HIDDEN RISKS OF ALTRUISM

Comments on MMWR Report

There is nothing more commendable than selflessly helping other people, especially after a disaster like the earthquake in Haiti. Most of us probably know of someone or some local group that volunteered to do service in Haiti or the Dominican Republic. You might even have gone there yourself.

A report from the CDC in MMWR (Morbidity and Mortality Weekly Report) forwarded to us by Linn Haramis chronicles a study of 28 missionary workers from Nebraska and Georgia. Less than one-half of the travelers had pre-trip knowledge about the potential mosquito-borne diseases in the region, especially dengue. The attack rate among the travelers was ≥25% in Haiti. A similar investigation in the Dominican Republic in 2008 found an attack rate of about 42%.
For the details of this study, go to
http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6027a2.htm?s_cid=mm6027a2_e&source=govdelivery

WEST NILE VIRUS – TRENDS FOR 2011 IN USA?

Jack Swanson and Rich Lampman

Here is a brief (and probably out of date as soon as we type it) review of positive mosquito pools and number of positive counties across the USA. There appears to be several trends, especially early northern WNV activity, perhaps facilitated by the unseasonably warm weather.

There are 7 counties with West Nile virus activity in Illinois. The greatest number of positive mosquito pools is from Cook County. Positive birds or mosquitoes are also reported from DuPage, Gallatin, Kendall, LaSalle, St. Clair, and Tazewell. The official number of positive mosquito pools is 26; however, by searching the internet and looking at INHS test results, it appears there are at least 39 mosquito pools as of July 27, 2011.

Nationally, there are twelve human cases from 8 states (Arizona, California, Georgia, Mississippi, South Dakota, Texas, and Virginia), and 5 presumed viremic blood donors (PVDs) from California, Arizona, Mississippi, and two states without human cases **(Indiana** and Louisiana).

As of July 26th, 121 counties from 24 states reported WNV activity (mosquito, bird, or human). Most (85 counties in 20 states) were from the past month and 4 new states reported WNV activity in just the past week (Indiana, New York, Utah, and Virginia). There are **676 positive mosquito pools** reported to CDC from 19 states with the bulk from Texas, California, and Pennsylvania. Our search of public health sites returned a slightly higher number of positive pools.

Positive mosquito pools by state:

MA: 16
CT: 2
NY: 4
NJ: 29

PA: 136
OH: 33
IN: 1
IL: 39 (unofficial) 26 official from IDPH
IA: 1

MO: 43

TN: 17
MS: 3
GA: >50 based on newspaper report from Chatham Co.

NE: 4
UT: 1
WY: 4

AZ: 37
CA: 147
TX: 171

The first positive mosquitoes for the Northeastern States were within 2 weeks of each other (CT, MA & NJ). Even though PA had the early positive mosquito pool (May), most (23) were collected in 3 weeks, mid to end June. Likewise for the States that had early positives: AZ, Jan. & Ca, Feb. Most of their positive mosquitoes were in the last 2 weeks of June for AZ (18) and in CA all from the same week in mid June (20 of 31 total). Likewise TX had 40 of their positive mosquitoes from the last 2 weeks of June. Finally the mid-west States, IA, MO & IL had the first positive mosquito early June, within 2 weeks of each other. If the hot temps hold and we continue to get intermittent periods of rain, we may soon see many more positive mosquitoes especially in that northern tier of PA, OH, IN, IL, & MO (St. Louis). The rate of increase in PA appears to be a true ramping up of transmission between birds and mosquitoes

NPDES UPDATE

HR 872, which exempts pesticide applications - including mosquito control - in, over, or near waters of the United States from burdensome Clean Water Act (National Pollutant Discharge Elimination System (NPDES) permitting requirements, is stalled in the Senate. We need 60 senators' support to get the bill to the Senate floor for a final vote before the October 31st deadline when the NPDES takes effect!

Contact our Senators, Durbin and Kirk, in one or more of their district offices. Ask them to promise support for HR 872, called "Reducing Regulatory Burdens Act of 2011". Background information on this crucial legislation can be found at: http://www.mosquito.org

AND NOW FOR SOMETHING COMPLETELY DIFFERENT--TICK-BORNE PATHOGENS!

Rich Lampman, with a little help from his friends

Sometimes the perceived increase in prevalence of a pathogen is due to an increase in surveillance or a better, more sensitive detection method. Of course, sometimes it's due to a greater number of people coming into contact with infected arthropods. It seems both might be true for the emerging tick-borne pathogens causing ehrlichiosis and anaplasmosis.
Ehrlichia and *Anaplasma* are tiny (0.2-2 µm) obligate, intracellular bacteria that resemble *Rickettsia* and are transmitted by ticks. *Amblyomma americanum* (Lone Star tick) is typically associated with ehrlichiosis, whereas *Anaplasma phagocytophilum* is often attributed to infected *Ixodes scapularis*, which also transmits agents that cause Lyme disease and babesiosis. Both pathogens are transmitted to humans from the tick bite and they multiply within the cytoplasm of infected white blood cells.

Human monocytic ehrlichiosis (HME) is caused by *Ehrlichia chaffeensis, which* infects monocyte vacuoles. Human granulocytic anaplasmosis (HGA), formerly known as human granulocytic ehrlichiosis (HGE), is caused by *Anaplasma phagocytophilum*. Historically anaplasmosis has a greater prevalence in northeastern and north central US. **For more, see:**
http://relative-risk.blogspot.com/2011/07/rise-of-hme-and-hga.html

During 2000-2007, the reported incidence rate of HME increased from 0.80 to 3.0 cases/million persons/year. The case-fatality rate was 1.9%, and the hospitalization rate was 49%. Anaplasmosis (HGA) increased from 1.4 to 3.0 cases/million persons/year. The case-fatality rate was 0.6%, and the hospitalization rate was 36%.
For more, see:
http://www.ncbi.nlm.nih.gov/pubmed/21734137

RAMP TEST OBSERVATIONS

1. CDC "Proficiecny Test" Of WNV Samples

Three mosquito abatement districts in Cook County participated in a CDC test of West Nile virus standards (infected mosquito pools with different amounts of virus). They ran the samples on their RAMP machines like a "proficiency panel" and then shipped their samples to the Medical Entomology Program at INHS (part of the Prairie Research Institute at the University of Illinois). The samples were tested by RT-PCR TaqMan and results were sent to CDC for comparison to the known starting amount of virus. The CDC will report the results at a later date for a multi-state comparison.

From our perspective, all 3 MADs detected three positive pools that appeared to be a ten-fold dilution series based on the uniform difference between the cycle thresholds of the 3 samples. The results indicated the RAMP value was not linearly related to RT-PCR cycle threshold value, but it was good for detecting even small amounts of virus (equivalent to cycle thresholds as high as 33 and 35 for the RT-PCR).

2. Odd "False" High Ramp Values

Recent experience indicates pipette amount (faulty pipettor) in a cartridge are important. This was inspired by summary observations from Paul Geery of DesPlaines Valley Mosquito Abatement District

Although this was based on a small sample size, the results seem to indicate low volume of test liquid in a test cartridge could cause artifacts. Recently while running RAMP tests on some mosquito pools, DVMAD ran 6 pools of mosquitoes and noticed that the liquid was barely making it over the reading area on the cartridge. They found the blue pipettor, which came with the kit, was not delivering the full 70 microliters. Whatever the exact volume, the liquid barely made it to the end of the cartridge.

Two of the 6 pools, gave a "Low Signal" error message, but the four that ran without an error message had higher RAMP units than previous runs. One of the samples was positive at 179.0 units. When all the pools were retested on test cartridges from the same kit and a functioning blue pipettor, all the RAMP values were lower and the "positive" sample was clearly negative with a RAMP of 6.8.

It appears that a low volume in the test cartridge may yield higher RAMP values, perhaps even a "false positive". So the best advice is to occasionally look at the volume in the cartridges, especially if you start to get a "low signal" error message or a result that doesn't seem to agree with other samples.
Similar experience? If so, please contact Rich Lampman (richlamp@illinois.edu).

REGULATORS OF WEST NILE VIRUS RISK

Richard Lampman and Jack Swanson with the support of many

As of July 15th, it is obvious that West Nile virus transmission is becoming more common, especially in the northeastern states (PA, OH, IN, and IL). The projected meteorological forecasts are consistent with a continuing rapid amplification. At this time, we are often inundated with requests for information. Here are some suggestions for topics to cover. This is by no means an exhaustive or complete review.

Arthropod-borne transmission of a pathogen, like West Nile virus (WNV), is often divided into a **"natural/endemic cycle" and an "outbreak/ epidemic" phase**.

The natural or endemic cycle is the process by which the pathogen is continuously passed (transmitted) between arthropod vectors and vertebrate hosts (e.g., mosquitoes and birds for West Nile virus; mosquitoes and chipmunks or squirrels for La Crosse encephalitis virus; and ticks and small rodents/mammals for borreliosis or Lyme disease).

Mortality of vertebrate hosts in the natural cycle is usually low, thus there are few visible signs of transmission until humans or domesticated animals (e.g. horses) get sick or die (the outbreak or epidemic phase). In the case of WNV, corvids (the bird family with blue jays and crows) are susceptible to the virus, thus these species act as wild sentinels for WNV transmission. Unfortunately, they are not equally distributed among areas of human risk.

Not all vertebrates can be hosts of WNV and not all arthropods can be vectors. Vertebrates that get infected and have a high enough level of pathogen in their blood (viremia, in the case of arboviruses) to infect a susceptible feeding insect are called "competent hosts". Similarly not all insects and ticks can transmit every blood-borne pathogen.
Mosquitoes have several transmission barriers – a pathogen, like a virus, must infect the gut and then escape into the insect blood cavity. From there, it must pass to the mosquito salivary glands, infect them, and the saliva must have enough virus particles to infect a competent vertebrate host during the next mosquito bloodmeal. Mosquitoes that can do this are called "competent vectors". Transmission barriers are why mosquitoes do not transmit all blood-borne viruses, such as those that cause hepatitis or AIDS.

Competency in laboratory studies does not mean importance in the field, because it is the contact between the vector and the competent host under natural conditions that counts. Recent studies have found that in our area American robins are competent hosts and tend to be the preferred hosts for *Culex* vectors, thus they are believed to be "superspreaders" of the virus to mosquitoes.

An outbreak or epidemic transmission of a pathogen occurs when an infected vector feeds on an atypical vertebrate, thus "bridging" the transmission to animals that are not competent hosts but tend to have symptoms from infection by the pathogen. For WNV, humans and horses are such "dead end" or "incidental" hosts.

The risk of West Nile virus is a function of the number of infected mosquitoes that are likely to bite a susceptible person. ***This can be affected by many biological and environmental factors, which is why predictions about transmission levels are often incorrect.*** A good answer to the question, "So what's WNV going to be like this year?" is "I can give you the mosquito forecast, if you can give me the temperature and amount of rain and frequency over the next 30 days." This usually drives home the point that our hypotheses may be solid, but uncertainty about environmental regulating factors makes predictions prone to error.

Regulators of disease transmission include any factor that affects the rate of contact between vectors and hosts, the number of infected and susceptible mosquitoes and birds, length of the vectors life, vector dispersal capability, virus incubation period in the vector, amount of virus in mosquito bite, magnitude and duration of infection in hosts, feeding behavior of vectors, and the ability to transmit (competency).

The main factors that modify transmission tend to be:

1. **Landscape:** The physical characteristics of an area provide the infrastructure for bringing the elements of transmission together, namely the interaction between vectors, natural hosts, and humans. Landscape features often are related to vector abundance, flight paths, and exposure to environmental factors that affect survivorship and longevity. Many mosquitoes stay relatively local (1-2 miles), that is near their oviposition sites (aquatic sites), whereas others often fly long distances (over 5 miles). For example, *Culex* vectors of WNV are often found near breeding sites, but *Aedes vexans* may come from flooded areas several miles away.

2. **Temperature:** Rate of development or turnover of broods, rate of infection of the vector with virus, amount of circulating virus, and longevity or life of the vector are temperature dependent. Temperature is a KEY FACTOR as it affects multiple aspects of the virus-mosquito interaction and mosquito-bird-human interactions. Temperature and rainfall tend to have broad impacts on the ecosystem. For example, a large proportion of the mosquito population may be infected with WNV, but if a series of cool night periods occur, then their flight activity and blood feeding tends to be curtailed and virus replication is slowed in the mosquito.

3. **Rainfall:** All mosquitoes have an obligate aquatic phase in the immature stages - egg, larvae & pupae. The water holding areas may vary from natural to artificial containers or range from ground pools to bromeliads holding water in their foliage. If they hold water for the length of the development time at the ambient temperature, then they are potential habitat.

"Chicago's unpredictable weather patterns make forecasts of mosquito populations difficult", said one MAD director in Cook County.
For more technical aspects of weather and mosquitoes see http://mcc.sws.uiuc.edu/research/westnile/background.htm or http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2856545/

Floodwater vs. stagnant water: Sites initially flooded with clear water, often eventually become stagnant as microbial growth on organic matter (grass or leaves) increases.

Floodwater or nuisance mosquitoes, such as the inland floodwater mosquito, *Aedes vexans*, can become the main human biter. Also day biters like *Ae. albopictus* and woodland *Aedes (Ochlerotatus) trivittatus*, and sometimes *Aedes (Ochlerotatus) japonicus* and *Psorophora* species can get to annoying levels. The Eastern Tree hole mosquito, *Aedes (Ochlerotatus) triseriatus* can be a nuisance in wooded areas and may also be a vector if infected with LaCrosse encephalitis virus.

Heavy rainfall may flood container areas and temporarily reduce mosquito abundance or redistribute them but the rebound is often fast particularly during high temperatures.

Chicago and the suburbs may have relatively unique above and below ground features with massive underground infrastructure for mosquitoes to overwinter and escape direct sunlight and low humidity, as well as a significant "heat island" effect affecting temperatures and precipitation during the critical months of July and August, and a huge area with landscape that promotes mosquito-bird-human interactions.

Warm periods with below average rainfall tend to favor amplification of WNV and an urban increase in vectors (primarily Culex pipiens) and bird hosts seeking water and food. *We are lucky in the sense that Culex pipiens and Cx. restuans appear to be our primary vectors, and the more mobile and mammal feeding Culex tarsalis is relatively rare in the state.*

4. **Food resources, entomopathogens, predators, etc:** *There is a long list of factors that potentially affect mosquito fitness and/or competency of vectors.* In general, factors that stress or kill mosquitoes or birds may influence transmission in different ways. Although it is hard to generalize the impact of different types of stress and their complex interaction, mosquitoes with less energy reserves often have a shorter lifespan, thus have less long-term potential for transmitting a pathogen; however, in some cases these stressed mosquitoes are more competent vectors, thus increasing the short-term risk. For horizontal transmission (from mosquito vector to vertebrate host), the mosquito typically must survive at least 2-3 bloodfeeding-egg production cycles; the first to pick up the pathogen and the second or third to transmit it, depending upon the incubation period in the mosquito.

5. **The magnitude of aquatic habitats for mosquito larvae that are unnoticed, unknown, or inaccessible:** Despite a concentration of larval control on catchbasins in several communities, mosquitoes continue to be captured in those areas. Although wet catchbasins may be a main source of mosquitoes in urban areas, it is obvious that numerous above ground or unknown underground sites also exist. In the 2002 outbreak in Cook County few were aware of backyard underground areas holding water (e.g., old sewage lines and cisterns) that were created before modern record-keeping. One of the major jobs of a Mosquito Abatement District (MAD) is determining the location of potential breeding sites and preemptive treatment of them (e.g., the aforementioned treatment of catch basins).

Foreclosed, abandoned, or neglected areas may have structures or containers that hold water and organic matter, thus becoming urban habitat for vector mosquito species. An abandoned swimming pool or the tarp covering it have been known to generate thousands of *Culex* depending upon size, organic content, and shade.

6. **Bird Hosts**: Birds are the main reservoir hosts of WNV during spring and summer. Mosquitoes are probably the main overwintering reservoir hosts in fall and winter, especially in temperate areas like Illinois. Birds are not all equally important as hosts; the primary host species in the northeastern US appears to be American robins (often called a "superspreader" of WNV). Other species that may be involved include house sparrows, northern cardinals, mockingbirds, and a few other common species. Some species show a high rate of exposure (Mourning Doves), but are not highly competent (plus the high antibody rate means "avian herd immunity" would probably impact transmission if they were more competent). There is undoubtedly considerable regional variation in vectors and bird hosts. Avian roosting behavior (resting as a group at night) and their anti-mosquito defense behavior tend to vary between bird species, thus potentially altering transmission.

7. **Human behavior:** When substantial nuisance (non-vector) mosquito populations are present, people may be more willing to use insect repellent or they may just stay indoors during the evening hours. Consequently, there may be reduced vector – human host contact, which also would reduce risk of contracting WNV from the bite of an infected vector mosquito. Later in the summer hot (and drier) conditions may reduce non-vector nuisance mosquitoes, while infected *Culex pipiens* are increasing. *Culex pipiens* are often less aggressive biters than floodwater mosquito species and the public may perceive that there are less generic "mosquitoes" present – unfortunately, when the risk from infected *Culex* is actually increasing. A remark that indicates risky behavior regarding WNV is, "He loves sitting outside when it cools off after sundown"; basically this behavior increases exposure to host seeking *Culex.*

Lastly, because WNV is an endemic disease – not a NEW disease – citizens and local government officials may incorrectly assume that WNV has "disappeared" and it is no longer a threat to human health. For example, many WNV fever cases are no longer reported to health agencies, which reduces the official confirmed human case count. There are many historical examples of vector surveillance and management funds diverted to other areas and

Summary: Considering the number of factors that can modify arbovirus transmission, it is amazing that WNV reappears annually, especially in environmentally inhospitable years. This clearly demonstrates how well entrenched an arthropod-borne pathogen can become in an amazingly short time. However, there will undoubtedly be large fluctuations in the magnitude of transmission to humans, which will often result in the conclusion that the worst is over. **In contrast**, those working with mosquitoes regularly see high levels of endemic transmission with weekly infection rates well above 5-10 positives per 1000 mosquitoes (infection rate = IR). In the weeks when transmission peaks, MADs and Public Health Departments often talk about a season cumulative 5-10 percent of the pools being positive, calculating from the beginning of the season. Often during those weeks in August and early September, MADs report over 90% of the pools from a site as positive. Several seasons of research have shown that amplification tends to be very rapid and highly susceptible to environmental virus-dampening conditions, such as heavy rains and cool temperatures.

WNV has the potential to show up in different areas each year and reach alarming endemic levels. Let's hope we don't have to see what happens if surveillance and management are curtailed.

EXCERPT: THE NORTHWEST MOSQUITO ABATEMENT DISTRICT WNV UPDATE OF JULY 14, 2011.

Comments are the opinion of the Director, Mike Syzska.

"Director's Note: Human cases of WNV have been relatively low 2007-2010 in NE Illinois. I believe this has been primarily due to weather conditions including: abundant rainfall, below normal temperatures or a combination of both. Severe human WNV infection years typically coincide with warmer temperatures and drier conditions. The reason this occurs is because those weather conditions favor the production of *Culex* mosquito stagnant water habitats (which produce more *Culex* mosquitoes) in the metro-Chicagoland area. 2011 is currently heading in that direction and the risk of human WNV will be increasing from this point forward unless weather conditions change (e.g. La Niña perturbations in 2011?)! It is very likely we will see increasing numbers of WNV infected mosquitoes as amplification of the virus occurs in the bird population. Although WNV got off to a slow start in 2011 due to abundant rainfall & cooler temperatures earlier in the mosquito season it is only slightly behind schedule and likely to advance rapidly if the 90 degree temperatures expected shortly prevail and rainfall continues to be minimal!"

LITERATURE TO READ, DIGEST, AND SPREAD AROUND

ABSTRACTS EDITED BY R. L. LAMPMAN

PRESENT AND FUTURE ARBOVIRAL THREATS

By Weaver and Reisen.

See complete article at:
http://www.idpublications.com/journals/PDFs/AVRES/AVRES_MostDown_2.pdf

Arthropod-borne viruses (arboviruses) circulate among wild animals and vectors and sometimes there is a transmission spillover to humans and domestic animals. Some viruses, such as dengue (DENV) and chikungunya (CHIKV), no longer require a wild animal cycle to sustain an outbreak, thus urban epidemics are well-known.

West Nile virus (WNV) was introduced to North America in 1999 and underwent a dramatic geographic expansion. High amplification rates in WNV has caused the largest epidemic of arboviral encephalitis ever reported, first in 2002 and then again in 2003.

What new pathogen will occur in the next couple of decades is difficult to predict because the method and likelihood of pathogen introduction is complex. However, we can discuss the potential candidates from presently known emerging diseases.

Japanese encephalitis virus (JEV), the most frequent arboviral cause of encephalitis worldwide, has spread throughout most of Asia and south to Australia. Rift Valley fever virus (RVFV), another arbovirus that infects humans after amplification in domesticated animals, undergoes epizootic transmission during wet years following droughts. Like WNV, JEV and RVFV could become epizootic and epidemic in the Americas if introduced unintentionally via commerce or intentionally for nefarious purposes.

Climate warming also could facilitate the expansion of the distributions of many arboviruses. Bluetongue viruses (BTV) invaded Europe after an increase in climate warming and enabled the major midge vector to expand is distribution northward, extend the transmission season, and increase the vectorial capacity of local midge species.

The greatest health risk of arboviral emergence may come from urbanization and the colonization of habitats with indigenous vectors and pathogens. For example, the highly anthropophilic (attracted to humans) mosquito, *Aedes aegypti*, has expanded its urban distribution, which led to the emergence of permanent endemic cycles of urban DENV and CHIKV. The minimal requirements for sustained endemic arbovirus transmission are adequate human viremia and vector competence. *Aedes aegypti* and/or *Ae. albopictus* may be competent vectors for two other viruses: Venezuelan equine encephalitis virus, (VEEEV), presently an important cause of neurological disease in humans and equids throughout the Americas; and Mayaro virus, a close relative of CHIKV that produces a comparably debilitating arthralgic disease in South America.

ONCE RARE, TICK-BORNE INFECTION SPREADS

Read about it at: http://well.blogs.nytimes.com/2011/06/21/a-new-worry-about-tick-bites/

Babesiosis is an illness from infection with *Babesia microti*, a parasite that lives in red blood cells and is carried by deer ticks. This potentially devastating infection has gained a foothold in the Lower Hudson Valley and coastal Northeast.

According to a recent report by the CDC, there were 6 cases of babesiosis in the Lower Hudson Valley in 2001 and 119 cases in 2008. Where Lyme disease is endemic, like coastal Rhode Island, Massachusetts, Connecticut and Long Island, babesiosis also is becoming common.

In one study of residents of Block Island, R.I., babesiosis was just 25 percent less common than Lyme disease. Babesiosis is spreading slowly into other regions where it did not exist before, like the Upper Midwest.

There are an estimated 1,000 reported cases a year; experts believe this represents a fraction of the people who are infected. Babesiosis already is the most frequently reported infection transmitted through transfusion in the United States, responsible for at least 12 deaths. In New York City, 6 transfusion-associated cases of babesiosis were reported in 2009.

A SPOON FULL OF SUGAR (AND FERMENTED JUICE) MAKES THE SKEETERS GO DOWN IN THE MOST DELIGHTFUL WAY!

Have you ever reared *Culex* and fed them a honey water solution? If you did, I bet at some time you'd walk into the colony room and be overwhelmed by a sweet fermenting smell that the mosquitoes loved it and at times were hard to shake off the honey soaked wicks. Well, that's kind of the basis for an attractive toxic sugar baits (ATSBs) used to control mosquitoes in storm drains on the edge of St Augustine, Florida by Muller et al. 2010.

"The ATSB baits consisted of brown sugar, fruit juice, green dye marker and boric acid. They were placed in target drains and control drains had similar baits with orange dye and no boric acid. A total of 220 pupae of *Culex* were released in each control and toxin-treated drain, and the numbers of recovered mosquitoes were examined to determine the effectiveness of ATSBs in the storm drain system. A conical exit trap collected emerging adults. An average of 178.2 mosquitoes exited each drain in the control area; 87.0% of these had fed on the baits and were stained orange, whereas 13.0% were unstained. In the toxin-treated drains, 83.7% of hatched females and 86.6% of hatched males were controlled by the baits."

To see more go to:
http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2915.2010.00876.x/pdf

ATSB In Israeli Oases

'Attractive Toxic Sugar Bait' (ATSB) were sprayed onto patches of vegetation to lure mosquitoes and kill them. This irresistible trap was made by combining melon and guava extracts with beer and boric acid. The contents can be modified to local materials.

See more at:
http://borgenproject.blogspot.com/2011/04/attractive-toxic-sugar-bait-to-reduce.html

Comment by R. L. Lampman.
Attractive toxic sugar baits (attract-and-kill technology) appear good for knocking down mosquito adults in areas where there is little likelihood of impacting other animals. It sounds very encouraging. Boric acid has low toxicity to birds, fish, and aquatic invertebrates; however, it may impact domesticated animals and some non-targets. On-going research will evaluate the ecological impact of residential ATSB before this became a widespread foliar or above-ground control treatment strategy.

Comments in the IMVCA newsletter and email notes and updates are reviewed by the IMVCA executive board, but they are the opinions of the authors and not necessarily the opinion of the association