GMCA 2014 Annual Meeting

Session 1: Wednesday Oct 15

I. Gearing Up for Chikungunya in Georgia - Amanda Feldpausch
   A. Mosquito borne viral disease
      1. Joint pain
      2. Fever
   B. History
      1. 1950 Tanzania
      2. 2013 Caribbean
      3. 2014 Florida
   C. Symptoms
      1. Most people show symptoms
      2. Incubation period
         a) 3-7 days
         b) Range 1-12 days
      3. Variety of symptoms
      4. Joint pain
   D. Treatment
      1. Supportive care
      2. NSAIDS
      3. Acute symptoms resolve in 7-10 days
      4. Persistent and recurring joint pain
      5. Mortality is rare
   E. Prevention
      1. Reduce mosquito exposure
      2. Viremic first 7-10 days of illness (Onset of symptoms)
      3. Avoid places where CHIK occurs
   F. Concerns
      1. People are the reservoir
      2. Outbreaks can grow quickly
      3. We have vectors
   G. What we saw
      1. June 2014
         a) Patient 1
            (1) Advised patient
            (2) Asked to do mosquito surveillance - refused
         b) Mission group 1
            (1) Father called
            (2) All affected were under 18
            (3) Father did not want to give contact info
         c) Mission group 2
            (1) TN group Hospitalized here
            (2) Leader not willing to give contact info
      2. Response
         a) Educate Groups
         b) Test if clinically compatible
         c) Get info out to public
         d) Work on getting contact info from groups

3. CDC changed testing recommendations - outreach to commercial labs

H. Improving Epi response
   1. Guidance document
   2. Mosquito control outreach
   3. Media talking points
   4. Notifiable status

I. Surveillance in Georgia
   1. Passive
   2. Districts investigate
   3. Suspect case address shared with mosquito control with permission

J. Cases
   1. 21 cases so far
   2. June and July highest

K. Challenges
   1. Resources
      a) Testing
      b) Time
   2. Delay in reporting
   3. Lack of physician education - developed a physician guide
   4. Refusal of mosquito surveillance

L. Strengths
   1. Rapid guidance document development
   2. Amazing district staff
   3. Mosquito control

II. Field Application of Intensity Bottle Bioassay - Seth Irish

A. Developed by Bill Brogdon

B. Insecticide resistance
   1. Heritable change
   2. Causes
      a) Metabolic - pesticide breakdown
      b) Target site mutation
         (1) Genetic change
         (2) Pesticide not as effective
      c) Other
         (1) Cuticle thickening
         (2) Behavior change
   3. Resistance monitoring is importants
      a) Genotypic
         (1) Genotyping
         (2) Biochemical analysis
         (3) Field data
      b) Phenotypic
         (1) Bioassay
         (2) Topical application
         (3) Timed exposure (Bottle bioassay)

C. Bottle bioassay
   1. Glass 250 ml bottle
      a) Insecticide in acetone to coat bottle surfaces
      b) 1 control bottle - just acetone

2. Allow bottle to dry
3. Put mosquitoes in (20-25)
    a) Close bottle
    b) Observe over time

D. Specific dose depending on
1. Mosquito species
2. Pesticide

E. Diagnostic time is insecticide specific

F. Synergists help pesticide to work better
1. Expose mosquitoes to synergist for an hour
2. Test against pesticide
3. Helps determine what causes resistance

G. What does resistance mean?
1. Control failure? Depends on the circumstances
    a) Sometimes
    b) Sometimes not

H. Intensity assay
1. Diagnostic dose
    a) 1x
    b) 2x
    c) 5x
    d) 10x
2. Looking for operationally significant resistance

III. The Good, the Bad, and Why am I Doing This, Again? - Oscar Flite

A. The good
1. Equipment was supplied
2. Access to expertise
3. Partially funded
4. Still alive

B. The bad
1. Partially funded
2. Limited research beyond surveillance

C. So why keep doing this?
1. Cool research opportunities
    a) Mosquito fish in pools
    b) Mosquito ecology
2. Sites
    a) 7 in northern part of county
    b) 7 in southern part of county
    c) 1 in constructed wetlands
3. Methods
    a) Monitor each area every other week
    b) Monitor constructed Wetland site weekly
    c) CDC light trap and gravid trap with hay infusion used at each site
4. Data
    a) Constructed wetland (Primarily in light trap)
        (1) Cx salinarius
        (2) An crucians complex
        (3) Cq perturbans

b) Problem sites - wetland species
(1) Alabama Rd
(a) Cx salinarius
(b) Ae albopictus
(c) Cx erraticus
(2) Chester Ave
(a) Cq perturbans
(b) Cx salinarius
(3) Apple Valley
(a) Culex salinarius
(b) Cq perturbans
c) Periodicity of predominant species
(1) *An crucians* came off early than *Cx salinarius*
(2) Weather has an effect
(3) Travel time of runoff to constructed wetland is ~4 days

D. WNV
1. Cluster to northwest of wetland
2. Around Augusta National Golf Course
3. Hope to do virus testing next year

IV. Formulations for Mosquito Control Products - Mickey Taylor
A. PSEP website (UGA)
B. Pesticide
1. Active ingredient
2. Inert ingredients
a) Make product easier to handle
b) Increase pesticide safety
c) Make product work better
(1) Increased effectiveness
(2) Increased penetration
d) Make mixing and measuring easier

C. Types of formulations
1. Solution
a) Dissolve
b) Liquid or dry
2. Suspension
a) Dry carrier mixed with emulsion
b) Active ingredient high %
3. Emulsion
a) Ai dissolved in oil
b) Mixed with an emulsifier
c) Keep mixed

D. Formulations
1. Liquid formulations
a) ULV
(1) Almost 100% ai
(2) Applied as thermal or cold fog
(3) High drift potential
(4) Specialized equipment
(5) Application timing

(a) Inversion layer
(b) Low wind speed
(6) Respiratory protection
(7) Advantages
(a) Easy to handle
(b) Little to no agitation
(c) Easy on equipment
(d) No residue
(8) Disadvantages
(a) Drift
(b) Regular calibration is critical
b) Emulsifiable concentrate
(1) Ai dissolved in a petroleum-based solvent with an emulsifier added
(2) Advantages similar to ULV
(3) Disadvantages
(a) Can be phytotoxic
(b) Flammable
(c) Extra PPE needed
(d) Easily absorbed by skin
c) Flowables
(1) Wettable premixed powder
(2) Advantages
(a) Less absorption
(b) No phytotoxicity
(c) Easy to mix and measure
(3) Disadvantages
(a) Hard on equipment
(b) Can leave a residue
2. Dry formulations
a) Wettable powder
(1) Requires constant agitation to keep suspension
(a) Difficult to mix
(b) Can be abrasive
(2) Inhalation hazard
b) Dry flowable / water-dispersive powder
c) Soluble powder
3. Other
a) Micro encapsulated
(1) High ai
(2) Encased and suspended
(3) Gradual release
b) Water soluble packet
c) Briquets / soluble granules

E. Advantages and disadvantages
1. Equipment considerations
2. Safe application
3. Target pest
4. Risk to non-targets or environment
5. Cost

F. Adjuvant
    1. Types
        a) Surfactant
            (1) Spreader
            (2) Wetting agent
            (3) Emulsifier
            (4) Sticker
        b) Buffer
        c) Dye
        d) Anti foaming agent
        e) Etc
    2. Choosing the correct type
        a) READ THE LABEL
        b) Do not use industrial type products
        c) Adjuvant must be designed to work with product
        d) Test in small batch first
        e) May already be part of the inert ingredients

V. Industry Spotlight
    A. UNIVAR
    B. AMVAC

VI. Chatham County's Sentinel Chicken Program - Bobby Moulis
    A. EEE surveillance
    B. Chickens are deployed to areas where Arbovirus activity is likely
        1. Most programs use coops set up in sites and left all season
        2. Chatham County
            a) Chickens housed in a mosquito free coop
            b) Start with baby chicks In January
            c) Transfer to individual cages
            d) Only use hens
            e) Each bird is tagged with a wing tag
            f) Each cage is marked
    C. Sites
        1. Western part of county
        2. More rural areas
            a) Associated with rivers
            b) Hardwood swamp area
        3. 6 sites
        4. CDC light traps at sites
        5. Chicken cages are installed 12 feet off the ground
    D. Cages
        1. Bucket - enclosed with mesh at sides
        2. Exit trap at top
            a) Mosquito test data are quicker than bird data
            b) 1 week as opposed to 4 weeks
        3. Alternate black and white buckets
    E. Testing
        1. Bled 2 weeks after deployment
        2. Blood shipped to Tifton for testing
        3. Positives are rebled for confirmation

F. Mosquito side
    1. Difficult to catch
        a) *Culiseta melanura* not easy to find
        b) *Culex erraticus* may also be involved
    2. Easier to find EEE in chickens

VII. What's New at Richmond County Mosquito Control - Fred Koehle
A. Complain calls
    1. Use to be done off answering machine
    2. Switched to 311 service
        a) Look up info on map
        b) Send email to program
        c) Split work orders to additional agency where appropriate
B. Overgrown retention pond / drainage ditch areas
    1. Hard to find effective methods
    2. GOATS
        a) Low cost
        b) Quiet
        c) Accepted by citizens
        d) Do have to provide basic care
            (1) Water
            (2) Shelter
            (3) Feed occasionally
        e) Will be starting a breeding program
        f) Animal services is taking care of goats
        g) Takes about 60 days to get grass "mowed"

VIII. Preliminary Data on Investigations of Residential Misting Treatment for Mosquitoes - Tiffany Nguyen
A. Mosquito surveillance (UGA)
    1. Sampling methods
        a) CDC light traps with and without CO2
        b) Gravid traps with hay infusion
        c) Insect sweep nets
        d) Vacuum sampling
    2. Species
        a) Oc japonicus
        b) Ae albopictus
        c) Ae vexans
        d) Cx restuans
        e) Cx quinquefasciatus
        f) Ps ferox
        g) Anopheles
B. Barrier spray
    1. Hedgerow areas
        a) Vacuum sampled at 2 week intervals after treatment
        b) Bioassay cage studies
    2. Neighborhood assessment
        a) Pre and post treatment vacuum sampling
        b) Mixed results
        c) Most mosquitoes were *Ae albopictus*

3. Shadowing Pest Control Companies
    a) Company A
        (1) 1 tech
        (2) 15 treatment homes
        (3) 9 control homes
    b) Company B
        (1) 2 techs
        (2) ...

C. Summary
1. Impact for at least 2 weeks
2. Breeding sites may be a problem
3. Vacuuming is useful for collecting species to ID
4. Residual efficacy
5. Many houses being treated really do not have a mosquito problem

D. More data will be discussed at GMCA 2015

Session 2: Thursday, Oct 16 MORNING

I. God in His Wisdom Made the Fly, and Then Forgot to Tell Us Why - Nancy Hinkle

A. Background
1. Over 16000 fly species in North America
2. Original recyclers, biodegraders, and nutrient capturers

B. Some Important species
1. Crane fly
2. Chironomid (Non-biting midge)
3. New world screwworm fly is eradicated in North America
    a) Huge impact on livestock
    b) One reason why whitetail deer were scarce
4. Eye gnats
5. House fly
6. Blood feeders
    a) Stable fly - these bite
    b) Horn fly
    c) Black fly
    d) Culicoides (Ceratopogonidae)
        (1) Biting midge
        (2) No-see-um
        (3) Punkie
    e) Tabanidae
        (1) Horse fly
        (2) Deer fly
        (3) Green head fly
        (4) Yellow or dog fly
        (5) Louse fly
7. Blow fly - calliphorid
8. Love bugs (Bibionidae)
    a) Males have smaller heads
    b) Usually seen attached and mating, hence the common name
9. Indoor pests
    a) Fruit fly/pomace fly

b) Moth fly/drain fly (Psycodid)
(1) Bleach does not work
(2) Hot water doesn't work
(3) Larvae are in gelatinous layer
10. Phorids - humpback fly
11. Dark wing Fungus gnat
a) Common in overwatered plants
b) Feed on fungus
c) Larvae are communal
12. Fungus gnat
13. Black soldier fly

C. Things called flies that are not flies
1. Stonefly
2. Butterfly
3. Dragonfly
4. Etc

II. Applying Pesticides by Air - Scott Yackel

A. Use to be three counties with aerial programs
1. Glynn
2. Chatham
3. Liberty

B. Now just Chatham
1. Salt marsh
2. Hardwood swamps
3. Barrier islands
4. Old storm drain system

C. IMM program
1. Surveillance
a) Use helicopter to get tech to sites
b) Base control on data
2. Physical water management
a) Source reduction
b) Fish pools
3. Biological control
4. Larvicide
a) Helicopter survey to determine target
b) Treat breeding areas with granular materials
c) Treat source reduction ditches with oil
5. Adulticide

D. WNV
1. Something changed in 2003
2. What needed changing
a) Timing
b) Resistance
c) Targeting / equipment
(1) Truck
(a) Swath width
(b) Wind drift
(c) Product use

(d) Efficiency and timing
(2) Aerial
(a) More efficient and quicker - use two aircraft at once
(b) Can use Naled
(c) Timing is just prior to sunset (based on surveillance)
(d) Product management
i) Use the drift to get product in place
ii) Elevation above ground is usually ~200-300 feet in helicopter
(e) Need to take into account human activity
d) Set up an action plan based on surveillance numbers
e) Set up system to use low ai per acre
(1) Economically beneficial (88 cents an acre)
(2) Less environmental impact
f) Challenges
(1) Sports activity
(2) Weather
(a) Temperature
(b) Rain
(3) Budget for chemical
(4) Bee hives (>90 degrees bees sit outside)
3. Good community relationship

E. Other helicopter/air tractor uses - good community relationship
1. Search and rescue
2. Water rescue
3. Resupply missions
4. Aerial fire fighting
5. Police work

F. Helicopter is equipped with surveillance and search equipment

III. The Eradication of the New World Screwworm *Cochliomyia hominivorax* - Ian Brown

A. What is a screwworm?
1. A fly that initiates primary obligate myiasis
a) Invades live invertebrates
b) First attach on host
c) Use feed on live host
2. Powerful flier, fly up to 180 miles
3. Calliphorid
4. Red eyes
5. Determined to be the problem in 1933

B. Screw, or larva
1. Wood screw shaped
2. Feeding hooks
3. Body ringed with spines
4. Sit perpendicularly in wound

C. Life cycle
1. Eggs laid on edge of wound (5000+ eggs)
2. Larvae hatch from egg and enter wound
3. Feed on living tissue for 5-7 days
4. Leave wound, drop off host, burrow into soil
5. Pupate in soil

6. Adults
    a) Males mate aggressively
    b) Females only mate once

D. Pathology
1. All wounds targeted
2. Warm-blooded vertebrates targeted
3. Old wounds are colonized multiple times
4. Other flies became attracted to wound
5. Usually ended in death of host

E. Eradication
1. USDA
2. 1930s
    a) 1930s - Knipling developed the sterile insect technique (SIT)
    b) 1936 - Bushland developed an in vivo technique for mass rearing
    c) Figured out mating patterns
    d) Determined species involved
3. 1950s
    a) Knipling and Bushland solved the problem of mass sterilization
    b) Field trials
        (1) Island off the coast of Florida - issues with re infestation from mainland
        (2) Curaçao - flies eradicated in one year
4. Eradication timeline
    a) 1957 - east of Orlando, 70% eradication
    b) 1957-1958
        (1) Severe winter pushed screwworm south
        (2) Created a barrier zone
    c) 1959 - screwworm eradicated in southeast to Mississippi River
    d) 1961 - recruitment from areas with screwworm was problematic
    e) 1962 - southwest eradication program started
    f) 1966 - Indigenous screwworm eradicated from US
        (1) Long barrier to maintain
        (2) Cost was $5 million per year
        (3) This was only about 1/20th the cost of damage by screwworm fly
5. 1970 setbacks
    a) Weather was amenable to flies
    b) Huge outbreak in the US in 1972
    c) Worked on an agreement with Mexico to eradicate flies and set barrier at narrowest part, accomplished by 1984
    d) Cost was 1.8 million per year
6. 1980s
    a) Moved barrier to narrow part of Mexico
    b) No more U.S. outbreaks
7. 1990s
    a) Started eradication in Central America
8. Program continues

F. Critical steps
1. Fly surveillance
2. Livestock inspectors

IV. Know Thy Skeeter: The Role of the Gut Microbiota in Mosquito Development - Kerri Lynn Coon
    A. Health depends on gut bacteria
        1. Axenic - bacteria free gut
        2. Gnotobiotic - colonized by known bacteria
    B. Insects
        1. Often only one keystone bacteria species
        2. Mosquitoes
            a) Studies on interaction and relationship to vector competence
            b) Not much known about effect of bacteria on basic physiology
    C. Research
        1. Develop axenic mosquito larvae
            a) Bacteria come from female through egg shell
            b) Bacteria picked up from water
            c) Technique
                (1) Sterilize egg shell
                (2) Hatch in sterile water
            d) Outcome
                (1) Did not molt to second instar
                (2) All died
                (3) All species died
        2. Characterize gut bacteria
            a) Technique
                (1) Characterize microbial community of water and larvae
                (2) Identify and culture
                (3) Produce axenic larvae
                (4) Add bacteria back to determine which are necessary for development
            b) Outcome
                (1) Mosquito gut harbors a relatively simple bacterial community
                (2) This is similar but not the same as the water environment
                (3) Most are aerobic
                (4) 13 strains isolated - Cook, KL et al, 2014, Molecular Ecology 23, 2727-2739.
                (5) One replaced Non-specific bacteria strain allowed mosquitoes to molt
        3. What about field derived mosquitoes?
            a) Species
                (1) Aedes aegypti
                (2) Aedes albopictus
                (3) Cx quinquefasciatus
            b) Same assays used
            c) Same results
    D. Bottom line
        1. Rescue of mosquito development requires colonization of larval gut by bacteria
        2. What mechanism underlies the mosquito-bacteria interaction?
            a) Used E. coli collection with single gene mutations
            b) If it doesn't allow the mosquito larvae to develop, then why?
            c) Why do only certain bacteria colonize the gut?
            d) What is the necessary component that bacteria bring to the table?
            e) More work is being done
V. Industry Spotlight

A. AllPro - Temephos will no longer be manufactured
B. Central Life Sciences

VI. Educational Resources for Mosquito Management - Willie O Chance
A. Staying on top of the information
1. Newsletter
2. Pest Alerts
B. Extension agents
1. 158 of 159 Georgia counties have an extension office
2. Expertise varies
C. Website - online alerts (http://blog.extension.uga.edu/pestcontrolalert/)
1. Archive
2. Search by keywords
3. Register for email alerts
4. Links To additional info
5. Online training
a) Links to info
b) Webinars
c) Upcoming training
D. Emerging problems and issues
E. Regulatory changes
F. UGA services and publications
1. Insect ID
2. Research
3. Control info
G. Georgia Dept of Ag
1. License info - gapestexam.com
2. Training video is on the GMCA website
3. Pesticide training and Safety
H. Mosquito ID
1. GMCA
2. AMCA
3. ID classes
a) Florida classes
b) GDPH classes
I. Other newsletters
1. Dideebycha - GMCA newsletter
2. Wing Beats

Session 3: Thursday, Oct 16 AFTERNOON

I. Ants - Dan Suiter
A. Not an ant!
1. Velvet ants
a) Solitary parasitic wasp -
(1) Males have wings
(2) Females are wingless
b) Painful stinger
2. Velvet ants parasitize the larvae of the sphecids
B. Ants
1. Control issues

a) Why does the problem exist
    (1) Changes to environment
    (2) Look for conducive conditions
b) Baits
    (1) Minimize non-target exposure
    (2) Target specific
    (3) Ants share food
c) Spot treatments can be done to nest
d) Last resort is broadcast

2. Specific pests
    a) Number one pest in GA is the Argentine ant
        (1) Colony can cover 5 acres
            (a) Millions of ants in a colony
            (b) Many queens
            (c) Long forage trails
        (2) Treatment of choice is Termidor
            (a) Slow kill
            (b) Ants move product
        (3) Primarily found in south and central Georgia
        (4) Also called a sugar ant
        (5) Nest in mulch and leaf liter
        (6) Drought and cold drive ants inside
            (a) Will congregate under things
            (b) Behavior and metabolism change
            (c) Don't feed much so baits do not work well
    b) Tawny Crazy ants
        (1) Emerging as #1 pest
            (a) First found in GA in Albany (Aug 2013)
            (b) Aug 2014 - Camden and Glynn counties
        (2) Huge colonies
        (3) Find piles of dead ants
        (4) UGA wants reports of invasion
        (5) Flourish in areas with junk piles
        (6) Can short out electronics
    c) Carpenter ants
        (1) 2 species
            (a) Black - northern 2/3 of state
            (b) Florida - south of Savannah
        (2) Very baitable
        (3) Nest in large hardwood trees and under things
    d) Mound ant (look like Florida Carpenter ant)
        (1) Big aggressive ant
        (2) Found in northeast Georgia
        (3) Bait did not work well
            (a) Are a lot of granular bait
            (b) Didn't eat it - dumping
    e) Fire ants
        (1) Don't disturb the mound, it changes ant behavior
        (2) Granular bait used to treat area around the mound

f) Acrobat ants
g) Number of pest ant species - 16

II. Calibration - Jason Conrad
A. Requirements are different for different applications
B. Standards
1. Found on label
2. Equipment specific
C. Vendor should be able to help with calibration
D. READ THE LABEL
E. Specific applications
1. Barrier spray
a) Size of area
b) Label rate
c) Need to practice your application method before spraying chemical
d) Based on walking speed
e) Does not require droplet calibration
2. Adulticide
a) Flow rate
(1) Calibrate pump to insure proper flow rate
(2) Disconnect line from nozzle
(3) Need to be sure machine is at the desired operating pressure
(4) Collect for one minute into a graduated cylinder
(5) Adjust as needed
b) Droplets
(1) Adjust flow rate or RPM
(2) Droplet size is on label
(3) Droplet size affects ability to kill mosquitoes
(a) Better spread of product
(b) Product stay aloft longer based on size
(c) Off target drift can occur is droplets are too small
(4) Measuring droplet size
(a) DC-III
i) Wand placed in spray for 30 seconds
ii) Computer provides droplet count and average size
(1) Date and time stamp
(2) Product
(3) Flow rate
(4) Droplet size (median diameter)
(b) Need to have vendor calibrate the machine yearly
3. ALL MACHINES MUST BE CALIBRATED FOR FLOW RATE, BUT NOT ALL NEED TO BE DROPLET SIZED - depends on application
F. Trouble shooting
1. Loose fitting and connections put air in the line
2. Work backwards to find problem

III. Confessions of a Serial Association President - Roxanne Connelly
A. The associations
1. FMCA
a) 2008 - 2012
b) VP to past president

2. AMCA
    a) 2011 - 2015
    b) VP to past president

B. FMCA - a time for change
    1. 12 member Board
    2. Finances were problematic
        a) Crime - executive director was embezzling money
            (1) Had been happening long term ($250,000 proved)
            (2) Discovered around 2010
            (3) Turned over to state attorney
            (4) Finalized April 2014
            (5) Proved embezzled money is being returned
        b) Need to have more than one person looking at bank statements
        c) Board members have to not be afraid to ask questions
    3. Moved towards electronic
        a) Website
        b) Online registrations

C. AMCA - looking to the future
    1. Executive director hired through Association Headquarters
        a) Paid business
        b) Take a lot of the basic financial burden off Board
        c) Need to be sure that there isn't a volunteer to do the job
    2. Young professionals
    3. Worry about lack of young people in mosquito control - generational differences
    4. 15 member Board
        a) Regional directors - don't always represent region
        b) Looking to reduce size

D. Life after being president
    1. Dodd short courses
    2. Research
        a) Barrier sprays
            (1) Using several types of traps
            (2) Landing rates
        b) Dibrom non-target effects
            (1) Using different kinds of traps
            (2) Collected different kinds of insects
                (a) ID to species
                (b) Haven't decided on target species yet
        c) Redo Darsie's key to be more similar to Nathan Burkett-Cadena's key
    3. Chikungunya
        a) Workshop in June
            (1) 5 breakout groups
            (2) Questions
                (a) Tools had
                (b) Tools needed
                (c) Barriers to control and communication
            (3) Whitepaper will be coming out
        b) 11 locally-required cases of CHIK

4. Florida Resident's Guide to Mosquito Control - http://edis.ifas.ufl.edu/pdffiles/IN/IN104500.pdf

IV. An overview of Martin County Mosquito Control - Gene Lemire
   A. Program
      1. Personnel
         a) 7 FT employees
         b) 2 PT employees
      2. Primary pest
         a) Current primary pest mosquito is *Aedes aegypti*
         b) Use to be *Aedes albopictus*
   B. Procedures
      1. Use a lot of products with long term control
      2. Follow up calls with inspection
      3. Surveillance
         a) Larval dippers
         b) Mosquito magnet
            (1) 20 sites
               (a) Leave machine out
               (b) Tank works for about 21 days
            (2) Lots of citizen acceptance
         c) Sentinel chickens
      4. Things other than mosquitoes
         a) Tire pickup in winter
         b) Hymenoptera control
            (1) African bee control on county property
            (2) Yellow jackets
         c) Weed control
            (1) Right of Way control (Motorized tricycle)
            (2) Aquatic weed control
      5. Mosquito control
         a) Barrier spray
         b) Larvicide ditches
         c) Harborage spraying
         d) Thermal fogging
         e) Backpack ULV
         f) Truck-mounted ULV
      6. Impoundments
         a) Put out aerators
         b) Reduce salt marsh mosquito problem
   C. Improving a vector control program
      1. Educate
         a) Make the environment conducive for success
         b) Keep people informed
         c) Get people involved
      2. Work smarter not harder
         a) Keep learning
         b) Don't be afraid of failure

V. Preliminary Observations on the Ovipositing of Container Breeding Mosquitoes in West Central Georgia (Or a quest for *Aedes aegypti*) - Mike Womack

A. last collected *Aedes aegypti* in Central GA in 1993
B. Methods
    1. Sampling
        a) Spring 2013 (Feb-April)
        b) Fall 2013 (Aug-Oct)
    2. Ovitraps placed at student homes
        a) Set for 7 days
        b) Collect substrate
        c) Dump water
        d) Refill and restart
    3. Set ovitraps at new sites Aug-present 2014
    4. Eggs hatched and reared to 4th instar
C. Results
    1. Spring 2013
        a) 94 samples
        b) Egg diapause occurs - need additional light to hatch
    2. Fall 2013
        a) 89 samples
        b) Mosquitoes
            (1) Aedes albopictus - most abundant
            (2) Ochlerotatus triseriatus
            (3) Ochlerotatus japonicus
    3. Ovipositioning
        a) Begins slowly in mid-April
        b) Declines slowly through Oct and stops at first frost
        c) Winter egg diapause occurs

VI. Industry Spotlight
A. Clarke
B. Adapco

VII. South Carolina Update - Chris Evans
A. Arbovirus update
    1. Birds
        a) Started with just crows and jays
        b) Now taking some other species
        c) 21 birds submitted in 2014 From 10 counties
        d) 2 crows were WNV+
    2. People
        a) 46 tested from 11 different counties
        b) 17 cases of imported CHIK
        c) 2 cases of imported DEN
        d) One unknown flavivirus positive, prob DEN
        e) 4 WNV+
            (1) 2 viremia donors
            (2) 2 WNND, 1 imported From Mexico
    3. Mosquitoes
        a) Tested 16000+
        b) 17 counties submitted
        c) Isolated Flanders virus In 12 pools
        d) No WNV+ pools

4. Veterinary
    a) 7 EEE+ horses
    b) No WNV+ counties

B. Viruses
1. CHIK
    a) Counts
        (1) 11 human confirmed
        (2) 3 human probable
        (3) 3 human suspect
    b) Sources
        (1) Dominican Republic
        (2) Haiti
        (3) Puerto Rico
    c) One person had DEN and CHIK from the DR
2. DEN cases came from DR and the Philippines
3. Unknown virus gotten in Uganda

C. *Aedes aegypti* can be found in Charleston
1. Long term site
2. Attracted to gravid trap
3. Small numbers

D. Website http://www.scdhec.gov

Session 4: Friday, Oct 17

I. Why Public Health and Mosquito Control Need to Work Together - Rosmarie Kelly

II. Commercial Pest Control from the PMP Perspective - Larry Motes
A. Commercial applicators are part of the solution
B. Focus is primarily on nuisance mosquito control
C. Many are focusing on green solutions
D. Pest management of blood sucking Arthropods control trends
1. Increasing control of mosquitoes and bed bugs
2. Recent decrease in fleas
E. Bed bugs
1. Heat treatment
2. Canine inspectors
F. Mosquitoes
1. Treat
    a) Towns and cities
    b) Golf courses
    c) Universities
    d) Sporting events
    e) Homeowner associations
    f) Gated communities
    g) Residential
2. Frequency
    a) Repeat
    b) Event driven
3. Treatments
    a) Larvicides
        (1) Tire pile treatments

(2) Catch basins
b) Barrier spray
(1) Timing
(a) April-Oct
(b) Monthly application
(2) Mist blowers
(3) Do not apply to flowering plants
(4) Under decks
(5) Vegetation up to 8'
(6) Product
(a) Bifenthrin - 1 ounce per 1000 sq ft
(b) Safe after if dries
c) ULV
(1) Events
(2) Quick knockdown
d) Aquatic weed control

III. Colony Collapse Disorder - Richard Spencer
A. What is happening with bees has an impact on mosquito control?
B. What is CCD?
1. Sudden loss of worker adults from managed hives
2. Entire colony collapses within a few weeks
C. Suspected factors
1. Pests
a) Varroa mite
b) Tracheal mites
c) Small hive beetle
d) Africanized bees
e) Phorid fly
f) Bee louse
g) Wax moth
h) Other
2. Pathogens
a) Viral
(1) Deformed wing
(2) Black queen cell
b) Bacterial - foulbrood
c) Fungal - chalkbrood
d) Microsporidia
e) Other
3. Pesticides - neonicitinoids
a) Direct application to crops
b) Seed coatings
c) Application drift to flowering plants
4. Nutritional deficiencies
a) Stress for overwintering colonies
b) Reduces worker lifespan
c) Pollen - key protein source
5. Beehive management practices
a) Packed and shipped bees

b) Medical care and nutrition

D. Issues
   1. Do not know what historic bee hive loss has been
   2. Managed colonies
      a) Estimated 2.6 million hives in US
      b) Surveys focus on managed hives only
      c) Less than 25% of beekeepers responded

E. Protecting pollinators during mosquito control
   1. Educate applicators
      a) Inspect treatment sites
      b) Check for pollinators
   2. Remove breeding and resting sites where possible
   3. Larvicide
   4. Adulticide
   5. Communicate with homeowner
      a) Do not guarantee no mosquitoes
      b) Do not guarantee no disease
      c) Homeowner has a role to play
         (1) Set realistic claims
         (2) Set proper expectations
         (3) Keep good records

F. The future
   1. Pollinator protection is important to control efforts
   2. Keep looking for new solutions
      a) IGR sprayed on vegetation
      b) Botanicals
   3. Keep on top of the research
   4. Work together

IV. Bugs and Bodies: The Role of Insects in Crime Scene Investigations - Rich Merritt

A. Forensic entomology is the study of insects and other arthropods applied to legal issues,mess in a court of law

B. History
   1. China - 1235 AD
      a) First record of insects used to solve a crime
      b) Flies landed on the weapon of the murderer
   2. Discipline has grown from then
   3. Lots of TV and movie exposure

C. Disciplines
   1. Stored product
   2. Urban
   3. Medico-legal

D. Human body farm - Knoxville, TN
   1. Started by Dr William Bass
   2. Bass Anthropological Research Facility (BARF)

E. The job of forensic entomology
   1. Postmortem interval (PMI)
      a) Period of time between death and corpse discovery
      b) Entomologist definition - time between insect colonization and discovery
   2. Why use insects?

a) Arrive soon after death - arrival is species and environment dependent
b) Arrive in predictable patterns - communities change as decomposition proceeds
c) Development is predictable based on temperature

3. Why are insects not used?
a) Too few forensic entomologists - 15 in North America
b) Poor collecting

F. The insects
1. The flies
a) Calliphorids - arrive early
b) Sarcophagids - lay live maggots
c) Maggot mass increase temperature
2. Beetles
a) Silphids
b) Staphylinids
3. Incidentals
a) Lice
b) Butterflies
c) Ants - inhibit decomposition by removing larvae

G. The process
1. Colonization
a) Rendezvous
b) Feast
c) Exodus
2. Decay process after death (temperature dependent)
a) Fresh 1-2 days
b) Bloat 2-6 days
c) Active decay 5-11 days
d) Post decay 10-25 days
e) Dry 25+ days
3. Factors affecting the process
a) Physical
(1) Body wrapped up
(2) Body stored
(3) Clothing
b) Chemical
(1) Treated bodies
(2) Narcotics
c) Climate
(1) Weather variables
(2) Under water
d) Animal disturbance

H. Case histories
1. Boys at the Cemetery
a) Hanging nude body - thought to be a suicide
b) Middle of winter
(1) Insects associated with body die
(2) 3rd instar maggots found
(3) Needed to determine when adult flies were flying
c) Time of death was back when the temps were above 50 degrees

2. Maggots on Coke
    a) Woman was stabbed 4 times in back
    b) Most of the maggots were 1 week old
    c) One species appeared to be several weeks old and was found in nasal cavities
    d) Death had been one week ago but growth of the one species was accelerated due to cocaine use by the decedent
3. Black Fly Pupae Help to Solve a Murder Case
    a) Man hired a hit man to kill his wife
        (1) Tried to give her an overdose
        (2) Ended up beating her to death
    b) Dumped car and body into river
        (1) Very cold water
        (2) Lots of tannins in water
    c) Found by divers in June
        (1) Husband claimed wife had left but he had talked to her in the Spring
        (2) Found black fly larvae on windshield
            (a) Black fly larvae told another story
            (b) Larvae attach in November
4. CHIP
    a) Situation
        (1) Mother and son
        (2) Son had cerebral palsy
        (3) Neighbors stopped seeing Chip
        (4) Mother stated he was living with relatives in CA
    b) Woman was a hoarder
    c) Dogs went to back bedroom
        (1) Bed covered with cement
        (2) Fan blowing across bed
        (3) Human body found under cement on bed
    d) Skeltonized body found
        (1) Forensic anthropologist determined who the body was
        (2) Insects were found (60-90 days of development)
            (a) Blowflies
            (b) Phorids
            (c) Dermestids
    e) What was the mother charged with? Welfare fraud
    f) Could not determine cause of death
5. Insects at the Grave
    a) 25 year old murder
        (1) Exhumed body
        (2) Insects found in casket
            (a) Springtails
            (b) Coffin flies - can complete life cycle underground
        (3) Casket in a cement vault
    b) Lot of moisture
6. Blood Meal Gone Bad
    a) Paul Katts' case
    b) Petichial hemorrhages on thighs
    c) Body was warm when thrown out into wetland

d) Mosquitoes probed body but could not get blood

7. Unchained Melody
    a) Dead body floating in pond
        (1) Chained and weighted down
        (2) Body floated to top with decomposition gases
        (3) Threw her into the lake alive
    b) Blow flies attacked after body floated
    c) Forensic anthropologist determined how long she was in the water

V. Preparing for the Introduction of CHIK - Henry Lewandowski
    A. Protocol for dealing with CHIK
    B. The disease
        1. High morbidity
        2. Most people do show symptoms
    C. Asian strain introduced to the Caribbean in Dec 2013
    D. What can we expect
        1. Small localized outbreaks likely
        2. Not well prepared for dealing with container breeding mosquitoes
        3. Southeast US is particularly vulnerable
    E. Mosquito control
        1. Traditional
            a) Traditional habitat is isolated with concentrated breeding
            b) Flight ranges are long
            c) Sites are easily reached
            d) Amenable to larviciding
            e) Remote and rural
        2. Container breeders
            a) Short flight range
            b) Asynchronous breeders
            c) Many breeding sites
            d) Urban and suburban
    F. The virus
        1. Can human transmission be sustained?
        2. Can it establish in the US?
    G. The vector
        1. Georgia strains of *Aedes albopictus* are susceptible to the Asian strain of CHIK
        2. *Aedes aegypti* is rare in Georgia
        3. *Ochlerotatus triseriatus* is a competent vector
        4. *Ochlerotatus japonicus* is also competent
    H. What is happening in Chatham County?
        1. Focus on *Ae albopictus* and *Oc triseriatus*
        2. Need to know
            a) Activity times
            b) Trap preferences
            c) When to spray
        3. Looking at activity levels using a collection bottle rotator to determine peak activity times
        4. Preparing for CHIK
            a) Vector surveillance - measure vector populations over time
                (1) Oviposition traps

(a) Labor intensive
(b) Rapid development

(2) Larval surveillance
(a) House index - % houses with larvae
(b) Container index - % containers with larvae
(c) Breteau index - # positive containers per 100 houses inspected

(3) Lethal ovitrap
(a) Attracts egg laying females
(b) Monitors adult population

(4) BG sentinel traps
(a) optimize adult *Aedes albopictus* and *Ae aegypti* collections
(b) Will also collect *Oc triseriatus*
(c) Method chosen

b) Next step is to pick sites for monitoring populations
(1) Need to determine thresholds for *Aedes albopictus*
(2) Need to determine human disease risk

c) Source reduction - hard to get people to keep containers contained

d) Adulticiding
(1) Don't neglect the handheld foggers for small area control
(2) Aerial application

e) Larviciding
(1) ULV methoprene
(2) Aerial larviciding

f) Public education is vital

I. Summary
1. Use lessons learned from WNV
2. *You may need more than one option for control*

Business Meeting

I. Budget
A. Covered expenses
B. Thanks to commercial and sustaining members
C. 42 attendees

II. Upcoming events - Savannah
A. MAMCA meeting Jan 13-15, 2015
B. AMCA meeting 2016

III. Board 2014-2015
A. President - Alan Gaines
B. VP - Jeff Heusel
C. Members
1. 1-year: Kenna Graham
2. 2-year: Joey Bland
3. 3-year: Steve Pavlovich
D. Sustaining Member Rep: Steve Sullivan
E. Public Health Liaison: Rosmarie Kelly
F. Extension Liaison: Elmer Gray
G. Secretary-Treasurer: David Touwsma