GMCA ANNUAL MEETING, 2023

DAY 1

A. AMCA Washington Day Update - Tiffany
    a. Key issues, 2023
        i. National Public Health Framework
        ii. SMASH Act
        iii. Farm bill
    b. Travel stipend available
    c. Talked to:
        i. Both senators
        ii. 4 representatives
B. Hot Topics in Mosquito Management: PSEP – Allison Johnson
    a. Housed in UGA Entomology Department
        i. Pesticide stewardship
        ii. Website - PSEP.UGA.edu
    b. Work closely with GDA
    c. Program resources
        i. Educational resources
        ii. Training programs
        iii. Study guides
        iv. Homeowner education
    d. Changes coming
        i. Both structural and commercial
        ii. Will happen in next couple of years
            1. Exams will change
            2. Training materials will be updated
        iii. Changes to who is considered a non-verified applicators
        iv. Info on drone use added
        v. Structural
            1. Minimum age change
            2. Easier to get access to records
        vi. Agricultural Inputs
            1. Changes in certification and training
            2. Changes in requirements
        vii. El Niño impact in 2023 and 2024
            1. Monitoring is key; no more spray and pray
            2. HTTPS://site.extension.UGA.edu/climate/
                a. Newsletter by Pam Knox
                b. Up to date weather info
        viii. Pollinator protection
            1. Record keeping redundancy is vital (consider body cams)
            2. Train to recognize sensitive sites
                a. It is more than just a honeybee hive
                b. Avoid flowering plants, including weeds
            3. Educate public
        ix. Symptoms of pesticide exposure in pollinators
            1. Reduced activity in foraging

2. Behavioral changes
    a. Increased aggression
    b. Abnormal movements
    c. Abnormal egg laying patterns
3. Dead bees with tongues sticking out

x. Mosquito-borne diseases
1. Important to have an IMM program
2. Educate clients

xi. Allison Johnson – ajohns14@uga.edu

xii. Educational resource – Emma Grace Crumbley @emma_the_entomologist

C. Changing the Landscape – Amy Trimm
a. Problems
i. 3 major rivers in Chatham County
ii. 618 square miles of watershed
iii. Dredge areas
iv. Coastal
b. Lots of expansion/development creating new breeding areas
i. More people to complain
ii. Fewer trees
iii. More impervious surfaces
iv. Changes to land use
c. How does this affect mosquito control
i. Lost 20 sites due to construction
ii. Gained 10 new sites
iii. New construction rarely has retention/detention pond issues
1. How about in 10-15 years
2. New sites are often tied into old sites without upgrades
iv. Chatham County is at sea level, which makes moving water from increasing impervious surfaces difficult
1. Septic tank failures
2. Water is going to become a *Culex* issue
v. Homes built next to swamps
1. Nuisance species
2. Potential for EEE transmission
d. Rivers
i. Sewer lines
ii. Failing pumps/tide gates
iii. Canal blockages
iv. Green space/trees that help absorb water are being eliminated
e. Runoff calculations
i. https://www.uaex.uada.edu/environment-nature/water/stormwater/nwastormwater/drainage-issues/calculate-runoff.aspx
ii. https://www.uaex.uada.edu/environment-nature/water/stormwater/nwastormwater/drainage-issues/determine-conditions.aspx

D. In2Care Trapping System Overview – Pablo Rioz Tubio
a. Eave tubes
i. Protection against malaria

ii. Resting site for *Anopheles*
iii. Quick knock-down pesticide on tube

b. Mosquito station
i. Mosquito transfer station
ii. 2 biocides on screen within station
1. PPF
2. Fungus spores
iii. Uses mosquitoes to spread larvicide throughout area
iv. Eggs laid in station
1. Pupae die before they reach adulthood
2. Larvae eat dead pupae and get infected
v. Female mosquito killed within several days
1. Fungi causes illness
2. Mosquito unwilling to blood feed

c. Target *Aedes* spp and *Culex* spp
i. Working on a *Culex* attractant
ii. Currently doing cage, semi-field, and field tests

E. Industry Spotlight
a. Amguard - Derek Wright (http://www.amvac-chemical.com/)
i. Part of AMVAC Chemical Corporation
ii. Public health products
1. Organophosphates
a. Dibrom
b. Trumpet EC (naled)
2. Barrier sprays
a. Lambda-Cylohalthrin
b. Bifenthrin
3. Enclosed areas: Nuvan prostrips – dichlorvos
iii. HTTPS://mosquitocontrolfacts.com

b. Clarke – Sydney Brogdon (http://www.clarke.com/)

F. The Secret Life of Mosquitoes – Dan Peach
a. Plant sugars are essential for mosquitoes, both male and female
i. Stone, et al, 2009, J Med Ent
ii. Removing sugars will cause populations to crash

b. Pollination
i. Peach and Gries, 2020. Entomol Exp et Appl. 168
ii. Flowers with composite flowers (Asteracea) are mentioned often
iii. Hypothesis: mosquitoes are pollinators of generalist plants
1. Peach and Gries. 2016. Arthropod-Plant Interactions
2. Pollen collects on legs and proboscis
3. Can mosquitoes actually pollinate the flowers? Yes
iv. Finding plants – sensory gestalt
1. Olfactory VS visual cues
2. Hypothesis – UV cues attract mosquitoes to tansy flowers
a. Mosquitoes are sensitive to UV light
b. Are mosquitoes behaviorally responsive to UV cues? Yes

c. Future plans
i. Look at genetics

ii. Pollination ecology and applications for control
iii. Investigate olfactory, visual, and microbial cues

G. Drone Granular Characterization & Calibration – Katie Williams
   a. Why calibrate/characterize?
      i. Required by label
      ii. Efficacy and efficiency
      iii. Correct and defendable applications
      iv. AIDS in resistance management
   b. Granular flow calibration equation
      i. PPM = [PPA x Speed (mph) x Swath (ft)]/495
      ii. PPM – pounds per minute; PPA – pounds per acre
      iii. Calibrator available on valent website - https://www.valentbiosciences.com/publichealth/calibration-calculators/
   c. Calibration/characterization for drone applications
      i. Calibrate by collecting product and adjusting as needed
      ii. Characterization
         1. Swath analysis
         2. HTTPS://valentbiosciences.shinyapps.io/Swath_Analysis_Excel

H. Industry Spotlight
   a. Central Life Sciences - Mike Riles (https://www.centralmosquitocontrol.com)
   b. Target Specialty Products – Steve Molnar (http://www.target-specialty.com/)
   c. Co-Diagnostics – Dallon Durphy, https://vimeo.com/666076122 (http://codiagnostics.com/)

I. Disease Vector Education Center & Science Museum – Richard Weaver (Anastasia Mosquito Control District)
   a. St John's County, Florida
   b. History
      i. 2003 - Rudi started working at AMCD
      ii. 2005 - Rudi became director of the program
      iii. 2017 -Rudi went to a meeting in China and was inspired
      iv. 2018-2020: planning for a museum
      v. 2021 – work began
      vi. 2022 – AMCD staff started building interior exhibits and displays
   c. AMCD sits on 18 acres
   d. What is the education center?
      i. Multifaceted
      ii. Emphasis on vectors and diseases
      iii. For children and adults
      iv. Interactive, visual, auditory…
   e. Exhibits
      i. Outdoors
         1. Playground
            a. Each piece has an interpretive sign related to mosquitoes
            b. Insect themed
         2. Bee hive
         3. Gardens
            a. Pond with gambusia
            b. Bat house

c. Repellent and attractive plants

ii. Interior

1. Swamp theme in lobby area
2. Habitats and food sources
3. Saltmarsh area
4. Life cycle and pinned mosquitoes with magnifiers
    a. Insectary
    b. Videos
    c. Egg/egg raft models
    d. Mosquito models
5. Disease history
6. Kid's area
    a. WSP toss
    b. Coloring area
    c. Spin games
    d. Live displays
    e. Microscopes
    f. Mosquito tech photo op
    g. Mosquito models
7. Classroom
    a. Wet lab
    b. AV system
    c. Displays
    d. Mosquito movie posters
8. Mosquito control technology and tools
    a. Bell 206 flight simulator
    b. Various displays
    c. Equipment examples
    d. GPS/GIS info
    e. Mosquito trap tree
    f. Gambusia fish tank
9. Arthropods of public health important
    a. Ticks
    b. Bed bugs
    c. Lice
    d. Flies
    e. Fleas
    f. Triatomid bugs
10. Entomology is fun
    a. Bee hives
    b. Bug models
        i. Mimicry
        ii. Various other arthropods
11. History of mosquito control
12. AMCD history

J. Predatory & Parasitic Impacts of Water Mites on Mosquitoes – Adrian Vasquez

a. Climate change and mosquito research

i. Vectors spread into new areas

ii. Need an IMM approach
b. Can water mites be added as a tool for mosquito control?
i. What is the impact?
ii. Likes and dislikes
iii. Generalist or specialist feeders?
c. Water mites
i. Extremely biodiverse
ii. Found everywhere
iii. Primarily freshwater invertebrates
iv. What are they eating
1. Vasquez, et al. 2021. PLOS One. Water mite diets reveal prey diversity.
2. Feed on mosquito larvae and aquatic worms
d. Study
i. Set up buckets to collect rain
ii. Add mosquito larvae
iii. Add water mites
iv. Saw a reduction in mosquito larvae
e. Future research
i. Mosquitoes in storm water infrastructure
ii. Are these structures creating new vector species habitats
iii. Compare to mosquitoes in natural areas

K. GDPH Update – Rosmarie Kelly

DAY 2
SESSION 1

A. Southeastern Center of Excellence: Purpose & Collaboration – Kassidy Caride
a. CDC grant
b. 13 States & territories partnership
c. Establishing 2 additional partnerships
d. Partners
i. Other COEs
ii. State Health Departments
iii. Universities
e. Projects - Looking to shift from reactive to proactive response
i. Mosquito
ii. Tick
iii. Training opportunities
1. Internships
2. VBD Public Health certification
3. Targeted CEUs
a. Dodd short courses
b. Tick University
c. Online training modules
4. Training opportunities for underrepresented populations
5. Support students in higher learning

B. How to Start a Mosquito Control Project – Bryan Boone
a. CDC NACCHO grant with Chatham County

b. Challenges
    i. Low population base
    ii. Lots of retirees
    iii. High poverty rate
    iv. Low payroll
c. Program building
    i. Buy-in is everything
    ii. Learn the law
    iii. Know the area
    iv. Find money wherever you can
d. Timeline
    i. Started in 2019
    ii. Prior to that the program was spray & pray
        1. Spraying sun-lethal dose of product
        2. No surveillance
    iii. 2020-2021
        1. Started larviciding
        2. Larval surveillance & landing counts
        3. Upgraded equipment
        4. CALIBRATION
        5. Small budget – big changes
    iv. Used google earth pro
        1. Mapped beekeepers
        2. Mapped larval surveillance
    v. 2021-2022
        1. Creating first official mosquito control position
        2. Absorbed Parks Department
        3. Lab & office space
        4. Dedicated pesticide storage
        5. Awarded 2023 SPLOST funding
        6. Got lots of donations
        7. Purchased computers & traps
        8. Got a GPS-enabled truck
    vi. GIS mapping
        1. Frontier Precision
        2. Good info with low man hours
        3. Allows for more hands-off management
        4. Surveillance & lab functions
        5. Interactive warning system for no spray areas
    vii. Challenges
        1. Director wears multiple hats
            a. Mosquito control
            b. Parks
            c. Code enforcement
        2. High turnover
        3. Limited workforce & limited pay
    viii. Adopted Task Management Software (Asana)
        1. Makes monitoring multiple departments possible

2. Has a powerful free version & low cost paid version
3. Replaces email, text, note taking, file storage, etc
4. Allows assigning of tasks
    a. Completion date
    b. Photos
    c. Notes
5. Integrates with Microsoft, google, biz apps

C. Public Health Surveillance & Response to Locally Acquired Malaria Cases in Florida, 2023 – Rebecca Zimler
    a. Human malaria
        i. 4 species; one zoonotic species
        ii. *Plasmodium falciparum* is the most prominent
        iii. Carried by *Anopheles* spp, primarily *An quadrimaculatus*
        iv. Most cases in US come from Africa
    b. Life cycle - https://www.cdc.gov/malaria/about/biology/index.html
    c. Basic symptoms are similar to a lot of diseases
    d. Testing
        i. Rapid antigen tests
        ii. Blood smear
        iii. PCR
    e. History of malaria in Florida (https://www.floridahealth.gov/diseases-and-conditions/mosquito-borne-diseases/_documents/guidebook-chapter-eight.pdf)
        i. Endemic until ~1940s
        ii. Elimination
            1. Draining breeding sites
            2. Window screens
            3. DDT used by mosquito control
        iii. Locally acquired cases
            1. Nothing from 1948-1990
            2. 1990 – *P vivax*
            3. 1996 – *P falciparum*
            4. 2009 – *P falciparum* through transfusion
            5. 2010 – *P falciparum* of cryptic origin
        iv. Imported malaria cases
            1. Driven by conditions overseas
            2. Travel associated
        v. 2023
            1. *P vivax*
            2. Primarily from the Americas
            3. First case in May
                a. Homeless male (64 y)
                b. 2 week history of symptoms
                c. Tested for babesia and malaria
                d. No travel history
            4. Seven local cases found between weeks 16 & 27
                a. Several were homeless
                b. No cases had severe malaria
            5. Started active case finding

a. Syndromes surveillance
b. Outreach to homeless population
c. Rapid notification to mosquito control of suspected cases

6. Mosquito surveillance
    a. Extensive trapping in area using several trap types
    b. 593 mosquitoes submitted for testing
    c. 3 *Anopheles crucians* tested positive
    d. Extensive control was done in affected areas
        i. Both larviciding & and adulticiding
        ii. Targeted *Anopheles*
7. Lessons learned
    a. Not all hospitals are set up for rapid ID
    b. Outreach worked
    c. Partnerships help response
    d. Letting mosquito control know immediately helped to reduce transmission

D. The Influence of Climate & Land Use Land Coverage (LULC) on WNV Transmission in Lowndes County 2012-2023 – Eric Chambers
    a. Background
        i. Valdosta State has a mosquito surveillance program in partnership with the County and City of Valdosta
        ii. Mosquitoes are sent to SCWDS for testing
        iii. Great experience for grad students
        iv. Data are shared with city, county, and State
    b. Impact of urbanization on WNV mosquito infections
        i. Determinants
            1. Urbanization
            2. % impervious area
                a. Creates artificial breeding sites
                b. Contributes to spread of vectors
            3. What is driving WNV transmission/mosquito distribution
                a. Bowden et al. 2011
                b. Study aims
                    i. Trap index
                    ii. Temperature
                    iii. LULC
                c. Data collected between 2012-2021
                    i. Culex nigripalpus
                    ii. Cx quinquefasciatus
                    iii. Cx salinarius
                d. Traps located throughout county
                    i. 14 trap locations
                    ii. 13/14 collected WNV+ pools during study
                    iii. Percent positive varied
                e. Sampled 3x a week between mid-March to mid-November
                    i. Gravid traps – 2x a week
                    ii. Light traps – 1x a week
                f. Weekly trap index to normalize data

g. Viral testing at SCWDS
h. Monitored temperature
    i. No real trend
    ii. Most WNV+ when temperatures were over 24 degrees C
i. Climate – Weather Underground
j. LULC – USDA
    i. Highest WNV+ pools found in areas with high % impervious surface
    ii. Highest urbanization levels

c. Update on heartworm talk
    i. Project
        1. 8 urban sites/8 rural sites
        2. Collected mosquitoes
        3. DNA extraction & PCR
        4. Calculated MLE
    ii. Results
        1. Collected 10 genera/29 species
        2. Collected a total of 15,539 mosquitoes
        3. Gray Curtis Distribution Index was 0.816; high diversity between areas
        4. Difference in total MLE between urban and rural areas
            a. More vector species – urban
            b. More heartworm – urban
            c. Found 2 new positive species

E. Government to Industry – Scott Artman (Veseris)
    a. Started at St Lucie County Mosquito Control
        i. 2004, right out of school
        ii. Stayed for 15 years
        iii. Started as an inspector 1
        iv. Worked every position possible, but preferred inspection/surveillance
        v. Worked up to Inspection Supervisor
    b. Indian River Mosquito Control
        i. Sentinel chicken program
        ii. Worked on adult/larval ID at FMEL
        iii. Developed a predator-proof sentinel chicken coop
        iv. Stayed for 3 years
    c. Dependent VS Independent Districts
    d. Change is not always a bad thing
    e. Learned a wide variety of things at mosquito control
    f. Why move to Industry
        i. Whole new list of expectations
        ii. Changes in roles and duties
        iii. Wider responsibilities
        iv. Get to work with a team
        v. Different markets
            1. Need knowledge of the markets
            2. Need to get products to different customers – deal with supply chains
            3. So much more than sales
                a. Education

b. Outreach
c. Support

vi. Lots of site visits
vii. Biggest transition was working in an office after being in the field
viii. Networking opportunities
ix. Other side of the pictures
x. Access to new technology

g. Government is significantly different than Industry
i. Both contribute to the community and to policy
ii. Both lead to growth
iii. Need to look to the future

F. Industry Spotlight
a. FMC – Donny Powers (https://gss.fmc.com/us/en/resources/best-management-practice/mosquitos)
b. Frontier Precision – Joey Savelo (https://frontierprecision.com/)
c. GroPro – Jeff Runnels (https://www.groproag.com/)
i. Mosquito & midge control (Skeeter)
1. Biocide
a. Kills eggs, larvae, pupae
b. Affects adults that come into contact with product by inhibiting the adult's ability to sense CO_2
2. OMRI
3. FIFRA 25(b)
4. Zero REI
5. Control is 92-98% in 24 hours
6. Lasts up to 30 days
7. Modes of action
a. Garlic oil that causes neurological & muscular damage
b. Nematodes – *Heterorhabditis megidis*
i. Feed on larvae & pupae
ii. Release bacteria

ii. Partners
1. Target Speciality Products
2. Veseris

G. Practical IPM with Barrier Treatment – Dan Killingsworth
a. Used primarily by commercial pest control companies in the last 20 years or so
i. Residual
ii. Non-target concerns
b. AMCA – BMPs
i. Treat around perimeter
ii. Not all that effective with *Culex* spp
c. Integrated Pest Management
i. Originally designed for agricultural systems
ii. What is the top priority for vector management
1. Action thresholds are not as cut and dried as with agricultural thresholds
a. No vector-borne diseases?
b. No citizen complaints?
2. Need to recognize the driving force behind the pest problem

3. Define through limitations (resource driven)
    a. Control area
    b. Surveillance
    c. Work force
    d. Equipment
    e. Planning/expertise
    f. Outreach/communication
    g. Treatments
    h. Modeling
    i. Time
4. Communication is the key to success

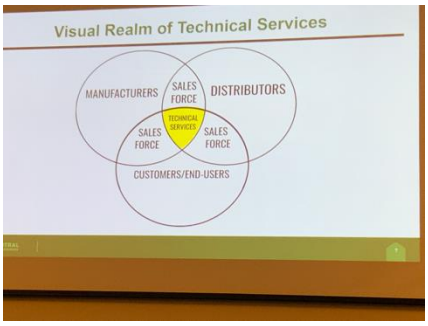
iii. Evaluating barrier treatment work

1. Materials/Methods
    a. Fogger VS sprayer
        i. Fogger – blows product over treatment site
        ii. Sprayer – treats within vegetation
    b. 1% Bifenthrin
    c. Target all acceptable vegetation
2. Conventional treatment
    a. Deposition on vegetation
    b. Need to remove everything from backyard that shouldn't be sprayed first – hard to avoid obstacles
    c. Limitations
        i. Set back required
        ii. Affected by wind
3. Sprayer
    a. Wand reaches into vegetation
    b. Puts product on underside of leaves
    c. Avoids flowers and buds
    d. Targeted
    e. Fewer drift concerns
    f. Less impacted by wind
4. Evaluation
    a. Droplet size target deposition
    b. Non-target drift
    c. Time per service
    d. Volume of product used
    e. Complaints or re-service requests (do surveillance when possible)
5. Results – sprayer worked best

SESSION 2

A. Leveraging Entomological Technical Service – Tony Hughes
    a. Technical services mean activities or programs designed to enable business, commerce, and industrial establishments to acquire scientific and engineering information more efficiently
    b. It is often indirect

c. Center of everything



d. What should be done
    i. Train and exchange information
    ii. Review plans & practices
    iii. Presentations
    iv. Monitor
    v. Assist
    vi. Stay educated
    vii. Assist with end-user issues
    viii. Help with label interpretations
    ix. Investigate and troubleshoot product failures
    x. Participate with R&D
    xi. Review publications
e. Not part of the job
    i. Don't sell products
    ii. Don't arrange distribution or prices
    iii. Don't deal with returns
    iv. Don't make label changes
    v. Don't critique competitors
    vi. Don't buy loyalty
f. Case studies
    i. Product getting jammed up in equipment
        1. Bearing getting gunked up
        2. County program re-engineered bearing access
    ii. Altosid ProG in landscaped area grates
        1. EPA RED facts
        2. Explained how methoprene works in layman's terms
    iii. Tire plants/IPM plan
        1. AMCA BMPs
        2. Listed equipment and products
        3. Surveillance traps
        4. Collaborate with local mosquito control

B. Wastewater Treatment Plant Pest Problems & Solutions – Joe Iburg
    a. Midge control in the Back River WWTP near Baltimore
        i. Treated river with bactimos WBP by helicopter
        ii. Wastewater Treatment Plant along River
        iii. Problem is usually a chironomid midge
            1. Like low oxygen waters
            2. Organic-rich areas

iv. Found midges in a variety of areas in the treatment plant; largest number in sand filtration facility
v. Best way to treat
    1. Whole system?
    2. Specific high production areas?
vi. Used vectobac 12AS introduced just upstream of the sand filtration
vii. Midge larvae we're found in algae growing along some of the troughs

b. Avian malaria in Hawaii
    i. Honey creeper populations being devastated by avian malaria (*Plasmodium relictum*)
    ii. Vector *Culex quinquefasciatus*
    iii. Treatments
        1. Wolbachia
            a. *Culex* have wolbachia
            b. Need to introduce incompatible wolbachia
        2. Bti liquid application
            a. Larvicide for cryptic species
                i. Currently using a mix of Bti and *B sphericus*
                ii. Sprayed a gallon per acre
            b. Needed to determine what equipment will give the proper flow rate, droplet size, and spray swath
            c. Used Bioassay cups to determine if product was getting to the right spot

C. BEACONS Overview & Invasive Mosquito Update – Mike Riles
    a. Biodiversity Enhancement And Control Of Non-native Species working group
    b. 3rd year of funding
    c. IP_3M
    d. Multi-state collaboration
    e. Funded through IPM Center, which is funded through USDA
    f. HTTPS://FMEL.ifas.ufl.edu/invasivemosquito/
        i. Publications
        ii. Blog
        iii. Dashboard with maps
        iv. Easy data submission
        v. Training
    g. Objectives
        i. Stakeholder meetings
        ii. Stakeholder engagement
        iii. Surveillance capacity survey
    h. No national contingency plan for invasive mosquitoes
        i. Few programs share data
        ii. Surveillance and control are local or regional
        iii. Publications are delayed or never done
        iv. Taxonomy is under-utilized
        v. Large lag times between introduction and identification
    i. Vector Surveillance and Control at Ports, Airports, and Ground Crossings
    j. Collaborating with CDC Center of Excellence NOLA
    k. Infographics – email Mike

l. Other projects
    i. Full day advanced ID course at the 2024 Dodd Course
    ii. Developing low-cost mosquito traps for detection of invasive mosquitoes

D. Asian Long-Horned Tick Infesting Wildlife Areas in Georgia – Isabelle Roeske
    a. Suitable habitat found through much of the east coast
    b. Introduced species
        i. Native to east Asia
        ii. Introduced to US in 2010
    c. Bionomics
        i. 3 host ticks
        ii. Feeds on over 30 different hosts
        iii. Parthenogenesis
    d. Disease vector
        i. *Rickettsia japonica*
        ii. *Theileria orientalis*
        iii. Possible vector of Heartland virus
    e. Other issues – reduced fitness in host animals
    f. Surveillance
        i. 2021 – 12 locations in NE Georgia
        ii. 2022 - 46 WMA and State Parks
        iii. 2023 – resampled 5 sites with most ticks
    g. Issues
        i. Joro spiders
        ii. Briars
    h. Looked for muscadine areas as deer like to eat muscadines
    i. Processing
        i. Identification
        ii. Genetics
    j. Results
        i. Count
            1. 2022 – 3 nymphs
            2. 2023 – 67 nymphs
        ii. Buck Shoals WMA in White County
        iii. All ticks found in same location in WMA
        iv. First evidence of tick not associated with the cattle industry
    k. Publication within next 6 months

E. Pollinator Conservation – Conor Fair
    a. Who are the pollinators?
        i. Great variety
        ii. Focus on bees
            1. Many species
                a. 20,000 species worldwide
                b. 4000 found in North America
                c. 500 in Georgia
            2. 7 families of bees
                a. Andrenidae
                    i. Minor bees
                    ii. Fairy bees

b. Halictidae
    i. Alkali bees
    ii. Sweat bees
c. Colletidae
    i. Cellophane bees
    ii. Masked bees
d. Megachilidae
    i. Leaf cutter bees
    ii. Resin bees (giant resin bee - invasive species)
    iii. Mason bees
e. Apidae
    i. Bumble bees
    ii. Carpenter bees
    iii. Honey bees
    iv. Cuckoo bees
        1. Look like wasps
        2. Nest parasites
    v. Digger bees
f. Melittidae & Stenotritidae

b. Why are they in decline?
    i. Multiple complex drivers
    ii. Different areas have different problems (Dicks et al. 2023)
    iii. Pesticide risk
        1. Direct exposure – sprays
        2. Indirect exposure – systemic pesticides in agriculture
        3. Need to disconnect sprays from bees
            a. Avoid flowers
            b. Spray in the evening
            c. Work with beekeepers
        4. Sublethal effects may have behavioral, physical, and reproductive effects
    iv. Land cover/land management
        1. Habitat fragment
        2. Smaller patch sizes
        3. Urbanization
        4. Agriculture
        5. Proscribed fires
            a. Decline in bee richness
            b. Fire diversity
    v. Pollinator Health Task Force (Bloom et al. 2022)
c. What can we do?
    i. Gap between scientists and general public
    ii. Need to move away from behaviors that negatively impact pollinators
    iii. Pollinator garden perceptions and preferences

F. Why Do We Spray for WNV Suppression? – Rosmarie Kelly
G. Industry Spotlight
    a. Thermacell – Ben McMillan (https://www.thermacell.com/)
        i. Number of repellency systems
        ii. Tick tubes

b. Valent BioSciences – Katie Williams (https://www.valentbiosciences.com/)
    i. Primarily larvicide products
    ii. ReMoa Tri adulticide
        1. Triple action insecticide
            a. Abemectin
            b. Fenpropathrin
            c. C8910
        2. New modes of action
c. Veseris – Scott Artman (https://pestweb.com/)

H. Field Evaluation of the BG-Pro Trap in Kennesaw, GA
    a. Background
        i. Mosquito surveillance is important
        ii. Many trap types available
    b. CO_2-baited battery-powered traps
        i. CDC miniature light trap with fan above net
        ii. BG-Pro with fan below net
            1. Configurable
            2. Can use BG-lure (artificial human scent)
    c. What can the BG-Pro trap do?
        i. Materials
            1. BG-Pro with lure, no light
            2. BG-Pro without lure, no light
            3. CDC light trap
        ii. Methods
            1. 9 trap sites
            2. 3 daily replicates
            3. 3 trappings per week
        iii. Trapping location
            1. Suburban area
            2. Linear Park with trail system
                a. Creek along trail
                b. Densely forested
                    i. Oak
                    ii. Pine
                c. Small park areas along trail
                d. Predominate vegetation
                    i. English ivy
                    ii. Chinese privet
                    iii. Muscadine
        iv. Results
            1. Identified mosquitoes
                a. BG-Pro with lure: 3221 adult females
                b. BG-Pro no lure: 1499 adult females
                c. CDC: 255 adult females
            2. Statistics
                a. GLMM
                    i. Species
                    ii. Genus

iii. Sex
b. Fixed effects for trap, temperature, and rainfall
c. BG-Pro outperformed CDC light trap
3. BG-Pro trap durability
a. Different trap locations
b. Set out over 7 weeks
c. High diversity of species
v. Conclusions
1. BG-Pro outperforms CDC light trap for *Aedes* and *Psorophora*
2. Collected several *Culex* spp
vi. Positives & Negatives
1. Pro
a. Specimens are not damaged
b. Sturdy design protects catch bag
c. Multiple configurations
2. Neg
a. CDC light trap is lighter
b. BG-Pro has lots of pieces
c. BG-Pro black bag makes it difficult to know what is in the bag

I. Fighting the Future – Doug Nelson
a. Old guard don't like change
i. Traps
1. Trying to switch from New Jersey light traps
2. No funding
3. Don't want change
ii. Need a budget increase
1. Better equipment
2. Traps
3. Training
b. Moving to a new facility

J. Transitioning from a Government Research Setting to a R2 University – Andrew Haddow
a. USAMRIID
i. Biological agents
1. BSL 3 and 4 agents
2. Walter Reed does BSL 2 agents
ii. Established in 1969 (US Army Medical Unit)
1. Offensive programs
2. After the treaty, switch from an offensive to defensive program
iii. Mission – defer and defend against biological threats
b. History
i. Personal reliability program
ii. SME on anthropology-borne and zoonotic pathogens
iii. Biosafety
iv. Guidance & recommendations
v. Overseas training activities
vi. Briefings/taskings
vii. Response to WHO public health emergencies
1. Ebola (2013-2014)

a. High risk for disease transmission due to people dying in the street
b. Lots of flies in areas
i. Project Flywalker – used house flies
1. Flies walked through monkey blood
2. Walked across monkey faces
3. No disease
ii. Vaccine safety studies – used sand flies (no replication)
iii. Immunologically privileged sites
2. Zika virus (2015-2016)
a. Nothing was known
b. All tests done simultaneously
3. SARS-CoV-2 (2020-2021)
a. Stability studies
i. PPE
ii. Clothing
iii. Skin
iv. Currency
v. Fruit
b. Got no virus back after an hour

viii. Left to come to Kennesaw State
1. Wife works at CDC
2. Wanted to teach future generations

c. Kennesaw State
i. History
1. Combination of 2 separate colleges started in 1948
2. Science complex
3. Agricultural station
4. 2 campuses
a. Marietta
b. Kennesaw
5. 2018 – R2 status
ii. Facilities
1. Cell culture, virus isolation, diagnostics
2. Arthropod containment lab – level 2
3. Animal biosafety – level 2
4. 2 insect growth chambers
5. Glove box for pathogen injections
iii. Decent lab setup

d. Challenges
i. Starting over
1. Transitioning from BSL-3/4 to BSL -2
2. KSU has no history of pathogen work
ii. Needed to get everything up and running
1. Electrical issues
2. Fire in biosafety cabinet
3. Had to move from one lab space to another
4. Air handling issues

iii. Death by committee- bureaucracy worse than in the military

e. Expectations
    i. 2021-2022
        1. 60% research
        2. 30% teaching
        3. 10% service
    ii. 2023-?
        1. 50% research
        2. 40% teaching
        3. 10% service
    iii. R2 university with R1 expectations
    iv. Bring in money or else
f. Research
    i. Arboviral surveillance and virus-host infections
    ii. Arboviral discovery and virus characterizations
    iii. Synergistic effects
g. Students make it worthwhile
h. Looking for collaborations

DAY 3

A. Dealing with Problem Spray Issues – Caroline Efstathion
    a. What to do
        i. Don't apologize unless you did something wrong
        ii. Try to educate; don't be defensive
        iii. Try to understand the concern and look for a resolution
        iv. You just can't help some people
    b. Explaining mosquito control
        i. Tell people the process
        ii. Talk about surveillance
        iii. Talk about what is done besides spraying
        iv. Talk about regulations
        v. Talk about targeted control
        vi. Talk about your program
    c. Educate about IMM programs
    d. Educate people about surveillance and mosquito species
    e. Examples
        i. Government approved genocide
            1. Put her on the no-spray list
            2. Will never change this person's mind
        ii. Chemical sensitivity
            1. Wants to know what was being sprayed
            2. Sent labels and SDS
            3. Had her ask the golf course that she lived next to what they were spraying – that was the problem
        iii. Crazy spray truck driver
            1. GPS tracking really helps
            2. No one was doing any of this
            3. Sometimes drivers will drive too fast, but that's about it

iv. Upset beekeeper
    1. Bees were not anywhere near the beekeeper
        a. Thought a few dead bees reported by her mom meant the spray killed her bees
        b. Put her on no-spray
    2. Neighbor called and screamed about not being sprayed

f. Honey bee issues
    i. Number one killer of honey bees is ignorant beekeepers
    ii. Mosquito control done correctly is not the culprit
    iii. Timing is everything
    iv. Tips for protecting bee hives
        1. Place hives more than 300 feet from road
        2. Place back of hive to road
        3. Place a barrier between road and hives
        4. Aerial spray
            a. Cover hives with a sheet
            b. Turn on sprinklers to keep bees inside
        5. Keep mosquito control appraised if the hives are moved
    v. Get to know the local beekeepers
        1. Go to meetings
        2. Give presentations
        3. Do notification calls
        4. Get bee hives registered
    vi. Resources
        1. Ellis, et al. IFAS Extension, UF
        2. UF IFAS PIE

B. Insecticide Resistance Update – Tiffany Nguyen
    a. Tasked with developing a pesticide resistance testing program in Georgia
    b. Insecticide resistance – overall reduction in ability of a product to kill pest
    c. Why does resistance develop?
        i. Use same pesticide too long
        ii. Use pesticide improperly
    d. 4 different types of resistance
    e. Multiple and cross resistance also occur
    f. How is it done
        i. Collect eggs
        ii. Rear up eggs to adulthood
        iii. Bottle Bioassay
        iv. Record mortality
    g. Focus on *Culex* and *Aedes*
    h. Test mosquitoes against commonly used pesticides with and without synergists
        i. Organophosphates
        ii. Pyrethroids
    i. Resistance levels vary through place and time
        i. Testing technical grade active ingredients
        ii. Developing resistance should lead to a chemical rotation or change in protocols and additional monitoring

C. Tools and Strategies for Resistance Management – Donnie Powers

a. Maintaining susceptibility
    i. Strategic class to class rotation
    ii. Prevention is better than fixing a problem
b. Mode of action – method used by chemical to affect target species
    i. Sodium channel blockers
    ii. Cholinesterase inhibitor
    iii. Classes
        1. Pyrethroids
        2. Organophosphates
c. Testing
    i. Bottle bioassays
    ii. Real world testing
d. IMM strategy is the key to resistance management
    i. Surveillance
        1. Proactive larviciding
        2. Rotate OP and pyrethroid (type I, II, or alt MOA) adulticides
    ii. Calibration & droplet management (optimization)
        1. Impacts dosage
        2. Impacts impingement on mosquito
        3. Keeps product in air where mosquitoes are located
e. Challenges
    i. Perception of mosquito control
    ii. Odor associated with pesticide
    iii. Safety concerns

D. Thermacell Testing Methods – Ben McMillan
a. History
    i. Began in 1981 to bring portability to consumer products
    ii. Targeted mosquitoes starting in 1990s
    iii. 2000s improved mosquito products
    iv. 2021s – Expanded worldwide
    v. 2022 – acquired by SC Johnson
b. Concerns
    i. Research for efficacy and effectiveness
    ii. Safety issues
    iii. Product doesn't lead to resistance issues
    iv. Appropriate fuel sources
    v. Portability
c. Testing
    i. Set thermacell emitter in center of area to be tested
    ii. Place walls to mitigate wind movement
    iii. Efficacy tested in many different environments
    iv. May have to deal with resistance issues
    v. Do comparative studies
d. Other insects
    i. Data available on repellency for *Culicoides* midges
    ii. Looking to generate data on Chironomid midges
    iii. Data from yellow fly – not yet analyzed

E. Georgia Ticks, We Got 'em – Janemarie Hennebelle (GDA)

a. Reportable and foreign animal diseases
    i. ALT
    ii. Vesicular/ulcerative/erosive
    iii. TB
    iv. Brucellosis
    v. RHDV
    vi. Avian influenza
    vii. Screwworm
b. Georgia considered high risk for invasive organisms
    i. Airport
    ii. Seaport
c. Surveillance program in place
    i. Collection kits sent to vets
    ii. Organisms submitted to Veterinary Lab in Illinois
    iii. ALT
        1. Partnerships with UGA, DPH
        2. Database from 2005
d. Tick summaries - https://dph.georgia.gov/environmental-health/insects-and-diseases
    i. Human disease issues
    ii. Animal disease issues
e. Updates in ALT
    i. 2017 – USDA confirmed presence in New Jersey sheep
    ii. Native to SE Asia
    iii. Reproduce by parthenogenesis
    iv. Adapted to a variety of hosts
    v. Probably introduced in 2010 – incorrectly identified as the rabbit tick, which is native
    vi. Competent vector of parasites, bacteria, and viruses
    vii. USDA map - https://www.aphis.usda.gov/aphis/maps/animal-health/asian-longhorned-tick
f. Georgia
    i. Currently in 4 counties
    ii. Found first in Pickens County
    iii. Hosts
        1. Cattle
        2. Possum
        3. Cat
        4. Deer
        5. Environment
    iv. Animal health issues
        1. Large numbers found on animals causes loss in fitness and possible death
        2. Decreased production
        3. *Theileria* transmission
    v. Human health issue – no current evidence
    vi. What's next?
        1. Awareness
        2. Education

3. Submit ticks
4. Surveillance

vii. Resources
1. https://agr.georgia.gov/asian-longhorned-tick
2. USDA map
3. SCWDS
a. https://vet.uga.edu/education/academic-departments/population-health/southeastern-cooperative-wildlife-disease-study/research/ticks-tick-borne-illnesses/
b. https://vet.uga.edu/wp-content/uploads/2021/11/2021-October-SCWDS-Briefs-Newsletter.pdf

F. The Public Health Extension Specialist Role and Resources – Elmer Gray
a. Background
i. Wildlife biologist
ii. Moved to UGA in 1999
iii. Extension specialist for public health
iv. GMCA Board of Health
b. Current activity
i. Not faculty
ii. Public health extension specialist
iii. Licensed applicator in SC
iv. Involved in a number of different projects
v. Serves as a resource to county agents, esp for special problems
vi. Media presence
c. Providing accurate information
i. Networking is important
ii. CAES stories have a long reach
1. Focus on biology of pest
2. IPM approach
3. Solve problems in understandable language
d. Need for literature to deal with specific issues
i. Collaborate - Don't reinvent the wheel
ii. Resources - https://extension.uga.edu
1. Circulars
a. Mosquito biology and behavior #1155 (https://extension.uga.edu/publications/detail.html?number=C1155&title=mosquito-biology-and-behavior)
b. Mosquito control around the home #1266 (https://extension.uga.edu/publications/detail.html?number=C1266&title=mosquito-control-around-the-home)
c. Pollinators #1188 (https://extension.uga.edu/publications/detail.html?number=C1188&title=the-intersection-of-mosquito-management-and-pollinator-protection)
d. Best management practices #1154 (https://extension.uga.edu/publications/detail.html?number=C1154&title=best-practices-of-integrated-mosquito-management)
2. Pest Management Handbook

3. Category 41 manual

iii. Lots of other resources available

Business Meeting

2024 Board of Directors

President: Doug Nelson
VP: Caroline Efstathion
Directors -

1-year: Natasha Agramonte
2-year: Bryan Boone
3-year: Dan Peach

Secretery-Treasurer: Misty McKanna
Past president: Tiffany Nguyen
Sustaining Board Member: Mike Riles
GA Public Health Representative: Rosmarie Kelly
GA Cooperative Extension Representative: Elmer Gray

Next meeting:

Amicalola Falls State Park & Lodge
Oct 16-18, 2024