# EFFICACY RESEARCH ON AUTOMATED MISTING SYSTEMS

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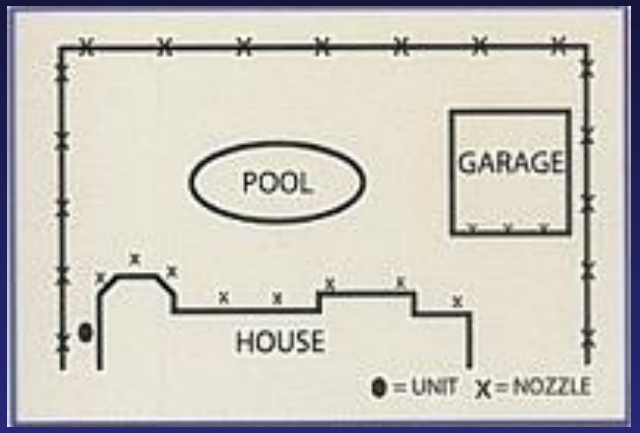
# WHAT ARE AUTOMATIC MISTING SYSTEMS?

Automated application systems that apply water formulated insecticides in the form of a mist via a series of spray nozzles in order to provide an envelope of protection against host-seeking mosquitoes within a defined area, e.g. residential backyards.

closed loop system




# WHAT ARE AUTOMATIC MISTING SYSTEMS?

**TYPICAL SYSTEMS**

Drum contents automatically agitated prior to application.

# WHAT ARE AUTOMATIC MISTING SYSTEMS?

- Programmed to apply 2 applications per day at dusk and dawn
- 30-45 sec spray duration
- Generally apply synergized pyrethrins

# STUDY OBJECTIVES

- Determine efficacy of automatic misting systems from commercially installed units to reduce mosquitoes in residential backyards

- Determine efficacy of insecticide and method by which reduction occurs using a commercially installed system in a simulated backyard

Field study initiated March 22 through November 16, 2007 (35 wks)

Three residences used with MistAway System© units previously professionally installed by Arrow Pest Service, Panama City, FL

Application a 45 sec spray of 0.05% AI mixture of SummerFrost™
pyrethrins (3%)
piperonyl butoxide (6%)
n-octyl bicycloheptene dicarboximide (10%) (MGK synergist)

- Application set for one dusk and dawn application/dy system operates at 180 psi delivers 41 ml/min per nozzle
- # nozzles 26-43 per backyard along interior perimeter at 10 ft intervals ≈3-4 ft height
- Median diameter of droplets from nozzle=50µm as determined by Malvern laser

- Control yards were at least 100 ft away from treatment yards in same neighborhood
- ABC traps with light/baited with $CO_2$ (500 ml/min) 24 h collections 2x/wk used as evaluation

- Avg. backyard size 56 ft x 85 ft (ctrl & trt)
- Data presented as average mosquito abundance per trap week
- Percent reduction

# ADDITIONAL EVALUATION CRITERIA[d]

**Established Threshold to Justify Application of Mosquito Adulticides**

**Florida Statute 5E-13.036:**

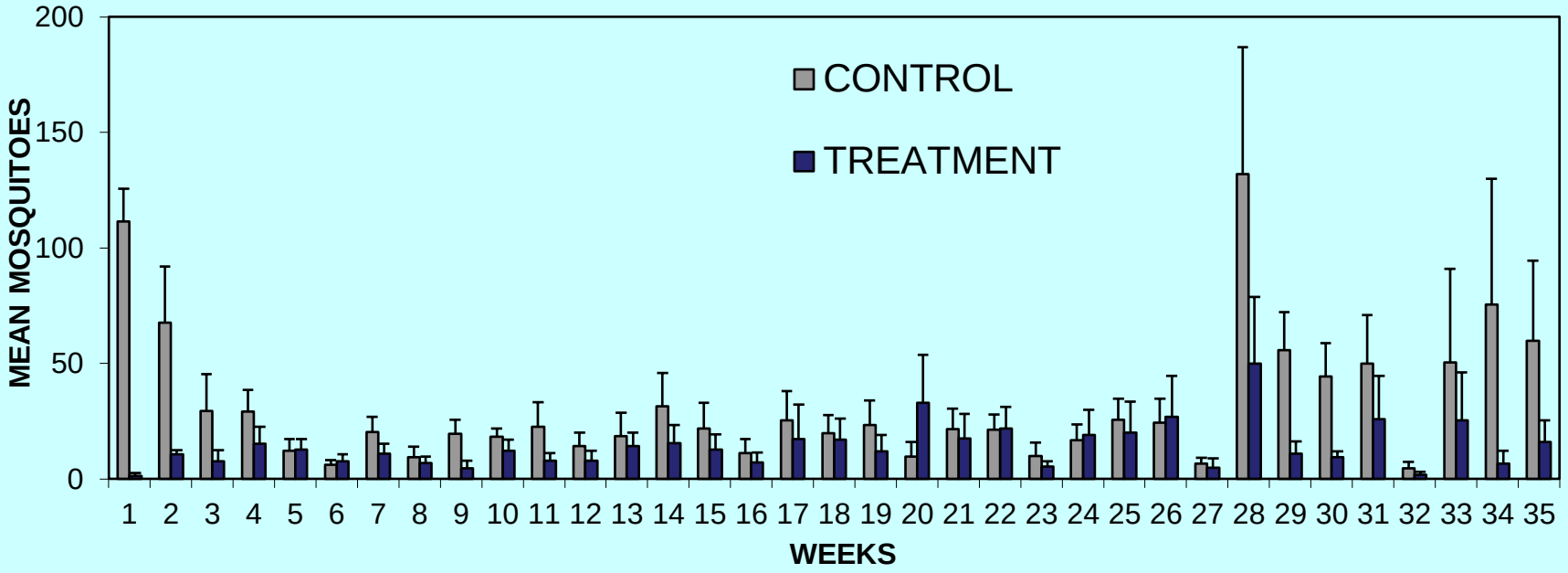
"…..25 mosquitoes, or more, per night in a light trap justifies the application of an adulticide by Florida mosquito control programs..."

**Florida Administrative Code 2006**

# RESULTS

**Objective 1**: Determine efficacy of automatic misting systems from commercially installed units to reduce mosquitoes in residential backyards

Weekly mean abundance of mosquitoes collected from ABC light traps in backyards with and without MistAway automatic misting system.



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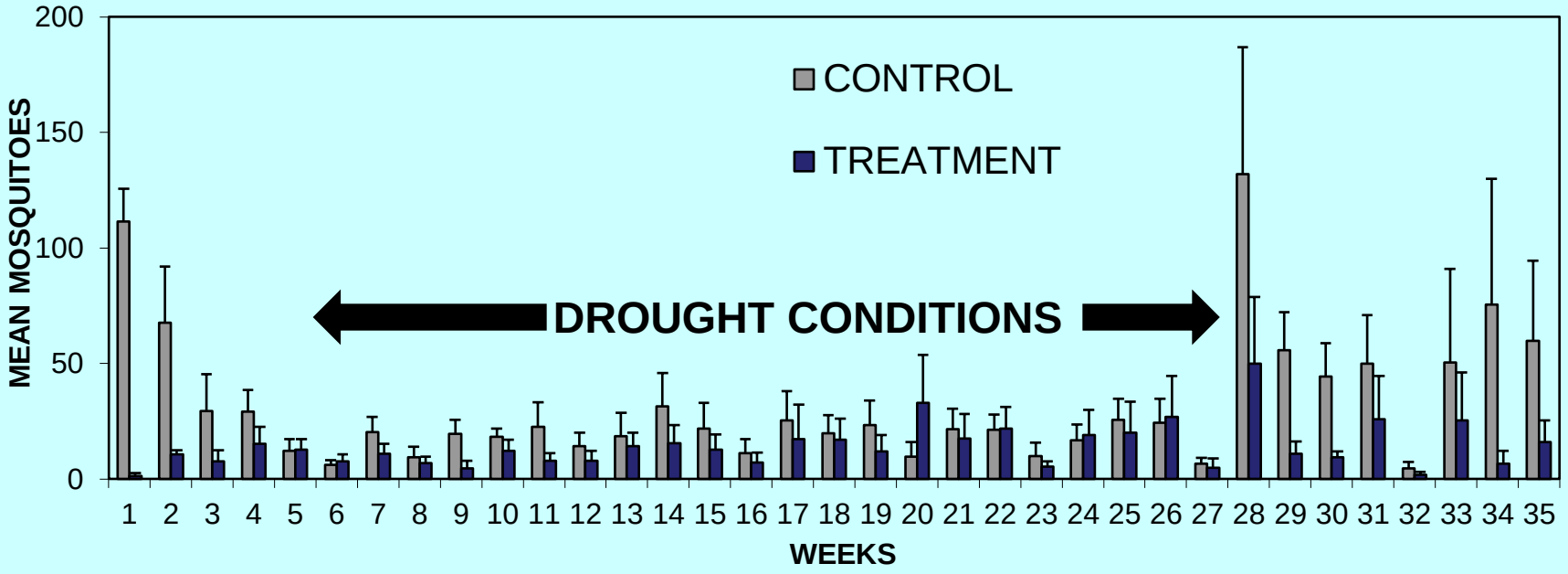

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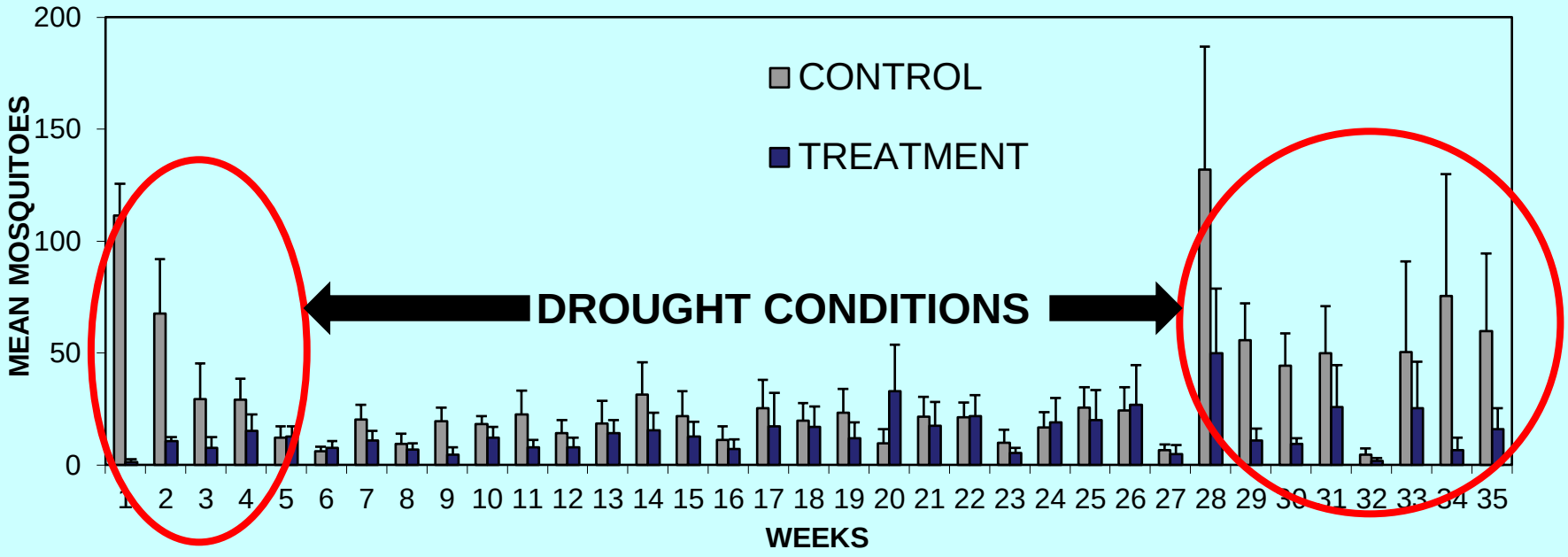
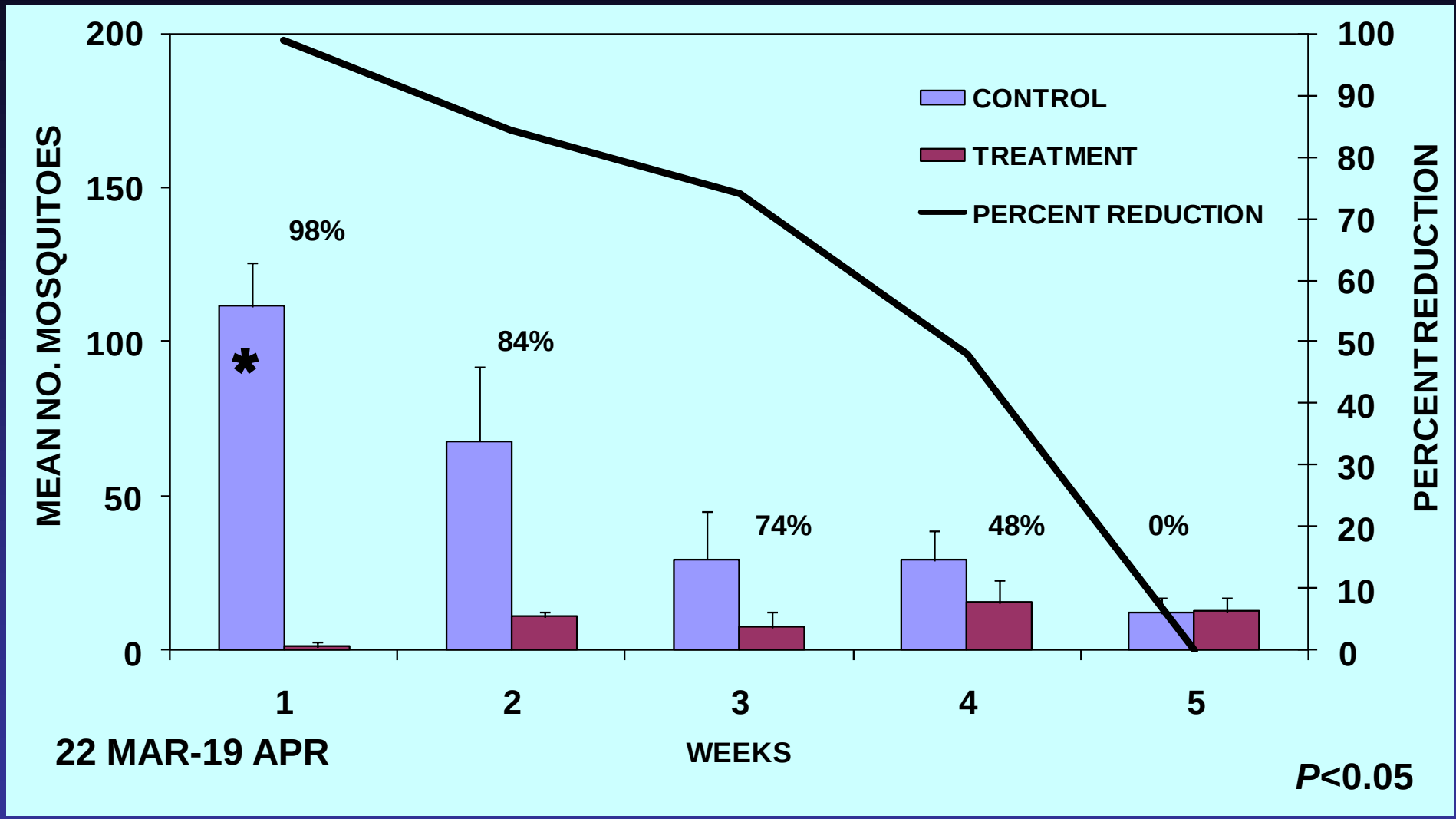
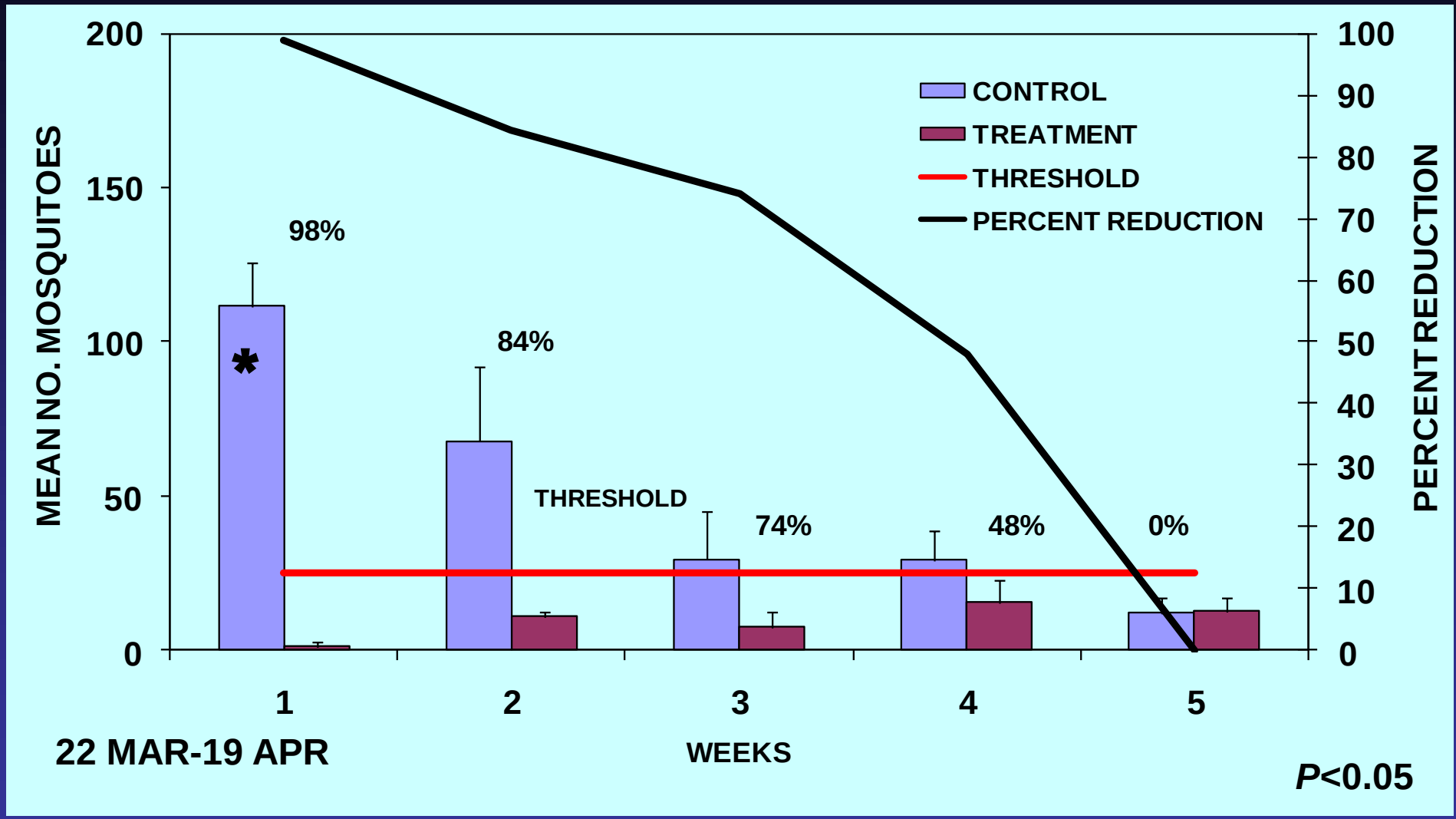





Major pest spp: *An. crucians, Cx. salinarius, Oc. canadensis canadensis*

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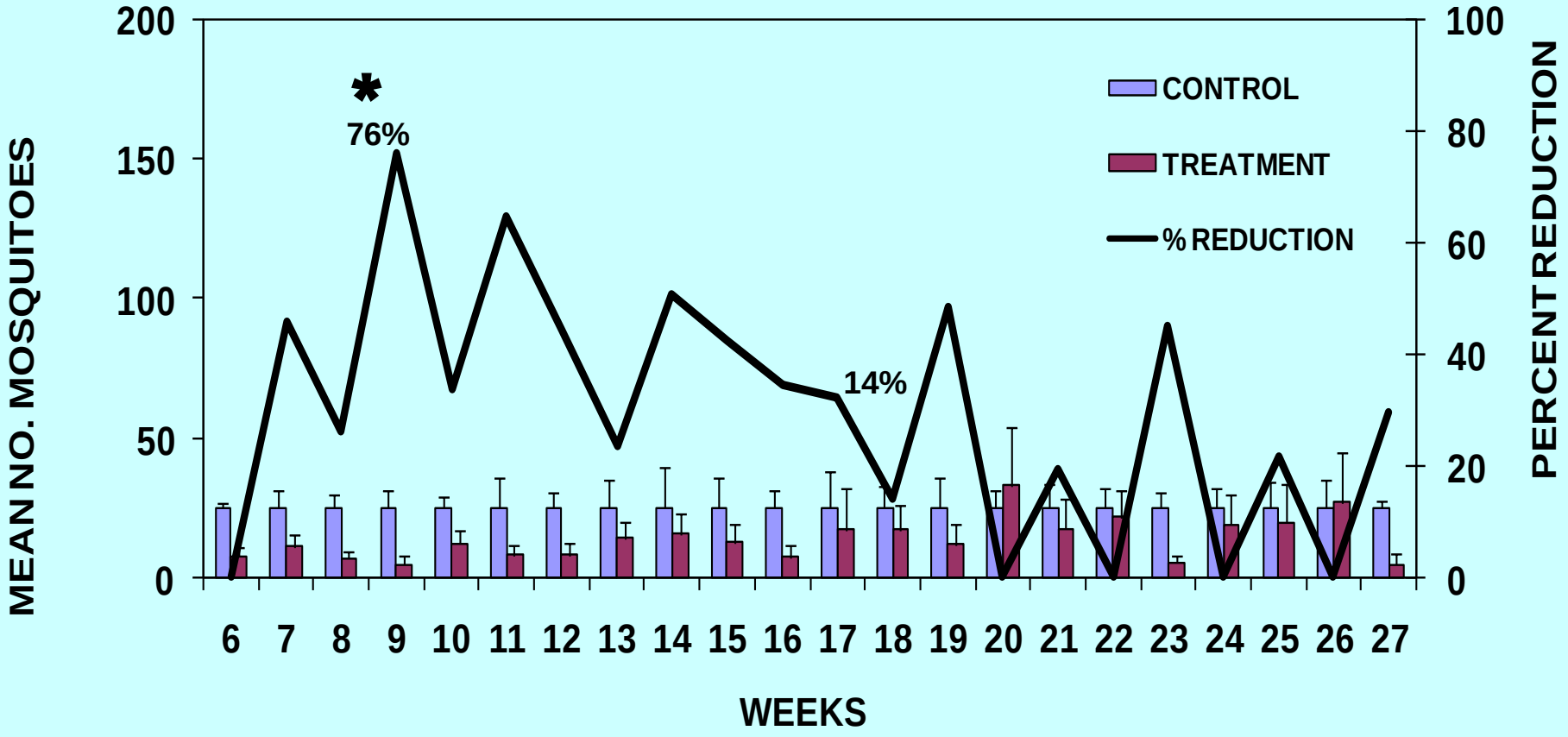
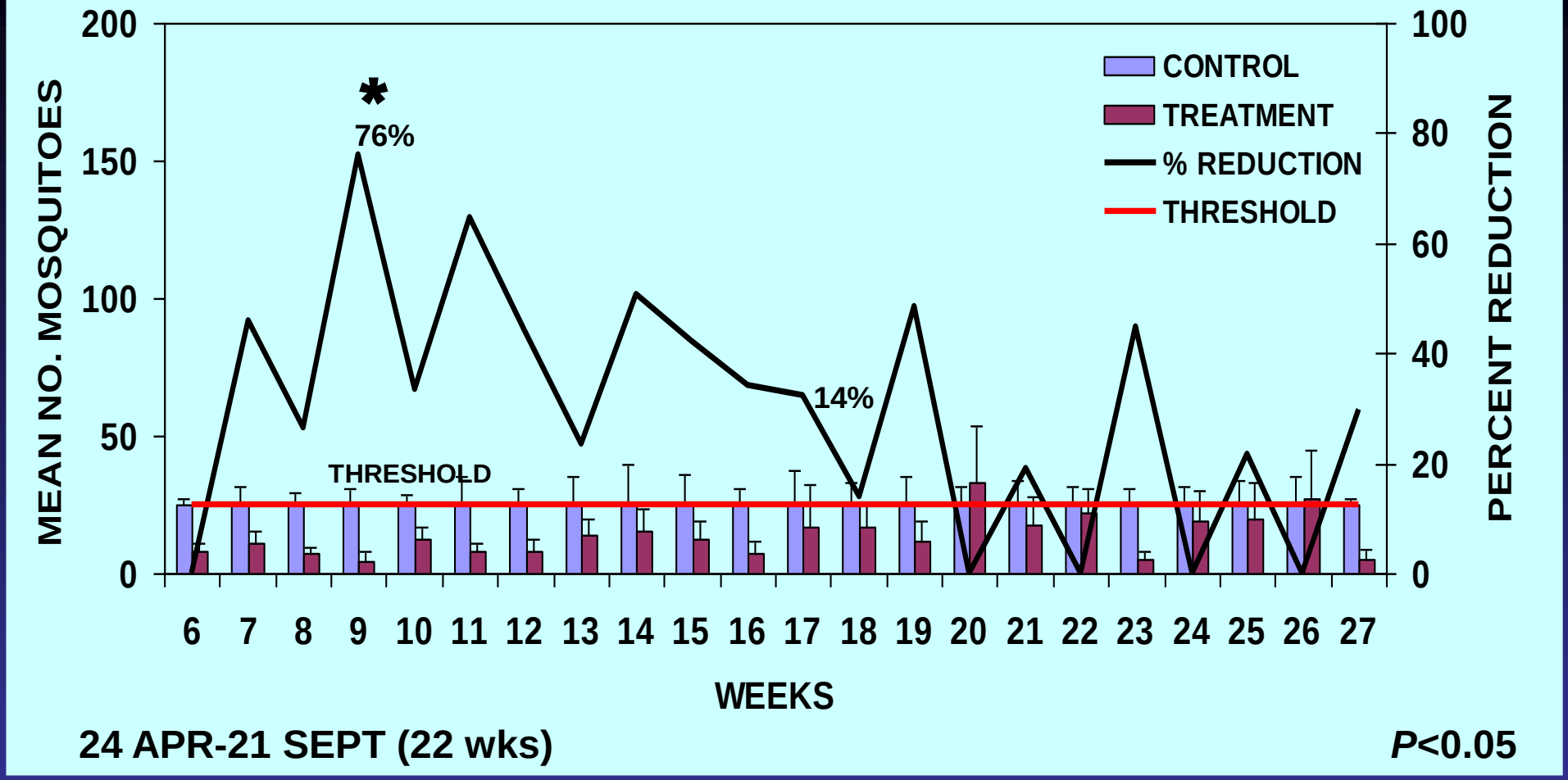
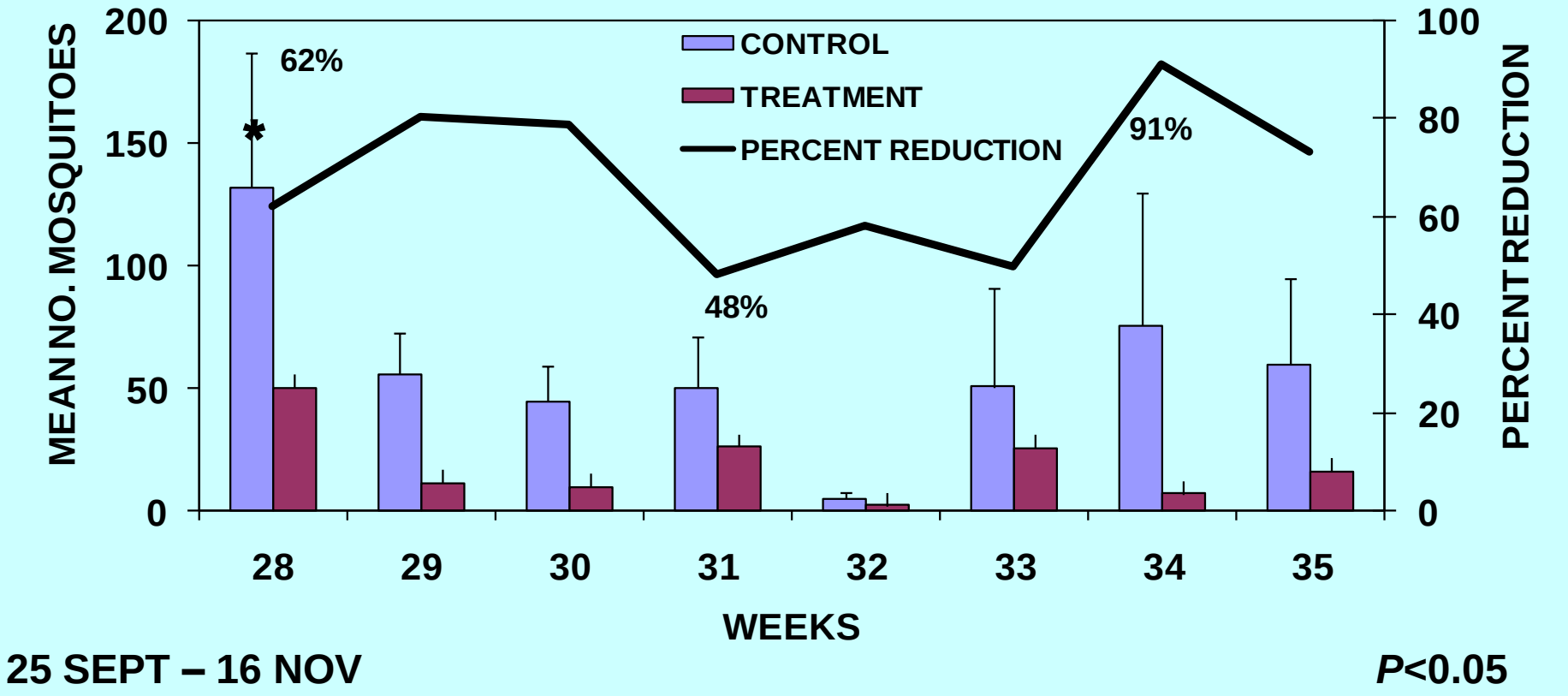



Major pest spp: *An. crucians, Cx. erraticus, Cx. salinarius.*

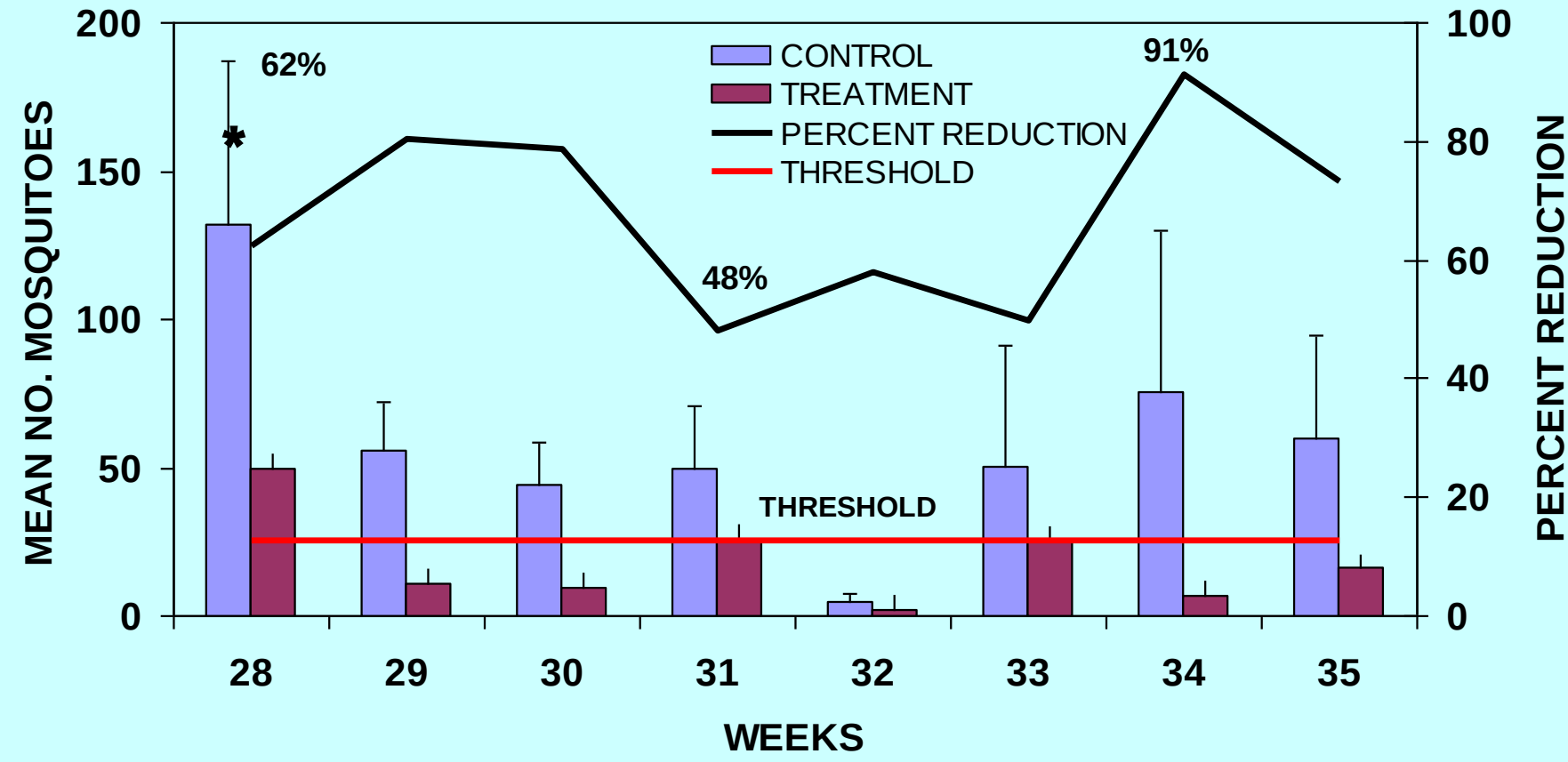



Major pest spp: *An. crucians, Cx. erraticus, Cx. salinarius.*

Mean mosquitoes in trt backyards under threshold 20 wks.
Mean mosquitoes in control backyard under threshold 19 wks.




Major pest spp: *Oc. taeniorhynchus, An. crucians, Cx. erraticus*




Major pest spp: *Oc. taeniorhynchus*, *An. crucians*, *Cx. erraticus*

# SUMMARY

- Weekly reduction was highly variable (98-14%)
- Mosquito abundance in treatment backyards below threshold 30 wks
- Mosquito abundance in control backyards below threshold 21 wks

# RESULTS

**Objective 2**: Determine efficacy of insecticide and method by which reduction occurs using a commercially installed system in a simulated backyard

SIMULATED BACKYARD CONSTRUCTED ON LABORATORY GROUNDS

50 FT (W) X 75 FT (L)

4 FT (h) PVC  "FENCE"

MISTAWAY SYSTEM INSTALLED BY ARROW PEST SERVICE

NOZZLES PLACED AT 10 FT INTERVALS (TOTAL 18 NOZZLES)

NOZZLE ANGLE 45°

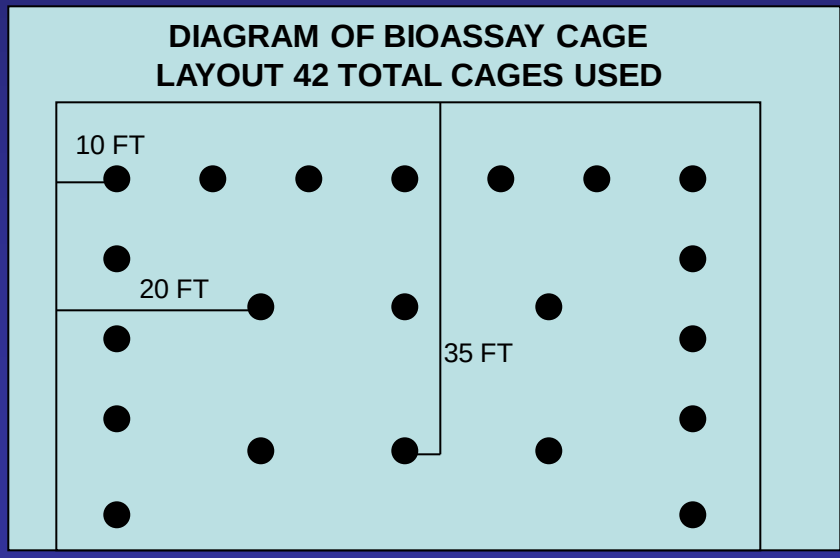
WAX MYRTLE PLANTS AS VEGETATION ALONG FENCE

CAGED BIOASSAYS USED LAB REARED ADULT Asian tiger & southern house MOSQUITOES

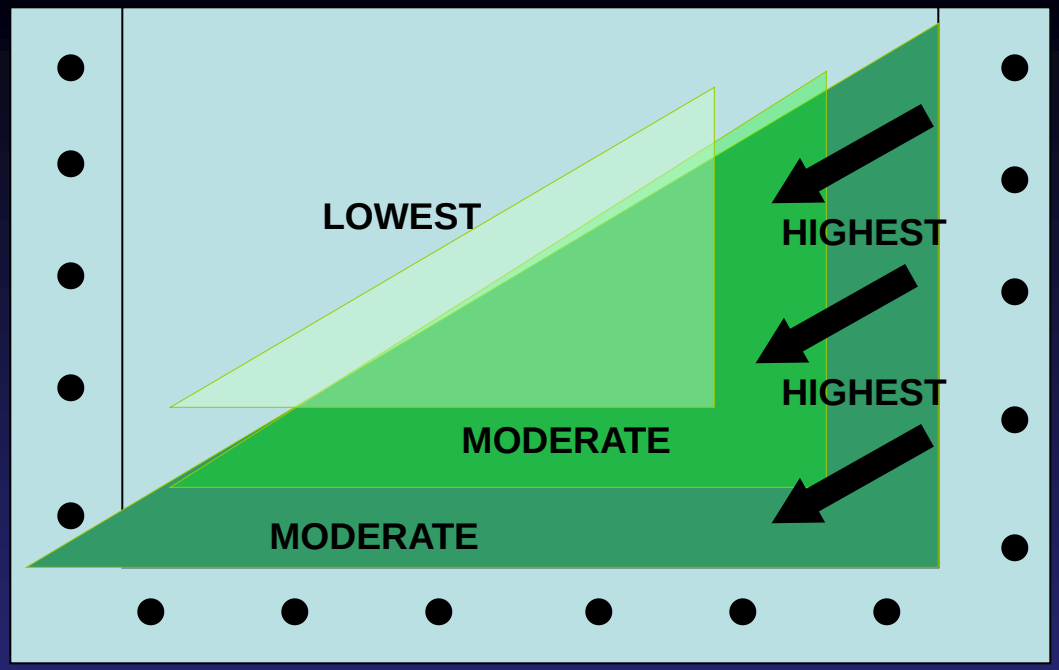
VERTICAL BRASS CYLINDRICAL CAGES 4.5" (diam) x 5" (h) & SOLID BOTTOM SUSPENDED ≈4 FT FROM GROUND SURFACE

PERIMETER CAGES LOCATED 10 FT FROM NOZZLES & INTERIOR CAGES LOCATED IN MIDDLE OF YARD

TESTS CONDUCTED AT DUSK



# Test Findings

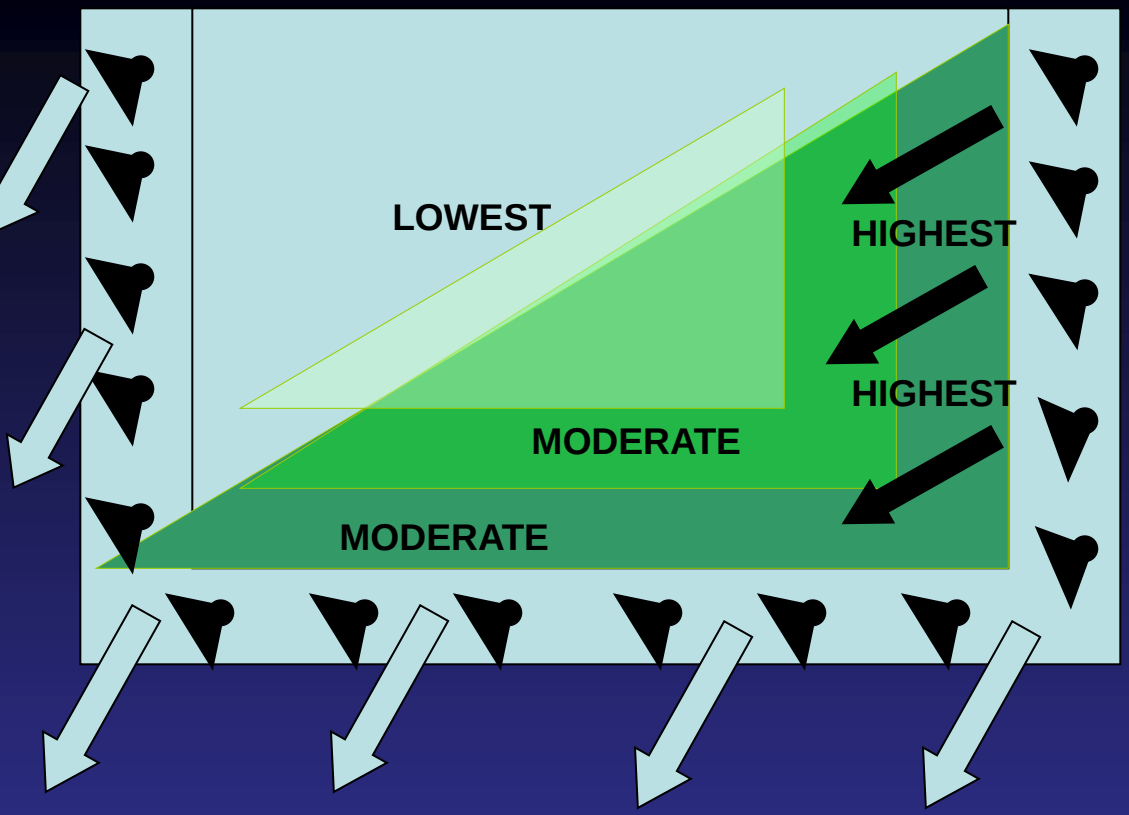



**NE WIND**

Mosquito mortality was dependent on distance from nozzle relative to wind speed and direction.

| Distance from nozzle (ft) | Knockdown/ mortality Asian tiger & so. house mosquitoes |
|---|---|
| **10** | **91-65*** |
| **20** | **89-67*** |
| 30 | 45-42 |
| 40 | 34-33 |
| 50 | 46-7 |
| 60 | 36-13 |
| 70 | 24-34 |

***P*<0.05**




NE WIND

BECAUSE EFFICACY IS PRIMARILY AFFECTED BY WIND DIRECTION

DRIFT MAY BE QUITE A CONCERN WITH THESE UNITS

# EXCISED LEAF BIOASSAYS

**Southern wax myrtle**
**(*Myrica certifera*)**

**in 3 gallon pots**


**mean leaf area: ~ 1.8 in$^2$**

# SUMMARY

**1) Reduction in backyards appears to be due exposure of adult mosquitoes directly to spray.**

**2) Mortality from residual deposits on leaves (shrubbery) may aid in reduction but is NOT the primary mechanism of control.**

**3) Mosquito knockdown/mortality in excised leaf bioassays was highly variable, averaged <25%.**

**No repellency was noted in tests.**

Caged adult Mosquitoes


Leaf bioassays with adult mosquitoes

# ISSUES

- Insecticide application is by calendar rather a response to pest population levels
- High risk (?) of repeated applications by homeowner because system can be overridden
- **DRIFT** major concern to adjacent backyards that may have chemical sensitive individuals/pets (chemical trespass)
- Non-target effects are largely unknown

# NATIONAL PEST MANAGEMENT ASSOCIATION

# BEST MANAGEMENT PRACTICES FOR MOSQUITO MISTING SYSTEMS

Drafted 2006

## BMP 1. GENERAL QUALIFICATIONS

1. All systems designed, installed, and serviced by commercial applicator companies and certified operators **(takes it out of hands of "distributors-only" and general public).**

2. **Certified operator must be trained in IPM.**

# BEST MANAGEMENT PRACTICES FOR MOSQUITO MISTING SYSTEMS

## BMP 2. ADVERTISING

**In its advertising any company selling, installing or servicing mosquito misting systems <u>may not</u>:**

1. **Make exaggerated, mislead, untrue, deceptive claims related to efficacy or public health protection.**
2. **State that pesticides are safe or non-toxic.**
3. **State materials used are organic or natural unless criteria for statements are met.**
4. **State pesticides used are registered or approved by federal or state governments.**
5. **Use images that convey an impression that contradicts pesticide label directions.**

# BEST MANAGEMENT PRACTICES FOR MOSQUITO MISTING SYSTEMS

## BMP 3. INTEGRATED PEST MANAGEMENT

**1. Any company that sells, services, or installs mosquito misting systems MUST PROVIDE IPM SERVICES to its customers.**

- ✓ Inspection
- ✓ Identification of target pests
- ✓ Employ appropriate pest management measures
- ✓ Educate consumers presence of larval developmental habitats, prevent/manage pest problem
- ✓ Evaluate effectiveness of management measures

# BEST MANAGEMENT PRACTICES FOR MOSQUITO MISTING SYSTEMS

## BMP 3. INTEGRATED PEST MANAGEMENT (Contd)

2. All technicians and sales personnel trained in accordance with proper application of IPM techniques just mentioned.

3. Company must provide customers with an information sheet communicating those IPM components.

# BEST MANAGEMENT PRACTICES FOR MOSQUITO MISTING SYSTEMS

## BMP 4. TRAINING REQUIREMENTS

4 hours classroom training & 8 hours field training

IN THE FOLLOWING AREAS:

- ✓Mosquito biology and identification
- ✓Mosquito prevention
- ✓Integrated Pest Management for mosquitoes
- ✓Mosquito Misting System installation, operation, & service

# BEST MANAGEMENT PRACTICES FOR MOSQUITO MISTING SYSTEMS

## BMP 4. TRAINING REQUIREMENTS (Contd)

**All training previously listed and any state required training must be completed <u>BEFORE</u> any employee is allowed to work unsupervised.**

# BEST MANAGEMENT PRACTICES FOR MOSQUITO MISTING SYSTEMS

## BMP 5. INSTALLATION PROCEDURES

- ✓ Design
- ✓ Installation
- ✓ Override procedures
- ✓ Combination Insecticide and Evaporative Cooling Systems Prohibited
- ✓ Lock installed on all systems to prevent access to insecticide reservoir
- ✓ Specimen label of material reviewed with client
- ✓ All pesticides stored in containers no more than 55 gallons (dilute pesticide) stored per ½ acre

# BEST MANAGEMENT PRACTICES FOR MOSQUITO MISTING SYSTEMS

## BMP 6. SERVICE PROCEDURES

- ✓ Service performed by certified PCO's
- ✓ Customers written notification of application times
- ✓ Provide client with specimen label, information on operation of system, and consumer's obligation including:

  a. Periodic visual inspection to ensure unit working properly

  b. Periodic visual inspection of application area

  c. Periodic visual inspection of tubing system

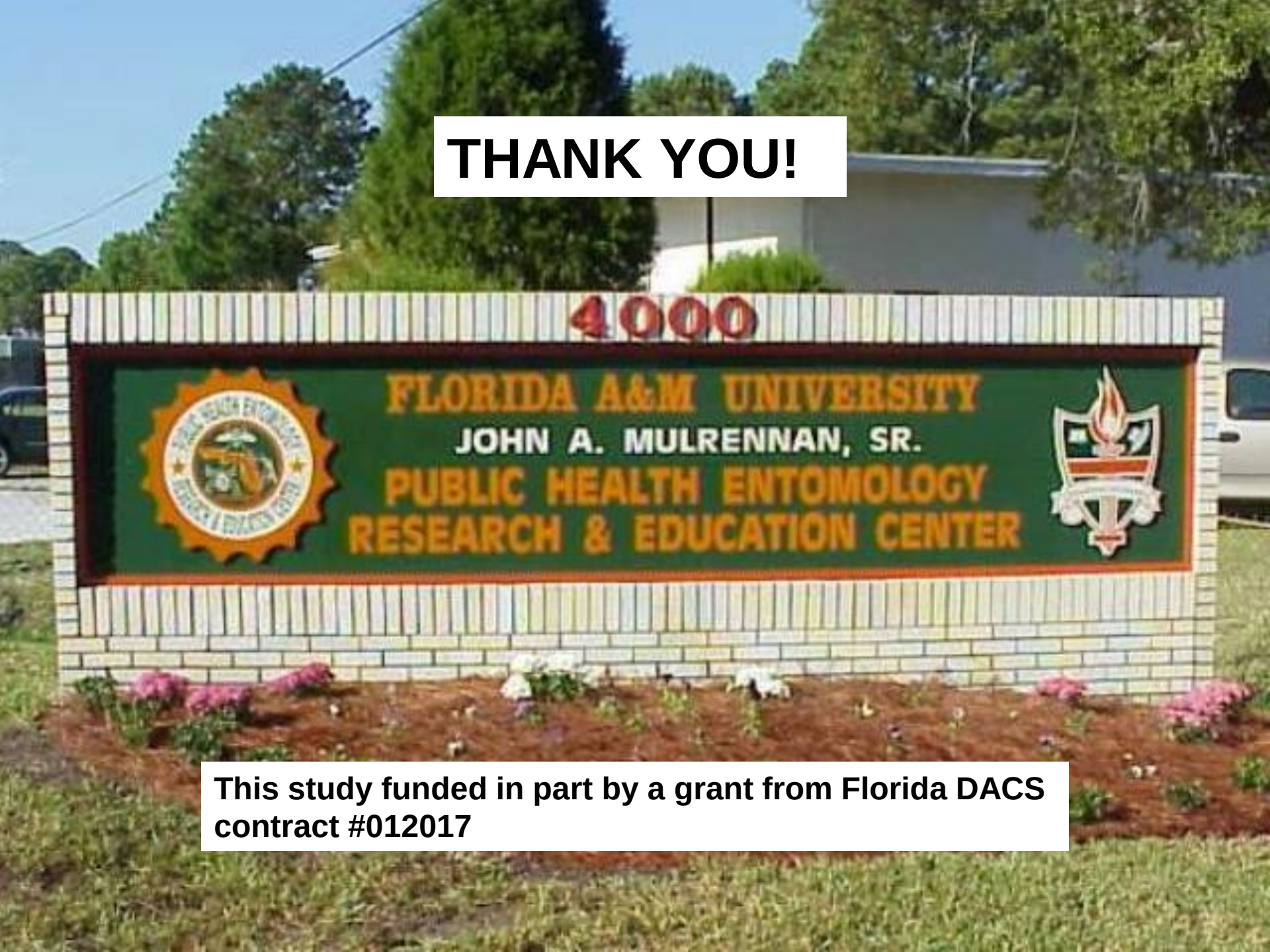
  d. Signed statement that client understands/agrees to follow label, operation of system and obligations relating to operation

# BEST MANAGEMENT PRACTICES FOR MOSQUITO MISTING SYSTEMS

## BMP 7. CONSUMER INFORMATION DISCLOSURE

**Following information must be provided to client:**

- ✓ Mosquito IPM sheet
- ✓ Pesticide Label
- ✓ Proper and Safe Use of Automatic Misting System
- ✓ Emergency Shut Off Procedures
- ✓ Service and Warranty Information

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