EXPANSION OF SCREWWORM MASS REARING IN PANAMA

Cochliomyia hominivorax
New World Screwworm

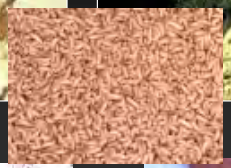
Muhammad F. Chaudhury
Screwworm Research Unit
USDA-ARS
Panama City, Panama

USDA Agricultural Research Service

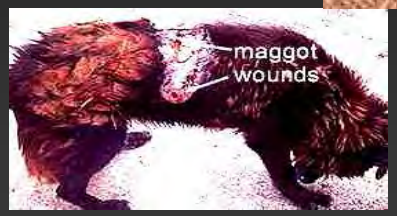
APHIS

MYIASIS

Livestock



Wildlife



Pets

Humans

Historical Distribution of Screwworms

Screwworm SIT Program

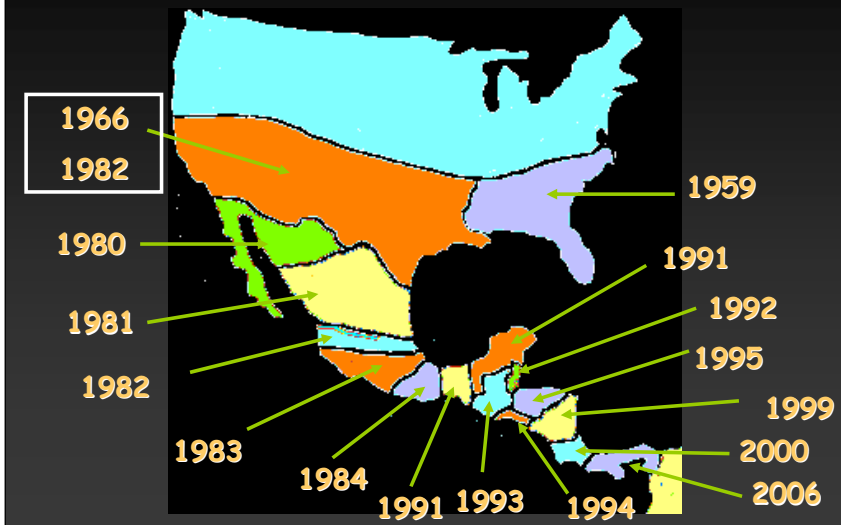
- Mass rear
- Sterilize
- Release sterile flies – aerial, ground
- Monitor myiasis cases
- Monitor fly population

Florida Screwworm Factory

Mission Texas Screwworm Factory

Screwworm Factory
Tuxtla Gutiérrez, Chiapas, México

Past Eradication Progress



Current Status

NEW SCREWWORM FACTORY
Pacora, Panama

Production in Panama Plant

- Total area for mass rearing : 7500 sq. m.
- Present production: 45,000,000 per week
- Amount of diet: 60,000 liter per week
- Cost of diet ingredients (spray-dried bovine blood, spray-dried poultry eggs, milk substitute, gelling agent and formaldehyde solution): $25,000 per week

PANAMA PRODUCTION PLANT FLOOR PLAN

Bio-secured Area

Current R&D Program

- Diet formulation and optimization
- Reduction/Elimination of ammonia
- Oviposition attractant
- Cryopreservation of embryos
- Genetic sexing (male only) strain

Larval Diet

- Artificial diet: Dietary ingredients
- Optimization of diet-
  - –Nutrient elements
  - –Nutritional requirements
  - –Diet utilization

  DIET ECONOMY

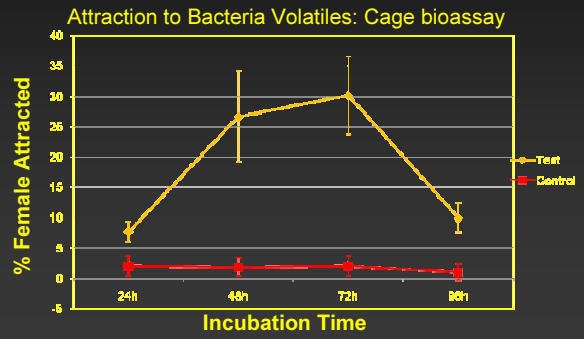
Chaudhury & Skoda 2007; 2009

Ammonia Problem on Production Floor

- NH3 is produced during larval development - ~100 ppm
- Use of gel/cellulose-based artificial diet
- Diet additives
  - – Bacteria (*Nitrosomonus* and *Nitrobacter*)
  - – Biosol (Yucca Extract)
  - – KMnO4

Oviposition Attractant

- Bacteria isolated – identified.
- Bacteria-inoculated and incubated blood.



Chaudhury et al. 2010

Oviposition Attractant

Extraction and Identification

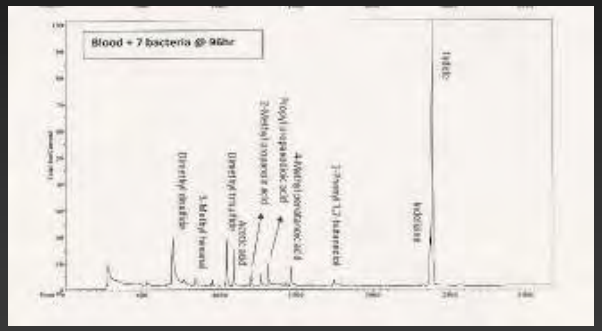
SPME FIBER

GC-MS

(In collaboration with Dr. Jerry Zhu, USDA-ARS, Lincoln, NE)

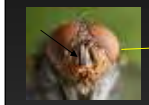
Oviposition Attractant

GC-MS Determination of Compounds from Volatiles Produced by 7 Species of Bacteria

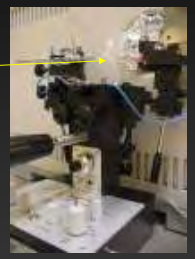


Oviposition Attractant

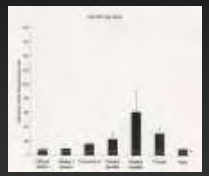
Electroantennography



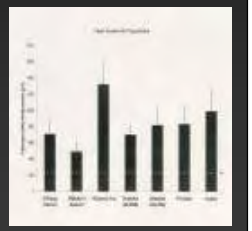
Fly Head



EAG Responses of Male and Female Flies to Selected Chemicals



Males



Females

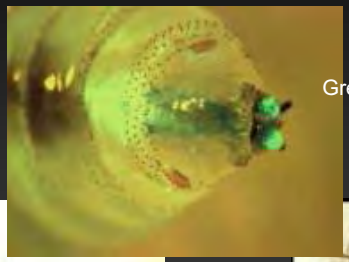
Cryopreservation

- Collaborator: Dr. Roger Leopold (USDA-ARS Fargo, ND)
  - Six-hour-old screwworm embryos
  - Chorion and lipid layer of vitellin membrane
  - Load with cryopreservant
  - Save in Liquid nitrogen

Screwworm Embryos

Genetic Sexing Strain

Collaborators: Dr. Alfred Handler (USDA-ARS, Gainesville, FL);
Dr. Felix Guerrero (USDA-ARS, Kerrville, TX)



Green Florescent Protein gene

Injection of DNA

(GFPG and TetraS gene)

Acknowledgements

Dr. Agustin Sagel
Dr. Steven Skoda

THANK YOU

SUNSET IN PANAMA