San Diego County Eye Gnat Research And Education Project

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Presentation Outline

- Background
- Brief history
- Creation of the Project
- Transparency
- Overall goal and how to achieve it
- Research goals and some results
- IPM Approach

Background

Eye gnats are prevalent in the warmer U.S. states including the southern parts of California and Arizona. In San Diego County, especially in the Jacumba and Escondido areas, they have been a nuisance problem for many years and are the source of numerous citizen complaints to Departments of Environmental Health - Vector Control, and Agriculture Weights and Measures. While the source of the eye gnats is unknown, residents of the area blame local agriculture and are looking to the County for a solution to this nuisance problem. Eye gnats are nuisance problems in other agricultural areas in Southern California and have been extensively studied for more than a century. In many cases the eye gnat problem has been successfully addressed by identifying the source, altering land management practices, implementing an integrated pest management (IPM) approach and conducting a sound public outreach and education program. While some elements of this approach have been tried in the Jacumba area, the overall program has not yet been successful in alleviating the problem to date.

Background

Eye gnats

- Attracted to eyes, ears, nose, mouth, scabs, mucous
- Extremely persistent
- Potentially transmit pink eye and other animal bacterial disease
- Disrupt normal outdoor life (work, play, gatherings, etc.)
- Small numbers are normal in southern California – Endemic
- Greater numbers are assiciated with irrigated agriculture

Eye Gnat, *Liohippelates collusor*

- 1.5 to 2.5 mm long
- range from shiny black to dull gray, with yellow, orange, or dark brown and orange legs
- eggs are very small (approx. 0.5-mm long), curved, and bluntly tapered at either end
- Larvae burrow into a food medium (tilled weeds or agriculture) as soon as they hatch

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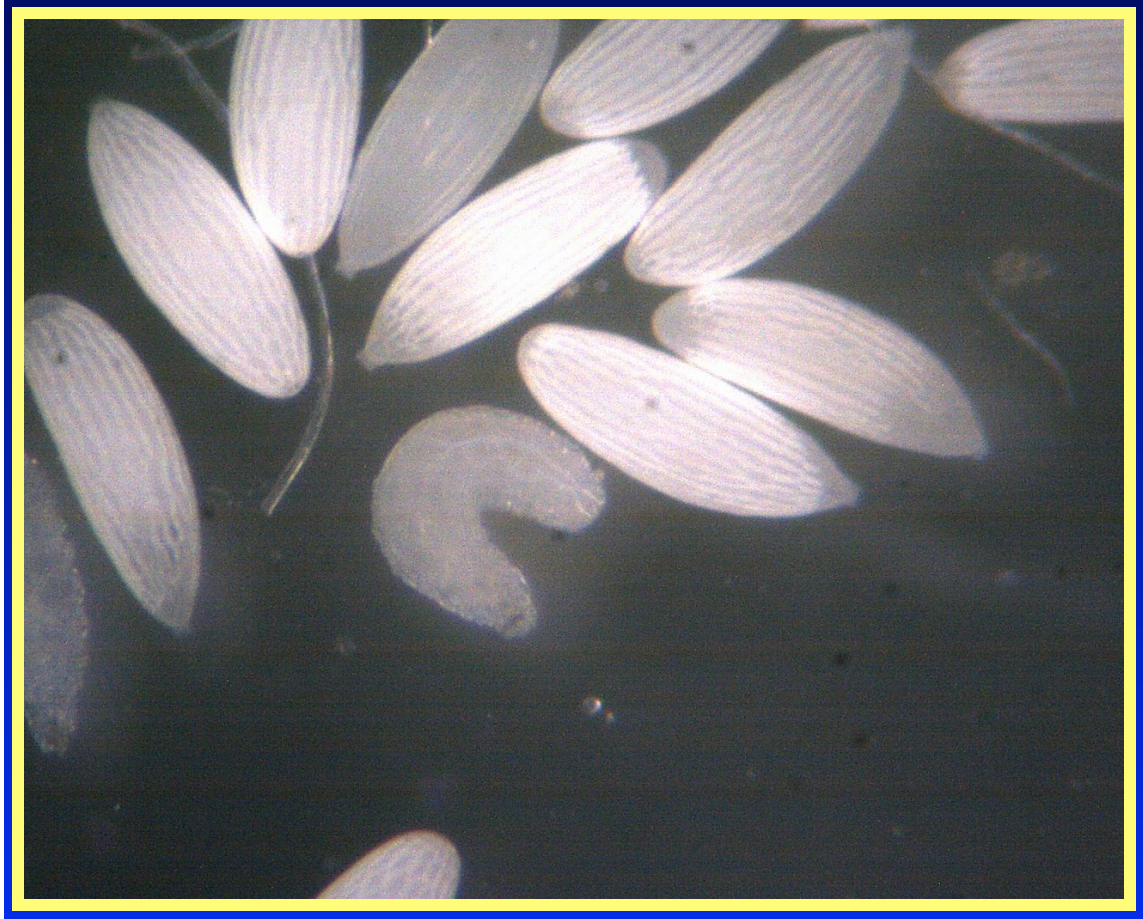

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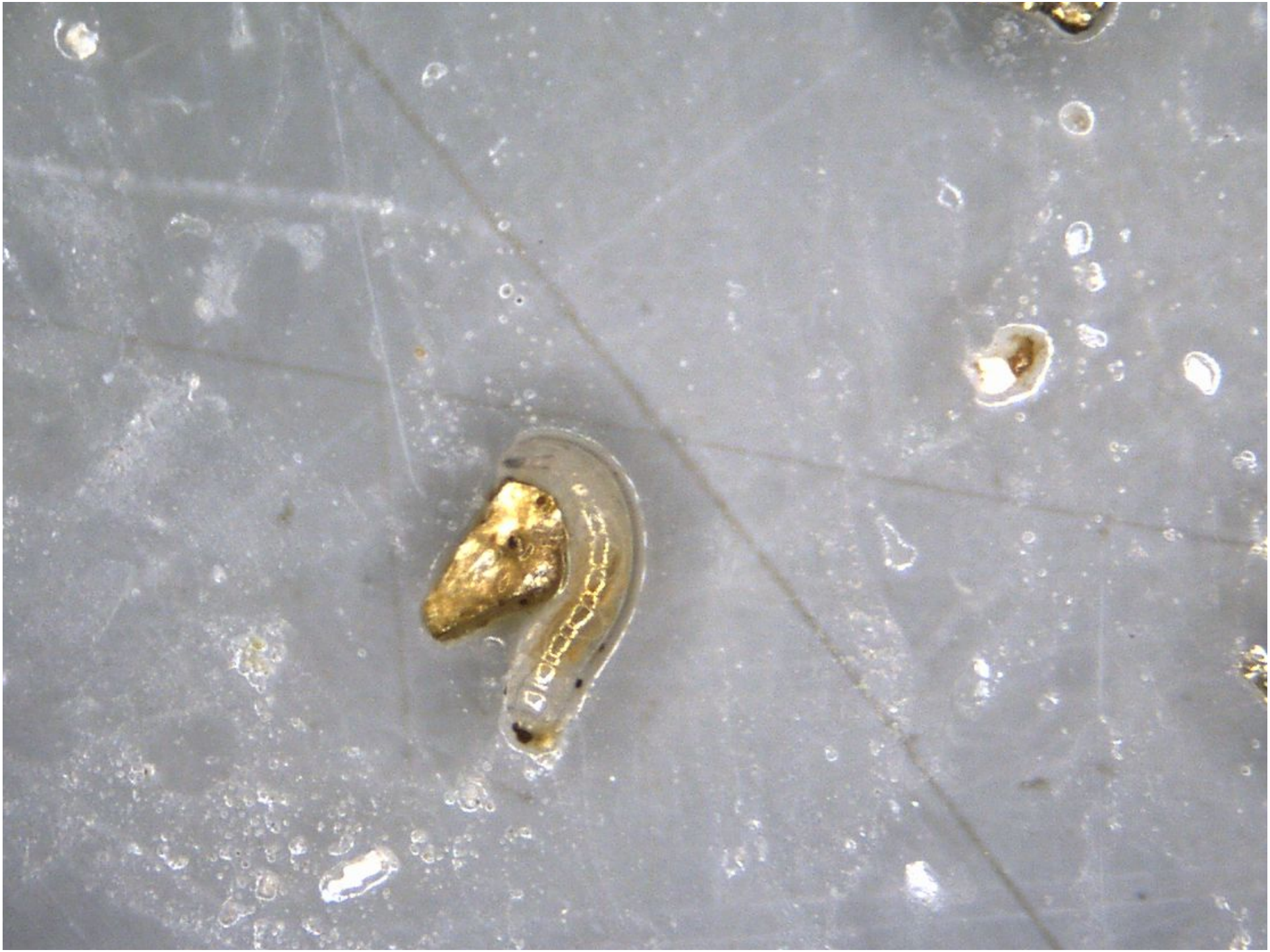

History

- County sought help
- First Visit
- Research preparation
- Scientific literature
- Mir Mulla
  - Visit
- Search for the source
- All encompassing approach

Creation of SDCEGREP

- San Diego County Eye Gnat Research and Education Project
- Cooperation among SD County DEH, AWM, UCCE, and local farm
- Identification of the problem and potential solutions
- Research and Education
- Seek scientific support from UC Riverside

Overall Goal

Reduce eye gnats to natural levels

Reduce the eye gnat impact on communities in close proximity to farming

Direct research toward the overall goal

Transparency

Web Page

Home
About Extension

Home & Garden

Home Horticulture
Master Gardener Association

Natural Resources

Coastal Resources
Invasive Plants
Environmental Issues

Nutrition, Family & Consumer Science

Nutrition, Personal Finance, and Food Safety Education

Commercial Agriculture

Agricultural Economics & Small Farms
Floriculture & Nursery
- About Ask the Advisor
- Power Point Presentations
- Research Studies in Floriculture and Nursery Production

San Diego County Eye Gnat Research and Education Project

Eye gnats can be found all over the country, but they have become a very serious nuisance pest in San Diego County. The communities of Jacumba and Escondido have been calling county and extension offices in search of some relief to the issue. However, it is a very difficult issue to mitigate.

There are numerous flies that are called gnats, but eye gnats are a small fly that hovers and waves back and forth across the eyes, nose, ears, mouth, etc. They need to feed on a protein source such as the mucus found around your eye. In numbers, they can be very bothersome. For more information see the links below.

Eye gnat pest note published by San Diego County Ag Weights and Measures

Pest Notes - Eye Gnats

The information in the PowerPoint presentation below is a summary of the research study conducted on the serious eye gnat infestation in the community of Jacumba in San Diego County.

Jacumba 2008-2009 Eye Gnat Research Project Power Point Presentation

2008 County Eye Gnat Report Research Report 2008

2009 County Eye Gnat Report Research Report 2009

Research Update as of June 24, 2010 Adult eye gnat numbers are coming down!

2010 County Eye Gnat Report Research Report 2010

Transparency

- Web Page
- Collaborative Tools
  - Invited members
  - JAG
  - County Officials
  - Scientists

UNIVERSITY OF CALIFORNIA AGRICULTURE AND NATURAL RESOURCES
COLLABORATIVE TOOLS
A SIMPLE WAY TO STAY CONNECTED

HELLO, JAMES BETHKE
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SAN DIEGO COUNTY EYE GNAT RESEARCH AND EDUCATION PROJECT GROUP

GROUP DESCRIPTION

ADD A NEW DISCUSSION

GENERAL DISCUSSION LIST	POSTS	STARTED BY	SUBSCRIPTION	LAST POST DATE/TIME	
UT article - Newest Message!	1 New!	Tracy Ellis	Subscribed	11/18/2011 at 10:27 AM	Delete
Power Point Presentation is on the web	1	James Bethke	Subscribed	2/9/2009 at 8:04 PM	Delete
New file in the files section	1	James Bethke	Subscribed	11/4/2008 at 12:32 PM	Delete
New file in the files section	1	James Bethke	Subscribed	9/3/2008 at 10:07 AM	Delete
new file in the files section	1	James Bethke	Subscribed	7/8/2008 at 12:51 PM	Delete
Two new files in the files section	1	James Bethke	Subscribed	6/24/2008 at 3:33 PM	Delete
Jacumba visit on April 16 with Dr. Mir Mulla	1	James Bethke	Subscribed	4/11/2008 at 2:16 PM	Delete
Jacumba visit March 5	4	James Bethke	Subscribed	4/2/2008 at 1:30 PM	Delete
Aerial Map of Jacumba	3	Tracy Ellis	Subscribed	12/28/2007 at 4:38 PM	Delete

History

Annual Reports (available online)

- 2008, 2009, 2010
- 2011 in progress

Contents

Executive summaries

Brief technical reports of each project

Records of site visits and lots of photos

Recommendations for management

2008 Report

CONTENTS

2008 Report

VISITS TO JACUMBA

- March 5 – Jim Bethke and Gary Tanazaki test attractants at BorntFarms
- March 12 – Jim Bethke, et. al. perform attractant trial at Bornt farms

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- April 16 – Jim Bethke, Mir Mulla and Harold Axelrod visited Jacumba and observed farm and close proximity of the town. Also met with six members of the community to discuss situation.
- June 12 – Jim Bethke, Marianne Whitehead and Alan Schepps conduct attractant trial
- June 30 – Bryan Vander Mey starts as primary eye gnat researcher for Jacumba
- July 9 – Jim Bethke, Tracy Ellis and Bryan Vander Mey visit Bornt Farms and take fly samples to be identified
- July 16 – Jim Bethke and Bryan Vander Mey go to UC Riverside and talk with Mir Mulla and Harold Axelrod on possible experiments and methods
- July 17 & 18 – testing of traps/products at Kit Carson Park
- July 23 – Bryan Vander Mey visits Bornt Farms and town
- July 29 – Kit Carson Park for trap testing
- July 30 – Bryan Vander Mey builds emergence traps and visits Bornt Farms in Jacumba
- August 1, 4 & 5 – Trap testing at Kit Carson Park
- August 7 – set up first emergence test in Jacumba
- August 11 – check emergence traps in Jacumba

How is the Goal Achieved?

Basic equation in ecology

- **Population growth is influenced by Births + deaths = population**
- **No. of young is influenced by amount of food and fecundity and fertility of females**
- **No. of deaths is influenced by numbers of natural enemies and natural causes such as disease events**

Why is Organic Farming Implicated?

- Exceptional and excessive food source
  - Organic Farming Tenant – Replace Organic matter through tilling practices
  - Tilling of weeds
  - Additional organic matter one or more times a year
- Exceptionally few natural enemies or natural causes for a natural death rate
- Pesticide use restrictions – no effective control or management method

Why is Organic Farming Implicated?

- Trend - Locally Grown Organic Produce
- Grown in close proximity to urban environments
- Eye Gnat population growth has been gradual
- Previous year's aestivating population provides large populations earlier every year

RESEARCH PROJECT GOALS 2008

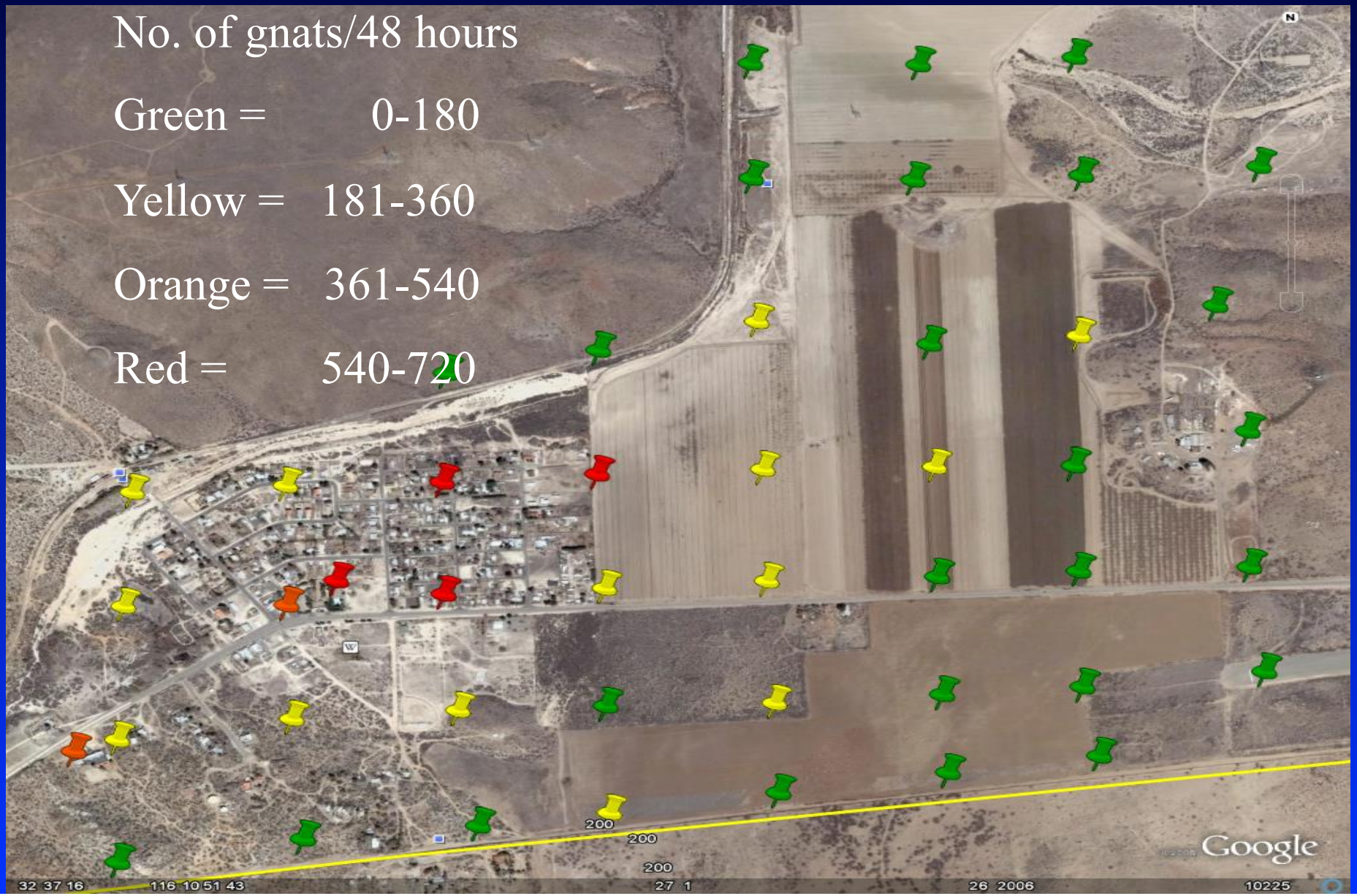
- Experiment with new trap designs and investigate new attractants
- Locating the greatest sources of the gnats that need mitigation
- Search for possible organically acceptable treatments for local organic operation as well as testing new cultural control methods
- Education by providing pertinent publications and information
- Developing a Collaborative Tools site for greater communication

Eye Gnat Laboratory Studies

- Colony Rearing
- Insecticide assays
  - topical and residual assays on adults
  - surface soil application assays
- Field soils
  - eye gnat emergence from field soils
- Soil incorporation studies
  - fresh and dry organic matter
  - organic granular pesticides
- Egg and larval feeding and emergence studies

At what depth will larvae or pupae survive?

October 28-30, 2008



RESEARCH PROJECT GOALS 2008

Deer Off	Putresecnt whole egg solids	0.78
	Capsaicin and related capsaicinoids	0.0006
	Garlic	0.0006
	Other ingredients	99.22
Edible Acid Casein	Protein	90.00
	Moisture	8.00
	Ash	2.00
	Lactose	<0.5
Hydrolyzed Casein	Protein	86.00
	Moisture	5.00
	Ash	5.00
Liquid Fence	Putresecnt whole egg solids	24.65
	Garlic	2.96
	Sodium laural Sulfate	0.61
	Potassium sorbate	0.49
	Other ingredients	71.29
Repellex	Dried Blood	7.50
	Other ingredients	92.50
LI700 **Soy based adjuvant**	Methylacetic Acid	34.70
	Phosphatydicholine	45.30
	Other ingredients	20.00

RESEARCH PROJECT GOALS 2008

RESEARCH PROJECT GOALS 2009

- Continued surveillance of eye gnat populations
- Determine at what elevation the gnats are traveling between the farm and the community
- Continued refinement of eye gnat traps and the evaluation of the farm produced trap
- Search for possible organically acceptable treatments for Bornt Farms
- Education by providing pertinent publications and information

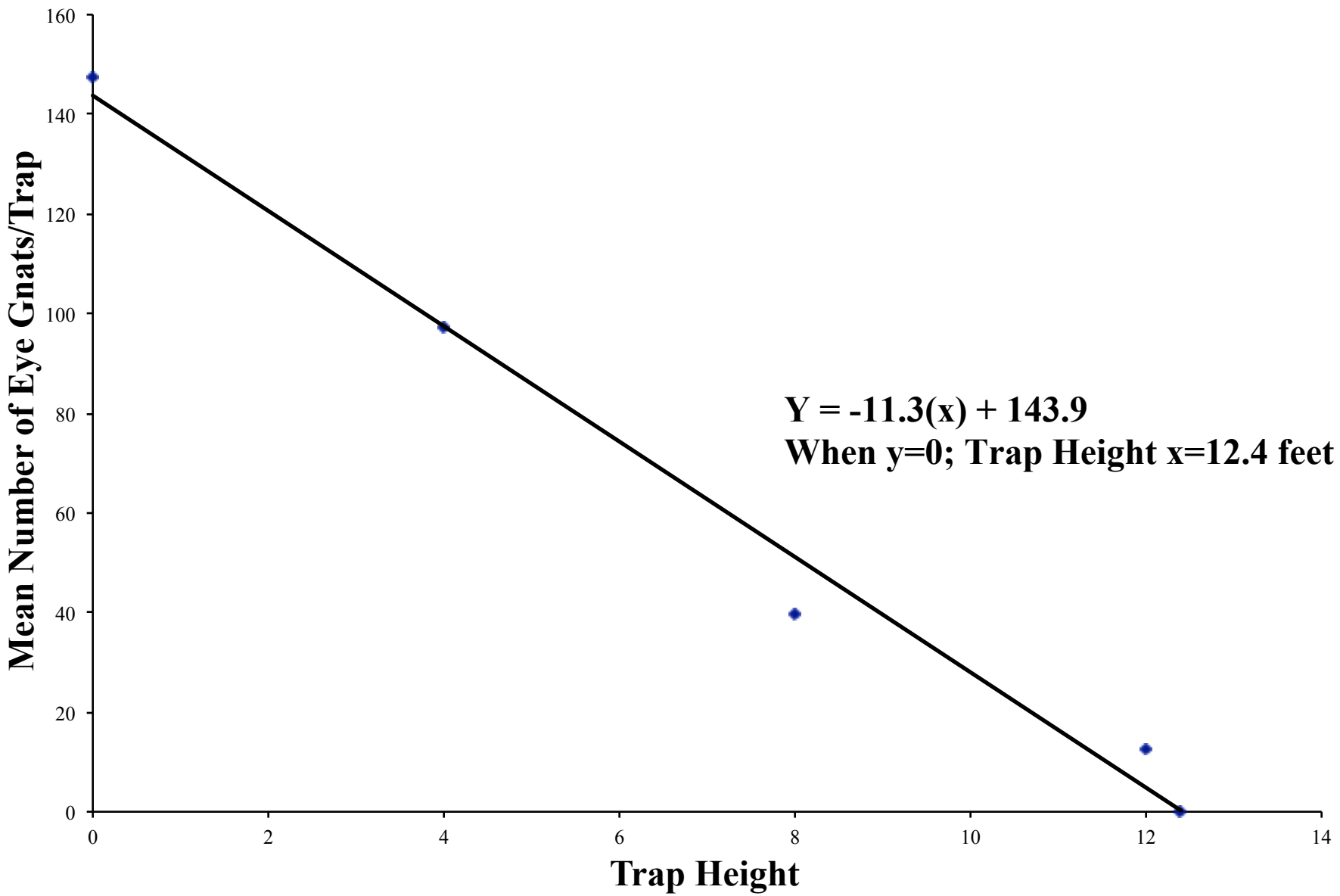
Development of Highly Effective Collar Trap

Development of Highly Effective Collar Trap

HOW HIGH DO THEY FLY?

Height of Trap (Feet)	Mean No. (±SE) Gnats	Percent Reduction
0	147.6 (24.9)a	-
4	97.4 (18.9)a	34%
8	39.7 (9.0)b	73%
12	12.7 (3.1)c	91%

HOW HIGH DO THEY FLY?



All Encompassing Approach 2010

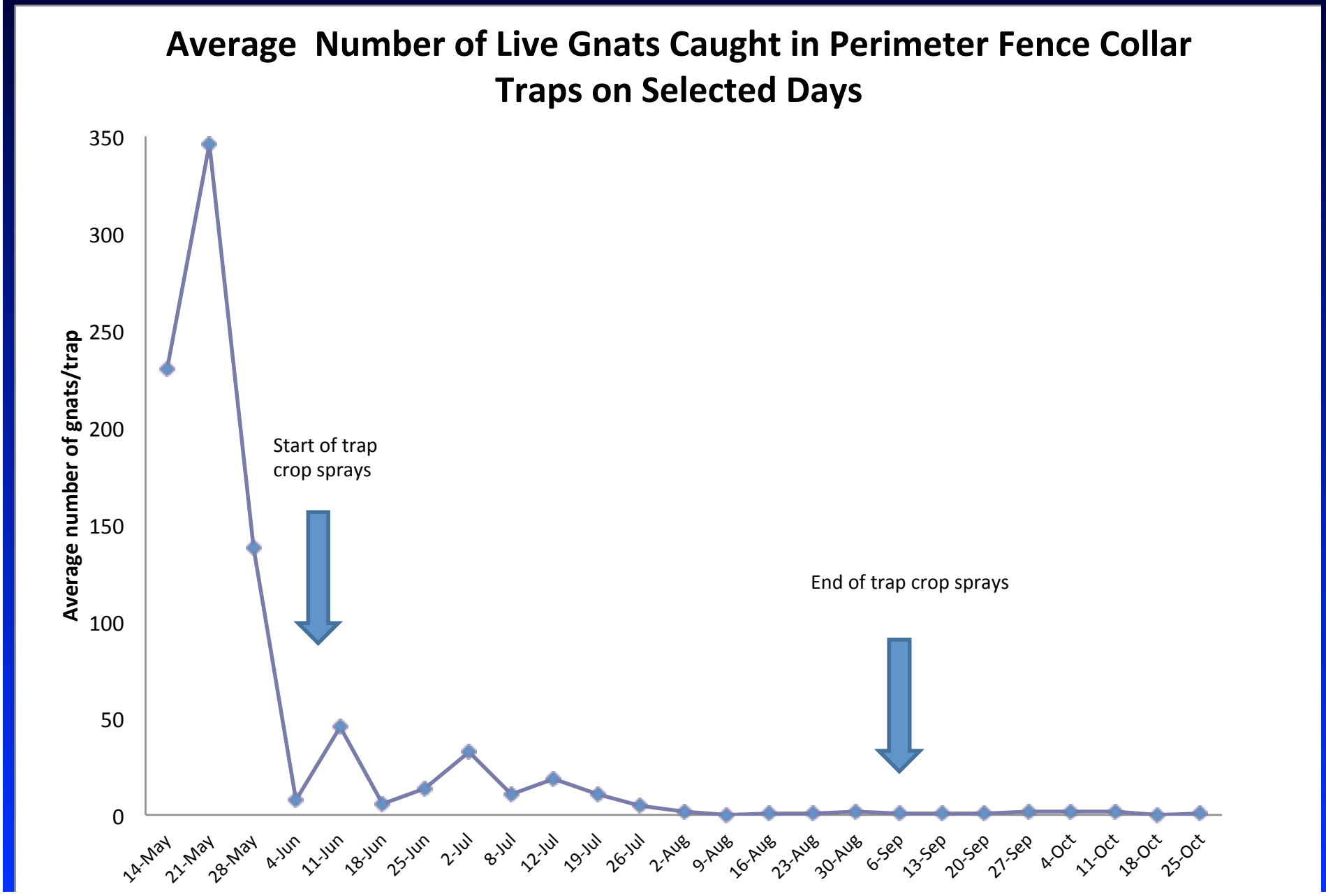
JACUMBA

- **Wall like barrier (12' wall would exclude 100%)**
  - **Erosion barrier (36")**
- **Buffer zone treated with conventional insecticides**
  - **100 linear feet, 12 production rows, 3 and 1**
  - **Alfalfa was very good host (scientific literature)**
  - **Taller plant, corn between**
- **Weekly applications of OMRI registered pesticide**
- **Mass trapping between farm and community**
  - **Double row staggered and 10 feet apart**

BUFFER CROP TREATMENTS

- Conventional or synthetic insecticdes
  - Malathion (organophosphate)
  - Cyfluthrin (pyrethroid)
  - Carbaryl (carbamate)
  - Applied weekly and in rotation
- Appropriate distance from organically produced crop
- Using separate pesticide equipment
- Follow label instructions and cannot be applied during conditions that cause drift

Buffer Crop Treatment Effect



Acknowledgements

- Bryan Vander Mey – SRA
- Irma DeBonis – Agricultural Technician
- County Staff
- Cooperating Growers
  - Bornt Farms and Be Wise Ranch
    - Property, equipment, support
    - >2000 collar traps
    - Erosion barrier
    - Changes in farming practices