

MINUTES OF THE 2005 S-301 TECHNICAL COMMITTEE MEETING

Number and Title of the Regional Project: S-301, Development, Evaluation and Safety of Entomopathogens for Control of Arthropod Pests.

Location and Date of the Meeting: February 27-28, 2005
Edgefield Inn, Troutdale, Oregon

Meeting Participants:

Administrative Advisor (SAES)	D. Boethel
USDA/CSREES Advisor	(absent)

State Agricultural Experiment Stations

Alabama	W. Moar
California	B. Federici
	E. Lewis
Delaware	D. Borchardt
Florida	D. Boucias
	R. Stuart
Illinois	L. Solter
Maine	E. Groden
North Dakota	M Boetel

U.S. Department of Agriculture – Agricultural Research Service

Beltsville, MD	R. Farrar
Byron, GA	D. Shapiro-Ilan
Corvallis, OR	D. Bruck
	K. Donahue
	A. Griffith
	R. Kepler
Gainesville, FL	R. Pereira
Logan, UT	R. James
Peoria, IL	R. Behle
Shafter, CA	M. McGuire
Sidney, MT	S. Jaronski
Stoneville, MS	J. Leland
Yakima, WA	L. Lacey

Other Attendees

Becker-Underwood	E. Reinot
Earth BioSciences	T. Corell
Exosect	I. Baxter

Marion Ag. Service
Natural Industries
PACE Consulting
Pest Management Systems
SoilSmith Service

D. Hicks
T. Lichatowich
W. Gelernter
M. Bergin
S. Smith

Adopted Agenda: See attachment

Meeting came to order at 8:30 AM, February 27, 2005.

The meeting called to order by R. P. The first order of business was discussion of the upcoming submission of the renewal for the project. All is on schedule and no problems are anticipated in meeting the deadline of October, 2005 for the final product.

Denny Bruck, the local organizer gave details of the meeting location and meals to be served. Registration was set at \$50.

SARES Administrative Advisor's D. Boethel gave report on project and praised participants for effectiveness in producing reports and proposal renewal. David talked about the new proposed federal budget and the possible effects on Land Grant universities and the research conducted at these institutions. Some discussion followed with participants stating the different levels of impact expected in different universities. Expected impact vary from minimum in states that do not rely heavily on federal funding, to very hard on states such as Maine and others where most of faculty salaries are paid with federal funding.

Preliminary introductions on the Workshop followed and D. Bruck took command of the meeting to make introductions of Workshop presenters.

Special minutes: Workshop with Growers, Researchers and Industry representatives. Our goal was to come up with an action that could be taken by the group as a whole.

Two presentations were made at the beginning to illustrate two situations where microbials have been successfully implemented:

Robin Stuart presented a talk on the use of entomopathogenic nematodes in Florida citrus against the citrus root weevil.

Lerry Lacey presented a talk on using microbials in apple in western Washington.

Question: How flexible are growers in terms of implementing new methods for pest control?

- a. commodity-specific flexibility

1. Low-flexibility: potato, row crops, cotton, “traditional agricultural crops”
2. High-flexibility: tree fruit, greenhouse, nurseries

Proposed reasons for the differences were education, need for a fast re-entry interval for greenhouse operations and the need for new answers to new problems faced in the nursery business. Also, some crops have pressing pest problems that are not currently being solved by chemical control strategies, so they are looking for other alternatives.

Grower Needs

A suggestion was made that the traditional approach to solving insect problems is to wait until they are true crises. This is not an approach that is amenable with “sustainable agriculture”. Several reasons were suggested to underlie this situation. A most important one was that funding agencies will only fund research on an existing problem, by which time it is too late to treat is as anything but a crisis.

Most growers have diversified. In this newly diverse habitat, determining how to integrate various different crops into a cohesive management program is problematic. Suggestions were made by the growers that limited understanding of complexity of the system is a significant impediment management programs.

One suggestion was to emphasize a conservation approach to microbial control. This approach is compatible with many of the new practices of sustainable agriculture. The effects of composting and using “compost tea” were discussed at length. The final consensus, if there was one, was that we don’t know enough about what, exactly, comprises compost tea to know what the interactions between this amendment and microbial insecticides might be. This was identified as a potential fruitful direction for further research.

Stored products were also identified as problematic, especially those that contribute allergens to the environment.

New treatment thresholds need to be developed. The threshold for microbials might often be lower than those for chemicals. But, these are not available at the time.

We need to try to come up with recommendations about how to integrate microbials into the whole system.

Industry needs

It is a challenge to instruct growers to use products properly. When a product fails due to improper use, it is very costly to the biocontrol industry because the end users tend to think the product is unreliable. The method for getting instructions out to growers that was developed for the chemical industry is not working for biological control, partly because it takes a more sophisticated consumer to use microbials, and partly because a

major source of information for the growers is coming directly from the chemical industry.

We can't expect the majority of growers to make major shifts in management to accommodate microbials.

Information dissemination is a major problem. The chemical industry has spray manuals, etc. that every county agent has at their disposal. No such guide is available for microbials.

A proposal was made to develop such a guide. Such a guide should be:

Regularly updated.

Available on the Internet.

List relevant information that would enable County Extension personnel to recommend them.

Advertised in trade journals.

Linked to Pest Management Centers.

Organized based on the commodity groups in the SDC 314 proposal.

The possibility of the group submitting a grant proposal to SARE, or a similar agency, was discussed at length. The deadlines for various regional grant programs will be checked and the group will target one of these programs for a proposal. Possibilities other than SARE: IR-4.

A committee, comprised of the sub-project chairs, will build a framework for such a web page, and then send out questionnaires to everyone in their Subsections. Ellie Groden volunteered to check into the SARE grants in order to hire someone to coordinate and build the web page. Annual updates will be done in conjunction with the annual meetings.

Subproject Discussions:

Subproject 2 Discovery of entomopathogens and their integration and safety in pest management programs for ornamental, vegetable, fruit and nut crops.

(Chair, D. Shapiro-Ilan)

Drion Boucias (Univ of FL) is studying a new *Hirsutella* spp that is pathogenic to glassy winged sharpshooter.

Bill Moar (Auburn Univ, AL), is investigating Bt in weevils (sweet potato weevil).

Lerry Lacey (ARS, Wapato) reported on *M. anisopliae* on wireworms and virus Vs tuber moth worm.

Lee Solter (IL) is investigating surfactants combined with *S. feltiae* for thrips control. Also she is identifying a new microsporidia from black vine weevil in collaboration with Denny Bruck (ARS, Corvallis). Denny Bruck's lab is also looking as *M. anisopliae* for black vine weevil control in ornamentals.

David Shapiro-Ilan (ARS, Byron) is investigating microbial control of orchard pests. Nematodes are showing promise in control of pecan weevil, plum curculio, and lesser peach tree borer. Fungi are also showing promise for pecan weevil control. Shapiro-Ilan is conducting studies on the genetic basis of beneficial trait deterioration in collaboration with Randy Gaugler (Rutgers, NJ) and Byron Adams (Brigham Young Univ, UT).

Ed Lewis is conducting studies on entomopathogenic nematode infection dynamics in collaboration with D. Shapiro-Ilan and Jim Campbell (ARS, Manhattan, KS).

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The S-301 Meeting continued on Mon, Feb 28, 2005

Subproject 4 Discovery of entomopathogens and their integration and safety in pest management programs for medical, veterinary, and structural pests: (Brian Federici leading in place of chairs Jimmy Becnel & David Oi)

Bob Behle (ARS, Peoria) is working with a new foam formulation for delivery.

Drion Boucias (Univ FL) reported on *Helicosporidium* in *Culex*. Activities include methods of increasing virulence. This pathogen has an extremely wide host range.

Tom Corell (Earth Bioscience) reported on tick control with *Metarhizium anisopliae*; testing the F52 strain in field. The primary interest is in homeowner use.

Roberto Pereira reported on various activities at his location (ARS Gainesville) pertaining to fire ant research. David Oi is looking for new *Thelohania* in Argentina; and also looking at *Vairimorpha* field release. A combination of these two pathogens would likely be most efficacious.

Also at the Gainesville ARS lab, researchers found a new virus in ants (a picornavirus), which is the first virus reported in ants. A control approach would likely be inoculative or introduction (for virus and above pathogens) resulting in moderate reduction.

Pereira is pursuing fungi for fire ant control using a *Hirsutella* and an unidentified fungus (tentatively *Akanthomyces* sp.).

Ellie Groden (Univ ME) is working on an ant being called the European fire ant, which is a continuing significant problem in several localities in Maine. She did survey work in England and found several fungi and a nematode, including putative new species of fungus.

Brian Federici (Univ CA, Riverside) reported on work on recombinant bacteria for mosquito control; they transferred the toxin from *Bacillus sphaericus* into *Bacillus thuringiensis israelensis* (Bti) (both bacteria are already commercial products for mosquitoes). The result of the recombination is greater prod of *B. sphaericus* toxin per cell. The result is 10-20x efficacy compared to either wild type. Efficacy mostly vs. *Culex* but also may have potential Vs malaria carrying mosquitoes.

Subproject 1 Discovery of entomopathogens and their integration and safety in pest management programs for major acreage crops (Bob Behle, Chair).

Sugar beets:

Mark Boetel (North Dakota State Univ) is working on fungi for control of the sugar beet maggot using *Beauveria* and *Metarhizium*. He is collaborating with Stefan Jaronski (ARS, Sidney) and conducting lab and field trials. Jaronski (ARS, Sidney) working with *Metarhizium anisopliae* strain F52 for sugar beet maggot control, observed reduced efficacy with decreasing soil moisture. *Metarhizium* seems to work well when the insect density is not too high; at higher densities the pathogen approach will probably have to be integrated with other strategies. Jaronski is also looking at wireworms and Collembola control with fungi.

Cotton:

Bill Moar (Auburn University, AL) is working with Bt cotton. One project focuses on resistance management; the team is developing a standard protocol to detect resistance. Also Moar is working on developing resistance to *H. zea* in lab.

Jarrold Leland (ARS, Stoneville) is researching microbial control of cotton pests. He is collaborating with Mickey McGuire (ARS, Shafter) investigating new isolates of *B. bassiana* for control of *Lygus*. Leland is also looking at *Neozygites* in cotton aphid suppression (and for consideration in soybean aphid control).

Mickey McGuire (ARS, Shafter) reported on their focus on *Lygus* control with microbials in CA cotton. They observed high levels of control with *B. bassiana* fungi in alfalfa (they used alfalfa because *Lygus* populations are more consistent than in cotton). They have developed molecular markers for the *B. bassiana* strains so that they can follow infections/persistence of these strains following field application.

Alfalfa:

Rosalind James (ARS, Logan) investigated non-target effects of hyphomycete use in alfalfa on pollinators. Also they have developed PCR markers to identify chalkbrood infections. Additionally, in collaboration with J. Leland, she is working on *Varroa* mite control with *Metarhizium anisopliae*.

Potatoes:

E. Groden reported on studies using *B. bassiana* for Colorado potato beetle control, looking at interaction between introduced and endemic fungal strains.

L. Lacey (ARS, Wapato), is investigating potato tuber moth control, a significant emerging pest. They are looking at granulosis virus as well as fungi and nematodes for control. Also they are studying control of wireworms in potato; nematodes do not appear to be promising. *Metarhizium* may be an option.

Other:

Drion Boucias (U FL) is working on *Thripinema* in collaboration with J. Funderburk (U FL) for thrips control.

Subproject 3 Discovery of entomopathogens and their integration and safety in pest management programs for urban and natural landscapes (Roberto Pereira led the meeting in place of co-chairs Parwinder Grewal and Ed Lewis).

Lee Solter (IL) looking at host specificity microsporidia, and field trials for gypsy moth control; collaboration is with V. D'Amico (USFS, Newark).

Tom Corell (Earth BioScience) is cooperating with Ann Hayek (Cornell, NY) on *M. anisopliae* control of Asian longhorn beetle using bands of the fungus around the tree. Also Corell is working on white grub control in turf.

DeAnna Borchardt (U of DE) working with Vince D'Amico (USFS, Newark) is using a voltage clamp to study Bt toxin effects in gypsy moth.

Stefan Jaronski reported on grasshopper control with fungal agents on rangelands. He is investigating an attracticide and strip-treatment approach using GHA strain, but temperature tolerance is problematic due to behavioral fever. Also he is looking at Mormon cricket control with fungal agents. Jaronski is collaborating with Don Roberts (UT St. Univ.), they are looking for new pathogens in Mormon cricket.

FINAL BUSINESS MEETING

Project renewal and Meeting Format

Overall, the new program for the meeting (i.e., no plenary session) was viewed positively by the group.

It was proposed and agreed upon that everyone get a chance to look at the new proposal for comment before submittal.

It was suggested that the titles of the objectives be made more distinct to the reader; there was general agreement.

Site Selection

Wooster was offered last year (by Grewal) but concern arose over the potential snow. Preference was for Atlanta or Savannah (if cost and accessibility is OK). Athens was not favored. Host = Shapiro-Ilan and possibly Gardner.

Theme for 2006 meeting presentation and discussion

Topic = focus on the project's large acreage objective (e.g., cotton). Program support assistance and consultation will be from Bill Moar, Jarrod Leland, and D. Steinkraus. Possible speaker- Pat O'Leary. A historical perspective could be included. One proposal was to have a speaker from biocontrol producer group.

Dates: End of Feb (26-28 likely).

New business None

Adjourn.

Respectfully submitted,

Roberto Pereira
Chair

David Boethel
Administrative Advisor

ATTACHMENT 1

**S-301 Regional Research Project (SDC 314)
Agenda**

**February 27-28, 2005
Edgefield Inn, Troutdale, Oregon**

Sunday, February 27

- 7:00 AM CONTINENTAL BREAKFAST
- 8:00 AM REGISTRATION
- 8:30 AM PRELIMINARY BUSINESS MEETING
1. Local Arrangement's Committee Report (D. Bruck)
 2. Minutes of 2004 Annual Meeting (P. Grewal)
 3. Chair's report/Proposal for Project Renewal (R. Pereira)
 4. SARES Administrative Advisor's Report (D. Boethel)
 5. CSREES Administrative Advisor's Report (R. Nowierski)
- 9:00 AM SEMINAR PRESENTATIONS:
- Dr. Robin Stuart, "*Microbial Control of Citrus Pests*"
Dr. Lerry Lacey, "*Microbial Control of insect pests of tree fruit*"
- 10:00 AM BREAK (coffee, tea, snack)
- 10:30 AM WORKSHOP / DISCUSSION
- Use of Microbial Control in Fruit Crops:
- Recommendations for research and extension activities
 - Needs for policy changes and governmental actions
 - Grower needs and expectations
- 12:00 PM LUNCH (included in registration)
- 1:30 PM CONCLUSIONS AND RECOMMENDATIONS FROM
WORKSHOP / DISCUSSION
- 2:45 PM BREAK (soft drinks, snacks)

3:00–4:30 PM SUBPROJECT MEETINGS - SESSION I

Discovery of entomopathogens and their integration and safety in pest management programs for ornamental, vegetable, fruit and nut crops. [*Co-Chairs: Mike Brownbridge and David Shapiro-Ilan*]

5:30-7:00 PM MIXER

Monday, February 23

7:00 AM CONTINENTAL BREAKFAST

7:45 AM REGISTRATION

8:30 AM SUBPROJECT MEETINGS - SESSION II

Discovery of entomopathogens and their integration and safety in pest management programs for major acreage crops. [*Chair: Robert Behle*]

10:00 AM BREAK (coffee, tea, snack)

10:30 AM SUBPROJECT MEETINGS - SESSION III

Discovery of entomopathogens and their integration and safety in pest management programs for medical, veterinary, and structural pests. [*Co-Chairs: David Oi and Jimmy Becnel*]

12:00 PM LUNCH (to be announced)

1:15 PM SUBPROJECT MEETINGS - SESSION IV

Discovery of entomopathogens and their integration and safety in pest management programs for urban and natural landscapes. [*Co-Chairs: Ed Lewis and Parwinder Grewal*]

2:45 PM BREAK (soft drinks, snacks)

3:00 PM FINAL BUSINESS MEETING

1. Project renewal
2. Site selection committee report
3. Theme for 2006 meeting presentations and discussion
4. New business