

**Minutes of the 2007 Annual Meeting  
NE-1025, Multistate Research Project**

**Biology, Ecology and Management of Emerging Pests of Annual Bluegrass on Golf Courses**

Barton Lab, NYSAES, Cornell University  
630 W. North St., Geneva, NY

Attendees: Doug Haith, Peter Landschoot, Bruce Clark, Dan Peck, Rich Cowles, David Huff, Joseph Roberts, John Inguagiato, Jim Murphy, Dan Olmstead, Frank Rossi, Steve Alm, Darryl Ramoutar, Tom Hsiang, Albrecht Koppenhöfer, John Kaminski, Lane Treadway, Wakar Uddin, Masa Seto, Jennifer Grant, JoAnne Crouch, Michelle DaCosta.

Day 1

The meeting was called to order at 1:04 p.m. on May 8, 2007

Dan Peck welcomed us to the meeting, and complimented Bruce Clark for the excellent job done in preparing the first annual report.

A slate of officers was offered:

Chair	Dan Peck
Vice Chair	Pete Landschoot
Secretary	Rich Cowles
Outgoing Chair	Bruce Clark
Administrative Advisor	Rich Rhodes
Administrative Liaison	Rick Meyer

A motion to accept the slate was offered and seconded, and approved by unanimous vote.

The meeting then proceeded to state reports, summaries of which are given below.

California: Frank Wong was unable to attend, but he sent a full report.

Connecticut

Rich Cowles reported on his work with annual bluegrass weevil. Filter paper bioassays appear to be a very convenient and efficient means to identify pyrethroid susceptible vs. resistant adult weevils. At field dosages (based on amount applied per unit surface area) susceptible weevils all die within 48 h, whereas <10% of weevils from resistant populations die. Field trials of various chemical control products were not successful in 2006, due to excessive rain and flooding.

John Kaminski reported on anthracnose. Populations at golf courses appear to fall into two classes. Where anthracnose appears in the autumn, it is uncontrollable as it develops under the snow. In field trials, Lynx (tebuconazole) has had the best results, and this product will soon be registered. Very early spraying, as soon as the snow melts, may have benefits in preventing anthracnose development.

Maine: Alan Langille has retired and so is no longer a participant.

Maryland: Peter Dernoeden had hoped to get a student to work on this project, which didn't happen. As a result he's not sure how much he'll be able to participate with this project. Paula Shrewsbury couldn't attend due to the activities in the field season.

Massachusetts

Robert Wick, Geunhwa Jung and Pat Vittum were unable to attend.

Michelle DaCosta introduced herself to the group. She is interested in participating by investigating the drought and heat tolerance of annual bluegrass. Geunhwa Jung, the newly hired plant pathologist, will participate with isolates and genetic analysis of *Colletotrichum*.

Michigan: Joe Vargas was unable to attend.

Minnesota: Vera Krischik was unable to attend because of a family emergency.

New Hampshire: Stan Swier was unable to attend.

New Jersey

Albrecht Koppenhöfer reported on his lab's work. Chemical control plots were oversprayed by the superintendent, so that experiment needs another chance in 2007. In 2005, Ben found insect pathogenic nematodes at two courses, *Steinernema carpocapsae* and *Heterorhabditis bacteriophora* were recovered. There were large variations in nematode populations during the summer. They have estimated ~23% mortality for the first generation, 27% for the second generation. Instars 3, 4, and 5 are infected, with a higher incidence of infection for the later instars. Sc and S. feltiae look best in lab studies, especially against the 4<sup>th</sup> instars. S.f. preliminary results look good in field trials.

Jim Murphy described studies on the influence of cultural practices on the development of anthracnose.

- Seed production in annual bluegrass leads to severe carbohydrate depletion, therefore growth regulators that prevent seed formation may enhance tolerance to anthracnose. Primo, Proxy and Embark were studied; Primo reduces anthracnose by 29-60% relative to check plots. Mefluidide is only beneficial in reducing anthracnose when used in combination with Primo. Ethephon demonstrated some

- reduction in anthracnose severity when used alone. The BMP guidelines will be to use Proxy/Embark at labeled rates in March and April, Primo by itself later.
- A topdressing study determined that non-topdressed plots had more disease. A larger amount of topdressing and more frequent applications led to less disease, mostly due to improvements in the recovery phase.

JoAnne Crouch discussed the genetic analysis of anthracnose. The anamorph (asexual form) is the only stage found in nature. There are ~100 isolates, with no successful matings among any pairs tested. However, there is genetic evidence that sexual reproduction has occurred sometime in the past. Phylogenetic analyses were performed on 203 samples from 45 grass species, using the internal transcribed spacer (ITS) regions, the superoxide dismutase gene, and the MAT gene. Those species (*C. cereale* and *C. graminicola*) infecting C3 grasses have a broad host range, infecting 31 grass species, whereas the species of *Colletotrichum* infecting C4 grasses appear to be highly species specific.

After refreshments, the Director of the NYSAES at Geneva, Tom Burr, gave welcoming comments.

New Jersey (continued)

Bruce Clarke reported that tebuconazole (Lynx) worked slightly better without the green pigment; propiconazole (Banner) was not quite as good; and benzothiadiazole (Actigard) had some activity by itself. Actigard is not a conventional fungicide, rather, it activates systemic acquired resistance traits. Chlorothalonil (Daconil Ultrex) also worked quite well. Resistance appears to have appeared to QoI fungicides. A test of “Emerald Isle” which is a mixture of fungicides and other products, does help to suppress disease.

New York

Doug Haith introduced himself and offered assistance to the group for quantifying the environmental benefit for BMPs we develop. Doug’s specialty is modeling the movement of agricultural chemicals through soil and water.

Frank Rossi discussed how a mower’s set-up can affect stress on the turf, which then influences anthracnose development. Variables include the weight of the mower, type of roller, height, and blade angle, all of which influence the “aggressiveness” of the cut.

Dan Peck

- Maria Diaz’s Master’s Thesis is available as a PDF.
- His lab has found that ABW overwinter in rough-mown grass, often as much as 60 m from fairways. They are also found at the edges of woods and into woods. Pine litter is not a preferred overwintering site.
- Larvae were found to grow according to Dyar’s rule (a geometric progression of increasing size); there is non-overlapping head capsule width for each instar, so the instar can be identified readily by measuring the head capsule.

- Male and female beetles appear to emerge from overwintering sites and migrate to fairways at the same time.
- There are inconsistent results regarding the distribution of larvae at edges vs. interiors of fairways.
- Degree-day data appear to be quite tight, and will be confirmed with collaborators in 2008.
- An ABW fact sheet was written; a sample was distributed

## North Carolina

Lane Tredway discussed bentgrass and anthracnose basal rot. Newer Penn State varieties appear to be quite tolerant/resistant to this disease. Signature and Daconil combination has been very effective for its management. Proxy and Primo are used together to suppress annual bluegrass seed head development, but Proxy by itself causes poor color. All isolates of *Colletotrichum* have been resistant to thiophanate-methyl and azoxystrobin.

## Ontario

Tom Hsiang noted that he has found evidence of *Colletotrichum* hyphae growing within the grass roots, which was easily confused with summer patch. He had difficulty inducing infections in field trials with the standard inoculate and tarp method.

## Penn State

Pete Landschoot has been focusing on the effect of phosphonate fungicides. Signature helped on its own. In combination with Alude or 3336F, phosphorous acid helped, too. Alude plus 3336F, applied without Signature, were ineffective.

Wakar Uddin discussed his studies on interactions between mowing height and aggressiveness of verticutting. Lower mowing height and more aggressive verticutting resulted in greater disease. He has also been studying the influence of the source and rate of nitrogen. Sources include urea, IBDU, and methylene diurea.

The meeting adjourned at 6:02 p.m.

## Day 2

The meeting was called to order at 8:15 a.m. by Dan Peck

Penn State continued its report. Dan Peck passed along chemical control research trial reports from Paul Heller: Conserve or Dylox have given ~90% control of larval populations, while chlorantraniliprole has given 95% reductions in populations with a preventive timing.

Dave Huff gave an overview of his work on improving *Poa annua*.

- Those needing seed for their studies should contact him at [drh15@psu.edu](mailto:drh15@psu.edu). There are varying quantities of seed available for various kinds of study. Some gram quantities for greenhouse studies, the top 12 accessions have enough seed for some small plot work, and mixtures of seeds are available for slightly larger field plots.
- Different qualities of *Poa* are found associated with types selected for different growing conditions. Fairway (annual) types tend to have 3 – 6 tillers at the time of flowering, whereas the greens types will develop 9 – 52 tillers before flowering. Those with less flowering survive low mowing heights better. Control over the GA3 and GA20 production seems to be the key to perennial traits. Strangely, when perennial types are isolated, they often will revert to annual type habits often in ~2 generations. The cause of this reversion, and the perennial type traits, may be controlled by methylation of DNA which causes deactivations of genes. Close mowing heights may shock the plant and induce methylation, which in turn causes epigenetic modification of the phenotype.
- David collected various European species of *Poa* and studied their habits and adaptation last summer.
- Studies on the influence of growth regulators show that early blocking of the GA pathways is herbicidal, while later blocking gives healthier plants with more perennial characteristics.

University of Rhode Island was represented by Steve Alm. He mentioned that Bridgette Rummele will help with germplasm testing, but she couldn't make it to the meeting. The URI studies related to ABW will be continuing this year, but because of the bad weather, there were no data to report from the 2006 chemical control field tests.

Ad-Hoc Committees then reported.

- Industry Survey: John Kaminski launched the survey on Dec. 1, 2006. There have been 95 responses so far. Of the respondents, 23% report no problem with anthracnose. Superintendents spend \$10,000 - \$60,000 per course on fungicides, with 11 – 30% expressly for anthracnose management. Up to \$20,000 per course is spent on insect control, with most of the spraying related to collars and greens. There was a very uneven distribution of responding golf course superintendents among states. Pat Vittum will be asked to add a link to the survey site on her web page, and John will send us a Word version of the extended survey to use for obtaining data from selected superintendents.
- Best Management Practices: Jim Murphy will post documents already available onto the project's web site. Editors for the BMP document will be Jim Murphy, Frank Wong, and probably Paul Heller. Paul will be contacted to check on his willingness to serve in this capacity.

Break-out sessions were then called for the ABW and anthracnose groups.

#### Annual bluegrass weevil group

- Obtaining state and county level geographic data should be feasible from the Industry Survey information, along with inquiries directed to state extension entomologists and USGA agronomists.
- There was an incident reported by a USGA agronomist regarding ABW attacking bentgrass in the MD or VA area in 2006. We will ask Pat Vittum, who was called in to look at this incident, to get more information. We have not resolved whether and who would be willing to make collections from unusual incidents like this to make genetic determinations that these are indeed the same species of weevil.
- Steve and Darryl mentioned that about 150 adults are needed to run a topical dose-response determination of LD<sub>50</sub> for one insecticide.
- Only about 40 – 50 adults are needed to test for pyrethroid resistance with the filter paper method. Cowles will ship sets of kits to each of the entomologists in the project.
- Outstanding questions now are whether ABW adults fly back to their overwintering sites, and whether ABW larvae can successfully develop in other species of grasses. For the first question, pyramid (Teddens) traps may be useful. For the second, careful artificial introduction of eggs may be needed. Albrecht mentioned that the adults readily lay eggs in the laboratory.
- Comment to everyone: collect turf damage ratings when collecting cores to correlate larval density with degree of injury.
- We will submit “annual bluegrass weevil” to be given as the official common name by the Entomological Society of America. Currently there is annoying and persistent use of *Hyperodes* and hypies (pronounced HIGH-peas), which we’d like to change over time.
- The value of submitting a review article on ABW and/or anthracnose in Applied Turfgrass Science was discussed – there was mixed reception to this idea, as publication there in a brief could preclude fuller reporting elsewhere.

#### Anthracnose group (reported by Pete Landschoot)

- The group has been on track for the milestones, except for the infectivity/host study
- Frank Wong and John Kaminski are studying overwintering survival
- There was a recommitment to collect isolates
- Further factorial design studies are underway to look at the interactions of cultural practices such as mowing and fertility
- A procedure was worked out with David Huff to share germplasm
- Michelle (UMass) will initiate studies to look at heat and drought tolerance with the same selections being tested for susceptibility to ABW.
- Symposium for practitioners in 2009, possibly in Rhode Island.
- We need tangible outputs by the end of Year 2 (Sept. 2007)

The group then discussed the scheduling of the next meeting, which will be held in early April at Penn State.

Everyone was reminded to keep in mind the impact reporting that will be needed Year 4 or Year 5 of the project. These impacts need to be quantitative estimates of how we have changed superintendents' practices.

There was a reminder that the minutes and the Annual Technical Reports will be due 60 days from the meeting.

We struggled with the problem of non-participants in our project: people that "signed on" but have showed no signs of contributing. Examples, Tammo Steenhuis at Cornell University, and Robert Wick at University of Massachusetts. Others that were not attending had good reasons (as noted). We will contact the Administrative Advisor to discuss removing non-participants from the project.

The meeting was adjourned at 1:32 p.m.

Respectfully submitted,

Richard S. Cowles, Secretary

June 1, 2007