The Language of Pheromones

Program Update

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An important new area of research in my group is the study of pheromones for turfgrass insect monitoring. Pheromones are chemical signals that are released by one individual and stimulate a reaction in other individuals of the same species. Insects of the same species can communicate with one another by emitting small quantities of chemical substances from their bodies into the air. The released pheromone travels through the air until it is intercepted by antenna (or possible other body part) containing sensory receptors that recognize the pheromone as coming from a member of its own species. While in some cases pheromones are single compounds, in many instances an insect pheromone will be a blend of two or more compounds that are produced and released in a specific ratio by the insect. In such cases an alteration in either the structure of the individual compounds or the relative amount of any compound in the blend will cause the pheromone to become inactive.

Information transmitted through pheromone release include:

- The presence of a willing individual (usually a female) advertising her presence to distant members of the opposite sex (usually a male).
- The presence of high quality food or a valuable area to mate or take shelter
- The presence of danger such as predators or parasites or other unwanted intruders in the area.

Although we know that many insect species employ sex pheromones to attract mates, the confirmation of the presence of a sex pheromone is just the first in a long series of steps need to use this pheromone in a practical pest management program. These steps include the verification of the pheromones presence, isolation, identification, and synthesis of compounds and determining proper blend ratios in the laboratory, testing of release rates in the field, optimization of trap placement and design in the field, and finally incorporation of the pheromone into an established turfgrass pest management program. Possible uses of pheromones in turfgrass pest management programs include confirming the presence of exotic or endemic insect pest species, pinpointing the source of an insect population, estimating the size of an insect infestation, and improving the timing of insecticide applications.

MIKE VILLANI
CORNELL UNIVERSITY TURFGRASS TEAM

Turfgrass, Soil and Water Quality Program: 1998, A Year of Transition

The best way to sum up 1998 is to say it was a major year of change. My department changed its position on staff support for faculty resulting in a 50% cut in support staff that I have had for over 15 years. Fortunately, the department has shifted part of Jeff Barlow's time to serve the technical role in my program. Jeff brings with him a strong turfgrass background and has served as our in-house IPM specialist for the past several years.

Results from this year field studies were interesting. The impact of nutrient pretreated zeolite amendment of sand in the greens construction phase was remarkable. If you attended this summer's field day you got to see first hand how effective the natural zeolite was in improving establishment. Applying a natural zeolite (Zeopro) that was pre-loaded with fertilizer (N-P-K) to sand at a rate of 10% by volume, compared to the traditional sand to peat mix (80/20 by volume), resulted in a dramatic improvement in the establishment rate of creeping bentgrass. Within 30 days after seeding, the Zeopro amended sand greens had 80% turfgrass cover compared to only 25% for the sand-peat mix greens. Samples of the drainage water have been collected for analysis to determine the extent of nutrient leaching (nitrate, phosphorus and potassium) as influenced by amend type. From our previous research with natural zeolites, we found them to increase the amount of fertilizer nitrogen in the clippings while reducing nitrate leaching. These results suggest they can be used to enhance establishment in sand based turf systems.

Sewage treatment facilities are one of the contributors of phosphorus in surface waters, which can lead to algal blooms resulting in unsafe drinking water, fish kills and poor quality recreation waters. One option for the disposal of sewage effluent is to land apply it. We have very few sites in the northeastern US that land apply sewage effluent. This summer we were involved with a project with the Lake Placid Resort Club involving using the Village of Lake Placid sew-

If Not for You...

Research, especially field research is an extremely expensive endeavor, requiring substantial funding for the collection of sufficient data test a given hypothesis with a reasonable amount of certainty. For the past several years we have been surveying golf course fairways and home lawns in central New York in an effort to predict which environmental and historical factors influence the distribution and persistence of scarab grubs in turf. These studies suggest that Japanese beetles tend to prefer well managed irrigated turfgrass that is close to vegetation suitable for adult feeding. They appear to prefer loamy soils in full sun. By comparison, European chafers are found in lower maintenance turf sites, without irrigation, and with sandy, well-drained soil textures. They are also commonly found surrounding small trees that serve as aggregation sites for mating pairs. Black turfgrass ataenius grubs were often found on high organic soils and turfgrass with heavy thatch.

These studies have required the collection and processing of thousands of individual soil samples totaling several tons of soil over the four year duration (and counting) of this project. We have been well funded for this study through state and local agencies as well as a strong financial backing from the New York State Turfgrass Association. There are crunch times however when field work needs to be done. That is when we need to call out the volunteers to help in the field who assist our studies by taking sample and processing samples without pay (we do however supply each of our volunteers with a new grub shirt for their efforts). Below is a list of individuals who have worked on the scarab project since 1995. Those individuals who have volunteered their time to help make this work possible are identified by an asterisk next to their name. We are deeply indebted to these people for their generosity.

Mark Adonna
Ken Bell*
Nancy Consolie
Karen Dean*
Jim Engle*
Tim Gibb*
Rachel Herring*
Mark Higgins*
Jana Lamboy*
John Minns Jr.*
Rick Piccioni
Paul Robbins
Julie Stavinsky*
Iris Velazquez
Jim Willmott

Fred Albertelli
Asia Bonnaci*
Frank Consolie
Ariel Diaz*
Kerrie Frisinger
Gisela Godoy
Carol Herring*
Steve Hitchcock
Chris Lenzo
Kandi Nelson*
Carlos Portillio*
Alfredo Rueda*
Rich Stigberg*
Mike Villani
Luann Wilsey

Leslie Allee*
Bonnie Carney
Tom Consolie*
Ariel Casablanca*
Jody Gangloff*
Jennifer Grant
Mary Lou Hessney*
RJ Jarecke
Ken Millington
Jason Nyrop*
Amy Roda*
Cliff Sadoff*
Aaron Teichner*
Karen Wentworth

Bill Arehart*
Chris Casey*
Dan Dalthorp
Preston Dinkle
Chris Gerling*
Bob Hazel*
Wendy Heusler
Vera Krischik*
Brian Minns*
Jan Nyrop*
Chad Reissig
Malia Sommerville*
Maher Tawadros*
Livy Williams

Mike Villani
Cornell University Turfgrass Team

age effluent to irrigation 18 of the 45 holes of this golf course. This project involved the Village of Lake Placid (Paul Guttmann), the Lake Placid Resort Club (Joe DeForest), NYSERDA (Larry Pakanes) and Cornell University. The Village reduced its phosphorus discharge into the Chubb River by 25%, which the golf course had very good looking-functional turf the entire summer. Issues of concern in this project are: would the phosphorus in the sewage effluent irrigation water increase the phosphorus in the turf soil to the point that phosphorus would runoff from the golf course and enter the Chubb River as before; and would the use of sewage effluent irrigation water that contains salts cause damage to the turf. Based on sampling the river and observations of the turf quality, it appears that sewage effluent irrigation of this golf course did not increase the level of phosphorus in the river and did not injure the turf from salt. It should be noted that this was an unusually wet summer so the amount of irrigation was limited and salts would be washed out of the soil. We plan to continue this project next year and will sample impact of phosphorus runoff at a much closer location to the irrigated portion of the golf course.

A. Martin Petrovic
Cornell University Turfgrass Team

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