

Objectives:

(1) Hold biocontrol field days at three locations in Michigan to facilitate distribution of the pathogen throughout Michigan, wherever Japanese beetle has been found.

Pesticide Application Risk Reduction Technology for Golf Course and Athletic Field Turfgrass Using Treated Sand Topdressing Technology

Dr. J.M. Vargas, Jr., Ron Detweiler, and Nancy Dykema

Research at M.S.U. suggests that it may be possible to combine the routine golf course maintenance operations of sand topdressing and pesticide application into one efficient operation, using a combination sprayer/topdresser machine. This novel technology should reduce the cost, play disruption, and the environmental impact (fuel use, CO₂ emissions) of these maintenance operations by reducing the number of trips over the turf, especially greens and tees. The potential for operator and bystander exposure to spray drift and volatilization should also be reduced, since the sprays will be applied to the sand in a wind-protected environment on the topdresser, prior to expulsion of the sand to the turf. "Proof of concept" research is underway for the control of turfgrass diseases such as dollar spot and anthracnose, and to expand the utility of this technology beyond fungicides, to fertilizers and other sprayable turfgrass maintenance products

Optimizing the Efficacy and Environmental Fitness of a Commercial *Pseudomonas* Bacterial Biocontrol Product for the Control of Turfgrass Disease

Liewei Yan and Dr. J. M. Vargas Jr.

Dollar spot caused by *Rutstroemia floccosum* syn. *Sclerotinia homoeocarpa* F. T. Bennet, is the most costly disease on golf courses. This pathogen is becoming resistant to many different fungicide chemical classes thus increasing the need for development of a sound biocontrol alternative to chemical fungicides. A fungicide/antibiotic-producing bacterial strain of *Pseudomonas aureofaciens* Tx-1 (Tx-1) has been commercialized for golf course use with some success in recent years. To achieve adequate control it must be applied daily. This may be partially explained by UV susceptibility of Tx-1, which is a common limitation of biocontrol agents. Results from various wavelengths of ultraviolet radiation (A, B, C) exposure tests showed a significant drop in Tx-1 survivors following increased dosage. Protection with a promising sunscreen was demonstrated in all UV exposure tests. Addition of this sunscreen to Tx-1 cultures provided statistically significant improvement in UV-B tolerance compared to Tx-1 alone. In an attempt to identify the most UV-resistant individual cells, Tx-1 was exposed to intensive UV light (UV-C) for various lengths of time (*in vitro*). Cells (10TC30) with significantly improved survival rate after 7 J/m² UV-C irradiation was found followed by 10 cycles of 30 seconds of UVC exposure. Results from bioassays against *R. floccosum* showed the production of antibiotics efficacious did not change after UV exposures. Field data of dollar spot studies

showed that applied Dollar at high concentration (10^7 CFU/cm²), Tx-1 sunscreen mixture and the strain 10TC30 provided promising disease control on the field study. Population sizes of the treatments were monitored, and results demonstrate the improved percentage of survival of Tx-1 with the protection of sunscreen.

Establishment and Management of Naturalized Secondary Roughs

Aaron Hathaway, Dr. Kevin W. Frank, and Jeff Bryan

Naturalized secondary roughs have become more common on Michigan golf courses over the last 20 years. Whether designed by the architect, or implemented by existing golf courses, these 'out-of-play' areas now appear on all styles of golf courses. Theoretically, these areas require fewer inputs than finely maintained primary rough. However, we have learned that they do require some inputs in order to look and perform as desired. Research at MSU is exploring ways to most effectively and efficiently establish these areas and various approaches to maintaining them year after year. Plots were established by planting either fine fescues or prairie species; or by allowing existing primary rough to grow with fewer inputs. Weed control treatments will include preemergence and postemergence herbicides, burning, and periodic mowing. Results from this research will directly benefit golf course superintendents in Michigan, helping them maintain naturalized secondary roughs with the right balance of aesthetics, inputs, and playability.

Michigan Turfgrass Environmental Stewardship Program

Dr. Kevin W. Frank

The Michigan Turfgrass Environmental Stewardship Program (MTESP) uses a series of self assessment modules to help golf courses evaluate their level of surface and groundwater protection on their entire property. The program, established in 1998, has helped nearly 300 golf courses create an environmental action plan that prioritizes environmental protection activities for the golf course properties. Over 100 golf courses have completed their action plans and achieved certification in the program. There are now 11 modules in the program, with two additional modules currently under development. The GAM has played an important role in the development, promotion, and support of the MTESSP.