The Michigan Turfgrass Foundation and
Michigan State University present:

Turfgrass Field Day

Robert Hancock Turfgrass Research Center
Wednesday August 12, 2015

Michigan Turfgrass Foundation MTF Education • Research • Extension Founded 1957

Michigan State University AgBioResearch

MICHIGAN STATE UNIVERSITY | Extension

Schedule

9:00 AM

Golf 1

- Managing diseases and promoting plant health on golf courses
  Dr. Joe Vargas, Nancy Dykema, and Adam Palmatier

Golf 2

- New methods and recommendations for establishing creeping bentgrass Dr. Trey Rogers, Thomas Green, Eric Chestnut, and Jacob Bravo

Golf 3

- The effect of plant growth regulators and plant health programs on mitigating winterkill of Poa annua putting greens
  Kevin Laskowski

Lawn & Athletic Fields 9

- Avoiding grub damage by growing smart lawns and athletic fields
  Dr. David Smitley

Lawn & Athletic Fields 10

- Turfgrass fertilizer technologies and environmental fate
  Dr. Kevin Frank

9:30 AM

Golf 4

- Mechanical methods to reduce disease incidence and encourage plant health
  Dr. Thom Nikolai

Golf 5/Lawn & Athletic 12

- Herbicide programs for managing naturalized rough areas and herbicide programs for eliminating *Poa annua*
  Aaron Hathaway

Golf 6

- Controlling insects, including an update on Annual bluegrass weevil and European crane fly
  Dr. David Smitley

Lawn & Athletic Fields 11

- Disease management in lawns and athletic fields
  Dr. Joe Vargas, Nancy Dykema, and Adam Palmatier

Lawn & Athletic Fields 12/Golf 5

- Herbicide programs for managing naturalized rough areas and herbicide programs for eliminating *Poa annua*
  Aaron Hathaway

10:00 AM

Golf 2

- New methods and recommendations for establishing creeping bentgrass
  Dr. Trey Rogers, Thomas Green, Eric Chestnut, and Jacob Bravo

Golf 5/Lawn & Athletic Fields 12

- Herbicide programs for managing naturalized rough areas and herbicide programs for eliminating *Poa annua*
  Aaron Hathaway

Golf 7

- Understanding turfgrass stress and plant health
  Dr. Emily Merewitz , Yingmei Ma, Sha Liu, and Sanalkumar Krishnan

Lawn & Athletic Fields 12/Golf 5

- Herbicide programs for managing naturalized rough areas and herbicide programs for eliminating *Poa annua*
  Aaron Hathaway

Lawn & Athletic Fields 13

- Turfgrass species selection and management
  Dr. Kevin Frank

10:30 AM

Golf 3

- The effect of plant growth regulators and plant health programs on mitigating winterkill of Poa annua putting greens
  Kevin Laskowski

Golf 4

- Mechanical methods to reduce disease incidence and encourage plant health
  Dr. Thom Nikolai

Golf 7

- Understanding turfgrass stress and plant health
  Dr. Emily Merewitz , Yingmei Ma, Sha Liu, and Sanalkumar Krishnan

Lawn & Athletic Fields 11

- Disease management in lawns and athletic fields
  Dr. Joe Vargas, Nancy Dykema, and Adam Palmatier

Lawn & Athletic Fields 13

- Turfgrass species selection and management
  Dr. Kevin Frank

11:00 AM

Golf 2

- New methods and recommendations for establishing creeping bentgrass
  Dr. Trey Rogers, Thomas Green, Eric Chestnut, and Jacob Bravo

Golf 3

- The effect of plant growth regulators and plant health programs on mitigating winterkill of Poa annua putting greens
  Kevin Laskowski

Golf 6

- Controlling insects, including an update on Annual bluegrass weevil and European crane fly
  Dr. David Smitley

Lawn & Athletic Fields 10

- Turfgrass fertilizer technologies and environmental fate
  Dr. Kevin Frank

Lawn & Athletic Fields 14

- Comparing precision spray equipment with wands and ride-on sprayers Aaron Hathaway

---

11:30 AM

Golf 1

- Managing diseases and promoting plant health on golf courses
  Dr. Joe Vargas, Nancy Dykema, and Adam Palmatier

Golf 4

- Mechanical methods to reduce disease incidence and encourage plant health
  Dr. Thom Nikolai

Golf 7

- Understanding turfgrass stress and plant health
  Dr. Emily Merewitz, Yingmei Ma, Sha Liu, and Sanalkumar Krishnan

Golf 8

- NTEP Trials: Fine leaf fescue fairway, creeping bentgrass fairway and green

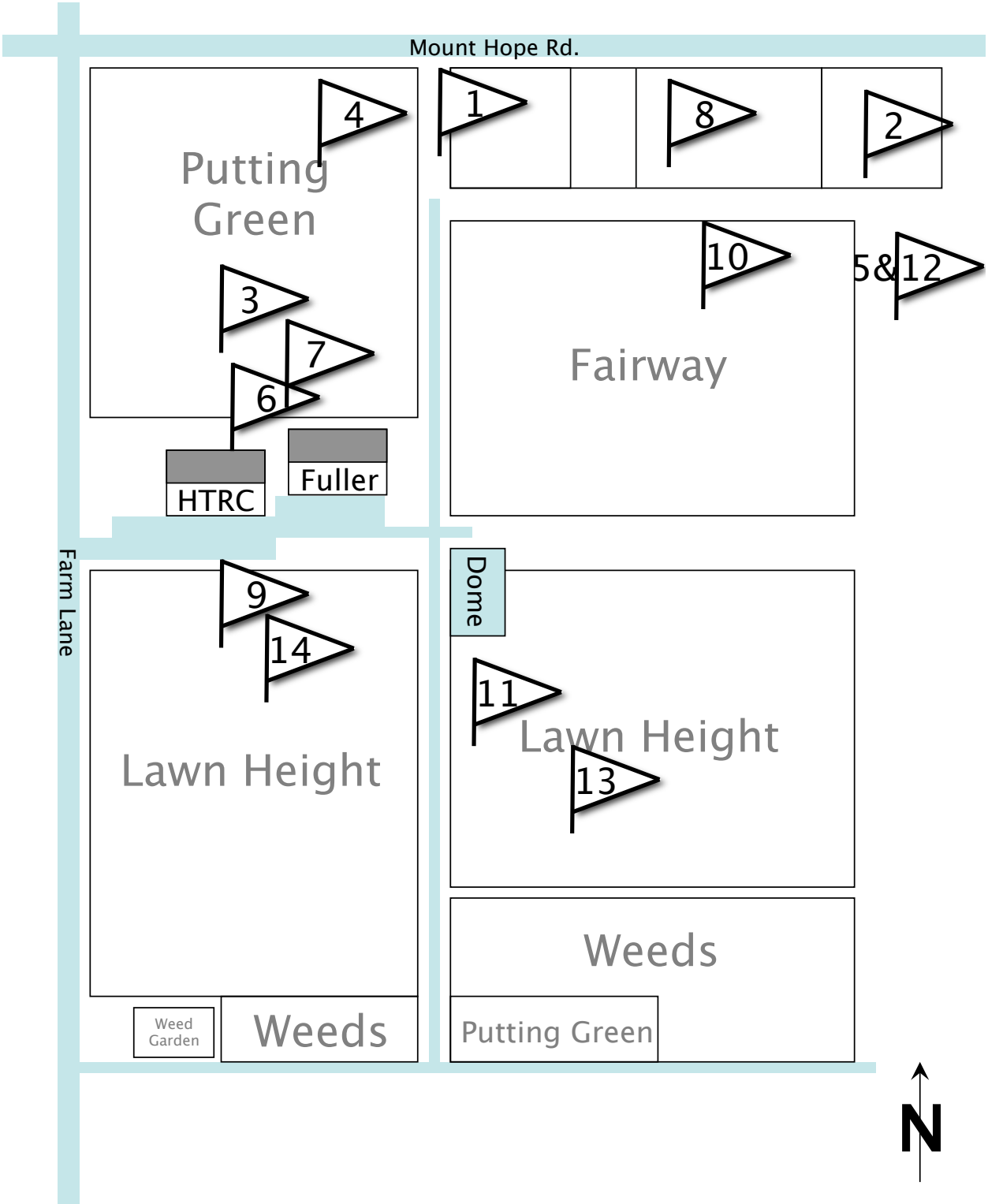
Lawn and Athletic Fields 9

- Avoiding grub damage by growing smart lawns and athletic fields
  Dr. David Smitley

Lawn & Athletic Fields 14

- Comparing precision spray equipment with wands and ride-on sprayers Aaron Hathaway

2015 Turfgrass Field Day Stops



A great big... Thank You!

The MSU Turf Team would like to recognize the following companies that have donated to the operation of the Hancock Turfgrass Research Center in 2015.

Accuproducts International
Agrium Advanced Tech.
Arysta Life Sciences
BASF
Bayer Crop Science
Bernhard & Co., Ltd.
Carl Schwartzkopf
Cleary Chemical Corp.
Countryside Lawn & Power
Dakota Peat & Equipment
D & G Equipment
Dow AgriSciences
Forest Akers Golf Courses
Grigg Brothers
Harrell's
IPAC Inc.
Jacobsen
John Deere Ag. & Turf Div.
John Deere Landscapes
J.R. Simplot Co.
JRM Inc.
JW Surge
J.W. Turf Equip.
L.T. Rich Co.
MTF Founders Society
Pace Equip.
PBI/Gordon Corp.
Petro-Canada/Civitas
Quali-Pro
Residex
Rhino Seed & Turf Supply
The Scotts Miracle-Gro Company
Spartan Distributors
Spears Manufacturing
Syngenta Crop Protection
The Andersons
The Gandy Co.
The Toro Co.
The Toro Co. – Toro NSN
Tri-Turf Inc.
Tru-Turf Pty. LTD.
True-Surface
Turfco Manufacturing
Weingartz
Wesco Turf, Inc.
AMPAC Seed Company
Rainbird Corporation
Lacrosse Forage & Turf Seed
Smithco

Table of Contents

Golf 1. Managing Diseases and Promoting Plant Health on Golf Courses

Nancy Dykema, Adam Palmatier, and Dr. J.M. Vargas, Jr.

DOLLAR SPOT.

Dollar spot, caused by the fungus *Sclerotinia homoeocarpa*, is a very important disease of turfgrass, characterized by small bleached to straw-colored spots up to 3 inches in diameter. If left untreated, the spots may coalesce and form larger, irregularly-shaped, blighted areas. The disease can be spread via equipment such as mowers, from clippings, or just from plants growing in close proximity. Dollar spot is typically more severe in drought-stressed areas as well as those under low fertility. When daytime temperatures range from 60-90°F and nighttime temperatures fall into the 50-60°F area, the disease is most active. Under these temperatures, heavy dew formation usually results and often cob-web like mycelia may be observed on the turf.

In recent years, several new fungicides have been registered which control dollar spot. Some of the new SDHI fungicides have shown strong activity against this pathogen, along with many other classes of chemistry. Our dollar spot field trials contain numerous products both alone and it combinations. This year, several dollar spot trials were conducted, including two "early season" treatment studies, preventive and curative studies on greens and fairways. Mowing height for fairway trials was 0.5" and for greens trials was 0.130". Differences in amounts of dollar spot among treatments are currently visible on many of those trials.

FLAGSTICK CREEPING BENTGRASS, A NEW RESISTANT CULTIVAR.

Plots established in 2012 to creeping bentgrass cultivar, 'Flagstick', demonstrate the high level of dollar spot resistance sustained by this new cultivar developed at MSU. This cultivar was included in the National Turfgrass Evaluation Program (NTEP) trials under the code 'SRP-1WM', where it ranked among the most dollar spot resistant cultivars during those trials. The importance of having a dollar spot resistant cultivar commercially available is enormous. It has the potential to reduce the number of fungicide applications made annually for the control of dollar spot which may result in financial savings for golf courses as well as reduce the environmental impacts of these fungicides.

NEW EXPERIMENTAL PRODUCT FOR THE REDUCTION OF ANNUAL BLUEGRASS IN MIXED STANDS.

There are many golf course superintendents who prefer creeping bentgrass over annual bluegrass. There have been many products that have been developed over the years to control annual bluegrass in mixed stands with creeping bentgrass and other turf species which have resulted in a variety of outcomes. We are testing a new experimental annual bluegrass product, developed by Sipcam Agro, which is showing good promise as an annual bluegrass control in mixed stands of both creeping bentgrass and Kentucky bluegrass. We have not observed any phytotoxicity to either creeping bentgrass or Kentucky bluegrass. Nor have we observed any

major annual bluegrass turf loss. The mode of action appears to be a suppression of the annual bluegrass and an increase in the creeping bentgrass and Kentucky bluegrass populations.

Golf 2. Establishment Strategies for Creeping Bentgrass Putting Greens

Eric C. Chestnut, Thomas O. Green, Jacob Bravo, Dr. John N. Rogers, III, and Dr. Jim Crum

New creeping bentgrass varieties, harsh winters, and a number of other environmental factors are forcing some superintendents to consider renovation of golf course putting greens. The purpose of this study is to find an ideal plan to establish a new creeping bentgrass putting green surface using four different factors. *Agrostis stolonifera* var. Pure Distinction was seeded into a sand-based profile (95/5 root-zone medium) in August of 2014. Two of the factors, mowing height and fertility rate, were started in the fall and the other two factors, verticutting and PRG regimes, were initiated the following summer.

Mowing heights were initially at 0.200" and 0.150" and were reduced by 0.010" and 0.005" each week, respectively, until a height of 0.125" was reached for both treatments. The nitrogen (46-0-0) fertility rates that were used were 0.05 lb N/1000 ft^2, 0.10 lb N/1000 ft^2, and 0.15 lb N/1000 ft^2 per week. The vertical mowing was done either every other week or not at all. The PGR (Primo Maxx) was applied at the labeled rate of 0.125 fl. oz./1000 ft^2 every other week or not at all.

The results from year one of this study showed that the two main factors contributing to overall plant quality were fertilizer rate and vertical mowing. Higher fertilizer rates resulted in better plant quality. The vertical mowing was too aggressive to be beneficial for the turf, and the plots that were verticut were always lower in quality than the plots that didn't receive the application.

Using the results from that project, a new study was designed using increased fertilizer rates (0.15 lb N/ 10000 ft^2, 0.20 lb N/1000 ft^2), and 0.25 lb N/1000 ft^2), brushes in front of the mowers, and wetting agents as factors. Early results from this study show that fertilizer was again the main factor, with higher rates receiving better quality scores. This study will be repeated next year.

The Effectiveness of Basamid as a Soil Sterilant

When renovating a golf course green or fairway, one important factor to consider is how to ensure that the seed being planted is the only seed that will germinate and that weeds, whether it be grassy weeds, annual bluegrass, or broadleafs, do not invade the newly renovated area. Sterilizing the soil is a necessary first step in this procedure. Without a soil sterilant, any existing weed seeds may become viable and germinate under the right conditions, which can become a major hindrance and competitor to the newly seeded area.

Traditionally, the most popular and surefire way to sterilize soil was the use of methyl bromide, but new EPA regulations have taken this product off the market and left growers with few

alternatives. One of these alternatives is dazomet, otherwise known as Basamid. This study was designed to test whether application rates, incorporation method, and tarping have any effect on the viability of weed seeds after the application of Basamid.

Golf 3. The Effect of Plant Growth Regulators and Plant Health Programs on Mitigating Winterkill of Poa annua

Kevin Laskowski, Dr. Emily Merewitz, and Dr. Kevin W. Frank

The winter of 2014 was significantly damaging to golf course putting greens. The drastically cold temperatures and precipitation of the winter of 2014 has devastated turf areas around the country. Significantly cold weather and ice accumulation occurred on golf course greens and lasted for extended periods of time. The duration and severity of ice accumulation has detrimental effects to the viability of putting green species. Annual bluegrass putting greens are understood to be more susceptible to winter damage than creeping bentgrass putting greens. This research aims to identify possible reasons as to why annual bluegrass is more susceptible than creeping bentgrass and also to determine methods to alleviate such damage.

Material and Methods:
Treatments:
Separate annual bluegrass and creeping bentgrass putting greens were utilized for experimental treatments. Individual plot areas were 60 $ft.^2$.
Plots were treated with:

1. Civitas One 12.75 fl. oz./1000 ft^2
2. Embark T&O 0.5 fl. oz./1000 ft^2
3. Banner Maxx 2.0 fl. oz./1000 ft^2
4. Primo Maxx 0.125 fl. oz./1000 ft^2

Chemical treatments were applied in the early fall/ late summer, in preparation for turf acclimation to colder environmental conditions. An untreated control plot was utilized to compare with other chemical treatments. Turfgrass plugs were taken from plots in mid-November once acclimation had been reached and then subjected to freezing conditions (-4°C). Plugs were treated with no ice and ice on top to simulate winter conditions. After 20, 40, 60, 100, and 120 days plugs would be removed from the freezing growth chamber and allowed to regrow.

Visual turf quality ratings, percent turf regrowth and crown membrane fatty acid composition will be evaluated.

Observed results:
After 20, 40, and 60 days, annual bluegrass had the most regrowth if treated with Civitas, this was followed by Banner Maxx and Embark respectively. Primo treated plugs displayed results similar to that of the untreated control which had very little regrowth.

During the spring of 2015, plots treated with banner max had significantly decreased quality when compared with other treatments. Primo Maxx and Embark allowed for quickest green up on creeping bentgrass greens. Embark on annual bluegrass resulted in lowest quality as spring green up began. This was followed by Banner Maxx. Civitas One and Primo Maxx resulted in the best quality in spring when compared with the other treatments.

Golf 4. Mechanical Methods to Reduce Disease Incidence and Encourage Plant Health

Dr. Thomas A. Nikolai, Aaron Hathaway, Joe Fabbo, D.J. Wait, and Isaac Motley

Plant health, or turfgrass health, is the newest catch-phrase in our industry seemingly replacing the often confusing terms "Integrated Pest Management" and/or "Sustainability". The industry acceptance of the term "turf health" is welcome to many on the MSU research team because MSU has been the world leader of turf health research for as long as there has been turfgrass research. For instance MSU researchers were the first to:

- *state Poa annua* did not die in the summer because it could not stand the heat which allowed MSU to make *Poa annua* health management health recommendations when others were stating *Poa* must be eliminated.
- state that "speed does not kill" which allowed it to make the first recorded observations about lightweight rolling and we noticed it was more beneficial to the putting surface and not detrimental as all other sources were reporting.
- initiate mowing/rolling frequency studies and suggested mowing less and rolling more during high stress parts of the year provided better turfgrass health
- discovered the chemical "velocity" and made programs to safely eradicate *Poa* while maintain healthy bentgrass
- discover that mulching tree leaves into established lawns decreased weed growth, increased spring green-up, and increased nutrient content making it great method to improve turfgrass health in low maintenance areas while getting rid of leaf-litter.
- investigate rolling following aerification and found that it increased customer satisfaction by increasing core-hole closure leading to a decrease in disease and healthier turfgrass.

At this Field Day stop Thomas A. Nikolai, Ph.D. will discuss three studies that were initiated to exam mechanical, cultural, and chemical impacts on putting green turfgrass health and customer satisfaction. Study number one exams long term putting surface maintenance with chemical inputs (*Signature* Xtra SG, Daconil) and determining if healthier turfgrass experiences quicker core-hole closure after aerification. Study number two exams if there are turfgrass health and playability difference among putting surfaces that are 1) double-cut daily with backtrack mowing 2) double-cut daily with perpendicular mowing and/or 3) daily single cut at an increased frequency-of-clip. The third study considers the differences between putting surfaces maintained with a grooved (Weihle) roller vs. a weighted smooth roller. The hypotheses being that the heavier smooth roller would increase green speed and decrease

disease. None of these studies are finished at this time but stop in and take part in the discussion.

Golf 5/Lawn & Athletic 12. Herbicide Programs for Managing Naturalized Rough Areas and Herbicide Programs for Controlling *Poa annua*

Aaron Hathaway, Dr. Thomas A. Nikolai, and Dr. Kevin W. Frank

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 then 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 that most effectively and efficiently maintain these areas with minimal chemical and cultural inputs. The goal is to maintain the ornamental quality (i.e. inflorescence, adequate turf cover) and playability (i.e. thin enough so golf balls can be found and played). The main focus will be weed control, investigating a variety of weed control programs with differing herbicides and timings.

Table 1: Turf Mix Treatments

1	**Highlander Links/Ecology Mix (HL/E)** 48.99% Beacon Hard Fescue 39.61% Jamestown IV Chewings Fescue 9.92% Cindy Lou Creeping Red Fescue
2	**Hard/Sheep Fescue (HSF)** 50% Marco Polo Sheep Fescue 50% Ecostar Hard Fescue
3	**TG Range and Field ESP Mixture (TG)** 29.49% Kentucky 31 Tall Fescue 24.97% Climax Timothy 13.97% Orchardgrass 9.97% Alsike Clover 9.26% Perennial Ryegrass 5.47% Gulf Annual Ryegrass 4.33% Kentucky Bluegrass
4*	**Existing Kentucky Bluegrass (KBG)**

*existing KBG was left in place, while all other plots were treated with glyphosate then stripped with sod cutters

Treatments: Treatments will consist of herbicide programs made up of preemergence and/or postemergence applications. Because preemergence herbicides are so cheap and effective, it will be included in all but the untreated. Although herbicides that include triclopyr and

clopyralid (Turflon and Lontrel) have a longer soil residual, theoretically making them a better choice for weed control in these areas when timing cannot be as refined (want to apply just after mowing or just before growth reinitiates in spring to reduce tracking), a common 3-way herbicide (2,4-D, MCPP, dicamba [Trimec Classic]) is included simply because it has such a broad spectrum of weeds it will control and is so cheap. This set of treatments covers a low-input program, which will be cheapest, and a high-input program, which will be more expensive and, in a way, is contrary to the primary goal of these low-input areas.

Table 2: Herbicide Programs

	Spring PRE	Spring POST	Fall POST
1	Pendulum AQ		Trimec
2	Pendulum AQ	Turflon Lontrel	
3	Pendulum AQ		Turflon Lontrel
4	Pendulum AQ		Turflon Lontrel Segment*
5	Pendulum AQ Gallery		
6	Pendulum AQ Gallery		Turflon Lontrel Segment
7	Pendulum AQ Gallery		Spot Treat
8	Untreated		

* Segment is a postemergence grass herbicide that is only safe on fine fescue.

Evaluations: Evaluations will focus not only on quality, but on playability as well. Inflorescence will be counted in the summer and fall by randomly placing a 24x24 inch frame randomly in each plot (3 samples) and counting seedheads or inflorescence. Quality, which cannot be assessed in the "normal" turfgrass ways (dark green color and density), but will focus on weed free and continuous community of plants, overall upright growth, and will include inflorescence. Weeds will be counted in each plot – when possible, weed species will be separately counted, but, if there are many, they will be counted as broadleaf and grassy weeds separately. Playability will be measured with biomass measurements and plant or turf stand lodging (falling over and laying, which will reduce players' ability to find and play balls). The

same 24x24 inch frame will be placed in each plot (3 samples) for biomass measurements – foliage from the soil upward will be clipped and wet weights, then dry weights, will be collected. Lodging will be assessed visually and measured on a scale from 1-9, where 1= no lodging and 9= complete lodging.

Golf 6. What to Look Forward to: European Crane Fly and Annual Bluegrass Weevil

Dr. David Smitley

Two species crane flies from Europe: *Tipula paludosa* (European crane fly) and *Tipula oleracea* (common crane fly) are now established in many locations in southeast Michigan and in the greater Grand Rapids area. The adult stage of both of these pests looks like a giant mosquito with a wing span of more than an inch. They prefer moist soils, so they are most likely to be found in irrigated turf, although with enough rain they can develop in almost any lawn. The European crane fly adult flies, mates and lays eggs in August and September and may be seen in or near infested lawns or golf turf in large numbers. The second species, the common crane fly, also emerges from late July to September, but may also have a second generation of adults that emerge in the spring. The larvae of both species, called "leatherjackets," grow to become nearly an inch-long and look like a brown or gray caterpillar with no head or legs.

In October the leatherjackets consume enough turf roots, stems and leaves to cause visible injury to lawns or golf courses. Thinning and dead turf may also appear in late April or May. Leatherjackets can be brought to the surface by drenching with a soapy water solution – 1 ounce dish wash soap in 2 gallons of water.

Lawns and fairways treated for grubs in the spring are **not** protected from European crane fly damage in October. However, if grub treatments are made in July or August, they should also protect against European crane fly damage in the fall. The best treatments are Safari, Arena or Allectus, Meridian or Merit applied at the grub rate between late July and early October.

Annual bluegrass weevil is a major golf course pest in the northeast United States. Because it is often resistant to pyrethroid insecticides, it can be very difficult to control. We have been expecting it to arrive in Michigan the last couple years because it became a problem in Pennsylvania and Ontario at least five years ago. We want everyone to aware of this future pest so that you will recognize it and be able to take the appropriate steps needed to control it before we see too much turf damage.
Watch for patches of dead annual bluegrass that appear in June or July on aprons around greens or on fairways. Usually, only the annual bluegrass dies, although bentgrass can become infested. Annual bluegrass weevil can be distinguished from anthracnose by the presence of sawdust-like frass, hollow stems, and the tiny (1/16th of an inch) weevils and their larvae (legless white grubs, 1/16th of an inch-long). The grubs may be found inside of annual bluegrass stems,and the adult weevils will float when cup-cutter samples of turf are submerged in water. The damage itself may look very similar to anthracnose damage. Golf course superintendents that see unusual patterns of annual bluegrass damage, especially on the collars around greens,

and suspect annual bluegrass weevil can send samples into the turf disease lab, or to the Northwest Experiment station for diagnosis. Also you can call my lab manager, Terrance Davis, at 517-355-4663, or send us an email at tdavis@msu.edu or smitley@cns.msu.edu .

Golf 7. Understanding Turfgrass Abiotic Stress

Dr. Emily Merewitz, Yingmei Ma, Sha Liu, and Sanalkumar Krishnan

Environmental stresses including drought, heat, winter-related stresses, and many others are all major problems faced by the turfgrass industry in Michigan. This field day tour will provide an overview of some of the major field research projects being conducted by the Merewitz lab. Three projects will be presented including 1) evaluation of fungicides containing plant health promoting components on creeping bentgrass responses to drought stress 2) summer stress and bacterial etiolation and 3) creeping bentgrass cultivar evaluation of summer stress performance. Project 1 will primarily discuss Fiata® and Signature Xtra® (Bayer) in combination with or without Primo under restricted irrigation conditions. For Project 2 we will discuss progress on our work to elucidate how phytohormones may be involved in disease progression of *Acidovorax avenae* and *Xanthomonas campestris.* While showing the field for Project 3, we will observe how a newly seeded field of 20 different creeping bentgrass cultivars handles no irrigation.

Golf 8. NTEP Trials: Fine Leaf Fescue, Creeping Bentgrass Fairway and Green

Dr. Kevin W. Frank and Aaron Hathaway

Trials were established in the autumn of 2014. The fine leaf fescue fairway trial will have ½ of each plot trafficked in 2016-2019. Each trial will be evaluated for 5 years.

Lawn & Athletic Fields 9. Avoid Grub Damage with 'Smart Lawns'

Dr. David Smitley

What is a 'smart lawn'? It's an adaptation of the 'Smart Gardening' program developed by MSU Extension for growing healthy lawns with a minimal use of pesticides. Lawn care professionals already use most of the following principals of Smart Lawns:

1. Mow lawns at 3 to 3.5" or for homeowners, set mower at the highest cutting height. This will create a deep, dense root system that will be tolerant of grub feeding.
2. Water during dry periods to avoid drought stress and to maintain a dense root system.
3. Apply at least 2 lbs of N per year, using a slow release fertilizer
4. Return grass clippings to lawn
5. Mulch leaves into the lawn
6. Establish lawns with Kentucky bluegrass (most lawns are already Kentucky bluegrass, fine fescue, or a combination of both). Fine fescue also has a dense root system, and should also be tolerant of grubs if managed properly.

If these principles are followed for two years, a dense root system will develop that will be tolerant of grubs, meaning that insecticides will not usually be necessary. Less than 10% of all lawns are expected to have any visible grub damage if they are maintained as a 'Smart Lawn'.

Lawn & Athletic Fields 10. Turfgrass Fertilizer Technologies and Environmental Fate

Dr. Kevin W. Frank and Aaron Hathaway

A runoff research area was constructed at the Hancock Turfgrass Research Center on the campus of Michigan State University in the summer of 2013. The turfgrass is Kentucky bluegrass maintained to home lawn standards. Individual plot size is 8 x 8 ft. with each plot draining to a collection gutter and then a collection vessel where runoff water can be quantified and tested for nutrients. The objective of this research is to collect data to determine whether or not the use of slow release fertilizers with single application rates as high as 4 lb. N/1000 $ft.^2$ increase the risk of nitrogen in runoff water.

Fertilizer Treatments:

1. Non-fertilized control
2. Standard program, 4 lbs N / 1000 sq. ft. annually:
   April: 60% urea/40% PCSCU applied at 1 lb N/1000 sq ft, plus 0-0-60 at 0.57 lb K_2O/1000 sq ft
   June: 60% urea/40% PCSCU applied at 1 lb N/1000 sq ft
   August or Sept: 60% urea/40% PCSCU applied at 1 lb N/1000 sq ft, plus 0-0-60 at 0.57 lb K_2O/1000 sq ft
   Oct or Nov (depending on timing of previous application): 75% urea/25% PCSCU applied at 1 lb N/1000 sq ft
3. Duration SIFI 35-0-10, single application in April, 4.0 lb N / 1000 sq. ft.
4. Duration SIFI 35-0-10, single application in April, 2.5 lb N / 1000 sq. ft., plus 0-0-60 at 0.43 lb K_2O/1000 sq ft
5. Duration SIFI 35-0-10, 2.5 lb N / 1000 sq. ft. applied in mid-October - November, followed by 1.5 lb N / 1000 sq. ft. applied in May or June 2013, based on observed longevity of fall application (4.0 lb N / 1000 sq. ft. total). From April through Sep 2013, make low rate applications (0.5 lb N / 1000 sq.ft.) of urea as needed to maintain acceptable turf quality. Limit these applications to the minimum necessary to maintain acceptable turf.

Lawn & Athletic Fields 11. Disease Management in Lawns and Athletic Fields

Nancy Dykema, Adam Palmatier, and J.M. Vargas, Jr.

Several diseases will be viewed in the field so participants can learn how to identify them as well as practices or conditions that may worsen each disease. Management strategies will be discussed including IPM methods.

RED THREAD.

This is a disease of undernourished, slow-growing turf. It is characterized by the appearance of pink to red, thread-like fungal structures (stromata) protruding from leaf blades. These look gelatinous under wet conditions and become thin and thread-like as they dry. The disease can spread from plant to plant by the growth of the stromata. Pink, cottony tufts can sometimes be observed in red thread patches under high humidity. As the epidemic progresses, the turf takes on a withered, dry appearance, often resembling dollar spot.

RUST.

Rust is another disease which can be worse on lean, stressed turf. When the disease is active, the pathogen undergoes sporulation cycles which result in prolific spore production. Spores that are yellow to dark brown appear on the surface of leaves, which give the appearance of yellow or orange turf stands when viewed from a distance. As these spores are formed, they rupture through the epidermis of leaf which can result in the withering and drying out of the plants. This disease is also easily identified when one walks across an infested lawn and ends up with a rust colored, powdery coating on their shoes.

NECROTIC RING SPOT.

This is a disease of Kentucky bluegrass that forms patches in the turf. The fungus attacks the roots of the Kentucky bluegrass plants. The infection takes place in the spring and fall in cool, wet weather, but the symptoms are usually not observed until the summer when the turf goes under drought stress. However, if you look close enough in the spring and fall you can observe red and purple blades of grass in the outer areas of the rings.

PYTHIUM BLIGHT.

Pythium blight is an important disease of perennial ryegrass, which occurs in the hot, humid weather of the summer. The key to outbreaks of this disease is saturated soils. The organism that causes the disease is classified as a water mold, so it is not surprising that it is a major problem in wet soils. Pythium blight can cause major turf loss in a short period of time if the hot, humid weather continues. Infected turf often has foliage with a wet, greasy appearance, which turns brown as it dries. Sometimes, early in the morning the fluffy, gray to white colored mycelium of the fungus can be seen on the turf.

Lawn & Athletic Fields 12/Golf 5. Herbicide Programs for Managing Naturalized Rough Areas and Herbicide Programs for Controlling *Poa annua*

Aaron Hathaway, Dr. Thomas A. Nikolai, and Dr. Kevin W. Frank

Please see pg. 13 for the report.

Lawn & Athletic Fields 13. Turfgrass Species Selection and Management

Dr. Kevin W. Frank and Aaron Hathaway

Selecting the best turfgrass species to match the site and expectations can be the difference between success or failure in turf management. At the Hancock Turfgrass Research Center we have the NTEP fine leaf fescue trial established in 2014, the NTEP Kentucky bluegrass athletic field traffic trial established in 2011, a low input sustainable turf trial established in 2007, and a trial with four different species and one cool-season lawn mix. The species are fine fescue, Kentucky bluegrass, tall fescue, perennial ryegrass. The cool-season mix is the traditional mix of Kentucky bluegrass, perennial ryegrass, and creeping red fescue. This trial has both unirrigated and irrigated blocks. During this stop we will look at how different species perform under different conditions and how species and management affect pest incidence.

Lawn & Athletic Fields Stop 14. Comparing Sprayer Technology and Herbicide Technology

Aaron Hathaway and Dr. Thomas A. Nikolai

How do ride-on sprayers and lawn gun sprayers compare to precision research sprayers? We have learned through the decades, especially as sprayer technology continues to advance, that smaller droplet sizes can increase herbicide coverage and, potentially, increase herbicide efficacy. However, smaller droplet sizes also tend to be more easily moved by wind. So, considering factors like this, how can we weigh the pros and cons of the sprayer technology available? To help answer this question, herbicide treatments were applied with a ride-on sprayer, a lawn gun, and a research sprayer (4-nozzle boom sprayer). These sprayers vary in spray volume application rates (from 15-85 gallons per acre) and vary in droplet sizes provided by the differing nozzles. Trimec Classic was applied with each of these sprayer technologies with and without a surfactant to evaluate whether weed control efficacy will vary.

Just as spray technology is advancing, herbicide technology is as well. Although new active ingredients aren't becoming available too often, differing tank-mixes of proven herbicides always emerging in the market. Trials were initiated to explore some of these combination products and relatively new active ingredients for control of annual weeds like crabgrass, goosegrass, and purslane. The trials include combination products like Q4, SquareOne, and Last Call and include stand-alone products, such as Drive and Tenacity.