



DEVELOPING AN EFFECTIVE & ENVIRONMENTALLY SOUND Fungicide Program

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Many of us are enjoying some well-deserved rest and rejuvenation for our physical bodies during the winter months here in Ontario. Yet, as Turf Managers, our brains are constantly buzzing with ideas on how we can perfect our passion for the upcoming season. During the 2023 OGSA Conference in Blue Mountain, attendees were given the opportunity to hear from one of Rutgers University's Emeritus Plant Pathologists, Dr. Bruce B. Clarke. Throughout the years, Dr. Clarke centered his research around biotic and abiotic diseases of cool-season grasses. Focusing on control, resistance, environmental factors, cultural management, disease development as well as reduction of chemical inputs. His wealth of knowledge from his dedicated findings led us to a very informative session on how we can truly be mindful of our environmental footprint while continuing to provide a high-performance product.

"There's an approach," Clarke says, "a systematic approach that can be utilized and integrated with your cultural management practices so that fungicides are part of the program but not the mainstay of the program." This refers to biological controls along with good genetics "selecting good germplasm, good species, good cultivars." In a nutshell, Clarke recommends that when you're developing a program, you want to get the most out of your fungicides. Carefully selecting and positioning products that enhance performance, maintain quality, and provide excellent suppression all while not breaking the bank or impacting the environment. Recognizing that the amount of fungicide we use depends on many factors including location, weather patterns, types of grasses we are maintaining (or that are available to us), and what diseases are most threatening.

Dr. Clarke has come up with a six-step process that has been successful in wielding a fungicide program that is specifically tailored to you, your location, and budgets amidst being efficient and environmentally sound:

STEP ONE:

Identify Major Diseases & When They Typically Occur

First and foremost, your program will never be one size fits all. While targeting, you will be tweaking these programs based on time of year - when they occur, and separating major diseases based on location - where they occur. Utilize historical data if you are new to the course; take a look at application records - what have they been spraying for and where. Veteran Turf Managers - know your 'hot spots' along with areas of importance.

Dr. Clarke provided the audience with examples of major diseases and timing of them on cool-season grasses from a Mid-Atlantic site that is not too different from what we Southern Ontarians' encounter:

- Spring - Anthracnose, Brown ring patch, Dollar Spot, Fairy Ring, Take-all Patch
- Summer - Anthracnose, Brown ring patch, Dollar Spot, Pythium Blight, Summer Patch, Yellow Turf
- Fall - Dollar Spot
- Winter - Snow Moulds, Yellow Patch

Awareness is your first step, timing is second, and efficacy is third.

STEP TWO:

Focus on the Most Important Diseases & Build a Core Fungicide Program Around Those Diseases

Dr. Clarke recommends you refine your focus to three or four most important diseases on your radar and construct a core fungicide program around them. "Start by backfilling for those core diseases, then refine it based on other diseases that may be of concern or that historically, may have occurred at certain times of the year." Going back to the example given in step one, the program would be based on Dollar Spot suppression along with Brown Patch and Anthracnose, your core diseases, then implementing control of Pythium Blight and Summer Patch as they have historically impacted turf conditions.

BUILD A CORE FUNGICIDE PROGRAM AROUND MAJOR DISEASES (GREENS)

Season	Date	Major Target Disease	Class	Other Diseases	Resistance Pot.
Spring	April		SDHI	BRP, TA	Mod-High
	May	AN, DS, SP	DMI	BRP, TA, FR	Mod
Summer	June	AN, BP, DS, SP	Qol + DMI	PB, YT, FR	Mod
	June	AN, BP, DS	Phosphonate + Nitrile	PB, YT	Low
	July	AN, BP, DS, SP	DMI		Mod
	July		Qil	PB, YT	Mod-High
	August	AN, BP, DS	Pyridinamine + Polyoxin	Low-Mod	
	August	AN, BP, DS, SP	Qol + Nitrile	PB, YT	Low-Mod
Fall	Sept.	DS	Pyridinamine		Low
	Oct.	DS	SDHI	TA	Mod-High
Winter	Nov.		Qol + DMI + Dicarboximide	PSM, TA	Low-Mod

AN: Anthracnose, BP: Brown Patch, BRP: Brown Ring Patch, DS: Dollar Spot, FR: Fairy Ring, GLS: Gray Leaf Spot, PSM: Pink Snow Mold, PB: Pythium Blight, SP: Summer Patch, TA: Take-all Patch, YT: Yellow Turf; 9 classes/10 diseases/11 Apps

STEP THREE:

Identify Strengths of Available Fungicide for Key Diseases (Efficacy Ratings)

Once you have deciphered your core diseases and timing, populate your program by selecting the most efficacious fungicides labeled for those target diseases. “Be sure to base it on efficacy ratings, not choosing fungicides unless they are a 3 or 4 on the 1-4 scale, 4 being best, from an unbiased source,” Dr. Clarke reminds us. “If the rating is giving you a 1 / 3, this indicates the product is typically scaled at a 3 when you do not have resistance issues. If you do, the rating becomes a 1, which essentially means it would not be the best product for you to use in targeting a specific pest.” This being said, he then mentioned you can add a 1 or 2 rating to a tank mix to then broaden the scope of diseases above and beyond the four core diseases. Be sure to find a couple products that target your core diseases, add them to a list and rotate these different chemistries throughout the program. This gives you lots of flexibility in rotation, decreasing the chances of resistance. Dr. Clarke’s personal approach is to always start with single active ingredients that are rated at a 3 or 4 with no premix or tank mix until he needs to as pressure rises. “Then using broad spectrum fungicides and/or premix or tank mixes when more than one disease is expected to occur.”

“Fungicide groups have their strengths and weaknesses,” Dr. Clarke explains. “Always place these chemistries when you’re expecting to see these diseases - rely on their strengths and never otherwise.” By capitalizing on strengths such as efficacy, low risk of resistance, a low

Environmental Impact Quotient, and rotating different modes of action, you reduce the potential of the negatives, glorifying the strengths!

STEP FOUR:

Optimize Control; Choose the Most Efficient Rates, Nozzle types, Water Volumes & Timing

Utilize the latest technologies! Improve your level of control while optimizing the use of fungicides, ultimately limiting the amount of fungicide executed. Dr. Clarke discussed many ways of seeing this through that are really quite simple.

In selecting a nozzle with a medium droplet size for leaf diseases, it allows the product to thrive off its strengths, adhering to the leaf and not bouncing off.

Increase your water volume, especially for root diseases. Foliar diseases - rule of thumb, you would never want to use less than 4 liters per 100 meters squared.

Are you spraying on a calendar basis? Every 7, 14, 21 or 28 days? This is OK, but not the best model to minimize your fungicide use. Dr. Clarke recommends, if you can, utilizing the Disease Predictive Model; this gives you the opportunity to determine when the weather conditions are conducive to developing disease. There are many of these models out there. Some based on soil temperatures, and others based on air temperatures and humidity. You can even attach these to your weather station to get property specific predictions. Like most things, some are better than others but all assist in timing an application with great accuracy, limiting your sprays to one or two as well as completely preventing targeted diseases rather than a curative application - not acquiring the same control. Dr. Clarke then states “And of course if you’re pretty comfortable and are utilizing Best Management Practices (BMPs), some earlier curative sprays based on thresholds is an option.” There was a study done on Anthracnose that proved if you are using thresholds along with BMPs, you can actually extend the interval for control. Some of us may be uncomfortable with this... as we would rather not see the disease before we make our move. That being said, we have also learned that it is easier to prevent than to cure. Yet, with BMPs in place, like managing higher nitrogen levels, alternating modes of action, and mowing at a higher height, ultimately increases the

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percentage of control, saving time and money with less applications.

GPS Mapping has done wonders for efficacy – efficiency as well as financially. In this case the saying, ‘you have to spend money to make money’ applies. Dr. Clarke believes there is a lot to look forward to in the future like Molecular Probes. This advancement is designed to predict the disease before symptoms develop, quantifying your populations at a localized site.



Dr. Bruce B. Clarke at the 2023 OGCMC.

STEP FIVE:

Use Strategies to Reduce the Potential for Fungicide Resistance

This step involves doing things above and beyond the obvious tank mixing. Adding to BMPs mentioned above, be sure to read labels and the plethora of information that they provide. This especially applies to resistance management (mainly Dollar Spot). But by alternating your modes of action and knowing the number of applications one can utilize in a year and placing them at the right time, you can limit your disease pressures drastically.

Clarke explains that the potential for developing fungicide resistance is not only dependent on the mode of action but also the pathogen. “Dollar spot has become so intelligent that it holds 90 percent of the reported cases of resistance. The genetic diversity has become so great that the potential for developing resistant strains or isolates is tremendous. So, you must be extremely careful when working with Dollar Spot and that you DO rotate chemistries, or you’re going to get into trouble.”

He also expresses never exceeding 3 to 4 SDHI applications per calendar year. Place them carefully for optimal suppression in and amongst your DMIS, QoLs, etc.

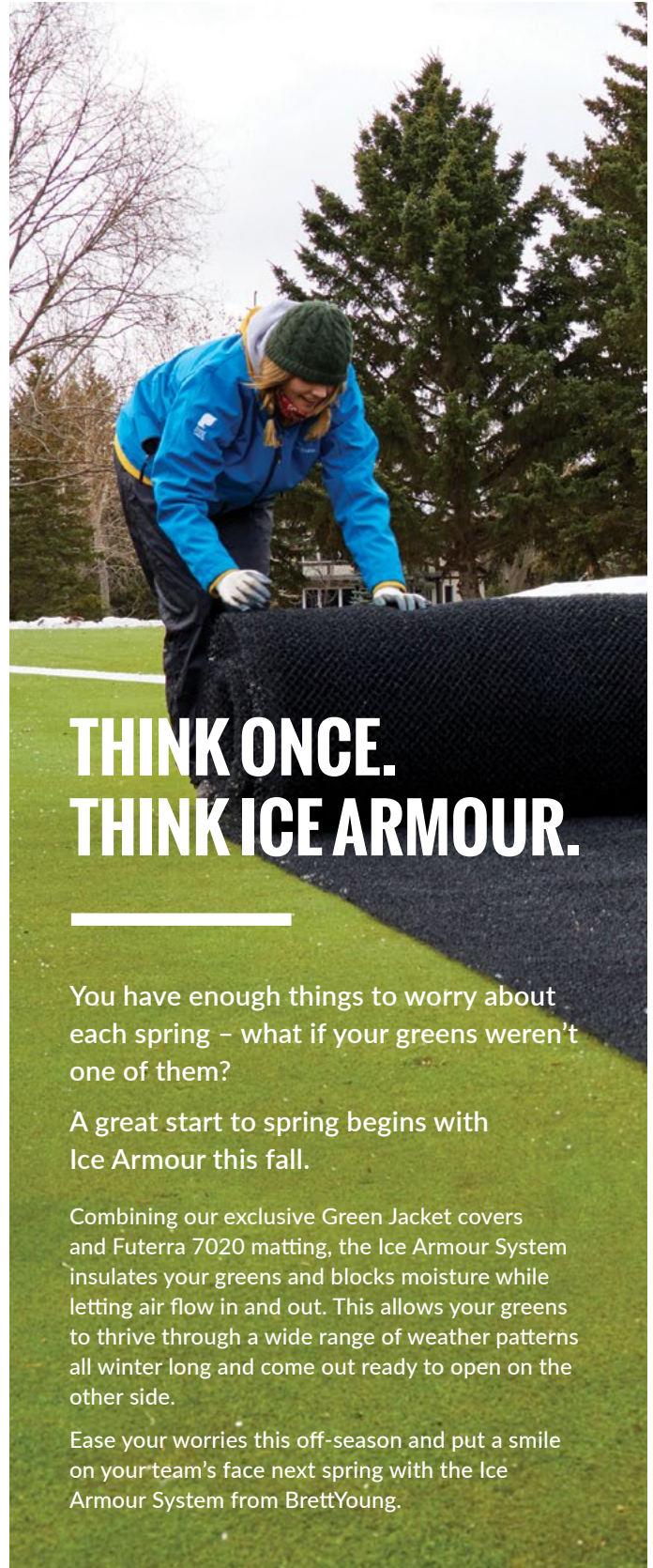
Use preventative applications for high-risk populations and avoid late curative applications. “At this point you’ve allowed the disease to build up to such critical levels that essentially you would have to dump a ton of fungicide down in repetitive applications to even attempt to knock it back and reduce symptoms – not ideal or environmentally sound,” Dr. Clarke comments.

STEP SIX:

Evaluate & Modify the Program Based on Potential Environmental Impact (Environmental Impact Quotient)

Once you think you are done, it is now time to tweak it! “The old ways of laying any and all products down is truly something of the past. Many places around North America and the world are demanding that we use less products,” Dr. Clarke expresses firmly. Take the time to evaluate the importance of your environmental impact with upstanding choices. Narrowing in on specific criteria - Efficacy, Economics, Resistance Potential, and Health Impact.

To ensure that you have formulated educated decisions, take advantage of tools like The Environmental Impact Quotient (EIQ). Developed at Cornell University and devised to determine the environmental impact of most commonly used pesticides in agriculture and horticulture. ■



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