

Maximize Fungicide Effectiveness with Proper Application to Strengthen Turfgrass Health

By Michael Kropp, BASF

For golf course superintendents, the battle against fungal diseases that attack and destroy turfgrass is never-ending. While today's science has produced many fungicides designed to prevent and cure outbreaks of the most damaging turf diseases, superintendents need to both properly choose the correct fungicide for a particular pathogen and then properly apply that fungicide.

Superintendents with the healthiest, disease-free turfgrass are those who have developed a comprehensive strategy to protect their turf including cultural controls, proper fertility and a fungicide application and rotation program to prevent disease resistance. Such a strategy increases the chances for successfully keeping deadly disease outbreaks at bay and decreases the likelihood of future flare ups.

More than 20 known fungal diseases attack turf, degrading its density, color and overall health. Some of the most common – and toughest to control – turfgrass diseases in Northern California include:

- brown patch (*Rhizoctonia solani*),
- pythium blight (*Pythium aphanidermatum*),
- anthracnose (*Colletotrichum graminicola*),
- take-all patch (*Gaeumannomyces graminis*),
- summer patch (*Magnaporthe poae*)
- and, rapid blight (*Labyrinthula terrestris*).

A combination of cultural controls and proper fungicide use are vital for helping maintain turf health and reducing plant stress. This well-rounded approach is critical for managing golf course turf – especially on greens. Greens are the areas most closely scrutinized and most susceptible to damage, primarily due to the disease-causing challenges placed upon the turf by regular, short mowing heights (1/8-inch or less), heavy traffic and the low disease resistance of grass species adapted to the environment. Given these disease-favoring conditions, golf course superintendents who take the time to understand the conditions that lead to turf ailments and disease mode of action will have a greater chance at successfully preventing disease. With knowledge in hand, superintendents can be better prepared to make superior choices when it comes to managing cultural controls, determining fungicide selection and calculating proper application timing and techniques.

Create a Turf Management Plan

Any good turf management plan for combating fungal diseases should include strategies that mix both chemical and cultural controls to help balance the effect on people, the environment and the turf. When developing a program, superintendents should consider their plan as a

“work in progress,” using several different, varying methods to promote long-term health. Key strategies to consider include:

- Develop a base of knowledge. Through building reference resources, superintendents will have a better understanding of key grasses, the pests that attack them and conditions that favor disease development. Common sources of knowledge might include fellow superintendents, university extension experts, researchers, product distributors and manufacturers – all of whom can provide a wealth of knowledge and background to help develop a successful strategy. Additionally, many university extension offices, distributors and manufacturers have developed web sites that house their many published research reports, informational articles, application guides and product labels.
- Develop a plan. Create a written plan outlining key tasks, overall plan purpose and the seasonal timing for each objective, with both chemical and cultural controls. Having a written plan can help superintendents and staff to identify priorities and concerns at distinct times, helping keep management efforts on track.
- Rely on cultural practices. With rising disease resistance, ecological concerns and the need to manage time and money more effectively, the benefits from cultural practices to develop healthy turf should always be considered as a key part of an overall disease program. While cultural practices are not a quick fix, the long-term benefits of proper cultural turf care can help keep devastating outbreaks at bay.
- Scouting. During daily course drives, pay particular attention to trouble areas and monitor the environmental conditions that can lead to disease, so that disease onset can be predicted and managed before reaching an epidemic stage. Maintaining a course map or diagram annotated with problem-prone areas can help provide a visual reminder of symptoms and areas to monitor.
- Maintain a log. Keeping a record of turf conditions, weather, course activity, disease occurrence, the actions taken and the results of those actions can assist in building a plan and furthering success in disease prevention.
- Do your own research. Select locations on the golf course where you can make product comparisons and create your own test plots. Evaluate cultural practices such as removing dew before spraying versus not removing dew. Test other factors that may impact product performance.

Choosing the Correct Products – Preventing Resistance

Choosing a fungicide that is effective against the fungus that is causing the disease in your turf is a critical first step as products are not equally effective against all fungi. Knowing the benefits and effects of a diverse range of fungicide products is important, because relying on a single product or type of fungicide can spur the development

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of areas that resist fungicides – an increasingly common trait amongst fungal diseases. To maintain effectiveness, consider rotating fungicide products as part of an overall disease-control program. Additionally, it is very important to maintain a log of the effectiveness of fungicides for your particular turf against prevalent turf diseases in your region.

Fungicides are characterized as contacts, local penetrants or systemics in the way they move about in the turfgrass. In order to protect turf, contact fungicides must cover the plant surfaces before fungi attack. If the target fungi attack the leaves, it is easy to apply a contact fungicide to the leaves; but as the leaves grow, new leaf tissue is exposed and unprotected. In order to maintain protection, frequent application is necessary. In the spring, this could be as often as every week. If the fungi attack the crown, rhizomes, stolons or roots, similar challenges are encountered due to tissue, but further complicated by the fact that soil and organic matter that surround the plant will filter and bind many chemicals to their surfaces.

Local penetrants move into the plant but have limited movement once inside the plant. However, they are effective at providing protection to areas of the turf that are not sprayed. Systemic fungicides are able to “move” within the plant once applied to the turf – allowing the active ingredient to work within and throughout the plant. Since the application, delivery and incorporation of fungicides play a major part in ensuring proper coverage and protection, systemic fungicides have the added advantage of making themselves present throughout the plant. All three types have their advantages and disadvantages and a balance of all three is needed for a comprehensive disease control program.

Proper Application is Key

Many times, the efficacy of a fungicide has more to do with the timing of its application than any other factor. As a general rule, preventive applications of fungicides generally have the greatest success against turf loss. This rule is especially true for root and crown diseases such as brown patch and pythium – cases in which disease is not easily seen until foliage is affected by damage caused at the plant’s lower extremities.

Preventive fungicide applications in the spring and fall can help reduce the amount of pathogens before the arrival of conditions favorable to the onset of such maladies. At the same time, seasonal applications of fungicide can help give the turf time to grow and become stronger. Applying fungicide before infection occurs is key, because once a turf area is infected, it becomes stressed, meaning that some degree of loss is almost certainly going to occur – regardless of how quickly superintendents react to the outbreak.

In addition to treating turf at the appropriate times, applying fungicide in correct quantities at the appropriate target location is also critical to success. Flat fan

nozzles spaced on 20-inch centers and placement of spray booms at 16 inches above ground height have been shown to help provide excellent coverage and overlap. The most common problem related to poor application is caused by improper spray nozzle selection.

Selecting the proper nozzle type – which serves to control spray droplet size – is an important management decision, because the size of a spray droplet can have a direct influence on the efficacy of chemicals applied. As an example, if the average diameter of a droplet is reduced to half its original size, eight times as many droplets can be produced from the same flow, so a nozzle that produces small droplets can theoretically cover a greater area with a given flow.

It is important to note, however, that extremely small droplets may not be able to deliver fungicides on target, because factors such as relative humidity and wind speed can affect the application accuracy of small droplets.

As a general rule, flat-fan nozzles are the preferred nozzles for use when treating for foliar diseases such as dollar spot where the active ingredient should be concentrated at the turf canopy. When treating for diseases that attack the crowns and roots (such as summer patch, anthracnose and pythium), fungicide needs to be delivered below the turf’s foliage.

While leaf wetness is less of a problem with systemic fungicides, efficacy is only possible with contact fungicides when the active ingredient comes in contact with the affected area. To help keep fungicides on target (especially contacts), applications should be made when the turf is dry, not dew-covered, and sprayer water volumes should be appropriate for the chemistry being applied.

In areas where there is poor irrigation water quality, the use of buffering agents may be necessary to correct extreme pH levels or water hardness to ensure that they do not hinder the active ingredient’s effectiveness. Before considering the addition of buffering agents, read the label and consult with your local manufacturer or dealer sales representative to understand how the current water quality and how changing that water quality will affect the product that you are applying.

Know Your Turf – and Its Enemies

There is no “universal program” available when it comes to preventing turf diseases and maximizing the effectiveness of fungicides. Therefore, superintendents need to consider many factors, including turfgrass species, disease type and persistence, cultural controls, fungicide spectrum of control, efficacy and length of control and environmental concerns. By understanding the challenges associated with turf diseases and how today’s modern chemistry helps support cultural control measures, superintendents will be able to best develop their individual, supporting fungicide program that considers the best products to use and the appropriate timing and application practices to ensure the greatest success in protecting turfgrass against fungal diseases.

Michael Kropp is a senior sales specialist with BASF Turf & Ornamental in the northwest region, and can be reached at:

(916) 591-0580 or via e-mail at Michael.kropp@basf.com