



StressGard™
FORMULATION TECHNOLOGY





Dedicated to fighting evils,
StressGard[™] Formulation Technology
never rests.



Behind the Innovation

At Bayer, we're all about the science behind healthy turf. Our mission is to support superintendents in their quest to control disease, manage stress and maintain high quality turf. The concept of *plant health* is not new for us. Over a decade ago, we promoted the term and revolutionized the industry with the development of the market's first plant health formulated product utilizing *StressGard*[™] Formulation Technology, also known as *StressGard FT*.

It's featured in five of our fungicides:

Tartan[®] | Chipco Triton[®] Flo | Interface[®] | Chipco[®] Signature[™] | Reserve[®]

What is *StressGard*[™] Formulation Technology?

StressGard FT is composed of active ingredients, inert ingredients and our advanced formulation technology.

Active ingredients are the components that provide chemical control of a pest. Some active ingredients also have positive effects on plant physiology. Fosetyl-Al and Trifloxystrobin are two examples of active ingredients that do more than just control disease. Both of these *actives* have a myriad of effects on plant processes and stress remediation.

Inert ingredients are used to help with mixing, suspension in the spray tank, and wettability on the leaf surface. However some *inerts* enhance the performance of the active ingredient. With *StressGard* FT, one of the *inerts* is a special technology that improves the ability of the active ingredients to better control disease and remediate stress.

Advanced Formulation Technology is the component that puts the active and inert ingredients together in an advanced formulation. Bayer utilizes particle optimization technology allowing formulation of nano particles in a much more uniform particle size. This improves product stability and performance.

What does *StressGard*[™] Formulation Technology do?

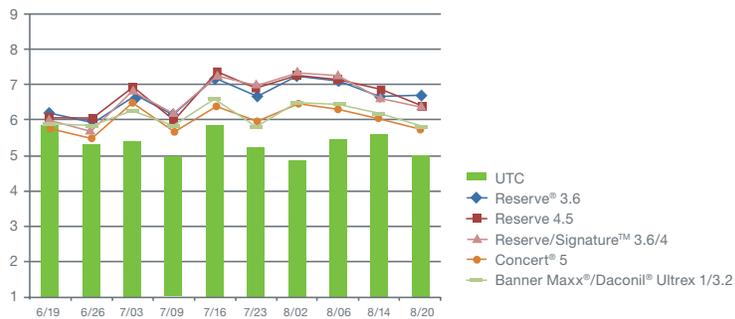
It improves the capability of the fungicide to deliver best-in-class turf quality, above and beyond disease control.

While fungicides formulated with *StressGard* FT control disease, they also help alleviate stress. Fungicides formulated with *StressGard* FT help improve certain plant physiology processes like photosynthesis and respiration so turf can perform better under stressful conditions. The end result is improved root systems below ground and better quality, denser turf above ground. And with less stressed turf, disease control is enhanced. Anthracnose is a good example of this phenomenon.

There are many fungicides that do a good job controlling specific diseases. However fungicides formulated with *StressGard* FT are proven to control disease while alleviating plant stresses — ultimately improving turf quality, density, color and playability.

Nothing has been extensively tested and proven to perform like fungicides formulated with *StressGard* FT.

Improved Turf Density



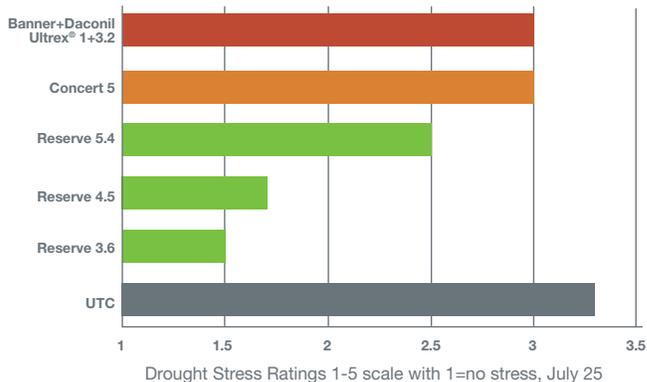
Trial conducted by Dr. Bruce Martin, June - August 2008, Clemson: Turf Density on Creeping Bentgrass

Improved Root Mass & Root Function



Greenhouse study on Crenshaw bentgrass. Both samples were fertilized and watered equally (8 lb. N/M sq. ft./Yr. & 0.1 inch irrigation daily). Two applications of Chipco® Signature were applied at a 14-day interval

Improved Drought Tolerance



Trial conducted by Tom Cook, June - August 2008, Oregon State: Drought Stress Rating (1-5; 1 being "no stress") on annual bluegrass green

Plant Stress

Stress is problematic in living organisms and plant physiology is very complex. Stresses affect golf course turf in many ways at different times of year and in different regions. Plant stress can be grouped into two main groups, biotic stress and abiotic stress.

Biotic Stresses affect plants from other living organisms

- Diseases
- Insects
- Weeds
- Nematodes
- Viruses and Bacterial infections

Abiotic Stresses affect plants from non-living things

- Temperature extremes
- High humidity levels
- Poor air flow
- Excessive or low solar radiation
- Low mowing heights
- Poor root zone and gas exchange
- Fertility issues

Plants have two important plant processes, photosynthesis and respiration. These are sometimes negatively affected by plant stresses, and the turf plant can suffer deteriorating turf quality.

Many of these abiotic stresses, in addition to damaging turf, are the same conditions that many biotic stresses desire. Often times you get a compounding problem of biotic and abiotic stresses where turf quality can really suffer. This is when it becomes very difficult to diagnose the real cause of the problem.

The Portfolio

We began researching and developing our *StressGard*[™] Formulation Technology portfolio in 1994.

Testing proved various product and inert combinations had a remarkable impact on the way turf grew and survived under stress. This research led to the first fungicide formulated with *StressGard* FT, Chipco[®] *Signature*[™]. Signature has proven itself over the years and has become a foundation product in fungicide programs.

To build on the concept of *plant health*, our researchers closely evaluated the physiological effects on plant processes and screened active ingredients and tested inerts. Physiological studies concluded that photosynthesis was enhanced if turf was treated before the onset of stress with fungicides formulated with *StressGard* FT. And further, that chlorophyll levels can be maintained and root systems strengthened.

In 2006, we were the first manufacturer to open a lab dedicated to the study of *plant health*. The lab is at our Clayton Research Facility in North Carolina, where we can evaluate turf in its real environment. Here, Tartan[®], Chipco Triton[®] FLO, Reserve[®] and Interface[®] were created, all with *StressGard*

FT's unique formula. Each product has their strengths in various diseases, but all deliver the same positive *plant health* effects and stress remediation. Excellent disease control with enhanced turf quality is the name of the game.

Our researchers at Clayton remain dedicated to developing the next generation of solutions to better manage green space without negatively impacting the environment.

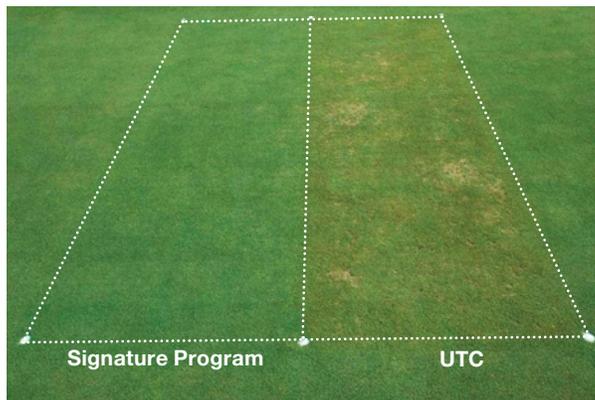


Overview

Chipco® Signature™ is the foundation fungicide for summer and winter decline programs. Protect your turf from stresses, control disease and improve color, vigor, uniformity and playability.

Controls

Summer Turfgrass Decline (high heat and humidity, increased traffic and low mowing heights), Anthracnose, *Pythium* Diseases, Bentgrass Deadspot, Yellow Tuft



*Trial conducted on creeping bentgrass in 2008:
This trial shows a Chipco Signature based program
at a 14-day interval*

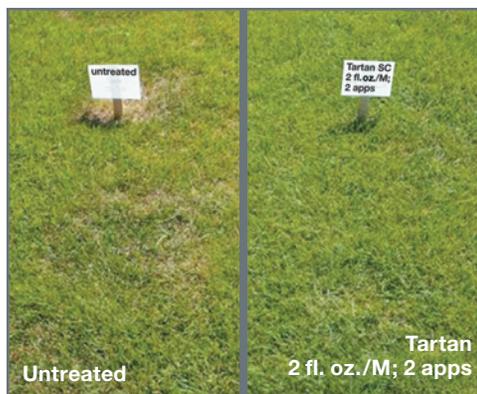
TARTAN®

Overview

Tartan® combines broad-spectrum performance with up to a 28-day residual and provides both contact and systemic action. Tartan strengthens the plant, helping improve the overall turf quality, while providing preventative and curative disease control. It's easy to apply and compatible for tank mixing with foliar fertilizers and insecticides.

Controls

Dollar Spot, Brown Patch, Anthracnose, Gray Leaf Spot, Fusarium Patch/Pink Snow Mold, Summer Patch, Southern Blight, Leaf Spot, Red Thread/Pink Patch, Stripe Smut, Rust and Fairy Ring on warm season grasses



Trial conducted by Dr. Bruce Clark, July, 2010, New Jersey: This trial shows summer patch pressure in the cool-season turf. When two applications of Tartan at 2.0 fl. oz./1,000 sq. ft. is used, effective control is visible in Kentucky bluegrass.

chipco TRITON® FLO

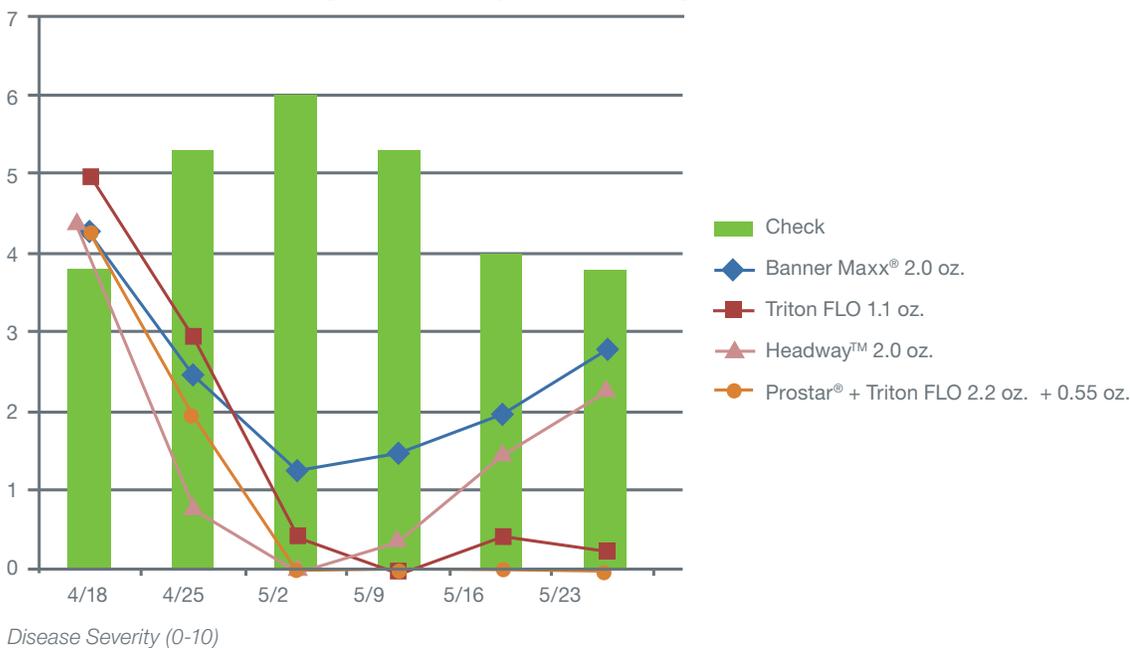
Overview

Chipco Triton® FLO is a DMI fungicide formulated with triticonazole. A water-based suspension concentrate formula, Triton FLO offers broad-spectrum and systemic control from the root of the plant to the tip, as well as residual control.

Controls

Anthracnose, Brown Patch, Dollar Spot, Summer Patch, Take-All Patch, Large Patch, Waitea Patch (ie. Brown Ring Patch), Rust, Necrotic Ring Spot, Red Thread, Gray Snow Mold, Leaf Spot

Waitea Control Trial DMI Fungicides at Torrey Pines GC, Wong UCR 2008



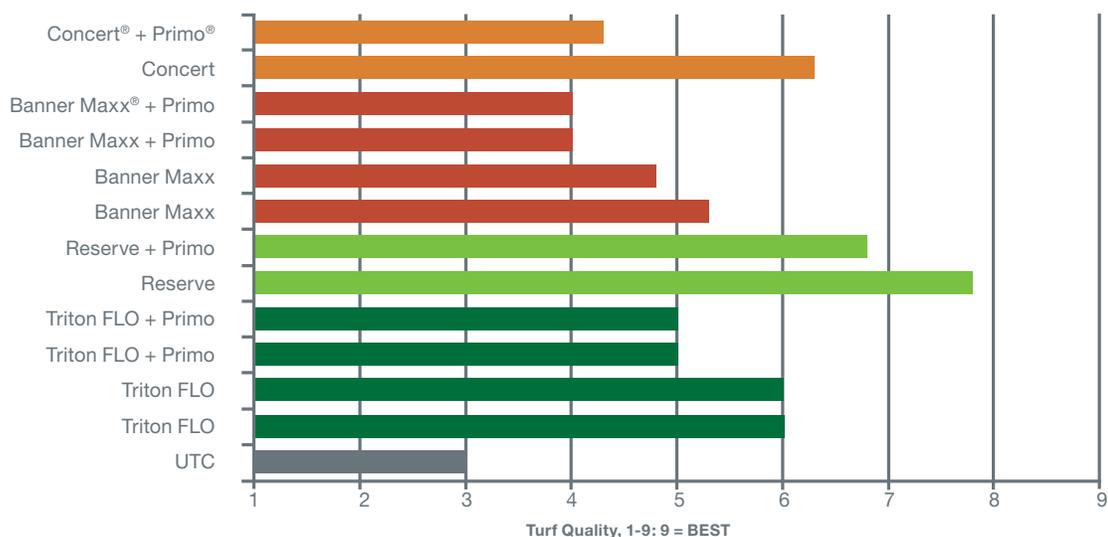
RESERVE®

Overview

Reserve®, an excellent tool for mixed stands of bentgrass and *Poa annua*, delivers superior, broad-spectrum disease control without turf thinning – maintaining turf roots and improving density. In fact, it controls diseases like anthracnose better than other DMI and DMI combination products on the market. Reserve is made up of triticonazole (.54 lb. ai./gal.) and chlorothalonil (4.25 lb. ai./gal.).

Controls

Anthracnose, Brown Patch, Waitea Patch (ie. Brown Ring Patch), Dollar Spot, Fusarium Patch, Gray Snow Mold, Leaf Spot, Necrotic Ring Spot, Pink Patch, Pink Snow Mold, Red Thread, Rust, Summer Patch, Take-All Patch, Algae, Summer Stress/Decline



Trial conducted by Rich Hanrahan, June – July, 2010: This trial shows the effects of Reserve on turf quality

INTERFACE®

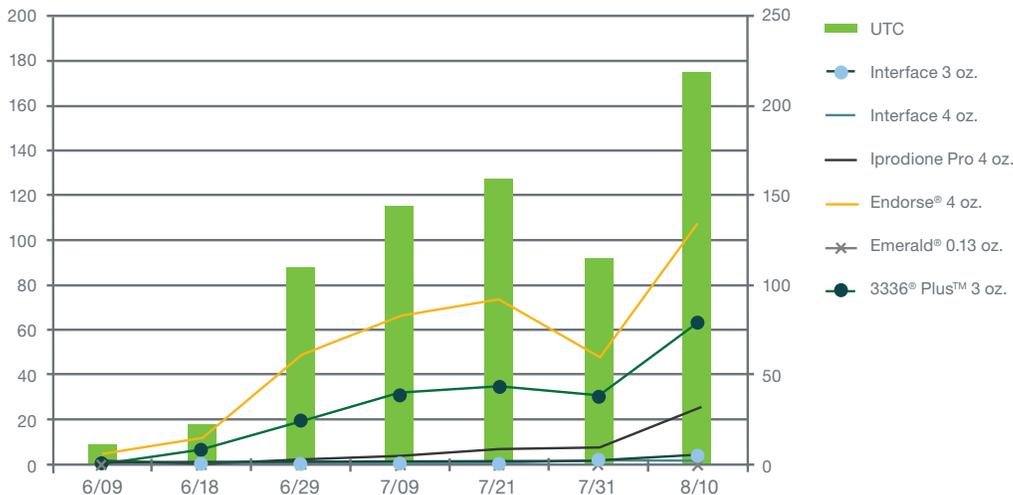
Overview

Interface® is a non-DMI fungicide that provides broad-spectrum disease control and reliable turf safety. Treated turf can fight winter stress resulting in faster spring green up. It also alleviates summer stress. With the active ingredients, iprodione (2.14 lb. ai/gal.) and trifloxystrobin (.13 lb. ai/gal.), you can expect denser turf and stronger roots while managing stress.

Controls

Leaf Spot (caused by *Bipolaris* spp, *Dreschlera* spp, *Curvularia* spp), Dollar Spot, Brown Patch, Pink Snow Mold, Seasonal Stress mitigation

Dollar Spot - Putting green, Dr. Clarke: Rutgers University Dollar Spot Lesion Centers



Trials conducted by Dr. Bruce Clark, April – August, 2009, Rutgers University, NJ:
Interface held to heavy pressure, while others began to break.

When & Where

Fungicides formulated with *StressGard*™ Formulation Technology improve turf quality, density, playability and wear.

The best time to begin applying these products is prior to stress conditions. For cool season turf, begin applications between your second mowing to June 1st. For warm season turf, begin applications between September 1st and March 15th or after your second mowing. In regions that deal with snow cover in the winter, make applications just prior to snow cover for earlier spring green up.

StressGard FT fungicide programs should be designed based on the turf area and type, primary and secondary disease concerns, and desired spray intervals. These factors will help shape a custom program.

Date	Product #1	Product #2
1 st week April	Tartan® 2 oz.	
1 st week May	Signature™ 4 oz.	Triton® FLO .8 oz.
4 th week May	Signature 4 oz.	Triton FLO .8 oz.
2 nd week June	Signature 4 oz.	Interface® 3 oz.
4 th week June	Signature 4 oz.	Reserve® 2.8 oz.
2 nd week July	Signature 4 oz.	Daconil Ultrex® 3.2 oz.
4 th week July	Signature 4 oz.	Interface 3 oz.
2 nd week August	Signature 4 oz.	Daconil Ultrex 3.2 oz.
4 th week August	Reserve® 3.5 oz.	
2 nd week September	Tartan 2 oz.	

*Sample Programs for Bent/Poa Greens:
Dollar Spot, Summer Patch, Anthracnose*

Date	Product #1	Product #2
1 st week April	Tartan 2 oz.	
1 st week May	Triton FLO 1 oz.	
4 th week May	Interface 4 oz.	
2 nd week June	Reserve 3.5 oz.	
1 st week July	Interface 4 oz.	Banol® 1.2 oz.
4 th week July	Signature 4 oz.	Reserve 3 oz.
3 rd week August	Interface 3 oz.	
1 st week September	Tartan 2 oz.	

*Sample Programs for Bent Fairways:
Dollar Spot, Brown Patch*

Testimonials

“(Chipco®) Signature™ is the backbone of my program. There aren’t any other chemicals on the market that give better results; Signature promotes *plant health* better than any fungicide on the market. Signature helps me control summer decline on my course...Creating as healthy a plant as possible is a priority and Bayer has given me products with *StressGard*™ Formulation Technology that assists me in keeping it a priority.”

– Tom Kaplun, Golf Course Superintendent, North Hempstead Country Club

“(Chipco) Triton® FLO is the reason why my course is anthracnose free with over 90% control. In part it’s due to the fact that *StressGard* Formulation Technology assisted the active ingredient in making a healthier grass plant and improving the plant health.”

– Tony Giradi, Golf Course Superintendent, Rockrimmon Country Club

“These products have made my job easier as I don’t have to do as much calculating, and the application is simple. I’m able to see the health of my turf by using the *StressGard* Formulation Technology products. My greens have never looked better.”

– Keith Kruger, Golf Course Superintendent, Acoaxet Country Club

Innovator Spotlight



Dr. Richard Rees, as Product Development Team Leader and Senior Principle Scientist for Bayer, is responsible for coordinating all fungicide and plant health technical development activities related to turf and ornamentals. He has published numerous patents and research findings during his 24 years with Bayer.



Dr. Tom Ruffy holds the honor of being named the first Bayer CropScience Chair of Sustainable Development, where his primary responsibility is to help further the long-standing collaboration between North Carolina State University (NCSU) and Bayer in driving environmental stewardship and sustainability into urban greenspace management.

You've got questions. We've got answers.

What is plant health?

We coined the term to refer to the quality of turf externally and at a cellular level. Plant health can be improved with products that manage turf stress and stimulate natural plant defenses.

What does *StressGard*[™] Formulation Technology do?

StressGard FT is an advanced formulation technology developed by Bayer. Fungicides with *StressGard* FT positively affect turf physiology, helping the turf plant to more effectively manage the stresses of a golf course.

How does it work?

Fungicides formulated with *StressGard* FT protect photosystems in chloroplasts and strengthen natural defenses of the plant along with the fungicidal effects of the products. Moderating radiation energy levels improves the efficiency and performance of chloroplasts to convert light energy and fix carbon dioxide, or to utilize carbohydrate reserves by photorespiration. It can also utilize carbohydrate reserves by photorespiration. Plant stress is reduced, improving the balance between photosynthesis and respiration. The result is a healthier plant above and below the soil surface.

What are some of the effects of using fungicides formulated with *StressGard* FT?

Not only do they control disease, they strengthen the plants natural defenses, protect the cellular structure of the plant, increase photosynthesis, improve root function and nutrient uptake, and lower respiratory requirements. The end result is healthier turf and improved quality. The results are even more apparent when the turf is growing under stressful conditions.

How long does it take to see the benefits and how long do they last?

Depending on the turf and stress conditions, results can typically be seen within 14 days of application. The benefits have been shown to last 21 days and longer depending on the time of year and number of applications.

Can I use fungicides formulated with *StressGard* FT without a disease present?

Yes, fungicides formulated with *StressGard* FT can be used preventively for disease control. *Plant health* benefits contribute to healthier turf and protect it from the onset of disease.

Do fungicides formulated with *StressGard* FT contain fertilizers?

No. Unlike some other products on the market, fungicides formulated with *StressGard* FT DO NOT contain fertilizers. Our fungicides do not mask the turf; they make turf healthy and strong.

Do the 5 fungicides containing *StressGard* FT work together?

Yes. Talk to your distributor or Bayer representative about designing a fungicide program that works for you. Programs vary based on environmental conditions and turf needs.

Bayer is a company

dedicated to innovative solutions and real results.

With a rich history and commitment to *plant health* solutions,
we have the experience and research to support our fungicides formulated
with *StressGard*[™] Formulation Technology.

Chipco[®] Signature[™], Tartan[®], Chipco Triton[®] FLO, Interface[®]
and Reserve[®] are proven to manage stress and improve turf quality.

We're always conducting advanced research and trials.

And new solutions are uncovered every day – opening the door to a healthier,
greener future for turf care professionals.

For more information,

visit BackedbyBayer.com/StressGard or contact your FSR.





Protecting Tomorrow, Today (PTT) is the vision of Bayer. It defines our contribution to sustainability and is the driving principle behind our strategic, operational and cultural activities.

We are proud of our industry's role of sustainability. We are committed to developing products that deliver superior results in balance with consideration for our environment.

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