

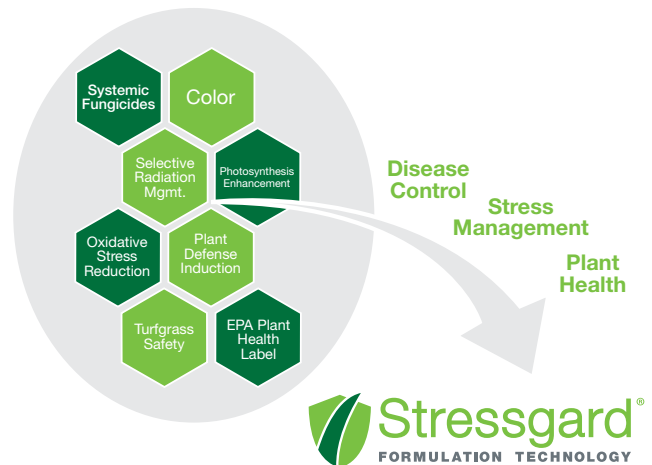
The Benefits Of Bayer Fungicides With Stressgard® Formulation Technology

Bayer fungicides with Stressgard Formulation Technology (Stressgard FT) offer benefits like outstanding disease control, stress management and plant health for turfgrass. That's because Bayer Stressgard FT fungicides have stacked technologies:

- Systemic fungicide activity
- Color enhancement
- Selective radiation management
- Photosynthesis enhancement
- Oxidative stress reduction
- Plant defense induction
- Summer turf safety
- EPA labeled plant health effects

Some of these technologies may be available in fungicides and plant health products from other manufacturers; with Bayer Stressgard FT fungicides,

these technologies are proven and already built in. The benefits add up to improved disease control, enhanced turf color and density, and overall improvements in turf quality.



Benefit	Stressgard FT	Intrinsic® Brand Fungicides	Daconil Action™	Civitas™ + Civitas Harmonizer™	Turfscreen™	Pigments
Systemic Fungicides	Chipco® Signature™ Mirage® Stressgard Interface® Stressgard Tartan® Stressgard	Yes	Contact Only	Contact Only	None	None
Color	Yes	No	No	Yes	Yes	Yes
Selective Radiation Management	Yes	No	No	Unknown	Unknown	Unknown
Photosynthesis Enhancement	Chipco Signature	No	No	No	No	No
Oxidative Stress Reduction	Interface Stressgard Tartan Stressgard	Yes	No	No	No	No
Plant Defense Induction	Chipco Signature	No	Yes	Yes	No	No
Summer Turf Safety (Cool-Season Turfgrass)	Chipco Signature Mirage Stressgard Interface Stressgard	Yes	Yes	No*	Yes	Yes
EPA Labeled Plant Health	Chipco Signature Interface Stressgard	Yes	No	No	No	No

*See product label for high temperature, stress and tank-mix restrictions.

Systemic Fungicides

All Stressgard FT fungicides provide systemic activity for disease control, resulting in long-lasting preventative as well as curative activity. Effective fungicidal active ingredients are a key part of successful turf disease management programs. Other products may have no fungicidal properties or only contain a contact fungicide.

Color

All Stressgard FT fungicides enhance turf color, adding to the natural aesthetic characteristics of both cool- and warm-season turfgrass. Other products may provide color, but can vary in the color quality or natural appearance.

Selective Radiation Management

Stressgard FT fungicides reduce the impact of harmful ultraviolet radiation and selectively allow for the transmission of red and blue light wavelengths used by turf plants for photosynthesis. Products that block all radiation, including the red and blue wavelengths, may actually injure plants by reducing the light available for photosynthesis (McCarty, B., Gore, A. and Gann, J. 2014. Is the grass really greener? *Golf Course Management* 82(8): 86-9.1). The degree of selective radiation and light filtration has not been scientifically documented for non-Stressgard FT products.

Photosynthesis Enhancement

Studies with Chipco Signature show an enhancement in photosynthesis in heat-stressed plants (Huang & Liu 2009). Enhanced photosynthesis equals more energy production in plants and increased tolerance to stresses and disease development. Other products have not shown this effect.

Oxidative Stress Reduction

Tartan Stressgard and Interface Stressgard contain trifloxystrobin and can be used to assist in stress reduction on turfgrass. Trifloxystrobin reduces oxidative stress in plants, resulting in increased tolerance to drought and other abiotic factors (Han et al. 2012), exactly like the mechanism promoted by BASF's Intrinsic brand fungicides.

Plant Defense Induction

Chipco Signature activates natural plant defenses to decrease the impact of diseases (Guest 1984). Although the active ingredient in Signature is primarily active against Pythium, it is effective in combination with other products to prevent stress diseases like anthracnose (Cook et al. 2006). The plant defense mechanism is separate from systemic acquired resistance utilized by acibenzolar-S-methyl in Daconil Action, and the two can be used together effectively.

Summer Turf Safety

Under summer stress conditions, some other products can cause significant damage to plants. Stressgard FT solutions have year-round flexibility. Non-DMI products like Interface Stressgard and Chipco Signature can be used anytime without risk of negative plant growth regulation effects. Potential turfgrass growth regulation effects caused by DMI fungicides in summer conditions are minimized when using Mirage Stressgard. Tartan Stressgard can be used safely in summer stress conditions, when rotated with a non-DMI fungicide in a seasonal program.

EPA Labeled Plant Health Effects

All turfgrasses benefit from Bayer's unique Stressgard FT. Very few products have the data requirements needed to be approved by the EPA and have plant health claims added to the product label. Chipco Signature, Tartan Stressgard and Interface Stressgard have been shown to have positive plant health effects. All three have passed the regulatory requirements to claim this on their labels.

References And Further Reading

- Cook, J., Landschoot, P. and Schlossberg, M. 2006. Phosphonate products for disease control and putting green quality. *Golf Course Management* 74(4):93-96.
- Guest, D. I. 1984. Modification of defense responses in tobacco and capsicum following treatment with Fosetyl-Al [Aluminium tris (o-ethyl phosphonate)]. *Physiological Plant Pathology* 25:125-134.
- Han, S. H., Kang, B. R., Lee, J. H., Lee, S. H., Kim, I. S., and Kim, C. H. 2012. A Trifloxystrobin Fungicide Induces Systemic Tolerance to Abiotic Stresses. *The Plant Pathology Journal* 28:101-106.
- Huang, B. and Liu, X. 2009. Physiological responses of creeping bentgrass to heat stress affected by phosphonate fungicide applications. *International Turfgrass Society Research Journal* 11:799-806.



Through the Healthy Turf, Healthy Tomorrow program, Bayer is dedicating 1% of Stressgard Formulation Technology sales to the advancement of plant health research and education through funding with the Environmental Institute For Golf. We believe these efforts will significantly enhance the superintendent profession, the turf industry and the game of golf.

To learn more, visit www.BackedByBayer.com/healthy-turf.

