# Strobilurins, Who Has Them, Where Do They Come From, and How Do They Work?

Jeffrey S. Gregos*

The Turfgrass Disease Diagnostic Lab conducts many fungicide evaluations for the control of turfgrass diseases. One of the benefits of performing this work is the opportunity to see what is new in the way of plant pathogen control products. One such chemistry, which has been tested extensively in recent years, is the Strobilurin Family. Currently there are only two members of this family available to the turf and ornamental market, but in the next couple of months and years there should be 4 to 5 members.

Most of you may be familiar with one of the family members, Azoxystrobin or better know in the turf and ornamental market as Heritage. Produced by Zeneca, this product has proven to be very effective against many diseases and probably the premier controller of basal rot anthracnose and several of the patch diseases. But, do you know how it works, where the original chemistry was derived, or what other chemicals are in this family that are or will be available in the future? In the following all of these questions will be answered, and an understanding of these chemicals should be gained.

## History

This family has some very simple beginnings and is modeled after naturally occurring compounds. The original compound was first extracted from *Stobillurus tenacellus*, a basidiomycete fungi that was found living on *Pinus sylvestris* (Scotch pine) pinecones in Europe. Yes, even fungi find other fungi objectionable and use fungicides to ensure their survival. Several companies have taken on to this example and have fashioned many compounds based on the original. The first company to do work on this chemistry was ICI or better known as Zeneca (soon to be Syngenta). They were shortly followed by BASF and the race to market began. It should also be noted that work started on these products in 1982, suggesting how long it takes to get new chemicals to the market place. Now just about every major agricultural chemical company is pursuing some derivative of the strobilurin chemistry. Currently, at least 4 companies have strobilurins in their experimental evaluation program or are currently marketing them.

## Mode of Action

Mode of action can be a vague term meaning the specific site of action (i. e. biochemical pathway) or more generally as the either systemic or contact transportation in the plant. For this article, specific site mode of action is not that important and it will only be mentioned that this class of chemical affects the *bc, complex* of the mitochondrial respiratory chain. More focus will be put towards explaining how the chemicals are

* Outreach Specialist, Turfgrass Disease Diagnostic Lab, Department of Plant Pathology, UW-Madison, 3101 Highway M, Verona, WI 53593

translocated through the plant. Three chemicals will be explained, azoxystrobin (Heritage, Zeneca), kresoxim-methyl (unnamed at print, BASF), and trifloxystrobin (Compass, Novartis).

*Azoxystrobin*

Azoxystrobin is slowly absorbed into the leaf and within 24 hours, about 10% of the chemical is absorbed. Once in the leaf it moves acropetally through the xylem (transported outward and upward from site of penetration). Additionally, azoxystrobin has translaminar movement or movement from the top of the leaf to the bottom of leaf. This provides protection to the entire leaf even if chemical is only applied to the top surface. Root absorption is also possible and due to the acropetal movement it is translocated through the xylem to vegetative parts of the plant.

*Kresoxim-methyl*

This chemical being investigated by BASF has shown to have similar uptake by the plant as azoxystrobin. Also, like azoxystrobin it has some translaminar movement from the upper to lower surface of the plant. Additionally, through radioactively labeled studies movement of the product has been observed through the waxy layers (surface systemic). This type of movement in combination with the translaminar movement has been termed quasi-systemic transport. Currently, this product is labeled in Europe on several crops, however it is not know when or if it will be labeled on turf in the United States.

*Trifloxystrobin*

Trifloxystrobin is a new chemical that recently was labeled this fall for use on turf under the trade name Compass. Unlike the last two chemicals it has very little absorption into the plant, with about 2% after 24 hours. But, its major mode of transport is similar to that of kresoxim-methyl. Novartis has termed this movement as mesostemic. To simply define mesostemic, it is simply transport through the waxy layer via superficial vapor movement. It additionally has translaminar movement, but has no movement through the vascular system of the plant.

**Resistance**

Like any single site fungicide there is a high possibility for resistance. Care should be taken with their use and excessive use should be avoided. Standard management practices should be employed such as rotation. This will ensure that we are able to use this chemistry for many years to come.

In summary, we are at a very important crossroad in turfgrass disease control. This is the first step to new and improved chemistries that have greatly reduce use-rates and are derivatives of naturally occurring chemicals, providing less impact to the environment and the people that use them.

**Reference:**


1. *Compass Technical Bulletin*, Novartis, 1999

2. Ypema, H. L. and Gold, R. E. 1999. *Kresoxim-Methyl, Modification of a Naturally Occurring Compound to Produce a New Fungicide.* Plant Disease. Vol. 83 No. 1. P. 1-17

3. *Heritage Reference Guide*, Zeneca Professional Products, 1996