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Azoxystrobin (Amistar): A Modern Fungicide for Sustainable Crop Protection

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Azoxystrobin is one of the world's most popular and widely used fungicides for protecting crops from destructive diseases caused by fungi. Belonging to the strobilurin chemical family, azoxystrobin was introduced in the mid-1990s and quickly gained popularity due to its broad-spectrum activity, reliability, and ease of use (Bartlett et al., 2002; Food and Agriculture Organization, 2008). The compound is inspired by substances naturally found in certain mushrooms, allowing it to work by blocking the energy-building process inside fungal cells. As a result, harmful fungi cannot grow or spread, making azoxystrobin a powerful tool for farmers seeking to protect crops like rice, wheat, grapes, vegetables, and many others (Vincelli, 2002).

What Is Special About Azoxystrobin?

Azoxystrobin comes from natural chemicals made by some mushrooms. When sprayed on plants, it spreads easily through the leaves and even new growth (Vincelli, 2002). Its key action is blocking the fungus from making energy. Without energy, fungi can't grow or spread—so diseases are stopped before they can damage crops (Bartlett et al., 2002). Another good thing about azoxystrobin is that it is not very harmful to humans or animals, which is why experts say it's generally safe for both people and the environment when used correctly (EPA, 2009).

How Well Does It Work?

Azoxystrobin works against a lot of different plant diseases on many types of crops:

- Grapes: It can reduce powdery mildew by up to 91% (Cabras & Angioni, 2000).
- Rice: It helps control a major rice disease called sheath blight (Baraldi et al., 2003).
- Wheat: It can reduce take-all disease lesions by 20–80% (Wong & Wilcox, 2001).
- Tomatoes: It helps plants use water better and can increase the number of tomatoes (Venancio et al., 2003).

Besides stopping disease, azoxystrobin also helps plants grow stronger and stay green longer (Grossmann & Retzlaff, 1997).

Is It Safe for the Environment?

Azoxystrobin doesn't stay in the environment for a long time. For example, on grape berries, it lasts about 5–11 days, and in soil, about 8–34 days (EPA, 1997). Most of it breaks down before it can harm animals or water. It's considered only slightly irritating to human skin and eyes, and not likely to cause bigger health problems (EPA, 2009).

However, it can have some effects on useful insects like bees if the insects get a large dose (Johnson et al., 2013). To reduce this, farmers are advised to avoid spraying when bees are active.

Can Fungi Become Resistant To It?

Yes—one of the main risks with azoxystrobin is resistance. This means that after using the fungicide for several years, some diseases can "learn" how to survive it, mostly through tiny changes (mutations) in their DNA (Ishii et al., 2001). Once this happens, azoxystrobin will stop working well against those diseases.

Resistance is most likely if farmers use only azoxystrobin many times a season, or if the same crop is grown repeatedly (FRAC, 2006).

How Can We Slow Down Resistance?

Experts suggest these rules (FRAC, 2023):

a. Don't use azoxystrobin alone for every spray; mix or rotate it with other fungicides with different ways of working.
b. Limit how many times you use it each season.
c. Use the full recommended dose, not less.
d. Combine spraying with other ways to fight disease, like growing stronger plant varieties and improving field conditions.

What's New with Azoxystrobin?

New versions are being made that mix azoxystrobin with things like natural oils or nutrients. These are meant to work better and to reduce how much chemical is needed (Konstantinidou-Doltsinis et al., 2006). Scientists are also finding new ways to help the fungicide stick to plants better, so it washes off less in the rain (Campos et al., 2018).

Main Points to Remember

- Azoxystrobin is a trusted tool for protecting crops from many fungal diseases.
- It is generally safe for humans and animals if used properly.
- Using it too much can cause diseases to become resistant, so it should be used wisely and together with other methods.
- New products and smarter ways to use azoxystrobin are being developed to keep crops healthy while protecting the environment.

Indian Success Story

Azoxystrobin has made a big difference for Indian farmers, especially those growing important crops like rice and onions. Let's look at two examples where this modern fungicide delivered real results:

1. Protecting Rice from Sheath Blight: Sheath blight is a major disease that damages rice yields in India, especially in states like Andhra Pradesh and Karnataka. Researchers tested a combination fungicide containing azoxystrobin (11%) with tebuconazole (18.3%) on the popular rice variety 'Swarna' over two seasons in Andhra Pradesh.

What they found:

- When farmers used the mixture at 1.5 ml per liter of water, disease incidence dropped sharply to around 6–8%, compared to nearly 91% in untreated fields.
- The severity of the disease stayed very low (7–8%), while control fields had disease rates as high as 57–90%.
- Healthy rice meant better yields and more profit for farmers.
- Similar results were seen in Karnataka, where azoxystrobin mixed with tricyclazole also reduced rice diseases and increased grain yield and net profit.

2. Saving Onions from Purple Blotch: Onions are a valuable crop in India, but they often suffer from "purple blotch"—another fungal problem. In Andhra Pradesh, field trials using azoxystrobin (11%) plus tebuconazole (18.3%) at 750–1,000 ml per hectare led to:

- The lowest incidence of purple blotch (about 17% vs much higher in other treatments).

- The highest onion yields and best profit margins for small farmers.

What Made These Applications Successful?

- **Effective Disease Control:** Azoxystrobin controls tough fungal diseases that traditional fungicides often miss.
- **Increased Yields:** Healthier plants produced more rice or onions, improving food security and farm income.
- **Safe for Crops:** The treatments didn't harm the plants, and no major side effects were found in either crop.

Why Does This Matter for Indian Agriculture?

For millions of Indian farmers, crop-destroying diseases have always posed big challenges. The success of azoxystrobin-based solutions, proven in actual farmer fields, shows that modern science can help boost productivity, reduce losses, and make agriculture more profitable and secure for rural families.

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