

# Some Principles Of Fungicide Resistance VIII: Fungicide Dependence Promotes Resistance Risk

This is the final in a series of articles on fungicide resistance.

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An important – and very logical – question is, “How can I prevent fungicide resistance?” It is an easy question to answer: Never use fungicides. That’s right – never using a fungicide is the only way to prevent resistance. If a fungal population has genes or mutations for resistance to the fungicide you are about to use, applying it creates selection pressure towards resistance. See the first article in this series for a more detailed explanation of this.

While prevention of fungicide resistance is impractical, you can reduce the risk. The best way to do so is to avoid over-relying on fungicides. A metaphor for overreliance on fungicides is depicted by a “fungicide umbrella”, in Figure 1.

An alternative to overreliance on fungicides is to use a variety of disease-control measures, appropriate to your particular production system. This is depicted graphically in Figure 2. Appropriate disease-control practices may include:

- Crop rotation
- Resistant varieties
- Management of irrigation and leaf surface moisture

- Fertility practices that impact disease
- Planting dates that reduce disease risk
- Sanitation in all its many forms
- Plant spacing and sowing practices that reduce disease

- Management of vectors and other pests
- Improved surface and subsurface drainage
- Raised beds
- Cover crops that reduce disease pressure
- Addition of organic matter to soil
- Mulching
- Pathogen-free seed

A diversified plant disease management program (Figure 2) will slow down the development of fungicide resistance. Furthermore, even if resistance develops, it will not be as damaging, as compared to a farm where only fungicides are used for disease control. A diversified plant disease management program is buffered against severe damage from fungicide-resistant strains,

since there are other tactics that are contributing to disease management.

**Bottom line:** The best way to protect the utility of fungicides is by not over-relying on them. Many crop-management practices can help reduce the reliance on fungicides.  $\Delta$

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Figure 1. A “fungicide umbrella”, representing a disease control program heavily dependent on the use of fungicides.

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Figure 2. A diversified disease control program, one that uses fungicides (one of the umbrellas) but uses other disease-control tactics, as well.

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