

CHEMICAL CRUTCHES

ARC: When we both started in our respective careers, most plant disease control products were quite broad in their spectrum of activity. In 1979, my first exposure to fungicides was testing an experimental product with chlorothalonil, which was later labeled as Daconil 2787. Chlorothalonil is very broad with activity against many foliar fungal diseases. The other product I remember was CGA48988, which was the numbered designation for Subdue (metalaxyl). This of course was a very narrow spectrum product targeting Pythium, Phytophthora and the downy mildews. What do you remember about fungicides in your early career, Marge?

MLD: Our earliest fungicide memories are from the same era. I remember thinking back then that the most widely used product, Benlate (benomyl), controlled almost everything, so that a lot of the classic leaf spot diseases just weren't showing up any more. This fungicide was very broad spectrum, like chlorothalonil, and had added advantages of having some systemic activity and having both root drench and foliar spray applications. When benomyl was the appropriate chemistry for a pathogen, it worked amazingly well, but when it was overused, resistance developed so that it no longer controlled Botrytis blight.

ARC: We have seen quite a bit of specialization in spectrum over the past 35 years. I remember products that have worked only on powdery mildew, only on Botrytis, and several that only work on Phytophthora and downy mildew. How do you feel about recommending narrow versus broad-spectrum products for efficacy, safety to the environment and resistance management?

ARC: Yes, we could do without the broad spectrums — as we currently use them, anyway. I am thinking more and more about biological agents as tiny chemical factories. They make much more than a narrow target single chemical. They could be the ultimate in broad-spectrum, low environmental impact disease prevention. In the long run, we will have to do better with real IPM and not just depend on a very active narrow target chemical. That approach will not allow us to be as sustainable as we need to be moving fully into this century.

Overall, I think the truly broad-spectrum fungicide/bactericides will go by the wayside. One of the best examples of this movement is the phase out of methyl bromide. Unfortunately, the replacement products don't work as well, have a more serious impact on the environment since their volumes must be quite high — and their cost is prohibitive in many cases. As I told some growers in the early 1990s, we must all become better growers without these chemical crutches.

MLD: Narrow-range products have often been outstanding in the level of control they offer . . . until resistance comes along. Guarding them against that eventuality can be done by strategic use of some of the multi-site action, broad-spectrum materials, used in rotation. Sometimes these broad spectrums have a much higher environmental impact than newer, narrow-spectrum ones (compare copper sulfate, working against many fungi and many bacteria, for example, to dimethomorph, with only Phytophthora and downy mildew targets — the copper sulfate has potentially a more negative environmental impact). Could we do without the broad-spectrums? Could we keep plants sufficiently protected without any chlorothalonil, mancozeb or copper?

MLD: We've gone from a hope in chemicals as the solution to the world's ills to being concerned that we've overused them and that the environment is harmed as a result. Having microbes do the job for us is an attractive alternative, since they can deliver their own chemical droplets more precisely, with much less waste. There will have to be lots of scientific discovery and product development ahead to get us where we need to be with biological controls against pathogens — and simultaneously we need more efforts in developing disease-resistant crops rather than disease-susceptible ones with plaid flowers that glow in the dark. ☞



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Botrytis is an example of a disease controlled by both broad-spectrum and narrow-spectrum fungicides