

Acylalanine Fungicides and Seed Tuber Treatment

In my article in the August 1980 issue of *PLANT DISEASE* (page 764), I suggested that seed tuber treatment with acylalanine fungicides could provide significant improvements in late blight control in potatoes, compared with conventional spray techniques. Recently, there have been instances in Europe of failure of one of these fungicides (metalaxyl) due to the development of resistant populations of *Phytophthora infestans*.

I no longer consider that seed tuber treatments should be used, since they would present a high selection pressure favoring the emergence of resistant strains of the fungus. It would be preferable to restrict the use of acylalanine fungicides to one or two applications per crop and to apply them as components in mixtures with conventional protectant materials (Hartill, Beaver, and Brook. 1975. *Proc. N.Z. Weed Pest Control Conf.*, 28th. pp. 130-132).

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Regulation and Profit: What Are the Prices?

The editorial in the October 1980 issue of *PLANT DISEASE*, "What Price Regulation?," by Charles J. Delp (page 901) complains of excessive governmental restrictions and pleads for acceptance of a more reasonable level of risk (apparently concerning pesticides). A reply is in order.

Government functions to do things that we can't do as individuals and to integrate extreme viewpoints into a workable compromise. Dr. Delp represents one viewpoint, and the "persuasive portion of the population . . . that is uncertain, fearful, and untrusting of the . . . water we drink [and] the food we eat . . ." constitutes the other. In our present state, of course we need pesticides and of course we need to regulate their use. In this regard, however, I feel that an unbiased appraisal will lead one to a more cautious and careful approach than Dr. Delp's.

The matter of risk requires the distinction of two kinds. A child's toy on the stairs, a dangerous intersection, a chain saw—these are risks we can deal with on an individual basis to the extent we choose, and should misfortune befall us, others are unaffected and indeed learn from our mistakes. An entirely different

sort of risk is presented by pollution in which 1) individuals have no choice and acceptance of risk is (or should be) a community decision, 2) our senses are often ineffective in detecting danger, 3) the potential for a long lag between the introduction of a material and manifestation of its harmful effects is worth considering, and 4) the public is ultimately forced to trust the decisions of scientists who the public increasingly realizes can make only educated guesses on some critical issues. These are the reasons, I feel, for the public suspicion and distrust of the adulterated environment as noted by Dr. Delp.

To suggest that the private sector can regulate itself in the interests of the public is simply to ignore history. This is one instance where the profit motive does not necessarily operate for the good of society. Chemical companies have in fact lobbied against research appropriations for development of alternatives to pesticides (*San Francisco Examiner*, February 1973).

Regulations causing inconvenience generally draw complaints, but the fact is that on the whole they protect our natural resources, our safety, our rights, our belongings, and our economic security from unscrupulous individuals and groups. In general, regulations protect the dispersed interests of individuals from the more powerful aggregate interests of corporations and industries. The annoying overabundance of forms and bureaucratic attitudes by regulatory agencies should not blind us to the fact that we are dealing with substances whose potential for long-term negative effects is too great to ignore. Let's correct the bureaucratic methods—and not throw out the baby with the bathwater.

Finally, I must point out that to portray an oppressive Communist regime as a logical extension of industry regulation is utter nonsense, and I feel it is inappropriate for our society to offer itself as a forum for advocacy using such scare tactics.

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Dr. Delp replies: I agree with Mr. Worrall on most of his points, but need to clarify his apparent misunderstanding. True, an oppressive Communist regime is not a logical extension of industry regulation. But he missed the point. I wrote that ". . . we seem willing to turn over increasing portions of our freedom to agencies designed to take risks out of our lives . . ." and "We are caught in a frantic quest for a life totally free of risks. Our fears are leading us into regulatory imprisonment."

Not just selected industry—all of us. Profits are not the issue. We are all paying the price in many ways.

The third paragraph of my editorial begins "Reasonable regulations are absolutely necessary . . ." but Mr. Worrall implies that I advocate throwing out the baby with the bathwater. He also implies that I suggest the private sector should regulate itself. Perhaps these misunderstandings were because I said "I favor those occasions when we can regulate without involving government machinery." When we are willing to relinquish all forms of self-regulation to our government, we open ourselves to complete government control. And that could be oppressive.

The 1979 Tobacco Blue Mold Disaster in Ontario, Canada

There is a lesson to be learned from epidemiological events leading to a preventable catastrophic epiphytotic. A study of this blue mold disaster is eligible for citation and discussion in introductory plant pathology courses. The blue mold epiphytotic is an elegant example of interactions of an aggressive and variable fungal pathogen, a susceptible host plant, the vagaries of environment, and the stupidity of man.

On 8 July 1979, brown circular lesions 2 cm in diameter were observed on tobacco leaves in a 3.6-ha field bordered on three sides by forest near Turkey Point, Ontario, Canada. On 4 June 1979, 0.4 ha of this field had been planted with Delhi 76 "speedling" transplants grown in Florida, where the blue mold fungus survives the winter. "Speedlings"—tobacco seedlings grown in soil in funnel-shaped containers—were used because they could be transplanted with minimal shock. This procedure was being tested with tobacco for the first time in Ontario with hopes that the crop could be harvested early, thus reducing the possibility of frost damage.

The disease was first diagnosed as cold-weather injury at the Delhi Tobacco Research Station, but the blight appeared in an adjacent field of Virginia 115 a few days later, about 3 days after irrigation.

On 11 July, another farmer who had planted "speedlings" observed spots on many plants, and then the name of the pathogen, *Peronospora tabacina* Adam, was announced by the Delhi Tobacco Research Station. The crop was sprayed with zineb but was cut down about a week later because the farmer was told by marketing specialists that tobacco companies would not purchase sprayed tobacco and because the disease had

advanced too far prior to spraying. The tobacco growers were advised to continue normal practices, such as topping, and spraying to inhibit sucker growth. They were also warned not to apply fungicides. Appropriate control measures were not taken because fungicide residue was not wanted in Ontario tobacco and the destructiveness of the pathogen was not appreciated.

On 18, 19, 20, and 23 July, all but one of the tobacco growers who had imported "speedlings" reported blue mold. The one grower who did not report blue mold on his "speedlings" during this summer grew his plants about 300 km northeast of the main tobacco area and in a less humid region.

On 1 August, a decision was made by a manager of the Ontario Crop Insurance Commission that an epidemic would not be declared until the disease had spread to 300 farms. Also, it was contended that the only thing that could stop the disease, the causal agent of which thrives in rain and temperatures below 16 C, was hot, dry weather. Unfortunately, the pathogen had survived and flourished during the second week of July when the day temperatures were about 30 C and the night temperatures were about 19 C.

On 1, 2, 3, 13, and 25 August, blue mold was reported on 60, 350, 600, 900, and 1,500 farms, respectively. By 25 August, the fungus had spread 200 km westward on easterly winds that occasionally occur when the usual westerly winds do not prevail. By September, the entire crop was cut down on 460 farms and a portion of the crop on another 200 farms. The crops that were cut down were within 40 km of the "speedlings" and were severely damaged during the first week of August when humidity was high, rainfall was frequent, and on two occasions fog persisted until about 11 a.m.

By 1 August, several growers knew their crops were ruined and they were certain it was unwise to continue normal practices on them. Even on 3 August, when 300 farms had severely infected plants and plants on 60 farms were completely covered with lesions, growers

were still advised to continue normal practices.

On 2 August, a nonpartisan plant pathologist stated on television that a devastating epiphytotic was in progress and that most of the tobacco in the Courtland area, the heart of the tobacco country, would be destroyed. He informed the public that the pathogen sporulated at temperatures as high as 28 C. He knew that the disease had destroyed the fields of tobacco in which the disease first appeared and that the pathogen had survived a week of extremely hot weather and had multiplied enormously when the plants were small. Thus, it was logical to prophesy the disaster.

On 3 August, a governmental task force, chaired by the chairman of the Ontario Flue-Cured Tobacco Marketing Board and composed of marketing specialists, insurance agents, agronomists, and Agriculture Canada plant pathologists, was set up. At this time, some members of the task force vehemently disagreed with the nonpartisan plant pathologist.

On 4 August, the task force recommended that normal practices be continued and that the bottom four leaves be removed and compensation of \$100/ha, a liberal sum, be given for removal. This exercise in futility was discontinued on 7 August, 3 days after its initiation.

Furthermore, on 6 August, a marketing specialist in the task force said there was no indication the disease was winning. He added that crop insurance adjusters had said on 5 August that only 300 acres of tobacco (worth \$900,000) had been ordered destroyed, and "that's a drop in the bucket." Obviously, the severity of the disease was not appreciated. This probably is why the task force failed to suggest that irrigation be stopped during the hot part of the day.

As a crowning blow, farmers were advised by insurance adjusters not to plow down their crops until they had been inspected—and the time lapse between reporting and inspection was up to 3 weeks. As a result, an abundant supply of inoculum was present during all of

August. After the tobacco grower obtained approval for plow down, he was advised to carry out this procedure between 10 a.m. and 3 p.m. At this hottest part of the day when the humidity was lowest, the mildew spores were most readily released and were blown to distant tobacco fields. Obviously, plant pathologists on the task force gave poor advice or the advice was ignored.

This disease catastrophe clearly demonstrates how a microscopic pathogen suddenly causes colossal destructiveness and prevents man's planned abundance. About 30% of the total flue-cured crop was destroyed, and this had a drastic effect on the gross tobacco product worth \$1.1 billion and many of the 36,000 annual jobs created by the tobacco industry. The Ontario Crop Insurance Commission, which insured some growers, was forced to borrow \$40 million from the Ontario Treasury in order to meet commitments. Total losses to provincial and federal treasuries have yet to be computed but are unquestionably sizeable.

Obviously, as soon as the disease was diagnosed all severely infected fields should have been destroyed immediately and the infected and adjacent fields should have been sprayed with fungicide, as is customary in Europe and Australia.

This is a classic example of the intricacies of an epiphytotic as influenced by an obvious breakdown in the practice of applied plant pathology.

In the army, the medical officer—not the commanding officer—is in charge of medication.

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