Education of a Plant Doctor

CYNTHIA WESTCOTT

We learn from the past. With the science of plant pathology rushing pell-mell into the future, shouldn't we occasionally sit back and reflect on what senior members of our Society have to say about their careers in plant pathology? We think so, and we invite our senior members to tell their stories to our younger members. We are pleased to inaugurate the series with this article by a distinguished APS Fellow.—The Editors

I have been asked to state my views on the past, present, and future of plant pathology and on whether our students are getting the right training. I cannot do that. It is nearly 50 years since I have had any connection with a university, and I do not know how plant pathologists are trained today. I can only summarize my own training in how to learn from plants and to question established procedures.

At the Beginning, Botany

It started with freshman botany at Wellesley. In autumn we planted bulbs under the trees in the orchard; in winter we learned to identify trees by their outlines; in spring we sketched a pear bud as it unfolded and was pollinated. We each had a tiny garden with a wide variety of plants, and we had to identify all the weeds we pulled up as well as every seedling.

In September 1921, I arrived at Cornell as a graduate assistant in plant pathology, the only woman in a department of 40 men. Cornell was then famous for its teaching system developed by Prof. H. H. Whetzel. This was a laboratory and conference system, with the weekly lecture more for inspiration than for imparting specific information. Each student chose 15 diseases for study, representing all types, and came to the materials room to check out a tray for each disease. I was in charge of materials, providing slides, specimens, and mimeographed information. When the student had learned all he could on each disease, he signed up for a conference with an instructor, who asked questions designed to show whether the student had done some real thinking on the implications of the disease or merely learned answers by note. Instead of being limited to the students' 15 diseases, I learned many times that number—excellent training for a future plant doctor.

After 4 years in the materials room, while completing the course work for my degree, I became a full-time research assistant to Professor Whetzel. He was working on the genus *Sclerotinia*, and I went along on collecting trips, lying flat on the ground hunting for tiny apothecia. I measured spores under the microscope and I transferred cultures. Our office, in the basement of Bailey Hall, had huge organ pipes going along the ceiling. These were covered with dust that jarred off whenever the organ was played, but I learned to make pure cultures in spite of this hazard. Such training helped when we went on a collecting trip to Europe, and I was able to make single-spore cultures in a hotel room, using a piece of fine wire stuck in a match and flamed over a candle.

My personal research, under Dr. L. M. Massey, was on rose diseases, especially the brand canker then afflicting the climbing roses in the display garden. I learned that the recommended strength of Bordeaux mixture could, under certain weather conditions, nearly defoliate roses. I learned that brand canker was controlled not by sprays but by eliminating approved methods of winter protection.

When the depression ended Professor Whetzel's research grant, I took a stopgap job at Rutgers, testing legume inoculants for a couple of years and taking a course in microbiology with Dr. Selman Waksman. Eventually, Professor Whetzel persuaded me to start out on my own.

A Modest Shingle Is Hung

I bought a house, with a neglected garden, in Glen Ridge, NJ. The town was entirely residential, but the borough council ruled that I could be considered a professional, like an M.D. In August 1933, I hung up a modest shingle as "The Plant Doctor." I had had no courses in entomology, but for 2 years entomologist Irene Dobroscky was a partner. When she left to be married, I had learned enough about insects to carry on alone, doctoring about 50 gardens a week over a 50-mile area.

Most of the space in my own garden had gone into replicated rose beds for testing pesticides. For clients, I never used chemicals that had not been thoroughly tried on these guinea-pig roses.

Not many of the pesticide combinations offered for ornamentals proved safe enough for clients. Some were toxic in cold weather, some in hot; some had safe ingredients in a toxic carrier. DDT in a mixture often caused defoliation by mites. Malathion used by arborists for trees injured roses caught in the spray drift. I kept receiving specimens for diagnosis, and at least half proved to be spray-injured rather than diseased.

In home gardens, keeping things ornamental is important. Toxicity and unsightly residue are objectionable, and following the usual advice to dust when plants are wet with dew makes a horrible mess.

In home gardens, insects and diseases have to be taken care of at the same time. Patterns of insect injury are just as important as disease symptoms. And only by actually doing the spraying myself could I see these patterns early enough to really get control. I did some consulting, going over problems with a client, writing out control measures, but this was not very satisfactory. People were too busy to follow directions. Only by actual service, timing treatments exactly, could I get good results.

Battles with Blight

During World War II, the United States Department of Agriculture sent me to Alabama for two winters to work on the azalea flower blight that was closing the big southern gardens several

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weeks early. When I was fingerprinted in Washington, DC, I was told that I was not expected to solve the problem, merely to keep the seat warm (meaning save the appropriation) until the men returned from wartime duties. I was supposed to carry out ground treatments to inhibit apothecial development. The fungus was *Ovulinia azaleae*, related to the *Sclerotinia* spp. I had worked with for so many years, and I was well acquainted with apothecia. Spraying for a flower blight was considered impractical. Azalea petals would be too hard to wet and would have too much residue, and spraying two or three times a week would be too expensive.

I did carry out all kinds of ground treatments and some did inhibit apothecial development. But the fungus also produced conidia, so blight was only delayed a day or so because of secondary infection from untreated areas. I also tried spraying, with a new fungicide James Horsfall was testing on hard-to-wet onions. And spraying worked! Even with hundreds of apothecia developing under a bush, spraying gave 100% control. I could even spray half a bush and get complete control while the other half was entirely blighted. Properly formulated, the spray was safe on azalea petals and, with 5,000 paid admissions on a Sunday when blight would normally have closed Bellingrath Gardens, the cost of spraying was negligible.

I was also interested in camellia blight, caused by a related fungus, *Sclerotinia camelliae*. Here control is entirely different. There is no secondary spore stage to spread blight from flower to flower, and so sanitation (cleaning up all fallen blossoms) plus chemical soil treatment is useful.

As an aid in controlling rose blackspot, rosarians are usually urged to clean up all fallen leaves. Gardens have taught me that is an unnecessary chore. The fungus may winter in cane lesions as well as in fallen leaves, but a regular spray program produces disease-free roses no matter how much inoculum is about. I have taken on gardens defoliated with blackspot and within 2 years been unable to find a single spotted leaf. The roses also taught me that with a good summer spraying program, winter protection is unnecessary in the suburban New York area.

Sharing Knowledge

Wellesley and Cornell had shown me so well how to learn from plants, I started writing to share this knowledge. The first book, *The Plant Doctor*, published in 1936, was a calendar of pest control for the Northeast, based on my doctor's casebook. After that, I spent winters traveling to learn about problems elsewhere, earning my way by lectures. When *The Gardener's Bug Book* came out in 1946 it gave me a peculiar pleasure to know that I, entirely self-trained in entomology, had written a reference book used in universities as well as by gardeners.

The Plant Disease Handbook was published in 1950 and *Anyone Can Grow Roses*, in 1952. The latter book was based on my own trials and errors over the years and started hundreds of people growing roses. A small summary book, *Garden Enemies*, was published in 1953 and my autobiography, *Plant Doctoring Is Fun*, in 1957. My last book, *Are You Your Garden's Worst Pest?*, in 1961, was not well received. People did not want to learn the ways they were harming their plants.

All except the two big reference books are out of print, but the big tomes go on. *The Plant Disease Handbook* had a fourth edition, revised by Dr. R. Kenneth Horst, in 1979, and Dr. John Weidhaas is now revising the *Bug Book* for a fifth edition.

In 1961, I gave up active service to gardens and moved to Springvale, a retirement community. I planted roses more for pleasure than as guinea pigs, but they still kept teaching me things. In 1971, a paralyzing virus disease left me somewhat disabled, and more recently heart and lung problems have restricted my learning to a few feet from the apartment door.