James Gordon Horsfall, 1905 to 1995

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James Gordon Horsfall died on 22 March 1995 at his home in Hamden, CT, not far from the circular plots of Lockwood Farm where he tested fungicides. He was buried in Grove Street Cemetery, near the grave of his hero, Samuel W. Johnson, founder of America's first agricultural experiment station. Horsfall was born on 9 January 1905 in Mountain Grove, MO, and grew up in Monticello, AR. The University of Arkansas, Fayetteville, granted him a B.S. degree in 1925 and Cornell University, Ithaca, NY, a Ph.D. degree in 1929. For 10 years he worked at the New York Agricultural Experiment Station in Geneva. From 1939 until his death he was chief plant pathologist, director, and Samuel W. Johnson Distinguished Scientist of The Connecticut Agricultural Experiment Station, New Haven.

The *New York Times* headlined his obituary, "Leading Plant Pathologist," and among his distinctions, investigating disease in plants stood first. He came to agricultural science naturally. He claimed his English grandfather settled in eastern Arkansas because the bird hunting was good in the Mississippi River flyway. When Horsfall was born, his father was a research horticulturalist at the Missouri State Fruit Experiment Station on the Ozark Plateau. Five years later, his father helped found a new state agricultural school in the Delta of southeastern Arkansas. The three Horsfall brothers became a horticulturalist, an entomologist, and a plant pathologist.

Following his father's example, James Horsfall attended the University of Arkansas, Fayetteville. He enjoyed repairing Model T's and envisioned a career in engineering, but when he found that engineers were not happy grease monkeys, he turned to biology. He enjoyed two summers on horseback spying boll weevils to be sprayed in cotton. His low pay was augmented, 48 years later, when he was referred to as the first scout of what we now call "integrated pest management."

After his graduation from Arkansas and Cornell, and safely in Geneva just weeks before the Great Stock Market Crash of 1929, two greenhouse growers set him on the trail of fungicides. They asked, "Doctor, can you soak tomato seeds in a copper sulfate solution and control damping-off?" Recovering from surprise at being called "Doctor," he experimented. Proudly rising to report his success at the Annual Meeting of The American Phytopathological Society, he was nearly speechless on seeing the great L. R. Jones in the front row. (A half century later, Horsfall shared with Jones, Butler, and Ward the honor of three lines in the index of G. C. Ainsworth's *Introduction to the History of Plant Pathology*.)

His faith in the importance of fungicides confirmed, Horsfall continued spraying and experimenting. In an era when conventional wisdom said, "Spare the Bordeaux and spoil the potatoes," he demonstrated his nonconformity by claiming Bordeaux harmed potatoes and was a dead horse ready to fall over. The new, synthetic organic compound called sulfanilamide had cured his daughter's dangerous ear infection, and Horsfall envisioned that other organic compounds could protect plants without harm. The control of damping-off by tetrachloroquinone on pea seed confirmed his vision, but sun and dew disarmed other organic sprays. Switching to sulfur-containing organics turned the trick for Horsfall and his colleagues, and Nabam was born. Soldiering through practical obstacles, they developed zineb and maneb as well. The organic fungicides tipped over the dead horse, not so much by controlling blight better but by harming the crop less than Bordeaux.

Surrounded by dying elms in the "Elm City" of New Haven, Horsfall and other colleagues dreamed a new dream—a chemotherapeutant that would cure rather than merely protect plants from disease. They did not succeed but tried bravely with augers and with beer cans hung on trees.

Horsfall delighted in reasoning theoretically and solving practically. He reasoned from log-probit curves and organic structures but built a machine for laboratory assay of fungicides and arranged his plots in a small, efficient spiral. His *Fungicides and Their Action*, published when he was 40, found its way into several languages, showing his mixture of log-probits and spiral plots.

Horsfall's eminence in fungicide research may obscure his contributions to epidemiology. In 1932 he grasped how a prolific fungus could overwhelm a partially effective control and coined "inoculum potential." With colleagues, he invented a way of visually quantifying infection that was eminently practical—and became a Citation Classic. He coauthored the first simulator of plant disease written for a computer. He inspired *Plant Diseases: Epidemics and Control* by J. E. van der Plank, who inscribed a copy "To A. E. Dimond, who with J. G. Horsfall, started this in July 1957." The book's combination of mathematics and real diseases transformed epidemiology.

Horsfall's love of good writing caused him, as a friend said, "To write like he talked." Another said he used "homely analogy and exposition to enlighten some of the more knotty technical problems...for easy reading and comprehension." He was the first editor of the student paper *The Arkansas Agriculturalist* and founding editor of *Annual Review of Phytopathology*. Editing a treatise with A. E. Dimond led to the connection with van der Plank. As an encore, he edited the second treatise with E. B. Cowling.

One of James Horsfall's favorite parables was of the little boy who was asked why he couldn't do as well in school as Alice. The boy answered, "Mother, Alice may be smart in school, but she is awfully dumb outside." Although Horsfall was smart inside and saw himself as a nonconformist, he was smart outside, too. As a fresh Ph.D. graduate, he turned the question of greenhouse growers to advantage. He presided over The American Phytopathological Society and The Society of Industrial Microbiology. After presiding over the International Congress of Plant Protection, he presented the next president with a gavel turned on his own lathe.

For 23 years Horsfall directed The Connecticut Agricultural Experiment Station, New Haven, and coped with dollars and scientists, farmers and legislatures. In 1970 the Governor of Connecticut asked Horsfall to lead his Committee on Environmental Policy. Its report and legislative work invigorated the state's protection of the environment, and Horsfall was named Citizen of the Year. For 15 years he served on the council that oversaw the citing of power plants and high tension lines in Connecticut. When he retired from the directorship of his beloved station, the secretary of agriculture wrote, "Perhaps more than anything you have helped to maintain the integrity of the original experiment station concept and the importance of basic research in the Federal-State agricultural science system."

Although he enjoyed the honor of membership in the National Academy of Sciences, he also considered it a responsibility. He fought for and won the continuity of its Board on Agriculture. During the 1970s, he inspired and led its studies of *Genetic Vulnerability of Major Crops* and *Agricultural Production Efficiency*. Horsfall wrote, "My philosophy has been to dig new knowledge from the face of the mine and then to add it to the fuel that powers the society that provides my groceries."

Horsfall and his wife Sue Belle Overton Horsfall are survived by two daughters, Margaret Schadler and Anne Thomas, six grandchildren, and six great-grandchildren.

Horsfall was made a Member d'Onore of the Societa Italiana de Fitoatria and fellow of the Academia Nazionale de Agricultura of Italy and of the Indian Phytopathological Society. The French gave him the Ordre du Merite Agricole. The universities of Vermont, Turin, and Arkansas granted him honorary doctorates.

In 1972, The American Phytopathological Society gave Horsfall its highest award, the Distinguished Service Award. He was a statesman for science. He had fun with fungicides.