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J.C. Walker

JOHN CHARLES WALKER

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BY DONALD J. HAGEDORN

FOR YEARS MANY PROFESSIONAL plant scientists considered John Charles Walker to be one of the world's greatest plant pathologists. Walker earned this reputation because of his high intellect, work ethic, and an unusual ability to scientifically assess plant disease problems and develop methods for their control. These control procedures almost always involved the practical application of his knowledge of and appreciation for related sciences, such as plant genetics, plant physiology, and biochemistry, which greatly benefited the vegetable growers and processors of our nation. They involved pioneering scientific achievements that scientists all over the world embraced and tried to emulate. His fundamental discoveries of plant disease resistance made a lasting impact on world agriculture.

John Charles Walker was born on July 6, 1893, in Racine, Wisconsin. His father was a cabbage grower and seedsman. Young Walker attended the rural district school and then Racine High School, graduating in 1909. In 1910 he enrolled in the University of Wisconsin, and in 1914 his B.S. thesis on onion smut disease won the university's Science Medal as the most outstanding thesis. For this honor his fellow graduates gave him a rousing cheer at commencement. He

earned an M.S. in 1915, and then attended Cornell University for the spring semester of 1916. He was granted a Ph.D. from the University of Wisconsin in 1918.

Walker was preceded in death by his first wife Edna Dixon Walker in 1966, his second wife Marian Dixon Walker in 1982, and his son John William Walker in 1938. He is survived by 10 nieces and nephews, 23 grandnieces and nephews, and 26 great-grandnieces and nephews.

When a very young student, Walker showed a preference for biological subjects. As a farm boy he had early interests in plant disease problems. Inspiration for fundamental research very likely came from boyhood association with his uncle, Dr. D. J. Davis, who was later dean of the University of Illinois College of Medicine.

Walker was influenced professionally from the beginning of his University of Wisconsin matriculation by L. R. Jones, who was chairman of the department of plant pathology and was concerned about the plant disease problems of the vegetable growers of southeastern Wisconsin. Jones saw in Walker the potential for a first class scientist and encouraged him in every possible way.

Walker possessed a unique personality with a demeanor suggesting a person who was very serious and all business to the point where one wondered whether he was approachable. Indeed he was often in deep thought, but if students or colleagues needed his counsel he was always willing to listen to the problem, give it thoughtful consideration and discussion, and provide valuable guidance. His judgment regarding subjects personal or professional was of real help to those who sought it. However, Walker did not have much time for small talk, such as the weather or athletic scores. Even though plant pathology was his consuming interest, he went fishing occasionally and participated weekly in the faculty bowling league. He also enjoyed bridge parties,

departmental picnics, and Christmas parties, and was a gracious host to students and friends in his home. He valued these occasions to become better acquainted with members of his research team and their spouses.

Good professional relationships with professors in other science departments at the University of Wisconsin were very important to Walker. Because he thought that many of his graduate students should be well trained in botanical and other subjects he kept in close contact with professors in the departments of botany, genetics, agronomy, and biochemistry. These people cooperated in various research efforts and often served as so-called "minor professors" to help select the most appropriate courses to be taken by Walker's students and to be members of the student's preliminary and final examination committee.

Walker received his B.S., M.S., and Ph.D. degrees from the University of Wisconsin-Madison. His first contribution to science was a paper presented in 1916 at the meeting of the American Association for the Advancement of Science in Pittsburgh, Pa. An abstract of this research, entitled "Association of plant pigments with disease resistance in onion," was published in *Phytopathology* in 1919. From 1917 to 1919 he was a scientific assistant in the U. S. Department of Agriculture; then until 1964 he was an assistant, associate, and full professor of plant pathology at his alma mater. From 1919 to 1944 he was also employed by the U. S. Department of Agriculture as a plant pathologist. In 1952 he was a visiting professor at the Instituto Biologico in Sao Paulo, Brazil.

When Walker first joined the faculty at Wisconsin his major research efforts concerned the severe disease problems of fresh and kraut cabbage, which were major vegetable crops in Wisconsin. His pioneering research on genetic resistance to the yellows disease saved the cabbage industry; but more importantly it showed the scientific community that disease

control through genetic resistance could be an effective and relatively inexpensive approach to solving plant disease problems. He continued to research disease problems in cabbage. He found both Type A and Type B resistance to cabbage yellows, Type A being the most stable, thus the most preferred. Walker and his students also developed cabbage varieties resistant to other troublesome diseases, including clubroot, mosaic, and tip burn. Wisconsin cabbage growers and kraut packers were so impressed with Walker's cabbage researches that they provided unsolicited funds to build new greenhouses at the University of Wisconsin to support this research.

Field and garden beans in the United States were being severely attacked by the common bean mosaic virus; so Walker and one of his students, W. H. Pierce, successfully sought resistance and proceeded with bean breeding research that resulted in the development and release of the first virus-resistant field and garden beans. Later, similar successful research efforts resulted in the development of the first beans resistant to the troublesome bacterial disease known as halo blight.

Walker was also the nation's leader on the researches of diseases of canning peas. The *Fusarium* wilt and near-wilt diseases were important, especially in the Midwestern and eastern states, where canning and later freezing peas were widely grown. These wilt diseases also became important in western states, where peas for seed and later peas for processing was a critical industry. Walker and his students developed and released sorely needed peas resistant to both wilt and near-wilt. Walker was the first scientist to demonstrate the chemical nature of disease resistance in plants. He found that the resistance of onion varieties with colored bulbs to onion smudge and three *Botrytis* neck rots was associated with the pigments in the onion's outer scales, which con-

tain the phenolic compounds protocatechuic acid and catechol. In the 1940s Walker saved the cucumber industry in Wisconsin by discovering resistance to the devastating spot rot disease and later developed cucumbers resistant to scab and mosaic. Also in the 1940s he restored the state's canning-beet industry by developing an inexpensive fertilization treatment to cure the troublesome internal black spot disease, which he found to be caused by soil boron deficiency.

Walker conducted pioneering studies on environmental factors that could have important influences on vegetable disease severity. Before plant growth rooms were in common use he devised ways to use greenhouses and water tanks to study the effects of temperature and plant nutrition on plants growing in quartz sand and inoculated with disease pathogens. These classic experiments proved for the first time that improper plant nutrition was an important factor for the initiation and eventual severity of important vegetable diseases. They led to new approaches to reducing the effects of specific vegetable diseases and sometimes to complete disease control. His innovative studies on the physiology of disease resistance often resulted in new and important research findings.

Walker recognized the need for a Wisconsin potato seed certification program and was the guiding force behind its instigation and development. The result was that many of Wisconsin's potato disease problems were brought under control.

Eighty-three graduate students in plant pathology were fortunate to have Professor Walker as their mentor. Many of them went on to prominent careers, applying his methods around the world. Walker authored or co-authored 450 publications and wrote two textbooks, *Diseases of Vegetable Crops*

(1935, 1952) and *Plant Pathology*. Both books are key texts in the plant pathology field.

Throughout his career Walker met his teaching responsibilities by being involved in the “backbone” courses in plant pathology and by conducting his course “Diseases of Vegetable Crops.” His lectures, while not enthusiastic performances, were interesting, remarkably well organized, complete, and up-to-date, and thus were much appreciated by those of us fortunate enough to attend his classes. In 1952 he was a guest lecturer at the Agriculture Institute of Sao Paulo, Brazil. The Racine, Wisconsin, Chamber of Commerce awarded a grant to the Wisconsin Alumni Association to establish the J. C. Walker lectureship in plant pathology at the University of Wisconsin. Earnings from this grant are used to bring distinguished guest lecturers to Wisconsin in honor of Walker’s development of disease-resistant crops, which has saved the multimillion-dollar vegetable growing and processing industry in Wisconsin.

As Walker’s national and international reputation as one of the world’s outstanding plant pathologists grew, potential graduate students and postdoctoral scientists sought out his research laboratory. This situation, while a real credit to Walker, was sometimes a problem, because most of these people needed financial assistance and only limited monetary resources were available at Wisconsin. In addition, research facilities were often crowded and could not easily accommodate additional personnel. Even so, he did a remarkable job as a major professor and a senior advisor to visiting scientists.

During the period 1923-64 Walker guided the research and graduate studies of 56 Ph.D.-degree and 18 M.S.-degree students of plant pathology. Fifteen of these people were from foreign countries. From Walker they all received professional guidance of the highest caliber, and also valuable

personal advice if they asked for it. In this way the professionalism of a great scientist and the philosophy of a wise person was spread virtually around the world. Walker valued and enjoyed his relationships with these persons from foreign countries, whether they were his graduate students or scientists who came to undertake a postdoctoral research project. He learned about the governmental and societal as well as agricultural problems that they encountered. In this way he could assign research projects that would be valuable scientifically and also reduce disease losses in their home countries.

Walker's research activities and accomplishments were also unusually well received and greatly appreciated by the vegetable growers, processors, and seedsmen who served these businesses. These people looked forward to the development and release of new disease-resistant vegetables that had been developed by University of Wisconsin research programs under his supervision. In fact, some of the funds needed to undertake these researches were sometimes provided directly by commercial organizations. Without such support, which was sometimes unsolicited, some of this research could not have been undertaken or would have been substantially delayed. The vegetable growers and processors also supported his research programs by urging both state and federal granting agencies to provide research funds for his use. These moneys were so effectively and efficiently used that government and commercial research support organizations repeatedly looked with favor on Walker's research needs and supported them financially.

The vegetable seed industry greatly appreciated Walker's plant breeding efforts and was quick to accept and put to use the new vegetables he developed. In most cases he was given full credit by the seedsmen for these new vegetable cultivars. They really were giant contributions.

Walker's scientific accomplishments were well recognized around the world. He was elected to the National Academy of Sciences in 1945. The University of Göttingen in Germany granted him an honorary doctor of science in 1960. In 1961 he was honored by a gift of new research greenhouses from the National Kraut Packers Association in recognition and appreciation of his contributions to cabbage growers and packers. The Botanical Society of America gave him the Merit Award in 1963. He was elected a fellow in 1965 and given the prestigious Award of Distinction by the American Phytopathological Society in 1970. He was honored by the British Association of Applied Biologists, Vegetable Growers of America, American Seed Trade Association, National Manufacturers of Processing Equipment, National Pea Improvement Association, National Pea Packers Association, and the U. S. Food Processors through the Forty-Niners organization. The University of Minnesota Department of Plant Pathology presented Walker its prestigious E. C. Stakeman Award in 1972. In 1978 he received the \$50,000 Wolf Foundation Prize in Agriculture in Israel for making "significant and lasting contributions to the advance of world agriculture." The prize committee judged him "among history's greatest three or four plant pathologists."

To summarize, the innovativeness, thoroughness, and number of Professor John Charles Walker's scientific accomplishments and publications were, and are, truly remarkable. He was the first scientist to demonstrate the chemical nature of disease resistance in plants. Furthermore he repeatedly and effectively used plant breeding as a pioneering approach for controlling important vegetable diseases. He developed disease-resistant cabbage, cucumbers, peas, beans, tomatoes, and onions. Seeds of these new vegetables were made readily available to seedsmen and growers and were promptly and widely accepted and used to solve pro-

duction problems that had been present for many years. Many of today's vegetable cultivars still carry the disease-resistant genes from his vegetable releases. He was truly a fine person and a great scientist!

ALTHOUGH THE WORDING has been changed here, some of the facts and thoughts presented were originally published in *Phytopathology* (vol. 85) and authored by C. R. Grau, D. J. Hagedorn, and P. H. Williams and in an article by G. S. Pound.

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