Plant Pathology
COLLEGE OF AGRICULTURAL & LIFE SCIENCES
UNIVERSITY OF WISCONSIN-MADISON

History Note No. 4

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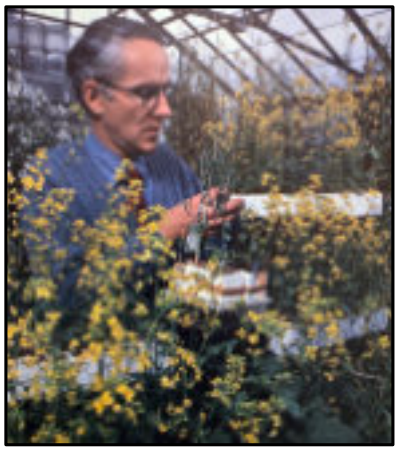
History No. 4: Wisconsin Fast Plants: A tool for Teaching and Research

The story of Dr. Paul H. Williams and the Wisconsin Fast Plants (WFP) has many twists and turns. Williams arrived at UW in 1959 from British Columbia, Canada and joined Prof. Glenn S. Pound's vegetable pathology program. One of the courses that he took was the methods course in biochemistry taught by Prof. Robert Burris. In the 1960's, there was strong federal support for research as the attitude was that science in the USA had fallen behind the USSR, which had launched the Sputnik satellite in the fall of 1957. Prof. Pound saw the possibility of research opportunities and asked Williams to help write the equipment section of an NIH grant on Disease Physiology. The grant was funded, which included equipment such as the Warburg Manometer Apparatus and radioisotope equipment.

Prof. J. C. Walker was set to retire in July 1962 at age 70, as then required, and Williams was selected by the faculty in 1961 to fill his position. Paul received his Ph.D. in 1962 with a thesis on *Albugo candida* resistance in radishes. In 1964 Prof. Pound became Dean of the College of Agriculture, and Prof. Williams was tapped to take charge of the vegetable pathology program, which included cabbage, carrots, lettuce, onions and cucumbers. However, since he had just graduated, he was encouraged to take a short research leave at Boyce Thompson Research Institute (fall 1963-spring 1964). When he returned, he continued the cabbage breeding program for disease resistance, which had been started by Prof. L. R. Jones, continued by Prof. J. C. Walker and then Prof. G. S. Pound. The National Kraut Packers Association had paid for a cabbage research greenhouse at Walnut Street to honor Walker. Cabbage (*Brassica oleracea*) is a biennial plant, which produces seeds in the second year. Prof. Williams recognized that he needed a model *Brassica* species, something like *Arabidopsis*, to speed up breeding for multiple disease resistance. So, in 1970 he filled the Walker greenhouse with a worldwide collection of over 2,000 accessions of the six *Brassica* species seeking accessions that did not require vernalization (Williams and Hill 1986. Science 232:1385). These accessions were obtained from the USDA Plant Introduction Stations. The six species were three diploid species, *B. nigra*, N=8; *B. oleracea*, N=9 and *B. rapa*, N=10, which are the progenitors of three allotetraploid species (genomes from two diploid species, for example, *B. napus* has the genomes from *B. rapa* and *B. oleracea*, so N=19). Very few accessions flowered without vernalization. Fortunately, plants from an accession of *B. rapa* from Northern India did flower without vernalization. After additional selection, a population of plants that would flower within 14 days of planting and produce seeds within 40 days was developed. The original goal was to help speed up breeding for disease resistance, but Prof. Williams thought that



these plants might also be a useful model for teaching students about plant growth and genetics. He decided to test these rapid-cycling brassicas of *B. rapa* in Prof. J. Crow's introductory genetics course. Since these plants worked well in the introductory genetics course, the emphasis switched from their use in breeding for disease resistance to developing them as a teaching tool. Prof. Williams with a colleague, Prof. J. Stewart of the School of Education, then set about developing a system and promoting the use of rapid-cycling brassicas (RCB's) for inquiry-based instruction. Important developments involved a simple growing system for these plants in a classroom and producing genetic stocks with different traits, e.g., purple vs yellow stigma, dwarf plants, or those with purple vs green hypocotyls. With the genetic variation stocks created in the RCB's, students could use them to ask questions about simple and quantitative genetics, and the role of environment in phenotypic expression.

B. rapa mutant: Wild-type stigma (right) and purple sigma mutant (right).

RCB's were patented and then trademarked by WARF as Wisconsin Fast Plants™. They are now produced by Tetrad, Inc. and sold by Carolina Biological Supplies worldwide.

The impact of the WFP™ program did not happen overnight, but through a process of bringing teachers to UW-Madison for workshops, followed by those teachers giving additional workshops. These teacher workshops were funded by numerous grants with the most important being from NSF, NASA, and Kellogg Foundation. The coordination of the workshops was managed by Coe Williams and Jane Scharer. Through these workshops the use of WFP™ was greatly expanded. Over 50,000 teachers have been trained in the use of WFP™ and over 90 million students have used these plants in the USA and in more than 27 countries. WFP™ have also been used in research, which was published in >3,500 articles. Interestingly, these plants were grown in the Russian space program MIR and then later in the US-Ukraine space program, where they were the first plants to be grown from seed to seed in space. What started as a dream to improve breeding for multiple disease resistance in cabbage became a worldwide science education tool.

Currently, the WFP™ program is administered in the Dept. of Plant Pathology. See the fast plant website: https://fastplants.org/ or https://en.wikipedia.org/wiki/Wisconsin_Fast_Plants.

Sources:

https://www.pbs.org/video/university-place-story-wisconsin-fast-plants

https://news.wisc.edu/fast-plants-programs-new-varieties-are-tailored-for-classroom-use/

https://fastplants.org/

https://en.wikipedia.org/wiki/Wisconsin_Fast_Plants

Musgrave, M.E. 2000. Realizing the potential of rapid-cycling *Brassica* as a model system for use in plant biology research. *Journal of Plant Growth Regulation*. **19** (3):314–325.

Tompkins, S.P. and P.H. Williams. 1990. "Fast plants for finer science—an introduction to the biology of rapid-cycling *Brassica campestris* (*rapa*) L.". *Journal of Biological Education*. **24**(4):239–250.

Wendell, D.L. and D. Pickard. 2007. Teaching human genetics with mustard: rapid cycling Brassica rapa (Fast Plants Type) as a model for human genetics in the classroom laboratory. Life Sci. Ed. 6:179-185.

Williams, P.H. and C.B. Hill. 1986. Rapid-Cycling Populations of *Brassica*. *Science*. **232**:1385-1389.

(Narrated by Paul H. Williams, Edited by Douglas Maxwell, Gayle Worf, Craig Grau and Dan Lauffer)