Ciba-Geigy Award

Sponsored by the Ciba-Geigy Corporation, this award is given to individual plant pathologists who have made significant contributions to the advancement of knowledge of plant diseases or their control. The award consists of a trophy and an expense-paid trip to Basel, Switzerland.

Margaret E. Daub

Margaret E. Daub was born in 1952 in Tokyo, Japan, but received most of her elementary and secondary education in the United States. She attended Wooster College, in Wooster, Ohio, where she graduated with honors in 1974. She entered graduate school at the University of Wisconsin and received her Ph.D. in plant pathology under the direction of Dr. D. J. Hagedorn. Her thesis research dealt with the mechanisms of resistance in beans to *Pseudomonas syringae* (*Phytopathology* 69:946-951; 71:547-550). From 1979 to 1982, Dr. Daub worked as a postdoctoral associate in Peter Carlson's lab at Michigan State University, where she began her research on mechanisms of action of the photosensitizing phytotoxin cercosporin.

Daub joined the faculty of the Department of Plant Pathology at North Carolina State University as assistant professor in 1983. She conducts basic research on mechanisms of pathogenesis and pursues both basic and applied approaches to the development of disease resistance in tobacco and other crops.

Daub has explored the use of somaclonal variation in improving resistance of high-quality flue-cured tobacco cultivars. From several thousand plants regenerated from isolated protoplasts, she found somaclonal progeny with elevated levels of resistance to Granville wilt, caused by *P. solanacearum* (*Phytopathology* 79:600-605). Through judicious choice of the cell culture methods, Daub was able to maintain the morphological and leaf quality characteristics of the original cultivars in these somaclonal lines.

Daub has also utilized protoplast fusion for practical application in tobacco germ plasm improvement (*Phytopathology* 80:1069). Her objective was to transfer resistance to tobacco mosaic virus and to several species of root-knot nematodes from the wild species *Nicotiana repanda* into cultivated tobacco. *N. repanda* had resistance to more tobacco diseases than any other *Nicotiana* species, but genes from this species have never been successfully incorporated into a tobacco cultivar. Using parental lines transformed for resistance to different antibiotics, Daub was able to select for rare fusion hybrids using a dual antibiotic selection scheme. Plants have been regenerated from these cultures, and their hybrid nature confirmed by isozyme analysis. The fusion hybrids are resistant to TMV. The plants are male-sterile but have been successfully backcrossed to the *N. tabacum* parent. The backcross progeny are currently being tested for nematode resistance.

Daub's current efforts are directed at developing resistance to tomato spotted wilt virus, which has become an increasingly serious problem on tobacco and other crops in the southeastern United States. This work has emphasized transformation of tobacco cultivars for expression of the viral nucleocapsid gene.

Some of Daub's most interesting and significant research is with the phytotoxin cercosporin. Cercosporin is produced by many members of the fungal genus *Cercospora* and appears to play a critical role in the ability of these fungi to parasitize plants. Daub showed that cercosporin is a photosensitizing compound. It absorbs light to produce both singlet oxygen and superoxide ions that are extremely toxic to cells (*Phytopathology* 72:370-374; *Plant Physiology* 73:855-857). Plants, bacteria, many fungi, and even mice are killed by cercosporin when exposed to light. Daub elucidated the mechanism of action of cercosporin on plant cell membranes (*Plant Physiology* 69:1361-1364; 71:763-766). When efforts to use in vitro selection to select resistant plant cells were unsuccessful, she initiated studies on the mechanisms of resistance of the *Cercospora* fungi themselves, virtually the only organisms that are resistant to cercosporin. These efforts led to the discovery that cercosporin resistance is strongly correlated with the production of reducing power by resistant fungi (*Phytopathology* 80:960). She is currently investigating the hypothesis that reducing power protects resistant fungi by a transient reduction and detoxification of the cercosporin molecule. The goal of this research is to improve control of plant diseases caused by *Cercospora*. This may be accomplished by the possible expression of fungal genes in plants or perhaps through the utilization of strategies aimed at disruption of fungal resistance mechanisms, rendering them vulnerable to their own toxin.

Daub has also contributed to the teaching program at North Carolina State University. She reorganized the material in the introductory plant pathology course to emphasize principles and concepts of plant pathology to complement the emphasis on specific diseases covered in accompanying laboratory courses. Most recently, she has developed a graduate course on fungal genetics and physiology, emphasizing theoretical and experimental approaches to the study of plant pathogenic fungi.

She is a member of the honorary societies Phi Beta Kappa, Phi Kappa Phi, Sigma Xi, and Gamma Sigma Delta. She has served as member and chair of the APS Biochemistry, Physiology, and Molecular Biology Committee. At the 1990 APS meetings she organized and chaired the session "Role of Light-Activated Compounds and Free Radicals in Host-Parasite Interactions." She is currently an associate editor of *Phytopathology*.