THE AMERICAN PHYTOPATHOLOGICAL SOCIETY

Founded 1908

Incorporated 1915

The APS Council

President, LAURENCE H. PURDY, University of Florida, Gainesville
President-Elect, WILEY N. GARRETT, University of Georgia, Athens
Immediate Past President, JOHN F. SCHAFER, Washington State University, Pullman
Vice-President, J. ARTIE BROWNING, Iowa State University, Ames
Secretary, DERALD A. SLACK, University of Arkansas, Fayetteville
Treasurer, EDGAR L. KENDRICK, Agricultural Research Service - USDA, New Orleans, LA
Editor-in-Chief, L. SEQUEIRA, University of Wisconsin, Madison
Publications Coordinator, THOR KOMMEDAHL, University of Minnesota, St. Paul

Councilors

R. JAMES COOK, Washington State University, Pullman (At Large)
JOHN L. LOCKWOOD, Michigan State University, East Lansing (At Large)
ROY L. MILLAR, Cornell University, Ithaca, NY (At Large)
RODRIGO RODRIGUEZ-KABANA, Auburn University, Auburn, AL (Caribbean)
PAUL H. WILLIAMS, University of Wisconsin, Madison (North Central)
RICHARD J. CAMPANA, University of Maine, Orono (Northeastern)
D. E. MATHRE, Montana State University, Bozeman (Pacific)
F. M. LATTERELL, U.S. Department of Agriculture, Frederick, MD (Potomac)
ROBERT T. GUDAUSKAS, Auburn University, Auburn, AL (Southern)

Staff

R. J. TARLETON, Executive Vice-President; The American Phytopathological Society, 3340 Pilot Knob Road, St. Paul, MN 55121

DIVISIONS OF THE SOCIETY

Caribbean: Pres. JULIO LOPEZ ROSA, Universidad de Puerto Rico, Rio Piedras; Vice-Pres. MARIO BUSTAMANTE COHBANA, Tegucigalpa, Honduras; Sec.-Treas. GUILLERMO E. GALVEZ-E., CIAT-IICA, Apartado 10281, San José, Costa Rica.

Northeastern: Pres. GEORGE N. AGRIOS, University of Massachusetts, Amherst; Vice-Pres. FELIX L. LUKEZIC, Pennsylvania State University, University Park; Sec.-Treas. WAYNE A. SINCLAIR, Cornell University, Ithaca, NY.

North Central: Pres. HOWARD BISSONETTE, University of Minnesota, St. Paul; Vice-Pres., JACK OTTA, South Dakota State University, Brookings; Sec.-Treas. GLEN D. STATLER, North Dakota State University, Fargo.

Pacific: Pres. R. JAMES COOK, Washington State University, Pullman; Pres.-Elect MARTIN F. STONER, California State Polytechnic University, Pomona; Sec.-Treas. BETH L. TEVIOTDALE, University of California, San Joaquin Valley Research Center, Parlier.

Potomac: Pres. C. R. CURTIS, University of Delaware, Newark; Vice-Pres. J. R. YOUNG, West Virginia University, Morgantown; Sec.-Treas. L. D.

MOORE, Virginia Polytechnic Institute and State University, Blacksburg.

Southern: Pres. CARROLL J. SOUTHARDS, University of Tennesee, Knoxville; Vice-Pres. O. W. BARNETT, Jr., Clemson University, Clemson, SC; Sec.-Treas. W. E. BATSON, Jr., Mississippi State University, Mississippi State.

EDITORIAL AND BUSINESS STAFF

Publisher and Business Manager, R. J. TARLETON; Director of Publications and Communications, STEVEN C. NELSON; Graphic Services Manager, MILES WIMER; Senior Technical Editor, VERA BAKER; Technical Editor, ROBERT J. MINTEER; Editorial Assistants, PATRICIA HEINLEN, KERRIE STANTON; Editorial Records Coordinator, JOAN E. McKINNEY.

Subscriptions: Communications should be addressed to The American Phytopathological Society, 3340 Pilot Knob Road, St. Paul, MN 55121. Nonmember subscription price: \$100.00 per year domestic, \$125.00 per year foreign (including Canada and Mexico). All prices include postage. Single current numbers (within 60 days of publication): \$12.00. (Price of back volumes and separate numbers on request.) Airmail rates for delivery outside of North America quoted on request. Ten-Year Index (Vol. 31-40, 1941-1950): paper cover, \$5.00. Ten-Year Index (Vol. 41-50, 1951-1960): paper cover, \$5.00. Claims for copies lost in domestic mails must be received within 90 days of the date of issue, otherwise the replacement charge will be \$12.00. Deliveries overseas are not guaranteed; foreign mailings are made at the subscriber's risk. No endorsement or any statement of claims made in advertisements is assumed by this journal or by The American Phytopathological Society. Membership in The American Phytopathological Society and special publication rates for members will be supplied by the Secretary or the Business Manager.

Published monthly at The American Phytopathological Society 3340 Pilot Knob Road, St. Paul, MN 55121 (612) 454-7250

Second class postage paid at St. Paul, MN, and additional mailing offices. PUB 431540 Subscription, \$100.00 per year

Copyright @ 1980 by The American Phytopathological Society, 3340 Pilot Knob Road, St. Paul, MN 55121.

The appearance of the code at the bottom of the first page of each article in this journal indicates that—except where direct copying licenses have been granted by the copyright owner—the copyright owner requires the user to pay the stated per-copy fee through the Copyright Clearance Center, Inc., 19th Floor, One Park Avenue, New York, NY 10016, for any copying beyond that permitted under Sections 107 and 108 of the U.S. Copyright Law.

Phytopathology

EDITORIAL BOARD

Editor-in-Chief:

L. SEQUEIRA, Department of Plant Pathology, University of Wisconsin, Madison, WI 53706

Senior Editors:

R. BAKER, Colorado State University, Fort Collins, 80521

A. H. ELLINGBOE, Michigan State University, East Lansing, 48823

K. J. LEONARD, North Carolina State University, Raleigh, 27607

R. HAMILTON, Agriculture Canada, Vancouver

ASSOCIATE EDITORS

G. S. ABAWI, New York State Agricultural Experiment Station, Geneva

J. R. AIST, Cornell University, Ithaca, NY

M. K. BEUTE, North Carolina State University, Raleigh

O. W. BARNETT, Clemson University, Clemson, SC

T. W. CARROLL, Montana State University, Bozeman

J. M. DALY, University of Nebraska, Lincoln

P. R. DAY, Plant Breeding Institute, Cambridge, England

V. H. DROPKIN, University of Missouri, Columbia

L. D. DUNKLE, Purdue University, West Lafayette, IN

G. L. ERCOLANI, Universita degli Studi di Bari, Bari, Italy

W. E. FRY, Cornell University, Ithaca, NY

D. GONSALVES, New York State Agricultural Experiment Station, Geneva

M. J. GOODE, University of Arkansas, Favetteville

R. M. GOODMAN, University of Illinois, Urbana

J. V. GROTH, University of Minnesota, St. Paul

A. C. HAYWARD, University of Queensland, St. Lucia, Brisbane, Australia

F. F. HENDRIX, University of Georgia, Athens

J. W. HENDRIX, University of Kentucky, Lexington

C. W. HESSELTINE, U.S. Department of Agriculture, Peoria, IL

V. J. HIGGINS, University of Toronto, Toronto, Ontario, Canada

J. P. HOLLIS, Louisiana State University, Baton Rouge

L. D. HOUSEWORTH, Ciba-Geigy Corporation, Greensboro, NC

O. C. HUISMAN, University of California, Berkeley

B. B. KINLOCH, Jr., U.S. Department of Agriculture, Forest Service, Berkeley, CA

W. H. KO, University of Hawaii, Hilo

S. S. LEACH, University of Maine, Orono

B. M. LUND, ARC Food Research Institute, Norwich, England

M. S. MOUNT, University of Massachusetts, Amherst

L. R. NAULT, Ohio Agricultural Research and Development Center, Wooster

J. M. OGAWA, University of California, Davis

E. J. PELL, Pennsylvania State University, University Park

H. R. POWERS, U.S. Department of Agriculture, Forest Service, Athens, GA

W. C. SCHNATHORST, University of California, Davis

G. E. SHANER, Purdue University, West Lafayette, IN

L. SHAIN, University of Kentucky, Lexington

M. D. SIMONS, Iowa State University, U.S. Department of Agriculture, Ames

W. R. STEVENSON, University of Wisconsin, Madison

J. K. UYEMOTO, Kansas State University, Manhattan

E. W. B. WARD, Agriculture Canada Research Station, London, Ontario, Canada

M. V. WIESE, University of Idaho, Moscow

W. WYNN, University of Georgia, Athens

GENERAL PUBLICATION POLICIES

Manuscripts may be submitted for consideration of publication in Phytopathology by members of The American Phytopathological Society and by nonmembers. Membership in the society is not a prerequisite for publication in the journal, but page charges are higher for nonmembers than for members. Submission of manuscripts: Submit all new manuscripts to The American Phytopathological Society, Editorial Office, 3340 Pilot Knob Road, St. Paul, MN 55121. Do not submit new manuscripts to the Editor-in-Chief. Submission implies nonsubmission elsewhere and (if accepted) no publication elsewhere in the same form without consent.

Content: Contributions should fall into the following categories: 1) Original research on some aspect of plant pathology or brief accounts of techniques or phytopathological history of general importance. Subject matter is not a criterion for judging the merit of an article for publication in Phytopathology. It is, however, the author's duty to establish relevancy to the science of plant pathology. 2) Review papers developing a new concept, hypothesis, theory, or other integration of plant pathology. 3) Letters to the Editor: These may explain, amplify, or otherwise comment upon research published in the journal or elsewhere. Letters to the editor are reviewed in the same manner as other contributions, and the Editorial Board reserves the right to reject or to publish letters of rebuttal when appropriate. If possible, the opportunity will be provided for a letter of rebuttal to appear in the same issue as the letter to which it is directed.

Page charges: The high costs of publishing require that we solicit from research sponsors voluntary contributions in the amount of \$55 per printed page for members and \$65 per page for nonmembers. Payment of the suggested contribution is not a condition of publication. Articles are accepted or rejected only on the basis of scientific merit. We ask that you advise your institution, company, or research sponsor of our need for contributions to support publication costs. Please send a letter confirming that you will make the contribution or ask your administrative officer to send a letter stating that funds are not available.

Separates: No free copies supplied. Reprints will be available at a nominal cost; quotation will be sent with proof.

For style details, follow: Author's Guide for Manuscript Preparation, Phytopathology 69:5-7, 1979, and CBE Style Manual (fourth edition, 1978), available from Am. Inst. Biol. Sci., Washington, DC. Authors are urged to have one or more colleagues read the manuscript critically prior to submission. Use of material from this journal: Phytopathology is copyrighted, and those who wish to borrow illustrations or data appearing in Phytopathology for use in other publications should obtain the permission from The American Phytopathological Society and the author of the paper and provide a line crediting Phytopathology as the source of the material.