THE AMERICAN PHYTOPATHOLOGICAL SOCIETY

Founded 1908
Incorporated 1915

The APS Council

President, JOHN F. SCHAFER, Washington State University, Pullman

President-Elect, LAURENCE H. PURDY, University of Florida, Gainesville

Immediate Past President, DURWARD F. BATEMAN, Cornell University, Ithaca, New York

Vice-President, WILEY N. GARRETT, University of Georgia, Athens

Secretary, DERALD A. SLACK, University of Arkansas, Fayetteville

Treasurer, EDGAR L. KENDRICK, Agricultural Research Service - USDA, New Orleans, Louisiana

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)
RODRIGO RODRIGUEZ-KABANA, Auburn University, Auburn, Alabama (Caribbean)
PAUL H. WILLIAMS, University of Wisconsin, Madison (North Central)
L. V. EDGINGTON, University of Guelph, Ont., Canada (Northeastern)
D. E. MATHRE, Montana State University, Bozeman (Pacific)
W. L. KLARMAN, University of Maryland, College Park (Potomac)
ROBERT T. GUDAUSKAS, Auburn University, Auburn, Alabama (Southern)

J. ARTIE BROWNING, Iowa State University, Ames (At Large)

Staff:

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

DIVISIONS OF THE SOCIETY

(aribbean: Pres. RAMON LASTRA, IVIC, Apartado 1827, Caracas, Venezuela; Vice-Pres. JULIO LOPEZ-ROSA, Universidad de Puerto Rico, Rio Piedras, PR; Sec'y-Treas. GUILLERMO E. GALVEZ-E., CIAT-IICA, Apartado 10281, San José, Costa Rica.

Northeastern: Pres. RAY A. CAPPELLINI, Rutgers University, New Brunswick, New Jersey; Vice-Pres. GEORGE N. AGRIOS, University of Massachusetts, Amherst; Sec'y-Treas. FELIX L. LUKEZIC, Pennsylvania State University, University Park.

North Central: Pres. RICHARD E. FORD, University of Illinois, Urbana; Vice-Pres. HOWARD BISSONETTE, University of Minnesota, St. Paul; Sec'y Treas. GLEN D. STATLER, North Dakota State University, Fargo.

Pacific: Pres. J. A. HOFFMAN, Agricultural Research Service-USDA, Logan, Utah; Vice-Pres. TSUNE KOSUGE, University of California, Davis; Sec'y-Treas. M. F. STONER, California State Polytechnic University, Pomona.

Potomac: Pres. J. R. STAVELY, Argicultural Research Center, Beltsville, Maryland; Vice-Pres. C. R. CURTIS, University of Delaware, Newark; Sec'y-Treas. L. D. MOORE, Virginia Polytechnic Institute and State University, Blacksburg.

Southern: Pres. J. C. WELLS, North Carolina State University, Raleigh; Vice-Pres. CARROLL J. SOUTHARDS, University of Tennessee, Knoxville; Sec'y-Treas. O. W. BARNETT, Jr., Clemson University, Clemson, SC.

EDITORIAL AND BUSINESS STAFF

TECHNICAL EDITOR, Robert J. Minteer; BUSINESS MANAGER, R. J. Tarleton; The American Phytopathological Society, 3340 Pilot Knob Road, St. Paul, Minn. 55121.

Subscriptions: Communications should be addressed to The American Phytopathological Society, 3340 Pilot Knob Road, St. Paul, Minn. 55121. Nonmember subscription price: \$80 per year domestic, foreign postage \$6.00/yr. extra (including Canada and Mexico). Single current numbers (within 60 days of publication): \$8.00. (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 with 90 days from the date of issue, otherwise the replacement charge will be \$8.00. Deliveries overseas are not guaranteed; foreign mailings are made at the subscriber's risk. No endorsement of 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, Minn. 55121 (612) 454-7250

Second class postage paid at St. Paul, Minn. and additional mailing offices. PUB 431540 Subscription, \$80.00 per year

Copyright © 1979 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 tenses 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, New York 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

J. H. TREMAINE, 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

G. BIRD, Michigan State University, East Lansing

D. COPLIN, Ohio Agricultural Research and Development Center, Wooster

P. R. DAY, Connecticut Agricultural Experiment Station, New Haven

U. DIENER, Auburn University, Auburn, AL

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

R. E. FORD, University of Illinois, Urbana

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

R. M. GOODMAN, University of Illinois, Urbana

G. J. GRIFFIN, Virginia Polytechnic Institute, Blacksburg

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

F. F. HENDRIX, University of Georgia, Athens

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

E. HIEBERT, University of Florida, Gainesville

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

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

J. KUC, University of Kentucky, Lexington

R. LAWSON, USDA, Agricultural Research Center-West, Beltsville, MD

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

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

C. NIBLETT, Kansas State University, Manhattan

J. M. OGAWA, University of California, Davis

R. PATTON, University of Wisconsin, Madison

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

H. S. 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

E. SHARP, State University, Bozeman

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

J. STEADMAN, University of Nebraska, Lincoln

W. R. STEVENSON, Purdue University, West Lafayette, IN

J. STRANDBERG, University of Florida, Sanford

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

R. ZEYEN, University of Minnesota, St. Paul

GENERAL PUBLICATION POLICIES

At least one author must be a member of The American Phytopathological Society, except that any subscribing institution outside the United States or Canada may have published, by a staff member, one paper (in English) per volume. A letter of transmittal, signed by an official of the foreign institution, should accompany such manuscripts.

Submission of manuscripts: Submit all new manuscripts to The American Phytopathological Society, Editorial Office, 3340 Pilot Knob Road, St. Paul, Minnesota 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 regular 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

Contributions: The high costs of publishing articles in Phytopathology requires that we solicit from research sponsors voluntary contributions in the amount of \$45 per printed page. 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 in support of publication costs. Please send a letter confirming that you will make the contribution or ask your administrative officer to send one 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 Amer. Inst. Biol. Sci., Washington, D.C. 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.