



GUIDELINES FOR THE INTEGRATED MANAGEMENT OF SOYBEAN PESTS

J. B. Sinclair, M. Kogan, and M. D. McGlamery

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Publication Number 2

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Correct citation:

Sinclair, J. B., Kogan, M., and McGlamery, M.D. 1997. Guidelines for the Integrated Management of Soybean Pests. National Soybean Research Laboratory Publication No. 2, College of Agricultural, Consumer and Environmental Sciences, University of Illinois at Urbana—Champaign, Urbana, Illinois.

Erratum:

Plate 58 should read: Bihar hairy caterpillar
Plate 86 should read: Dactuliochaeta red leaf blotch
Plates 123 and 124 should read: Solanum ptycanthum
Plates 128 and 129 should read: Xanthium strumarium

Cover watercolor: Charlotte N. Brady
Designer: Lynn H. Smith
Color insert designer: Marisa R. Meador

The National Soybean Research Laboratory provides equal opportunities in program and employment.

Preface

Integrated pest management (IPM) approaches have become a foundation for modern agricultural production. Excessive and untimely applications of pesticides, which formed the basis for earlier pest control methods, have been shown to be economically unsound as well as environmentally damaging and unacceptable to society. The use of a combination approach to pest management, utilizing all available tactics, provides the agricultural producer with the most effective and efficient means of managing common pests with minimal harm to the environment, to other organisms, and to society. Although pesticides may be used in specific situations, the IPM practitioner will fully assess the need and alternatives to these compounds before choosing a management approach.

The publication provides information on integrated pest management for the major pests of soybean. The authors furnish background information on the development of IPM systems for diseases, arthropods, and weeds as well as applied and theoretical approaches based upon long careers in their respective disciplines. With an increasing need for pest management options to replace the dependence on pesticides, this publication will help soybean producers worldwide not only to understand the role of IPM, but also assist them in implementing programs regardless of the size or scope of soybean production in their areas. The use of the term “guidelines” in the title correctly summarizes the contents of this publication as one intended to offer practical approaches to management of soybean pests as well as serving as a resource guide for past and current research in disease, arthropod, and weed management.

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Foreword

The Food and Agricultural Organization (FAO) of the United Nations initiated a series of plant protection publications in the late 1970's. In 1982, Marcos Kogan was invited by Lucas Brader, then Chief, Plant Protection Service, Plant Production and Protection Division, FAO, to coordinate the publication of Guidelines for the Integrated Control of Soybean Pests. FAO agreed to provide the introductory chapters. A team of specialists from the University of Illinois at Urbana—Champaign, including J. B. Sinclair, pathologist; F. W. Slife, weed scientist; and M. Kogan and M. E. Irwin, entomologists, were asked to develop the pest management guidelines. Dr. Brader left FAO in 1983, and the introductory material was not prepared.

The Illinois team produced the pictorial publication, Major World Soybean Diseases, Weeds and Insect Pests, as an aid for the identification of important soybean pests. This publication, which includes an atlas with color plates, was formatted as an insert for the guidelines project. Plates 1 through 82 provide an approximation of the shape and color of arthropod species. The photographs are enlarged to show details of those that may be found in soybean fields. These arthropods may be pests, natural enemies of the pests, or innocuous members of the soybean community. The black silhouettes are drawn to scale and indicate size. The common and scientific names of selected arthropods are listed in Appendix 1.

Although several guidelines for the control of either soybean arthropods or diseases have been published, no guideline provides a comprehensive coverage of all major categories on a worldwide basis. With the establishment of the National Soybean Research Laboratory (NSRL) at the University of Illinois at Urbana—Champaign, it was decided to complete the guideline project. FAO gave permission to use the color plates in the publication. We are grateful to D. A. Holt, Director, Office of Research, for the financial support from the Illinois Agricultural Experiment Station.

The scientific names of many plant pathogens and some weeds have been changed recently. For this publication, the Latin names for the hosts and pathogens, and weeds have been used as provided in the following publications:

Fan, F. F., Bills, G. F., Chamuris, G. P., and Roseman, A. Y., 1989. *Fungi on Plant and Plant Products in the United States*. APS Press, Inc., St. Paul, MN. 1253pp.

Hansen, E. M., and Maxwell, B. P. 1991. Species of the *Phytophthora megasperma* complex. *Mycologia* 83:376—381.

Sneath, P. H. A., Mair, N. S., and Sharpe, N. E., eds., 1986. *Bergey's Manual of Systematic Bacteriology*, 9th ed. Williams & Williams, Baltimore, MD. 2648pp.

Weed Science Society of America, 1989. *Composite List of Weeds*, 2nd ed., Weed Sci. Soc. America, Champaign, IL. 112pp.

Additional information on the identification, classification, epidemiology, and biology of soybean pests can be located in the following:

Bridges, D. C., and Bauman, P. A., 1992. Weeds causing losses in the United States by state and crop. pp. 75—147. In: *Crop Losses Due to Weeds in the United States—1992*, C. D. Bridges, ed. Weed Sci. Soc. America, Champaign, IL.

Elmore, C., ed., 1990. *Weed Identification Guide*, 5th ed. Southern Weed Sci. Soc., Champaign, IL. 500 pp

Gazzoni, D. L., 1979. *Soja: como Reconhecer e Combater suas Pragas*. (Soybean: How to Identify and Control its Insect Pests). Bayer do Brasil, Londrina, Brazil. 20 pp.

Gazziero, D. L. P., 1992. Integrated methods for weed management in soybeans in Brazil, pp. 291—298. In: *Pest Management in Soybean, L. G. Cropping*, M. B. Green, and R. T. Rees, eds. SCI by Elsevier Applied Science, London.

Hager, A., 1994. Weed management. pp. 135—212. In: *Illinois Field Crop Scouting Manual: A Guide to Identifying and Diagnosing Pest Problems*, M. Gray, ed. College of Agricultural, Consumer and Environmental Sciences, University of Illinois at Urbana—Champaign, Urbana, IL.

Higley, L. G., and Boethel, D. J., 1994. *Handbook of Soybean Insect Pests*. Entomol. Soc. America, Lanham, MD. 136pp.

Kogan, J., Kogan, M., Brewer, B. F., and Helm, C. G., 1988. *World Bibliography of Soybean Entomology*. Illinois Agric. Expt. Sta., Special Publ. 73. Vol. I, 665pp.; Vol. II, 291pp., Urbana, IL.

Kogan, M., and Kuhlman, D. E., 1982. *Soybean Insects: Identification and Management in Illinois*. College of Agricultural, Economic and Environmental Sciences, Illinois Agric. Exp. Sta. Bull. no. 773, Urbana, IL. 58pp.

Mitidieri, A., 1992. *Soybean weed problems in Argentina and their control*. pp. 272—281. In: *Pest Management in Soybean*, L. G. Cropping, M. B. Green, and R. T. Rees, eds. SCI by Elsevier Applied Science, London, UK.

Shepard, M., Lawn, R. J., and Schneider, MA., 1983. *Insects on Grain Legumes in Northern Australia; a Survey of Potential Pests and Their Enemies*. Univ. Queensland Press, St. Lucia, Australia. 89 pp.

Sinclair, J. B., and Backman, P. A., eds., 1989. *Compendium of Soybean Diseases*, 3rd ed. APS Press, Inc., St. Paul, MN. 106 pp.

Stubbendieck, J., Friisoe, G. Y., and Bolick, M. R., eds., 1994. *Weeds of Nebraska and the Great Plains*, Nebraska Dept. Agric., Lincoln, NB. 589 pp.

Wax, L. M., Fawcett, R., and Isely, D., eds., 1981. *Weeds of the North Central States*. North Central Regional Res. Pubi. no. 281. University of Illinois at Urbana—Champaign, Urbana, IL. 303pp. Inc., New York, NY. 450pp.

Zimdahl, R. L., 1993. *Fundamentals of Weed Science*. Academic Press, Inc., New York, NY. 405pp.