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American Herbal Products Association's

BOTANICAL SAFETY HANDBOOK

Second Edition



Edited by

Zoë Gardner
Michael McGuffin

Expert Advisory Council

Roy Upton
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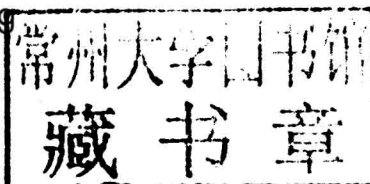
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DEDICATION

This book is dedicated to the memory of Mary Frances Picciano, Ph.D., former Senior Nutrition Research Scientist at the Office of Dietary Supplements, National Institutes of Health. Her interest, foresight, and willingness to have the Office of Dietary Supplements support a partnership with the American Herbal Products Association and the University of Massachusetts made this work possible.

PREFACE TO THE FIRST EDITION

Increased attention on herbal products, both in the marketplace and in the legislative arena, has created a need for wider public access to data regarding the safety of botanicals. The passage of the Dietary Supplement Health and Education Act in October, 1994, furthered the need for such information, as this law authorizes the use of cautionary labeling for dietary supplements, including those that contain herbs.

The American Herbal Products Association (AHPA), through its Standards Committee, convened a special SubCommittee (hereinafter "the Committee") to address this need. The Committee members identified considerable safety data in varied texts and journals and discovered that some attempts to classify herbs had been undertaken in several other countries. No comprehensive compilation or review of this data for botanical ingredients sold in the North American marketplace, however, was available in a useful format.

The goal of the present work is to find a rational platform for the evaluation of herb safety, neither assuming that all natural substances are inherently safe, as some popular references suggest, nor blindly accepting reports of toxicity from uncritical sources. In undertaking this

task, the Editors met with information that presented significant challenges. Many authors utilize unreferenced data, perpetuate historical inaccuracies or display inherent biases against the use of botanicals. Also, contemporary reviews of the toxicity of many herbs are not available. Nonetheless, the Editors are confident that the body of information presented here is largely accurate. It is our sincere hope that readers of this work will find it to be a valuable reference and will address all useful criticisms to our attention.

In sponsoring this effort, the American Herbal Products Association (AHPA) addresses the common interest of industry, the public, and regulatory agencies in assuring safe access to a wide range of herbs and herbal products. This document provides accurate data to guide manufacturers and consumers in safe utilization of herbal products. As the most broadly established trade association in the herbal marketplace, AHPA has, by supporting and sponsoring the creation of this work, furthered the herb industry's leadership role in promoting the responsible use of herbs.

PREFACE

This second edition of AHPA's *Botanical Safety Handbook* represents a significant modification from the first edition, published in 1997. At the same time, the second edition reflects the continued commitment of the American Herbal Products Association (AHPA) to provide accurate information about the safe use of herbs in a practical and accessible format.

The original edition classified botanical ingredients in four safety classifications to differentiate those that can be safely consumed when used appropriately from those for which some contraindication or other restriction is known, as well as those that should be used only under the guidance of a qualified expert. A handful of entries in that edition were also placed in a separate class if the editors had insufficient data for classification. The revised edition largely retains this safety classification system, except that if the review process did not provide enough information to make a knowledgeable decision on any specific herb, that species was removed from the text.

The present edition also includes a separate classification system to address what is known about the potential for an herb to interact with any drugs. Each of the herbs listed here is identified in one of three interaction classes to differentiate between those for which no clinically relevant interactions are expected and those for which clinically relevant interactions are biologically plausible or are, in fact, known to occur.

Botanical products continue to be broadly used throughout the world. In the United States, most herbs are sold in loose form or as tablets, capsules, or tinctures, and regulated as dietary supplements (this product class also includes vitamins, minerals, amino acids, and numerous other ingredients). Many herbs are also common flavorings for foods, or are used in teas. In addition, a handful of herbs provide active ingredients in non-prescription drugs. The U.S. marketplace for herbal products in the supplement category has increased significantly in the years since publication of the first edition, and the retail value of this product category grew from \$3 billion in 1996 (Muth et al. 1999) to \$5 billion in 2010 (Anon. 2011).

An even more significant change in the past 15 years has been the emergence of the Internet and online scientific databases as tools for accessing scientific information. The first edition of this book relied almost entirely on secondary references (i.e., books and other summaries of traditional or scientific information), and the editors of that document used their personal collections of such texts to compile the information needed to make

safety determinations for the plants addressed in it. On the other hand, the process for compiling information for this second edition, as described in the introduction, involved a much more thorough review of primary references (i.e., published research papers, case reports, and other original literature). Thus, while the first edition included just 280 references to evaluate the over 500 plants addressed therein, this revision cites 301 references just in its treatment of St. John's wort herb (*Hypericum perforatum*), ginkgo leaf and seed (*Ginkgo biloba*), and garlic bulb (*Allium sativum*).

Any attempt to provide a summary of safety information on botanicals will encounter certain prejudices and inaccuracies in the published record. One such prejudice, often repeated in reviews of herbal medicines and dietary supplements, is the view that consumers have been led to believe the myth that "anything natural is safe" (Barnes 2003; Dasgupta and Bernard 2006). While one survey of consumer attitudes in Canada found that 7 percent of respondents completely agree that there is no risk associated with products made with natural ingredients (Anon. 2005), there are no published analyses of consumer beliefs that indicate that there is broad acceptance of any such assumption.

It is, however, true that many of the plants that enjoy broad culinary and traditional therapeutic usage are generally safe. We can safely season our food with any number of herbs to make a meal more flavorful. We can appreciate a delicious cup of peppermint leaf or rose hips tea, or safely take an herbal supplement containing dandelion root, saw palmetto berries, or any number of other herbs. Although allergies and individual reactions have been recorded for a few herbs that are widely used in foods and supplements, such individual concerns are also seen with many other foods, and do not diminish the safety profile of the many herbs that are widely regarded as safe.

On the other hand, and as everyone knows, there are any number of plants that are highly toxic, even deadly. Every savvy North American hiker knows to stay away from poison ivy (*Toxicodendron* spp.) when walking in the woods. The death sentence imposed on Socrates by an Athenian jury 2,400 years ago was carried out with a fatal dose of poison hemlock (*Conium maculatum*). The poison curare, a blend of several equatorial rain forest plants (e.g., species of *Chondrodendron*, *Curarea* and *Strychnos*) is used by some South American hunter cultures to make their arrows more deadly (Schultes and Raffauf 1990). And in

the “concrete jungle” of Los Angeles, two young boys died in 2000 from ingesting a few leaves of the ubiquitous oleander (*Nerium oleander*) (Garrison 2000). Federal law and good common sense, however, prevent the use of any such highly toxic plants in products that are readily available to consumers.

The revised edition of the *American Herbal Products Association's Botanical Safety Handbook* fills the need for a reference that neither promulgates the myth that all herbs are always safe, since they are “natural,” nor accepts without review every case report or conceptual theory that draws an unsubstantiated or illogical conclusion of harm from an herb or herbal product. In assembling this revision, significant effort has gone into sorting out references that are factual from those that are inaccurate. Texts that communicate that all natural substances are inherently safe would not have been included here, though in fact no such documents were encountered. More effort was needed to avoid blind acceptance of reports that purport to identify herbal safety concerns with unreferenced statements or incomplete records of specific herbal preparations, which are unfortunately quite common, even in peer-reviewed scientific journals. Such references may nonetheless be included in this text to provide readers with a complete record, though efforts were made to highlight any perceived flaws.

Even as the consumer market for herbal supplement products expands and scientific information becomes more accessible, the goals of the second edition of the AHPA's *Botanical Safety Handbook* are essentially the same as those of the original edition. Companies that market herbal products are bound by federal regulations to disclose known safety concerns that may result from a product's use. Health care providers, especially those lacking in training or experience in the use of herbs, are in need of accurate data if they are to provide guidance to their patients who use herbs. And consumers of herbs and herbal products need readily understandable information to assist them in making safe and appropriate health care

choices. AHPA's *Botanical Safety Handbook*, 2nd edition is designed to provide the information needed by each of these audiences.

It should be recognized, however, that this reference is not an herbal user's guide. Numerous excellent references exist that provide information on the uses and benefits of herbs. Readers of the present document are advised to seek out these references, or to consult with experts qualified by training and experience, for advice on when and how to use herbs for their health benefits.

The editors are confident that the body of information presented in this second edition of the AHPA *Botanical Safety Handbook* is largely accurate, and hope that readers of this work will find it to be a valuable reference. Useful criticisms will nonetheless be welcome, and should be addressed to the attention of the editors.

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The members of this edition's Expert Advisory Council met together on a regular basis for nearly five years, all on their own time, and without any financial compensation. The expertise and experience embodied in these individuals are unsurpassed, and without them the work could not have proceeded beyond a collection of references, as it was through their efforts that these references were evaluated and organized into the present text. Biographies of each of these individuals follow.

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Nancy Turner, Donnie Yance, Eric Yarnell, and Yifang Zhang.

Thanks are also due to the generations of herbalists and scientists around the world whose research and experience have provided the basis for our understanding of the safety of medicinal plants. Their work and publications have created a significant foundation for our understanding of the safety of the botanicals reviewed in the present text.

Appreciation is also due to Joseph Betz, Ph.D. and the late Mary Frances Picciano, Ph.D. of the Office of Dietary Supplements (ODS) at the National Institutes of Health. Dr. Betz shared his ideas on the makeup of the Expert Advisory Council and on the importance of addressing the potential for an herb to modify the effect of a drug taken concomitantly, commonly referred to as an herb-drug interaction (a topic that was outside of the scope of the first edition). Dr. Picciano facilitated ODS's significant financial support of the revision process and ensured that the planned revision met high academic and scientific standards.

A number of research assistants helped to acquire and manage the thousands of documents reviewed in this project. A work of this scope would not have been possible without the enthusiastic assistance of Jamie Blair, Brittney Laramee, Annie Winkler, Ryan Rogan, Rye Zemelsky, Kathleen Broadhurst, Jennifer Kehoe, Margo Voskarian, Jennifer Hast, and Abigail Haines. Thanks are also due to Constance Parks and Bill Schoenbart for their detailed reading and editing of the manuscript.

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Fascinated by the connection between people and plants, Zoë Gardner has been studying, researching, and teaching on the production, conservation, quality, safety, and appropriate use of medicinal plants since 1998. After completing her undergraduate degree in environmental studies at the Audubon Expedition Institute, Zoë helped to establish the Medicinal Plant Program at the University of Massachusetts, earning her master's degree there in plant & soil sciences. More recently, Zoë joined the Research & Development Department at Traditional Medicinals, a leading producer of botanical dietary supplements. A self-proclaimed "herb nerd," Zoë is currently completing her Ph.D. on medicinal plant quality and safety.

Michael McGuffin

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Michael McGuffin has been active in the herbal industry since 1975, having owned and managed both retail and manufacturing businesses in this field. He is the managing editor of *Botanical Safety Handbook*, 1st edition (1997) and of *Herbs of Commerce*, 2nd edition (2000). He serves on the boards of the American Herbal Pharmacopoeia and United Plant Savers; on the Advisory Board of the USC School of Pharmacy Regulatory Science Program; and as chair of the U.S. Technical Advisory Group for ISO/TC 249, the International Organization for Standardization's Technical Committee on Traditional Chinese Medicine (provisional title). Michael maintains active involvement with regulatory agencies, and served on FDA's Food Advisory Committee Working Group on Good Manufacturing Practices for Dietary Supplements (1998–1999), FDA's Food Advisory Committee's Dietary Supplements Subcommittee (2003–2005), and California's Office of Environmental Health Hazard Analysis Food Warning Workgroup (2008–2010).

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Roy Upton has been trained in traditional Ayurvedic, Chinese and Western herbal traditions, has studied Native American and Caribbean ethnobotanical traditions, and is a professional member of the American Herbalists Guild. He is the executive director and editor of the *American Herbal Pharmacopoeia* and a member of the Standards Committee of the American Herbal Products Association and advisory committees for the American Botanical Council, AOAC International, and NSF International. Along with being an author and lecturer, Roy was co-founder and past president of the American Herbalists Guild and is the herbalist and director of the California-based herbal company Planetary Herbals.

Soaring Bear, Ph.D.

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Dr. Soaring Bear has been collecting herbal data, with a focus on toxicology, since the early 1970s. He earned a B.S. in biochemistry with honors and a Ph.D. in pharmacology from the University of Arizona. His doctoral research on structure-activity relationships and chemical interactions provides him with a unique perspective on bioactivity of herbs. He created herbmed.org and edited over ten thousand quick summaries and links into Medline. His work at the National Library of Medicine in the Medical Subject Headings (MeSH) section included significant revisions of the herbal, alternative medicine, and chemistry sections of MeSH, which improves the quality of millions of searches done every day on the pubmed.gov database.

David Winston, RH (AHG)

President, Herbalist & Alchemist

David Winston is an herbalist and ethnobotanist with over 40 years of training in Cherokee, Chinese, and Western/Eclectic herbal traditions. David is a founding/professional member of the American Herbalists Guild and has been in clinical practice for over 33 years. He is an

herbal consultant to many physicians and other health-care professionals throughout the U.S. and Canada. David is also the president of Herbalist & Alchemist, Inc. and founder and director of David Winston's Center for Herbal Studies and the Herbal Therapeutics Research Library. He is the author of numerous texts on herbal medicine, is an internationally known lecturer, and teaches frequently at medical schools, symposia, and herb conferences.

Daniel Gagnon, M.S., RH (AHG)

President, Herbs, Etc.

Daniel Gagnon, owner of Herbs, Etc., has been a practicing herbalist since 1976. Daniel has studied medical herbalism, pharmacognosy, and related subjects at the Santa Fe College of Natural Medicine, the College of Santa Fe, and the University of New Mexico. He received his B.S. in herbal medicine from the North American College of Botanical Medicine and his M.S. in herbal medicine from the Scottish School of Herbal Medicine. Daniel was a faculty member of the North American College of Botanical Medicine for over 10 years and currently serves as an herbal consultant to healthcare providers. He is the author of several books on herbal medicine.

Aviva Jill Romm, M.D.

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Before becoming a physician, Dr. Aviva Romm was a recognized expert in midwifery, women's health, and women's and pediatric botanical medicine, and she practiced as a homebirth midwife and herbalist for over 20 years. A graduate of the Yale School of Medicine, she completed her internship in internal medicine (Yale) and her residency in family medicine (Tufts). She was the president of the American Herbalists Guild, the founder and director of Herbal Medicine for Women, a distance learning program, and is the medical director for the American Herbal Pharmacopoeia. Dr. Romm has been active in establishing standards for botanical medicine practice and education in the United States, and is the author of numerous texts on botanical medicine, pregnancy, and children's health.

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Dr. Tieraona Low Dog's extensive career in natural medicine began more than 25 years ago. A graduate of the University of New Mexico School of Medicine, Tieraona has served as president of the American Herbalists Guild and is currently the Director of the Fellowship at the Arizona Center for Integrative Medicine at the University of Arizona School of Medicine. She has been involved in national health policy and regulatory issues, serving previously on the White House Commission of Complementary and Alternative Medicine and as a member of the Advisory Council for the National Center for Complementary and Alternative Medicine, and is currently chair of the U.S. Pharmacopeia Dietary Supplements and Botanicals Expert Committee.

Mary Hardy, M.D.

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Dr. Mary Hardy is an integrative medicine physician who received her Doctor of Medicine degree from Louisiana State University School of Medicine and studied medical ethics at Harvard Divinity School and Loma Linda University. She has studied with herbal practitioners in the United States and Europe and visited traditional healers in Peru, Kenya, South Africa, Morocco and China. She is the complementary and alternative

medicine expert for a number of research projects conducted by the Southern California Evidence-Based Practice Center at the RAND Corporation, co-chairperson of the Clinical Practice Committee of the Academic Consortium of Integrative Medicine, and associate director of the UCLA Botanical Research Center, funded by the National Institutes of Health.

Lyle Craker, Ph.D.

Professor, Medicinal Plant Program, University of Massachusetts Amherst

Dr. Lyle Craker has been a researcher in the field of medicinal plants for over 30 years. With a Ph.D. in agronomy from the University of Minnesota, he is founding and past editor of the *Journal of Herbs, Spices, and Medicinal Plants*, founding and current executive editor of the *Journal of Medicinally Active Plants*, past chairman of the International Society for Horticultural Science (ISHS) Section on Medicinal and Aromatic Plants, organizer of the Herb, Spice, & Medicinal Plant Working Group within the American Society for Horticultural Science (ASHS), and an organizing member of the International Council on Medicinal and Aromatic Plants and the American Council for Medicinally Active Plants. He is an advisory board member of the American Botanical Council and serves on the board of the AHPA Foundation for Education and Research on Botanicals.