

## NOTES ON ECONOMIC PLANTS

**Confusion of common names for toxic and edible “star anise” (*Illicium*) species.**—This note points out that the common names star anise, Chinese star anise, and Japanese star anise are used in contradictory ways among major reference works to refer to the comestible *Illicium verum* Hook. f. and the poisonous *I. anisatum* L. Accordingly, to avoid accidental poisoning, the unambiguous scientific nomenclature is preferable.

“Star anise” (so-named for the eight-pointed fruit) is commonly used to refer to two economic species of *Illicium* (Illiciaceae, less commonly Magnoliaceae), one with poisonous seeds, the other with seeds that are safely consumed. Although only one of the two species is considered toxic orally, both are known to cause dermatitis in susceptible individuals (13). The two species are quite similar, danger arising because the fruits resemble each other closely (4). The two species have often been confused for each other (16).

*Illicium verum* Hook. f. (Fig. 1) is an evergreen tree up to 10 m tall that is indigenous to southern China and Indochina (16) [according to (20), *I. verum* is not known wild]. The seeds of *I. verum* are an important industrial source of essential oil, principally used today for the production of anethole, and the formulation of anise-flavored compounded oils employed in liqueurs (6). The unripe fruit is chewed after meals as a digestive aid and breath sweetener, and dried fruits are employed as a condiment in curries, pickles, cookies, cakes, tea, coffee, and sweetmeats, particularly in Asia (4, 14). For culinary purposes, *I. verum* has the regulatory status GRAS [Generally Regarded As Safe (7)]. The plant has been used as a stimulant and carminative (4).

*Illicium anisatum* L. (*I. religiosum* Sieb. & Zucc.) (Fig. 2) is a small shrub or tree to 8 m in height. It is also indigenous to southeastern Asia, and is cultivated. Its seeds are very toxic, and have been used as a fish poison (18). Claus and Tyler (4) attribute the poisonous property to content of skimmnin. Anisatin and related convulsant sesquiterpene lactones have been identified in *I. anisatum* (11). Nevertheless, the seeds

of this species have been used medicinally in China, for example to treat toothache and dermatitis (18). In Japan cut branches are commonly used as Buddhist grave decorations on temple grounds (1). In North America this toxic species can be grown outdoors as an ornamental as far north as United States Department of Agriculture climatic zone 8 (1), which includes the warmest areas of British Columbia. Since both species have reputations as medicinal plants, their seeds could be encountered as imported items, or potentially in herbal practice, and an inadvertent substitution could occur.

There have been various degrees of confusion between the two species in the literature. Examples of guides to health and medicinal plants that simply fail to distinguish the poisonous and safe species are (2), (12) and (19). Rinzler (15) realized the problem, but used the wrong binomial: “Do not confuse Chinese star anise with Japanese star anise (*Illicium lanceolatum*), a poisonous plant used as an agricultural pesticide in the Far East.” Zeven and de Wet (20) seem to understand the vernacular nomenclature for the two species (see Table 1), but mistakenly interpret *L. religiosum* Sieb & Zucc. as a synonym of *I. verum* (see above). The contrasting common names given in the two major English language horticultural reference works are particularly misleading. Hortus third (1) refers to *I. anisatum* as both Japanese anise and Chinese anise; the latter usually designates the edible *I. verum*, and so the possibility arises of confusing the toxic and non-toxic species. The New Royal Horticultural Society dictionary of gardening (9) calls *I. anisatum* star anise and *I. verum* Chinese anise; since the name star anise is very widely applied to the non-toxic *I. verum*, giving it as the only common name for the toxic *I. anisatum* may lead to the latter’s consumption by error. Both of the preceding works also err by dropping the “star” in “Chinese star anise,” and Hortus third additionally errs in referring simply to “Japanese anise” rather than “Japanese star anise.” Such usage further compounds the possible confusion, potentially with anise, *Pimpinella anisum* L., a major competitive source of

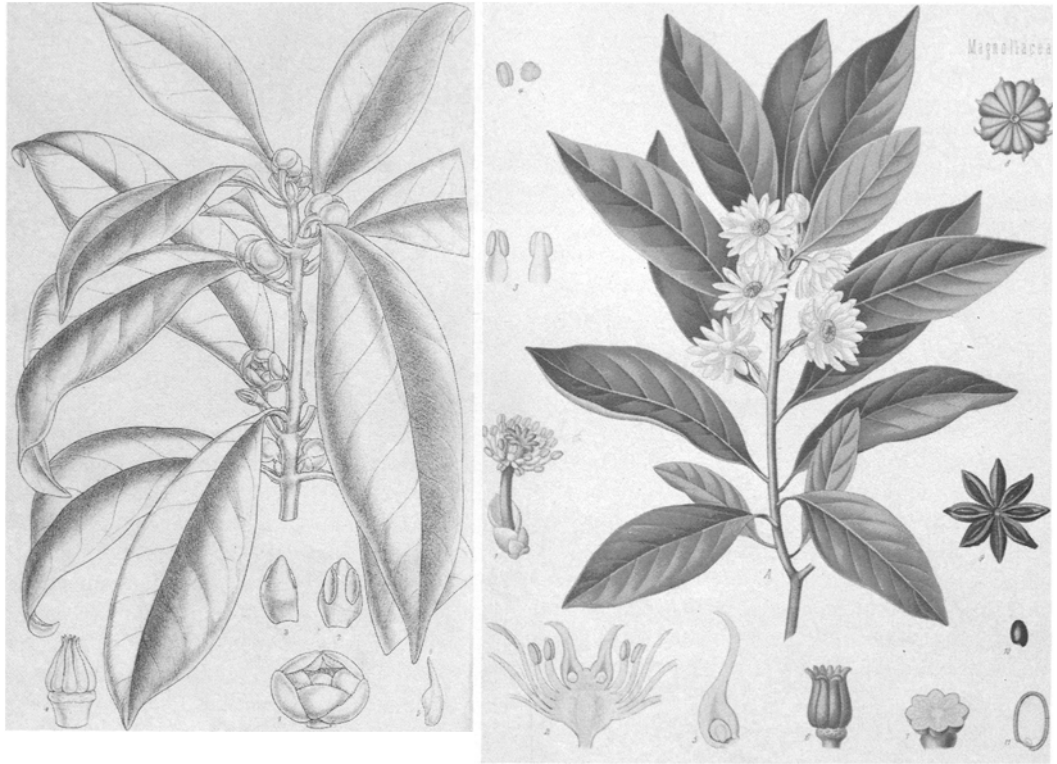


Fig. 1. *Illicium verum*, Plate 7005 from Hooker (1888).

Fig. 2. *Illicium anisatum*, Plate 63 from Köhler (1883–1898).

anethole and, unlike “Japanese anise,” a quite edible culinary herb.

Using the seeds of *Illicium anisatum* for culinary purposes could be fatal, so clearly recommendations for nomenclature are in order. As the scientific names are unambiguous, they represent the nomenclature of choice. The common name “star anise” is dangerously ambiguous, although it is now thoroughly established com-

mercially for *I. verum* (5), and therefore cannot be abandoned. To use it also for *I. anisatum* is very undesirable. *Illicium anisatum* is the sole species of the genus native to Japan, while there are about 30 species in China (11). The name “Chinese star anise” unfortunately has been used for both species (Table 1), although it is most appropriate for *I. verum*. Japanese star anise is a relatively unambiguous name for *I. an-*

TABLE 1. COMMON NAMES FOR *ILlicium ANISATUM* AND *I. VERUM* IN SOME STANDARD ENGLISH-LANGUAGE REFERENCE BOOKS.

<i>Illicium anisatum</i>	<i>Illicium verum</i>	Source
Star anise	Star anise	Chittenden 1951 (3)
Japanese star anise	Star anise, Chinese anise	Uphof 1968 (18)
Chinese anise, Japanese anise	Star anise	Bailey et al. 1976 (1)
—	Star anise	Tanaka 1976 (17)
—	China star anise	Heath 1981 (7)
Japanese star anise	Star anise	Zeven and de Wet 1982 (20)
Star anise	Chinese anise	Huxley et al. 1992 (9)

*isatum* (but see Table 1). However *I. verum* is also grown in Japan, so that even this common name should not be interpreted uncritically.

Literature Cited. (1) Bailey, L. H., and E. Z. Bailey. 1976. Hortus third. Revised by staff of L. H. Bailey Hortorium. MacMillan Publishing Co., New York; (2) Bianchini, F., and F. Corbetta. 1977. Health plants of the world. Atlas of medicinal plants. Newsweek Books, New York; (3) Chittenden, F. J. ("assisted by specialists"). 1951. The Royal Horticultural Society dictionary of gardening. Clarendon Press, Oxford. 4 vol.; (4) Claus, E. P., and V. E. Tyler. 1965. Pharmacognosy. fifth edition. Lea & Febiger, Philadelphia; (5) Foster, S. 1992 (editor). Herbs of commerce. American Herbal Products Association, Austin; (6) Furia, T. E., and N. Bellanca. 1975. Fenaroli's handbook of flavor ingredients. 2nd ed. CRC Press, Cleveland. 2 vol.; (7) Heath, H. B. 1981. Source book of flavors. AVI Publishing Co., Westport, Conn.; (8) Hooker, J. D. (editor). 1888. Curtis's Botanical Magazine, Vol. 114. London; (9) Huxley, A., M. Griffiths, and M. Levy (eds.). 1992. The new Royal Horticultural Society dictionary of gardening. 4 Vols. Stockton Press, New York; (10) Köhler, A. D. 1883-1898. Köhler's Medizinal Pflanzen. 3 vols. Verlag von Fr. Eugen Köhler, Germany; (11) Kouno, I., et al.

1989. Isolation of three new sesquiterpene lactones from the pericarps of *Illicium majus*. Chemical and Pharmaceutical Bulletin 37:2448-2451; (12) Mességué, M., and M. Peter. 1982. A kitchen herbal. Making the most of herbs for cookery and health. Collins, London; (13) Mitchell, J., and A. Rook. 1979. Botanical dermatology. Greengrass Ltd., Vancouver; (14) Morton, J. F. 1976. Herbs and spices. Golden Press, New York; (15) Rinzler, C. A. 1990. The complete book of herbs, spices and condiments. Facts On File, New York; (16) Smith, A. C. 1947. The families Illiciaceae and Schisan-draceae. Sargentia 7:1-224; (17) Tanaka, T. 1976. (Edited by S. Nakao.) Tanaka's cyclopedia of edible plants of the world. Keigaku Publishing, Tokyo; (18) Uphof, J. C. Th. 1968. Dictionary of economic plants. 2nd ed. Verlag Von J. Cramer, Lehre; (19) Weiss, G., and S. Weiss. 1985. Growing & using the healing herbs. Rodale Press, Emmaus, PA; (20) Zeven, A. C., and J. M. J. de Wet. 1982. Dictionary of cultivated plants and their regions of diversity. Pudoc, Wageningen.

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## BOOK REVIEW

**Plant Physiology.** Hans Mohr and Peter Schopfer. Springer-Verlag, New York, Mercedes 160 Imlay St., Brooklyn, NY 11231. x + 629 pp. (hardcover). \$59.95. ISBN 3-540-58016-6.

Plant physiology is a science that uses biological, physical and chemical principles to explain plant processes. This discipline is the study of how plant processes function to order growth and development, how they are controlled by endogenous and exogenous growth regulators, and how they are influenced by environmental and ecological factors. This text, translated by Gudrun and David Lawlor, is an English version of the fourth edition of a very detailed textbook. The book provides a valuable source for teaching and is a reference well suited for advanced undergraduate or beginning graduate students.

The book contains 698 figures that include graphical data presentation, diagrams, chemical structures, and metabolic pathways. These figures support concept discussions in the text and provide excellent teaching aids. Each chapter contains citations for further reading and a References section with over 470 citations. A general index enables quick access to specific topics.

The textbook presents the basic concepts of science and allied disciplines that enable the discussion of plant physiology beginning at the cellular level, advancing through the organismal level to the whole plant as it responds to various environmental factors. The text contains important details that illustrate physiological aspects of plant growth and development. Topics covered include: concepts of the cell—morphology, energetics, metabolism, division and growth; organellar structure and function—chloroplasts and mitochondria; respiratory and photosynthetic metabolism; inorganic metabolism and water relations; morphological development; hormone chemistry and mode of action; reproduction; senescence; metabolite and ion transport; stress resistance and crop production. This text is a valuable resource for teachers of plant physiology as well as researchers needing specific details on important concepts.

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