

CHEMISTRY AND ALLELOPATHY OF SOME WEEDY CYPERUS SPECIES

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ABSTRACT

Cyperus contains several important weedy species in the tropical, subtropical and temperate regions. Among them, *C. rotundus* L. (purple nutsedge) has been considered the worst weed in the world. Others such as *C. esculentus* L. (yellow nutsedge), *C. bulbosus* Vahl., *C. rotundus* (subsp. *tuberosus*), *C. kyllingia* Endl. (syn. *Kyllingia nemoralis*), and *C. brevifolius* (Rottb.) Hassk. (syn. *Kyllingia brevifolia*) are also weeds of various degrees of importance. This report summarizes our findings on the sesquiterpenes in the tubers, rhizomes, or roots of these *Cyperus* species in relation to their allelopathic potential. Three aspects will be discussed: (1). In *C. rotundus*, four major chemotypes were found based on the sesquiterpene composition in mature tubers. Distribution of these chemotypes in the Pacific Basin and Rim were investigated on samples from Indonesia, Vietnam, Thailand, Philippines, China, Hong Kong, Taiwan, Japan, Hawaii, Australia, Tonga, Guam, Cook Island, Palau, Saipan, Samoa, United States and Mexico. This information provided leads to the spread of this important weed and its biochemical evolution in relation to environmental factors. Major sesquiterpenes in the four chemotypes are α -cyperone, β -selinene, cyperol, cyperene, cyperotundone, petchoulenyl acetate and sugeonyl acetate. We compared the inhibitory activities of the essential oil from the four chemotypes and also, the major individual sesquiterpenes isolated from the oil against lettuce and oat seed germination and seedling growth. The results suggest that *C. rotundus* of different chemotypes may have different allelopathic potency against crop species. Possible variation within a weed species, therefore, could be an important factor affecting its aggressiveness. (2). *C. kyllingia* and *C. brevifolius* are morphologically similar, but were different in habitat, allelopathic potentials and chemical components in the roots and rhizomes. *C. kyllingia* contained higher terpenoids but *C. brevifolius* waxes. Since terpenoids are more phytotoxic than waxes in general, the former appeared to be more aggressive than the latter. (3). In the case of *C. bulbosus* and *C. tuberosus* subsp., they had tubers and were mistakenly collected as *C. rotundus*. The terpenoid profiles in their tubers, however, are sufficiently different and the chemotaxonomical approach using GC and GC/MS is recommended for their identification.