Inhibitory Effects of Monoterpenes on Seed Germination and Seedling Growth

Saban Kordali[a], Ahmet Cakir[b,*], and Sunay Sutay[a]

[a] Ataturk University, Faculty of Agriculture, Department of Plant Protection, Campus, 25240-Erzurum, Turkey
[b] Ataturk University, Kazım Karabekir Education Faculty, Department of Chemistry, Campus, 25240-Erzurum, Turkey. Fax: +90 442 236 0955. E-mail: cakira@atauni.edu.tr

* Author for correspondence and reprint requests

Z. Naturforsch. **62 c**, 207–214 (2007); received September 20/November 9, 2006

Monoterpenes, the chemical constituents of essential oils found in plants, are known biologically active compounds. The present study was conducted to investigate the inhibitory effects of 30 monoterpenes including monoterpene hydrocarbons and oxygenated monoterpenes on seed germination and seedling growth of *Amaranthus retroflexus, Chenopodium album* and *Rumex crispus* under laboratory conditions. The monoterpenes were applied at contents of 10 and 20 μl for liquid compounds and 10 and 20 μg for solid compounds. The results show that most of the monoterpenes significantly inhibited seed germination and seedling growth of the tested plants. Oxygenated monoterpenes including β-citronellol, nerol and terpinen-4-ol completely inhibited seed germination and seedling growth of all tested plants. Their inhibitory effects were also stronger than that of the herbicide 2,4-D. In general, monoterpenes were less effective against seed germination and seedling growth of *C. album* as compared with *R. crispus* and *A. retroflexus*. Phytotoxic effects of monoterpene hydrocarbons were found to be lower than those of oxygenated monoterpenes. The alcohol derivatives of oxygenated monoterpenes were also found to be more phytotoxic as compared with their acetate derivatives. Based on the present results, it can be concluded that the oxygenated monoterpenes can be used as potential bio-herbicides.

Key words: Allelopathy, Herbicidal Effect, Monoterpenes