

ABSTRACT

The objectives of this work were to determine whether the Sri Lankan plant species *Gardenia fosbergii* and the Ghanaian species *Cassia sophera* are effective in protecting stored rice, *Oryza sativa*, against infestation and damage by the rice weevil, *Sitophilus oryzae*, and to investigate the basis for this. Choice and no-choice bioassays indicated that *S. oryzae* adults were neither killed nor repelled by rice grains coated with methanol, dichloromethane or hexane extracts of *G. fosbergii* leaf bud exudate or by grains mixed with the powdered exudate. Instead, *S. oryzae* were attracted by some fractions obtained through fractionation of the crude methanol extract. In choice bioassays with untreated rice and rice coated with methanol extracts made from dry *C. sophera* leaves, *S. oryzae* adults preferred the untreated commodity. In no-choice bioassays a significant reduction of the F1 generation on rice mixed with powdered *C. sophera* leaves also indicated that the weevils were repelled by this botanical. In choice and no-choice bioassays with the Bruchid weevil, *Callosobruchus maculatus*, females laid significantly fewer eggs on cowpea, *Vigna unguiculata*, treated with *C. sophera* methanol extracts and there was a reduction in the F1 generation on cowpea treated with a hot water extract of dry *C. sophera* leaves. Field experiments conducted in northern Ghana confirmed that *C. sophera* hot water extracts were the most effective treatment in reducing the rate of cowpea damage and the infestation by *C. maculatus* over a 6month period compared to untreated cowpea, cowpea treated with *C. sophera* cold water extracts or *C. sophera* powder admixed with the pulses at 1% and 5% concentrations. However, the field experiment gave no clear indication about the efficacy of the same *C. sophera* treatments on rice, since rice grain damage after six months was negligible compared to the initial damage and the *S. oryzae* population could not establish itself but was replaced by the stored product pest *Tribolium confusum*. Olfactometric studies conducted with *S. oryzae* adults indicated that the compound(s) responsible for the repellent effect of *C. sophera* were not volatile because insects were repelled neither by the odour of rice grains coated with *C. sophera* extracts nor by powders. With the use of bioassay-directed fractionation a non-volatile compound was isolated from biologically active fractions and was identified by gas chromatography-mass spectrometry as α -tocopherolquinone. However, choice bioassays conducted with the isolated compound and with synthetic α -tocopherolquinone showed that *S. oryzae* adults were not repelled by this compound suggesting that another compound might be responsible for the repellent effect of *C. sophera* extracts and fractions to *S. oryzae* or that synergistic effects with other compounds might be involved in the biological activity. The use of botanical pesticides for protecting stored products in developing countries is discussed.