

Weevil repellent constituents of *chrysanthemum cinerariaefolium* vis (pyrethrum) for grain protection against the *Sitophilus zeamais* as a substitute for methyl Bromide

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Abstract:

The ozone layer that shields the Earth from damaging sun's radiation is diminishing. This has been attributed to substance such as chloroflorohydrocarbons and halons etc. Phase-out dates for these substances have been laid out in the Montreal protocol. Methyl bromide is one of these substances. In the Montreal Protocol, no date for its phase-out was set but annual consumption levels for signatory countries have been limited to 1991 levels. In Kenya, methylbromide is used to protect maize weevil, *Sitophilus zeamais*. This work therefore, set out to look into the possibility of using the essential oil of pyrethrum as a substitute for methyl bromide to control maize weevil during storage. The essential oil was extracted from the pyrethrum flowers by hydrodistillation. The constituents of the essential oil were examined by routine temperature programmed gas chromatography and then subjected to gas chromatography/mass spectrometry analysis utilizing the electron impact ionization technique. The analysis of the mass spectra adduced, coupled with the co-chromatography of the essential oils with the authentic samples of closely matching mass spectra, was the basis of the identification process. The oil consisted mainly sesquiterpenes. Those that were confirmed were Isocaryophyllene, Germacrene-D, trans- β -farnesene, β -Cubebene, β -Nerolidiol, (-)-Spathulenol, and β -Copaene. Trans-Chrysanthemic acid, β -Phenylethylisovalerate, Cadinene and Cadinol were identified using the mass spectrums only. Repellency bioassay study of the essential oil and its constituents was performed on the maize weevil, *Sitophilus Zeamais*. The Y-tube olfactometer method was used to study the repellency. The results showed that the essential oil of pyrethrum exhibited a higher repellency than DEET towards the *Sitophilus zeamais*. The oil was also very effective at low concentrations as 0.0001 μ l/disc. Of the constituents identified in the essential oil, only Isocaryophyllene, β -Nerolidiol and β -Copaene were bioassayed. The authentic samples for the other constituents were unavailable and thus not bioassayed.