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Bioactivity of leaf volatiles of *Azadirachta indica* A. Juss. and *Murraya koenigii* Spreng. against *Sitophilus oryzae* L. (Coleoptera: Curculionidae)

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ABSTRACT

Repellent activity, fumigant and contact toxicities of leaf volatiles of *Azadirachta indica* A. Juss. and *Murraya koenigii* Spreng. were evaluated against *Sitophilus oryzae* L. In the dual choice repellency test with *A. indica* leaf volatiles, significantly higher number of insects was repelled at doses above 100 mg, whereas volatiles of *M. koenigii* attracted insects at 25 mg dose and repelled at 300 mg dose. In the fumigant toxicity test 100 % mortality was observed at the concentration of 32.5 mg/ml, 3 days after the treatment with 2 volatiles separately. The LC_{50} values for fumigant toxicities were 13.5 and 22.5 mg/ml for *A. indica* and *M. koenigii* volatiles, respectively. In contact toxicity test, 100 % mortality was observed immediately after 48 h contact exposure of insects at concentrations of 0.375 and 0.125 mg/cm^2 of *A. indica* and *M. koenigii* respectively. The respective LC_{50} values were 0.12 and 0.08 mg/cm^2 for *A. indica* and *M. koenigii* leaf volatiles.

Key words: *Azadirachta indica*, bioactivity, *Murraya koenigii*, *Sitophilus oryzae*

INTRODUCTION

Insects are the main causative agents for grain deterioration and nearly 90% of the total dry matter loss in storage are due to insect pests (Fernando *et al.* 1988). The control of insect pests is largely based on synthetic pesticides. There are no contact pesticides or fumigants which are safer to control pests in stored food (Chapman and Dyte 1976). Excessive use of synthetic pesticides pollute environment with toxic residues, disrupt natural pest control mechanisms and enhance development of pesticide resistant insects strains (Arthur 1994; Swarnasiri and Palipane 1995). Hence there is an increasing demand to develop safe alternatives to replace synthetic pesticides (Tripathi *et al.* 2000).

Sitophilus oryzae L. (rice weevil) is one of the major pests of stored cereals and the predominant pest of milled rice (Chapman and Dyte 1976). In a previous study fresh leaves of *Azadirachta indica* A. Juss. (Neem) when mixed with paddy at 1% (w/w) effectively controlled *S. oryzae*, *Rhyzopertha dominica* and *Sitotroga cerealella* (Swarnasiri and Palipane 1995). In India, dried leaves of *A. indica* are mixed with stored grain to protect them from pest damages (Jotwani and Sircar 1965; Ahmed and Grainge 1986). *Murraya koenigii* Spreng. (Curry leaves) leaf steam distillates are found to be effective against *Aphis craccivora* and *Callosobruchus maculatus* (Bandara *et al.* 1990; KANP Bandara personal communication). Furthermore, *M. koenigii* leaves are extensively used for culinary purposes and in indigenous medicine.

Though the insecticidal effect of leaves of *A. indica* has been thoroughly studied on *S. oryzae*, that of the separated volatile fraction has not been studied. Also, there are few studies done on the effect of volatiles of *M. koenigii* on *S. oryzae*. This study was undertaken to evaluate the bioefficacy of the volatiles of leaves of *A. indica* and *M. koenigii* on *S. oryzae* with the view of developing environmentally safer and effective compounds for the control of this pest.

MATERIALS & METHODS

Insects

Adults of *S. oryzae* were obtained from laboratory cultures maintained at 28 ± 3 °C and 70 - 80% r. h. in insect room at the University of Kelaniya. Freshly milled white raw rice prepared according to Heinrichs *et al.* (1985) was used as the culture medium. One week old adults were used for the bioassays.

Extraction of volatiles

Leaves of *A. indica* and *M. koenigii* were air dried

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