

Full Length Research Paper

Insecticidal activity of four medicinal plant extracts against *Tribolium castaneum* (Herbst) (Coleoptera: Tenebrionidae)

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Methanol extracts from four medicinal plants, *Peganum harmala* (Zygophyllaceae), *Ajuga iva* (Labiataeae), *Aristolochia baetica* (Aristolochiaceae) and *Raphanus raphanistrum* (Brassicaceae) were studied for their insecticidal effects on the stored grain pest *Tribolium castaneum* (Herbst). Response varied with plant species. Larvae growth was significantly inhibited when they were fed with extracts incorporated into the diet. Good insecticidal activity against *T. castaneum* larvae and adults was achieved with extract of *P. harmala* seeds, followed by extract of *A. iva*, *Ari. baetica* and *R. raphanistrum* aerial parts. The extracts of the four plants disrupted the developmental cycle of the insect. Extracts of *P. harmala*, *A. iva* and *Ari. baetica* inhibited F1 progeny production. These naturally occurring plant extracts could be useful for managing populations of *T. castaneum*.

Key words: *Ajuga iva*, *Aristolochia baetica*, *Peganum harmala*, *Raphanus raphanistrum*, *Tribolium castaneum*.

INTRODUCTION

Higher plants are a rich source of novel natural substances that can be used to develop environmental safe methods for insect control (Arnason et al., 1989). Insecticidal activity of many plants against several insect pests has been demonstrated (Jilani and Su, 1983; Isman, 2000; Carlini and Grossi-de-Sá, 2002). The deleterious effects of plant extracts or pure compounds on insects can be manifested in several manners including toxicity, mortality, antifeedant growth inhibitor, suppression of reproductive behaviour and reduction of fecundity and fertility. Yang and Tang (1988) reviewed the plants used for pest insect control and found that there is a strong connection between medicinal and pesticidal plants.

Tribolium castaneum (Herbst) is considered as a major

pest of stored grains (Howe, 1965). Annual post-harvest losses resulting from insect damages, microbial deterioration and others factors are estimated to be 10-25% of worldwide production (Matthews, 1993). Control of these insects relies heavily on the use of synthetic insecticides and fumigants. But their widespread use has led to some serious problems including development of insect strains resistant to insecticides (Zettler and Cuperus, 1990; White, 1995; Ribeiro et al., 2003), toxic residues on stored grain, toxicity to consumers and increasing costs of application. However, there is an urgent need to develop safe alternatives that are of low cost, convenient to use and environmentally friendly. Considerable efforts have been focused on plant derived materials, potentially useful as commercial insecticides.

Peganum harmala L. (Zygophyllaceae), *Ajuga iva* L. (Lamiaceae), *Aristolochia baetica* L. (Aristolochiaceae) and *Raphanus raphanistrum* L. (Brassicaceae) are common plants in Morocco, and mostly in North Africa. Bellakhdar (1997) had reported that *P. harmala* and *A.*

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