I- INTRODUCTION

The effectiveness of organophosphorus insecticides against stored product insects was studied by various investigators **(Abo El-Ghar and Badawy, 1961; Gadavari *et al.*, 1964; Strong *et al.*, 1969; Williams *et al.*, 1978; Barbara and Linda, 1983; Patourel and Tayeb, 1988 and El-Lakwah *et al.*, 1993a).**

The use of synthetic pesticides in controlling stored product insects raising a concern among users and environmental protection authorities. One of the possible alternatives to synthetic pesticides is the screening of plants in search for alternative pest control agents such as extracts of plant leaves, flowers, seeds, plant dusts, plant oils etc. In order to overcome and reduce the danger of pollution occurring from the wide use of pesticides in controlling the pests. It is hoped that such agents would be more degradable in nature and with less adverse effect on mammals than of the conventional synthetic insecticides.

The bioactivity of several plant extracts, dusts and plant oils as pest control agents stored product pests was studied by many investigators **(Patterson *et al.*, 1975; Schoonhoven, 1978; Singh *et al.*, 1978; Deb-Kirtaniya *et al.*, 1980; Yung and Burkholder, 1981; Gujar and Meherotra, 1983; Ivbijaro, 1984; Yadav, 1984; Jaipal *et al.*, 1984; Su, 1984; Su, 1985; Abo El-Ghar and El-Sheikh, 1987 and El-Lakwah *et al.*, 1989, 1992 a, b, 1993 a, b, c, 1994 and 1995).**

Mostafa (1993) studied the effect of mixing wheat grains with powdered leaves of *Mentha longifolia* and *Thymus vulgaris,*

powdered rhizomes of *Curcuma longa* and powdered seeds of *Piper nigrum* and *Nigella sativa* on *Trogoderma granarium* powdered leaves of *M. longifolia* caused the greatest larval mortality, followed by *T. vulgaris, P. nigrum* and *C. longa* showed little activity. The use of controlled atmospheres containing various levels of carbon dioxide, or high nitrogen content against stored product pests were evaluated by several investigators **(Lindgren and Vincent, 1970; Tune, 1983; Bell, 1984; Navarro *et al.*, 1985; Navarro and Jay, 1987; El-Lakwah *et al.*, 1992; Ofuya and Reichmuth, 1993; Hashem and Reichmuth, 1994; El-Lakwah *et al.*, 1997 and Mohamed, 1999).**

El-Lakwah *et al.* (2000) studied the toxic effect of petroleum ether extract of dill seeds alone and under modified atmospheres against some stored product insects. Results showed that the dill extract was strongly troxic against the adults of *Sitophilus oryzae* and *Rhizopertha dominica,* but it was moderately toxic to *T. castaneum.* Also, results of the effectiveness of dill seeds extract under different modified atmospheres showed clearly that the various tested insect species were sensitive to seeds extract under modified atmospheres than seed extract alone.

Postharvest losses of grains are often caused by insect infestation losses of stored grains in different countries ranged from 1% to over 50% of the total annual production **(White, 1953).**

Prakash *et al.* (1993) evaluated twenty plant products against *Sitophilus oryzae.* Only 7 products significantly reduced

adult populations and weight loss of grains. Neem seed oil was the most effective, followed by *Piper nigrum* seed powder, leaves of *Vitex negundo,* leaves of *Andrographis paniculata,* dried mandaria fruit peel, rhizome powder of turmeric and seed powder of *Cassia fistula,* respectively.

Neem leaf powder in storage of wheat grains in metal bins revealed that a dosage of 1: 2000 by weight could prevent infestation by *Sitophilus oryzae* and *R. dominica* for up to one year. Germination of treated grains was 89.5-91.5% compared with 80.75% for untreated grains. Grain was also treated with 61% methane and 38% carbon dioxide. Gas at a pressure of 1.4 kg/cm/sup/2 and a flow rate of 20 litres / min. sealed in bins for one week resulted in total insect mortality **(Dakshinamurthy and Goel, 1992).**

The aim of this study was to investigate the following points:

1- Toxicity of two organophosphorus insecticides i.e., (malathion and pirimiphos-methyl) as well as the acetone and petroleum ether extracts of the plant to certain insect species infesting stored products namely the rice weevil *Sitophilus oryzae* (L.), curculionidae, Coleoptera; the lesser grain borer, *Rhizopertha dominica* (F.), Bostrychidae, Coleoptera and red flour beetle, *T. castaneum,*Tenebrionidae, Coleoptera.

2- Persistence of the two mentioned organophosphorus insecticides and the various plant extracts.

3- Impact of the most effective plant extracts at 1% (w/w) on insect populations and loss in weight of stored wheat grains caused by *Sitophilus oryzae* and *R. dominica* adults.

4- Effect of certain treatments on germination of wheat grains and chlorophyll content of the seedlings.

5- Effect of the sublethal concentrations of *Piper cubeba* fruits acetone extract, acetone and petroleum ether extracts of *Thymus vulgaris* flowering buds, malathion and pirimiphos-methyl on some biological aspects of *T. castaneum* adults.