EFFECT OF SOME PLANT OILS ON STORED GRAIN PESTS,

*Tribolium castaneum* and *Sitophylus oryzae.*

INTRODUCTION

The continuous increasing pressure of expanding human population has created a critical problem of food scarcity. So protection of stored grains and other agricultural products from insect infestation is essential to feed the increasing population. The presence of pests constitutes a serious ongoing problem in grain stocking and its derived industry (Perez Mendoza *et al* 2004). Stored grain insect pests have been damaging our economy by infesting agricultural stored products. According to estimate, the overall damage caused by stored grain insect pests account for 10-40% of loss would wide annually (Mathews, 1993). Several species of insect pests are known for attacking granaries and other food products since time immemorial (Mishra and Tripathi 2011). Wheat is a major source of food and energy in the major parts of the world. The stored grain losses include both quantity and quality. These losses occur when the grains are attacked by mites, insects, rodents and micro organisms. Besides consuming grains insects also contaminate the grains by their by products and making them unfit for consumption. Rice weevil *Sitophylus oryzae* and red flour beetle *Tribolium castaneum* are the serious insect pests of stored products feeding on flour, cereals, meal, crackers, beans, spices, pasta, dried flowers, chocolate, nuts and even dried museum spices (Via 1999, Weston and Rattringour 2002).

The Red beetle has been reported to be highly mobile both as adults and larvae in patches of flour and broken grains (Plaines 1999, Ashamo 2002). One factor that has made the insect population high in any substrate it colonizes, as its female insects can lay eggs almost throughout their life span (Lale *et al* 2002).
To control these pests, synthetic insecticides are used during storage to grains. They cause residual pollution of the environment, toxicity to consumers and residues on grains. Moreover *Sitophylus oryzae* has been reported to develop resistance synthetic insecticides (Benhalime *et al* 2004).

Wide use of insecticide and fumigants has led to serious problems including development of insect strain resistant to insecticides. (Ribeiro *et al* 2003), toxic residues on stored grains, toxicity to consumers and increasing costs of application. However, there is an urgent need to develop safe alternatives of low cost, convenient to use, environment friendly and non-toxic to humans. So the efforts have been focused on plant derived materials, potentially useful as commercial insecticide. There has been growing interest in the use of natural plant products for production of agricultural commodities due to their low mammalian toxicity and low persistence in the environment. (Raja *et al* 2001). So many plant products have been evaluated for their insecticidal properties against different stored grain pests. (Su 1990, Mukherjee and Joseph 2000, Carwni and Grossi-de-sa 2002,Mondal and khalequazzaman 2010). In the present study we will be studying on *Sitophylus oryzae* and *Tribolium castaneum* pests.

**Life cycle of Rice weevil, *Sitophylus oryzae* –**

*Sitophylus oryzae* are abundant in warm temperate and tropical regions. *S. oryzae* attacks small grains (rice, wheat and sorghum) Timothy Herrman(1998).

**Birth**

The adult female rice weevil lays an average of 4 eggs per day and may live for 4-5 months (producing 250-400 eggs).
Larval stage:
The eggs hatch in about 3 days. The larvae feed inside the grain Kernel for an average of 18 days.

Pupal stage:
The pupal stage lasts an average of 6 days (5-16 range).

Adult:
The new adult will remain in the seed for 3-4 days while its cuticle hardens and matures. A single generation can be completed in around 28 days.

Life cycle of Rust red flour beetle *Tribolium castaneum*

*Tribolium castaneum* is most common in tropical and warm climatic areas. It is 3-4mm long and reddish brown. It is secondary pest of a wide range of stored products. They do not breed rapidly in undamaged clean grains. Female lays 2-10 eggs each day throughout most of her adult life. Under optimal conditions 35°C, 75% R.H (relative humidity). It can increase at a rate of 70-100 times a month. Timothy Herrman (1998).

Birth

The Tribolium beetle, like all insects, hatches from an egg. A female beetle can lay two to three eggs per day over a period of several months. After she lays the eggs they will hatch within five to twelve days.

Larva Stage

From each egg hatches a beetle larva. The larvae are slender, cylindrical and are a cream or yellow color with brown heads. The larva period can last from 22 to 100 days depending on food supply and how quickly the larva can grow.
**Pupa Stage**

The pupal stage is where the beetle metamorphoses from a larva into an adult. In the Tribolium species the pupa stage generally lasts about eight days.

**Adult**

An adult Tribolium beetle will shed its pupa covering and emerge very hungry. Both the confused and red flour beetles are flat, shiny, and brown as adults with antennae and six legs.

Following commercially available plant oils will be studied as insecticide against the above mentioned two insect spp.

- Laung (clove) *Schyzgium aromaticum*. Highest repellent activity was observed against *Tribolium castaneum* (90%) and *Sitophylus oryzae* (90%). (Bhuwan B. Mishra, 2011)
- Orange- *Citrus reticulata*- It showed 78% repellent activity against *Tribolium castaneum* and 80% in *Sitophylus oryzae*. (Bhuwan B. Mishra, 2011)
- Neem- *Azadirachta indica* (Farid A. Taludker, 2006)
- Tagetes oil *Tagetes erecta*
- *Eucalyptus globules* (Bhuwan B. Mishra, 2012)
- Juniper oil *Juniperus communis*