PRINCIPLES AND PRACTICES TO CONTROL INSECT PESTS OF STORED FOOD

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Pest Control

Control means to keep anything under certain optimum limit.

Pest control means to keep the population of insect pest at certain optimum level so that they may not cause economic loss to the crops or any commodities.

Economic Levels of Pest Control

There are three levels:

Economic Threshold Level (ETL)

Level of insect pest population at which control measures must be applied to avoid the economic loss.

Economic Injury Level (EIL)

Level of insect pest population at which economic loss will start to occur.

Zero threshold Level

It represents zero threshold of insect pest population which means we can’t compromise even the presence of single insect in the food or food commodity. For stored grain insect pests there is zero threshold level.

Principles/ Practices of Insect Pests Control

Natural Insect Control

Use of Natural Mortality Factors like

i. Abiotic Factors

e.g. Temperature, Humidity, Gaseous concentration, light etc.

ii. Biotic Factors

e.g. Biocontrol agents (Predators, Parasites, Parasitoids, pathogens)

Principles/Practices of Insect Pests Control

Artificial/ Applied Insect Control

Use of some tactics/ practices to boost up the natural mortality factors so that the pest may not cause loss.

1. **Mechanical Control**

- Sanitation (maintaining hygienic conditions) in stores, grains and storage structures
- Sieving and winnowing of grains
- Trapping of khapra beetle by thigmotropism
- Trapping of red flour beetle by light

Principles and Practices of Insect Control

2. **Physical Insect Control**

- Heat treatment of stores, grains and storage structures
- Sundrying
- Super heating of stores
- Lowering moisture of stores and grains
- Low Temperature Treatment
- Use of Radiations

Principles and Practices of Insect Control

3. Biological Insect Control

Use of different bio-control agents (predators, parasitoids and pathogens) for the control of insects.

Predators

e.g. Stack bug, Cereal bug

Parasitoids

e.g. Braconids, Ichneumonids, Bethylids, Trichogrammatids

Pathogens

e.g. Entomophthora fungi (entomopathogenic fungi)

Bacillus thuringiensis (entomopathogenic bacteria)

Entomopathogenic nematoads

Principles and Practices of Insect Control

4. Chemical Insect Control

Use of different insecticides for the control of insects.

Mainly Al-phosphide tablets (Phosphine tablets) are used which is a solid fumigant

while methyl bromide, carbon tetrachloride are the liquid fumigants.

Different plant extracts (neem leaf extracts, citrus peel extracts, tobacco leaf extracts) are used for the pest control

Principles and Practices of Insect Control

5. Integrated Pest Management (IPM)

Intelligent selection and integration of different insect control practices in as compatible manner as possible in order to keep the pest population below economic threshold level and with minimum impact on the environment and within economically viable framework.

Components of IPM include:

i. Acceptable pest levels
ii. Preventive practices
iii. Regular monitoring
iv. Mechanical practices
v. Biological control
vi. Safe use of pesticide

Inorder to successfully implement the IPM practices, we need to know the complete insect biology and ecology.

Principles and Practices of Insect Control

Management of Stored Product Pests

- Monitor Pest Population
- Control through non-chemical means (Prophylactic Preventive measures)
- Use Chemicals as a last resort (Curative measures)

Inspection of incoming material (prevention) and proper grain handling is the first line of defense against most stored product insects.

General Measures for Stored Pest Management

1. Cleaning/Grading/Sieving of Grains
2. Sun drying/ Heat Treatment
3. Treatment of grains with different plant extracts
4. Treatment of Storage structures/Stores
5. Superheating of stores
6. Cleaning of stores and plugging of crevices.
7. Maintaining the unfavorable/non-conducive conditions for the pest development
8. Fumigation with Al-Phosphide (Phosphine Tablets)
9. Regular monitoring of stores