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# New Methods Employed in Managing Stored Grain Pests

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**SUMMARY**

In the present review article various control new methods for stored grain insects are discussed in detail and an emphasis was made to use non-chemical methods. Stored grain infestation is a very serious problem as various life stages of insects cause economic damage and deteriorates the quality of food grains and food products. There are number of stored grain insect pests that infest food grains in farmer stores and public ware houses and massively surge due to un-controlled environmental conditions and poor ware housing technology used.

## INTRODUCTION

Grain is an important consumable commodity that is used for human consumption at large scale. The production of different types of grains increased progressively due to implementation of advance production practices but because of improper storage facilities huge amount of grains has been spoiled. Total 12 to 16 million metric tons of food grains were spoiled due to unavailability of proper post-harvest handling of grains every year which is sufficient to feed the 33% population of India and total yearly grain losses has been estimated near about INR 50,000 crores.

**Deferent methods given below**

- Insect proof bins
- Insect proof bags
- Traps
- Irradiation
- Nanoparticles
- Silos
- Microwave technology
- Controlled atmosphere
- Low & high temperatures

**Insect Proof Bags**

Stored grains in storage structures were spoiled due to attack of different insects-pests, fungi, rats, mice, squirrel, birds, etc.

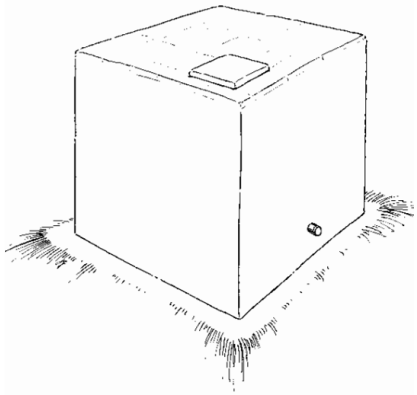

**HDPE bags with lamination inside**

**Grain pro bag**


**Zero fly bag**

**Insect Proof Bins**

Punjab agricultural university has been designed a storage structure called as PAU bin, constructed with galvanized iron sheet. Capacity varies between 1.5 to 15 quintals depends upon the size of designed PAU bin.



**PUSA bin**

**UV Light Trap**

**Nanoparticles**

- Some commonly used nanoparticlesare.
- Silver nanoparticleslike $AgNO_3$.
- Silica like; diatomaceous earth, synthetic silica ($SiO_2$), sands, Silica Aerogel.
- Aluminiumoxide ($Al_2O_3$),
- Zinc oxide($ZnO_3$),
- Copper oxide($Cu_2O$),
- Titanium dioxide ($TiO_2$)

**Silos**

Silos are constructed either with metal or concrete but according to the economical point of view metal silos are better than the concrete silos. Capacity of the silos depends upon the diameter and
Height of the silos. Approximately 25 thousand tons of food grain can be stored in this storage structure and loading and unloading in the case of huge silos performed with the help of elevators and conveyor Silos are generally constructed with metals, aluminum, concrete and rubbers used for long term storage of bulk quantity of food grains.

**Microwave technology**

- Microwave disinfestations seems to have a great potential as an alternative method of killing insects in stored-grain.
- Microwave generators can be operated in continuous or pulsed mode.
- It kills insect stages like larvae, eggs etc.
- Leaves no chemical residues and preserves quality.

**Controlled atmosphere**

- It implies alteration of natural storage gases *i.e.* carbon dioxide, oxygen and nitrogen to render atmosphere in stores detrimental to pests.
- It also refers to the process of changing the composition of existing atmosphere by introducing $CO_2$ or $N_2$.

**It can be achieved in following**

- Adding gaseous or solid $CO_2$ (9-10%).
- Adding $N_2$ gas.
- Removing $O_2$ gas (2-4%).
- Allowing metabolic processes which remove $O_2$ or add$CO_2$.

**Use of low and high temperatures**

- Optimal temperature for most of the storage insects is between 25º C and 33ºC.
- Temperatures between 13ºC and 25º C will slow development.
- High temperatures of 37ºC and above will stop development.

**CONCLUSION**

Adequate and efficient storage structures are required to minimize the losses during grain storage because consumption capacity has been increasing with rapid growth of world population. Mechanized high yielding practices as well reducing the food grain losses up to minimum extent has been essential for accomplishment of supplying the food grain as per capita of food grains amount required. Among the total post-harvest losses of food grains, 10–15% losses are due to unavailability of advance and appropriate storage structures, which contribute huge grain deficit that is why for increasing the per capita food grain availability and better market price a hygienic, economical and scientific storage structure has been needed.

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