

# STORED GRAIN INFESTATION BY INSECTS IN NORTHERN INDIA

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## Abstract

Survey of the geophysically devided zones of subtropical regions of Uttar Pradesh in Northern India indicated that occurrence of insect species differed in different regions depending upon the geophysical conditions and methods of storage. The dominant species infesting cereals were Sitiophilus oryzae L., Rhizopertha dorninica Fab.; Sitotroga cerealella Oliv., Tribolium castaneum Hebrst., Trogaderma granarium Everts., Oryzae-philus surinamensis L., Callosobruchus chinensis L. The fluctuations of the climate played a pivotal role in population development of insect species. The losses caused by insect pests of cereals had direct relation with storage method, design and climate fluctuations. The storage structures in cultivars houses differed zone-wise. The preventives and controls with special reference to the use of chemicals and resistance of insects were surveyed. Alternate techniques of grain protection have been discussed.

## Introduction

The traditional handling, drying and storage systems are considered inadequate. The characteristics of the crop are changed with the timing of harvest and subsequent operations may get shifted from a favourable dry season to unfavourable wet season. These factors have made the post harvest system vulnerable to loss. The tendency has been to direct efforts towards one component of pest control which is identified as of immediate need which in turn may have far reaching consequences on the entire post harvest system. The recommendations must suit the changes to traditional storage practices and should not be introduced in isolation. There is a need to integrate post harvest loss assessment with system research to link research results with the need of the farming community. This may provide a realistic assessment of changes that are feasible and acceptable.

## Methods and Materials

The State of Uttar Pradesh has been divided into four zones.

- 1 Northern Hill  
 Ht 500-1000 m MSL  
 Precp 200 cm, Low temp., dense forests; overflowing rivers and spring water. Crops, fruits, maize and wheat. Wooden Bins  
 Bamboo Baskets
- 2 Bhawar  
 Ht 150 to 200 m Wooden Bins  
 Precp 130 cm, water table very low Steel Bins, Bags  
 Crops, Soybean, paddy, maize
- 3 Tarai  
 Foothills of Shivalik range of Himalayas. Ht 100 to 200 m MSL  
 Precp 133 cm, 29 N Mud Bins  
 Crops, sugarcane, wheat, paddy and maize Bags, Godowns
- 4 Plains  
 Jammu-Ganges plains, Fertile alluvial soil, 8 C to 43 C  
 Eastern Plains Mud Bins, partition  
 Summers hot, Precp. 100-200 cm of a living room,  
 120 to 150 m MSL. Cropping season based on paddy. Bags, Godowns
- a) Western Plains  
 Precp. 60 to 80 cm  
 Predominant wheat, paddy sugarcane  
 Mud Bins, partition  
 of a living room,  
 Tin Drums, Bags,  
 Godowns
- b) Bundelkhand dry region  
 N, S-W plateau, hot in summer  
 Precp. 75 cm, 100-150 m MSL  
 Crops, small millets and chickpea  
 Underground pits,  
 Mud Bins, Bags,  
 partition of  
 a living room

Results

Insects

N. Hills

Sitophilus oryzae L.  
Sitotroga cerealella Oliv.

Bhawar

Tribolium castaneum Hebrst.  
Trogoderma granarium Everts.  
S. cerealella; S. oryzae

Tarai

S. oryzae, S. cerealella, T. castaneum

Plains

East

S. oryzae, S. cerealella, T. castaneum  
Oryzaephilus surinamensis L.

West

T. granarium, S. oryzae, Rhizopertha dominica  
T. castaneum, Callosobruchus chinensis L.

Central

S. oryzae, R. dominica, S. cerealella,  
C. chinensis, T. castaneum

Bundelkhand

T. granarium, R. dominica, T. castaneum  
S. oryzae, S. cerealella

## LOSSES

| Zone        | Method of Storage | Mean Loss (%) |            |
|-------------|-------------------|---------------|------------|
|             |                   | 4 months      | 6 months   |
| N. Hill     | Wooden bins       | -             | Negligible |
| Bhawar      | Bamboo basket     | 3             | 10**       |
|             | Bag               | 4             | 6          |
|             | Steel bin         | 1             | 2*         |
| W. Plains   | Bag               | 3             | 8          |
|             | Mudbin            | 2             | 7          |
| Tarai       | Bag               | 5             | 8**        |
|             | Mudbin            | 4             | 6**        |
| Bundelkhand | Bamboo basket     | 4             | 6*         |
|             | Bag               | 3             | 5*         |
|             | Mudbin            | 1             | 3*         |

Scanty rainfall, hot day and cool nights of Bundelkhand had less insect incidence but bad storage hygiene resulted in more loss.

Moisture varied from 9 to 16% in different stores, affected the relative loss.

\* Minimum loss

\*\* Maximum loss

## Conclusion

Geophysic conditions of zones, method of storage and storage hygiene and high moistures promoted insect build up and losses. Poor storage hygiene, even at low rainfall and low temperatures, increased losses compared to high rain fall and high humidity regions. Use of non-toxic materials like neem leaves, edible oils and ashes can prevent losses and environmental hazards.

## **PROBLEMES DE L'INFESTATION PAR LES INSECTES DANS LES REGIONS TROPICALES D'ORIGINE INDIENNE**

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### **Résumé**

Une étude portant sur les divisions géographiques des régions tropicales d'origine indienne a montré que la fréquence d'apparition de certaines espèces changeait d'un endroit à un autre selon le milieu géophysique et les méthodes de stockage.

Les fluctuations du climat ont joué un rôle pivot dans le développement des populations des espèces d'insectes. Les pertes occasionnées par les insectes déprédateurs des stocks de céréales et de légumineuses présentaient un rapport direct avec la méthode de stockage ; et les fluctuations climatiques et celles de constructions. Les bâtiments de stockage utilisés par les cultivateurs différent d'un endroit à un autre. Les nombreuses méthodes de stockage, les méthodes de prévention et de lutte sont étudiées en tenant compte des limites de plus en plus grandes que la résistance des insectes impose à l'emploi des substances chimiques. Les recherches portant sur les techniques de remplacement sont discutées.