

## LOSSES CAUSED TO STORED PRODUCTS BY INSECT PESTS IN PAKISTAN AND MEASURES FOR THEIR CONTROL

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**INTRODUCTION:** Pakistan is predominantly an agricultural country and before independence it was considered to be granary of India and used to meet most of the food requirements of the Indian population. After independence, the country continued to maintain its reputation in raising food grains for 4-5 years and met total domestic requirements. With the increase in population and also with the immigration of Muslim population from India to Pakistan, the problem of food became more and more important. Imports were made from foreign countries to meet the food requirements of the country. Every effort was made to increase the food production within the country so as to achieve self-sufficiency in food. Since it was the responsibility of the Government to meet the food requirements of urban and rural population, it was in the fitness of things to maintain huge reserves with a view to make a regular supply to the needy public all around the year. For this purpose the bulk of stored grain, particularly the wheat, imported from foreign countries under various programmes and that produced from within the country had to be stored in large godowns. The Government realized the importance of agriculture and provided every help in the form of inputs to bring an increase in the agricultural production in general and that of food grain in particular. Thanks to the efforts of the tiller of the land and the wheat breeders who brought green revolution in the country the production of wheat increased to 8.5 million tons in 1977-78. The rice production in Pakistan was 2.58 million tons by 1977-78. All efforts made towards increasing food production in this country may not achieve the desirable results if proper facilities of storage are not made available to the public and private sectors. Absence of adequate farm and village level storage facilities is one of the main problems in the country which results in substantial losses in food grain. Due to the fear of susceptibility of food grain to heavy losses during storage period of insect pests and rodents as well as due to his weak holding power the producer is forced to sell his surplus stock just after harvest. Before proceeding further it is imperative to make a critical analysis of the situation of farming profession in Pakistan since the conditions have a great bearing on the post-harvest activities of the farmer. The total farm area of the country is about 48 million acres and it is divided into 4.8 million land holdings; of these 77% fall in the category of small holdings; i.e., less than 12.5 acres. The area of these holdings is about 34% of the cropped area. As such the marketable surplus on these farms is small.

About 15% of the holdings vary in between 12.5 acres and 25 acres whereas the rest 7-8% are above 25 acres.

It may be mentioned here that in case of wheat, 20 to 25% of the total production is procured by the Government; 5-7% by a small percentage of urban population to meet their domestic requirements and the rest is retained at the farm. About 90% of the marketable surplus is brought to the market just after the harvest and about 10% marketable surplus is retained by a very small percentage of the farming community for disposal at later dates. However, depending upon the farm size, a good quantity of food grain is retained at the farm by the owners or tenants cultivating the farm. There are different types of godowns at village or farm level which include mud, bins, kothies, and other such constructions. The purpose of holding such stocks at farm level is to meet the continuous demand for consumption of the rural population. Moreover, it is meant to meet emergency needs or to overcome shortages during exigencies. The storage period for food grains held for consumption at the village or farm level ranges from 6 to 12 months. With regard to storage for commercial purposes the major portion of the grain is handled by the Department of Food which makes large scale procurement just after the harvest. Storage is done either in bulk or in bags.

There are, however, three types of godowns owned by the Government. They are Lahore sheds, House type godowns and Bins. The storage capacity of Lahore sheds is 6% of the existing stores. Unfortunately, they are not suitable for fumigation and they are used under very extreme conditions for very short terms. The House type godowns constitute 67% of the Government owned storages and are commonly in use. They are fit for fumigation. Bins represent 27% of the Government owned stores and are undoubtedly most suitable from the view point of grain storage as the infestation in these types of godowns has been found to be the lowest.

**LOSSES:** The loss caused to stored grain by insect pests and rodents is of a high magnitude in Pakistan and does not need any emphasis. On the basis of research conducted in Pakistan, it has been found that the losses to stored grain from insect pests and rodents may vary from 2-60% (1).

The relative importance of various food crops and the loss caused due to various factors is given on the following page.

The incidence of insect attack was found to vary from locality to locality and from commodity to commodity depending upon the type of godowns, type of storage (bulk or bag), ecological conditions, storage period and upon the fumigation and chemical treatments of godowns.

In Pakistan, 23 insect species have been recorded damaging the stored grain. Out of these, 6 are important. They are khapra beetle (*Trogoderma granarium*); the lesser grain borer (*Rhizopertha dominica*); the rice weevil (*Sitophilus oryzae*), red flour beetle (*Tribolium castaneum*); paddy grain moth (*Sitotroga*

*cerealella*) and Dhora beetle (*Callosobruchus chinensis*). These insects are found in all parts of Pakistan and their biology and nature of damage has been studied in detail with the ultimate object of finding out some effective control measures (2, 3, 4, 5, 6 & 7.

Food commodity	National or regional importance as food	Annual production (tons)	% of total annual food production
a. Wheat ( <i>Triticum vulgare</i> )	Staple food production	8.5 million	72.6
b. Rice ( <i>Oryzae sativa</i> )	Second major food	2.5 million	21.3
c. Maize ( <i>Zea mays</i> )	Used as food in the villages	.07 million	6.1

Major stages of postharvest processing and storage (drying, parboiling, storing etc.)	Estimated losses	Causes of loss
a. Wheat (Storing & Milling)	2-16% (average 5%)	Moisture
b. Rice (Drying, parboiling & storing)	2-10% (average 5%)	Heating Development of mold
c. Maize (Drying & storing)	2-8% (average 5%)	Damage from insects Rodents Handling & transportation

**VARIETAL SUSCEPTIBILITY:** Studies conducted on the varietal susceptibility of various wheat, gram and rice varieties to insect pests of stored grain revealed that the most susceptible variety with regard to percentage loss in weight and percentage of damaged grains was AU-44. Variety C-273 was comparatively the least susceptible. The loss was found to start within one month of the beginning of the experiment and was found to increase to higher and higher levels from April onward till it reached its maximum during July. No variety was found to be totally immune to the attack of insects.

The varietal susceptibility of 30 gram varieties to the attack of *C. maculatus* was studied taking into consideration the number of eggs laid on 20 grains of each variety; the number of grains infested out of the eggs laid on 20 grains and the loss in weight on percentage basis. The results revealed that out of all the varieties the least susceptible was 6508.

The results of experiments conducted on the susceptibility of seven rice varieties revealed that the highest loss in weight was in rice variety Basmati-198. Varieties Basmati-197 and IRR-6 did not show any significant difference from each other.

**MEASURES TO CONTROL:** The effect of Malathion and Nogos each used in 0.05% and 0.1% concentrations was studied on the larvae of *T. granarium* at 25°C, and 35°C in combination with 52% and 75% relative humidities (8). The mortality of the pests recorded at 75% relative humidity was higher than at 52% relative humidity for all the treatments. Maximum mortality of the pests was recorded 24 hours after the application of the insecticides. Malathion 0.1% on over all basis proved to be the most effective insecticide.

As a result of studies conducted on the grain protectants of insect pests of stored products the use of Malathion was found to be the best for protecting the grains from the ravages of insect pests of stored products (1, 9 & 10). A commonly recommended dosage is one part of premium grade Malathion 75% E.C. in 25 parts of water for treatment of empty godowns, heaps of grain, empty and filled bags and other articles and places of storage in and outside the human dwellings.

Studies conducted by Qayyum (10) on the use of fumigants revealed that Phostoxin and E.D.C.T. gave 100% mortality of the insect pests of stored grains. The use of these two fumigants is practised by the Government agencies in Pakistan. However their use is restricted in rural areas because of improper storage facilities.

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