



Integrated Management of Rice Storage Insects

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INSECTS, rodents, mites and fungi cause considerable damage to stored rice. Eighteen species of insects infest stored rice in India, out of which six are major pests. These are: Angoumois grain moth/paddy moth (*Sitotroga cerealella*), lesser grain borer (*Rhyzopertha dominica*), rice weevil (*Sitophilus oryzae*), rice moth (*Corcyra*

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cephalonica), saw-toothed grain beetle (*Oryzaephilus surinamensis*), and red flour beetle (*Tribolium castaneum*).

This technology bulletin provides information on the causes of the damages, and measures to reduce these losses through Integrated Management.

What makes Insects to Damage More?

- ✳ High grain moisture above 14%.
- ✳ Less fluctuation in diurnal and seasonal temperature.
- ✳ Unscientifically fabricated storage structures.

Losses due to Rice Storage Insects

- ✳ Insects feeding on rice grains cause:
 - ✳ 5 to 25% weight loss or quantitative loss.
 - ✳ 20-50% viability loss or loss in germination every year depending upon the storage conditions in addition to qualitative losses.

Sources of Infestation

- ✳ Hidden/latent infestation of rice storage insects from stitching, holes, cracks, crevices, wall and floor of previously used bags/structures/godowns.
- ✳ Storage insects being polygranivorous in habit, generally cross infest from previously stored cereals such as wheat, maize, oat, barley, millets and its products.
- ✳ Some storage insects also infest grain right from the standing mature crop in the field. This infestation aggravates, if conducive conditions prevail during transportation, drying, threshing and storage of the harvested crop.

For Integrated Management of Rice Storage Insects

Three main management components should be integrated in sequence, which are:

- ✳ Appropriate drying of the harvested crops and threshed grains.
- ✳ Disinfestation of storage containers/structures/stores.
- ✳ Use of grain protectants.

Appropriate Drying of the Harvested Crops and Threshed Grains

Follow these recommendations:

- ✳ Harvest appropriately mature rice crop, when colour of its culm, stalk of panicle and grain changes to yellow or golden yellow, about 30 to 35 days after 50% flowering. Harvesting of pre-mature or over mature crop leads to cracks in the grains.
- ✳ Dry threshed grains under sun for three days (eight hours/day) on bamboo/palm mats lined with black polythene (200 microns)



The photograph shows coleopteran pests of milled rice (left to right): *Sitophilus oryzae*, *Rhyzopertha dominica*, *Tribolium confusum*, *Latheticus oryzae*, *Oryzaephilus surinamensis* and *Tribolium castaneum*.

spreading 2.5 cm thick layer of the grains to reduce grain moisture below 14% in rice, and also to destroy field infestation of insects. Drying of grains on moist floor/surface causes cracking of grain, which facilitates infestation of insects.

Disinfestation of Storage Containers/Structures/Stores

Clean and disinfect storage containers/structures. Completely dry the treated containers/structures before storing the grains to check latent/hidden infestation and also cross infestation by treating the structures with the following insecticides.

Treatment of jute bags (dip and dry)

- * Fenitrothion (50 EC): 5 ml/20 litres of water.
- * Deltamethrin (2.5% WP): 15 g/20 litres of water.

Treatment of Structure/surface

- * Fenitrothion (50 EC) : 5 ml/litre water @ 20 ml/m².
- * Deltamethrin (2.5% WP): 1.5 g/litre water @ 20 ml/m².

Use of Grain Protectants

For Consumption Rice

- * Do not admix synthetic insecticides with rice for consumption. However, for seed storage use synthetic insecticides as grain protectants.
- * For consumption grains, use botanical grain protectants. Before



storing in properly disinfected structures, admix dried leaf powder @ 1% w/w of any of the following botanicals with rice grains: Senwar (begunia) (*Vitex negundo*), wild sage (*Lippia geminata*), bael (*Aegle marmelos*), wild basil (*Ocimum canum*) and powder of black pepper (*Piper nigrum*) @ 250 g/100 kg grains or camphor (*Cinnamomum camphora*) pellets @ 100 g/100 kg grains (only in air tight containers).

For Rice Seed

Treat with any of the following insecticides:

- * Deltamethrin (2.5% WP): 1 g/kg seed.
- * Sulphur powder @ 1 g/kg seed.

Precautions

- * Stack properly stitched bags on polythene sheets or on wooden dunnage, 50 cm away from the walls/floor, in lines, keeping a space of 50 cm between two lines, and 1/5 open space towards the roof. Do not stack more than 10 bags vertically.
- * Firmly close the inlet and outlet of bulk storage/containers using cementing materials.
- * Even after storage, inspect atleast once in a month. If the grains are found to be infested, retreat the grains and structures both for safe storage.

Remember

- * Storage of paddy is safer than milled rice.
- * Storage of parboiled/boiled rice is safer than raw rice.
- * Storage in bulk structures (Kothi/Kuthla/bins/silos) is safer than in bags/godowns.

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