

Storage Pests: Insects

Why is knowing insects important?

Rice storage pests include **insects**, pathogens, rodents and birds. These pests cause losses through a combination of feeding, spoiling and contamination of both paddy and milled grain. While many different species of insects are found in rice only a few are major pests. Insects in stored rice can be classified as either primary or secondary insects.

Environment

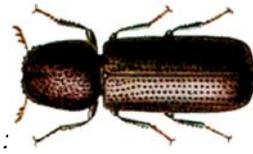
Each insect species has its own optimum temperature and moisture range conditions for development as well as a preferred feeding habit. Most insects fall into the following ranges:

Temperature	Relative humidity	Development cycle	Other factors
Optimum: 25-32°C Tolerance: <14°C / >42°C Terminal: <5°C / >45°C	Optimum: 70% Minimum: 25-40% Maximum: 80-100%	Beetles: 18-25 days Moths: 28-35 days Bad conditions: months	Moths are active at dawn and dusk Bags are easier penetrated than grain bulks.

Insect species

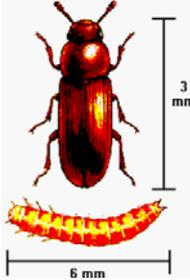
Primary insects

Larvae feed entirely within the kernels of the grain.

<p>Rice Weevil (<i>Sitophilus oryzae</i> (Linnaeus))</p> 	<p>Adults and larvae feed on grains. A female deposits up to 150 eggs. A single egg is laid in each grain after boring a hole inside. The egg stays in the grain until it becomes an adult. It completely damages the grain.</p> <p><u>Optimum conditions:</u> Temperature: 28°C Relative humidity: 70% Number of eggs: 150 Life cycle: 35 days</p>
<p>Angoumois Grain Moth (<i>Sitotroga cerealella</i> (Olivier))</p> 	<p>Eggs are laid on or the near grain. The white larvae bore into the kernels and feed on the inside. Mature larvae eat their way to the outer portion of the grain, leaving only a thin layer of the outer seed coat intact. Pupation just under the seed coat. When the adult emerges through a small trap door covering its exit point from the kernel. Infests only the surface layer of bulk-stored grain, as adults are unable to penetrate deeply.</p>
<p>Lesser Grain Borer (<i>Rhyzopertha dominica</i> (Fabricus))</p> 	<p>The eggs are laid in the grain mass. Larvae may enter the kernels and develop within or may feed externally in the flour-like dust that accumulates from the feeding of the adults and other larvae.</p> <p><u>Optimum conditions:</u> Temperature: 34°C Relative humidity: 60 -70% No of eggs 300 – 500 Life cycle: 20 - 84 days</p>

Secondary insects

Feed from the outside of the grain even though they may chew through the outer coat and devour the inside.

<p>Saw-toothed Grain Beetle (<i>Oryzaephilus surinamensis</i> (Linnaeus))</p> 	<p>Eggs are usually laid, either singly or in small masses in a crevice in the grain but in products such as flour they are laid freely.</p> <p><u>Optimum Conditions:</u> Temperature 30-35°C Relative humidity: 70-90% Number of eggs: 150 Life cycle 20 days</p>
<p>Rust-red flour beetle (<i>Tribolium castaneum</i>)</p> 	<p>Primarily attacks milled grain products. Adults and larvae feed only on the grain dust and broken kernels and do not attack the undamaged whole kernels. Infestation leads to persistent and disagreeable odors of the rice.</p> <p><u>Optimum Conditions:</u> Temperature 35°C Relative humidity: 75% Number of eggs: 500 Life cycle 20 days</p>

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