

## Rice white borer (408)

### Common Name

White rice borer; also known as the paddy stem borer.

### Scientific Name

*Scirpophaga nivella*; however, there are other *Scirpophaga* species and there has been confusion between them: e.g., *Scirpophaga excerptalis* is a pest of sugarcane, *Scirpophaga incertulas*, yellow stem borer, occurs on rice as does *Scirpophaga innotata*, white rice stem borer. Some authors consider *Scirpophaga nivella* to be the sugarcane top borer, and a miner pest of rice. Additionally, in the introduction to *Scirpophaga nivella*, PaDIL states: "This species is the same moth as the Australian species, *Scirpophaga chrysorrhoea*..." These moths belong in the Crambidae.

### Distribution

South and Southeast Asia, Oceania. It is recorded from Australia, Fiji, New Caledonia, and Papua New Guinea.

### Hosts

Rice, and species in the sedge family, Cyperaceae.

### Symptoms & Life Cycle

The larvae do the damage, similar to other rice borer species (**see Fact Sheet nos. 409, 410, 411**).

The young larvae bore into the leaf vein of a still folded leaf, making a series of holes across it - seen when the leaf is unfurled. They then tunnel through the internodes down to the growing point. The youngest, unrolled leaf, withers and dies as the larvae eat the young stem. The dead stems, known as 'deadhearts', can easily be pulled from the base of the plant. Later, damage to the panicles results: either they do not emerge or they emerge with white unfilled grain, a symptom known as 'whiteheads' (Photo 1). Frass and larvae may be seen inside the stems.

Eggs are laid in groups of 6-30, covered in scales and hairs, on the underside of the leaf near the main vein. The larvae are brownish-yellow, becoming whiter as they age (Photo 2). They have a reddish line (a blood vessel) along the back. Pupae are yellow in a silk cocoon. Adult females are pure white, whereas the forewings of males are yellowish-brown with four dark spots on each (Photos 3&4). Wingspans are about 30 mm. The anal tuft of the male is orange whereas that of the female is sometimes brownish. The moths are nocturnal and strong flyers.

### Impact

Rice plants can compensate for any damage caused by stem borers up to the stage of maximum tillering; however, infestation during panicle initiation and flowering causes loss in yield. Nevertheless, the white stem borer is considered to be a minor pest of rice.

### Detection & inspection

Look for deadhearts and whiteheads at the vegetative and flowering stages, respectively. Look for tiny holes in the stem, and dissect stems for frass, larvae and pupae.



Photo 1. 'Whitehead' - a symptom caused by stem borers: the base of the panicle is damaged preventing it from emerging or, if already emerged, the grain is unfilled and white.



Photo 2. Larva white rice borer, *Scirpophaga nivella*.



Photo 3. Adult white rice borer (female), *Scirpophaga nivella*.



Photo 4. Adult white rice borer (male), *Scirpophaga nivella*.

## Management

### BIOSECURITY

Countries not yet infested by the pink stem borer should consider all likely pathways for entry, and apply quarantine measures accordingly. Many countries throughout Asia, Africa, the Americas and Oceania are at risk. Pathways of introduction are likely to be via produce contaminated by pieces of stem of the many hosts infested by larvae or pupae.

### NATURAL ENEMIES

In general, there are many predators (e.g., grasshoppers, crickets, ladybird beetles) and parasitoids of stem borers. However, misidentifications of *Scirpophaga* species make it difficult to know which of several egg and larval parasitoids are associated with which host. The egg parasites, *Trichogramma australicum* and *Trichogramma japonicum*, are reported to have been released in Taiwan as part of a biological control program which included *Scirpophaga nivella*.

### CULTURAL CONTROL

*Scirpophaga nivella* usually occurs with other rice stem borers, e.g., *Chilo*, (other) *Scirpophaga* and *Sesamia* species and is controlled by the same measures used to control them.

Before planting:

- Handpick and destroy egg masses in the nursery.
- Prepare the land thoroughly ensuring vigorous plant growth when planted, and to destroy larvae and pupae of a previous crop.
- Plant at high density to compensate for damage that may occur.
- Rotate rice with non-host crops, e.g., legumes.

During growth:

- Try to synchronise planting in any area so that crops do not overlap, to prevent pest populations moving from harvested to standing crops.
- If irrigating, raise the level of the water from time to time to submerge the eggs on the lower parts of the plant.
- If the crop is seasonal, plant early.
- Cut out the stems with deadhearts and remove from the field. Destroy the larva or burn the stalk. Note this is labour intensive and not very effective as the pest may already have left.
- Apply nitrogen fertilizer in split applications: check local recommendations for rates and timing.

After harvest:

- Harvest crops at ground level to remove the larvae in the stubble.
- Plough in remaining rice stubble to kill larvae and pupae, and avoid leaving unharvested plants. Alternatively, irrigate the field, if that is possible
- Remove or plough in weed (grasses and sedges), which may be alternative hosts.

### RESISTANT VARIETIES

Modern rice varieties that are relatively thin-stemmed, short, high tillering, and early maturing, may result in less damage from this moth, and stem borers generally. This aspect is important as well-grown, vigorous crops can withstand 20% deadhearts and 10% whiteheads before yield is affected.

### CHEMICAL CONTROL

As the stem borer is thought to be a minor rice pest, chemical control is unlikely to be necessary. There is also the risk of destroying natural enemies if it is used. If chemicals are needed:

- Use abamectin, a natural fermentation product from a bacterium.
- In Fiji, diazinon and bifenthrin are recommended for (unspecified) stem borers.
- Chlorpyrifos and fipronil, have also been recommended, but note that chlorpyrifos is an organophosphate insecticide, and is a potent nerve agent; the World Health Organization (WHO) considers chlorpyrifos to be moderately hazardous (Class II). The use of fipronil is under review in Australia by the APVMA because of environmental concerns. A report is expected in 2020. Reviews on the use of chlorpyrifos are on-going in Europe, USA and Australia.
- All synthetic products are likely to reduce the impact of natural predators and parasitoids against this moth, and can only be recommended as a last resort.

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*When using a pesticide, always wear protective clothing and follow the instructions on the product label, such as dosage, timing of application, and pre-harvest interval. Recommendations will vary with the crop and system of cultivation. Expert advice on the most appropriate pesticide to use should always be sought from local agricultural authorities.*



Photo 5. Adult white rice borer, *Scirpophaga nivella* (side view).



Photo 6. Damage ('deadheart') to rice stem by *Chilo auricilius* (damage by *Scirpophaga nivella* is similar).

AUTHOR Grahame Jackson

Information (and Photo 1) Rice Knowledge Bank, IRRI. (<http://www.knowledgebank.irri.org/training/fact-sheets/pest-management/insects/item/stem-borer>); and CABI (2019) *Scirpophaga nivella* (white rice borer) Crop Protection Compendium. (<https://www.cabi.org/cpc/datasheet/49050>); and Khan ZR *et al.* (1991) World bibliography of rice stem borers 1794-1990. IRRI/ICIPE. ([http://books.irri.org/9712200159\\_content.pdf](http://books.irri.org/9712200159_content.pdf)); and White rice borer (and Photos 2-4) Anderson S, Tran-Nguyen L (2012) White Rice Borer (*Scirpophaga nivella*). (Source: N. Sallam DAFF Biosecurity.) PaDIL - (<http://www.padil.gov.au>); and from Pathak MD, Khan ZR (1994) Insect Pests of Rice. IRRI/ICIPE. ([http://books.irri.org/9712200280\\_content.pdf](http://books.irri.org/9712200280_content.pdf)). Photo 5 CBG Photography Group, Centre for Biodiversity Genomics. ([http://v3.boldsystems.org/index.php/Taxbrowser\\_Taxonpage?taxid=271138](http://v3.boldsystems.org/index.php/Taxbrowser_Taxonpage?taxid=271138)). Photo 6 Anderson S, Tran-Nguyen L (2012) Gold-fringed Rice Borer (*Chilo auricilius*). PaDIL - (<http://www.padil.gov.au>)

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