



EOREUMA LOFTINI (DYAR) (LEPIDOPTERA-CRAMBIDAE) (MEXICAN RICE BORER (MRB))

6

EOREUMA LOFTINI IS A MAJOR PEST OF SUGARCANE IN MEXICO, TEXAS (USA) AND HAS RECENTLY INVADDED LOUISIANA (USA). THE MEXICAN RICE BORER HOST PLANTS ARE SUGARCANE AND RICE. BSES ENTOMOLOGIST NADER SALLAM BASED AT GORDONVALE EXPLAINS.

biosecurity feature

ECONOMIC IMPACT

Mexican rice borer (MRB) is a significant pest of rice and sugarcane in Mexico and in Texas (USA). It has recently expanded its geographical range and invaded the state of Louisiana, a major sugarcane production state in USA. Legaspi *et al.* (1999) estimated that the annual collective damage done by both MRB and the sugarcane borer (*Diatraea saccharalis*) in the lower Rio Grande Valley of Texas was

approximately 20% of sugarcane internodes; most of that damage was attributed to *E. loftini*, since it then comprised more than 95% of the sugarcane stalk-borer population in Texas (Legaspi *et al.* 1999). Other studies estimated the losses to amount to between US\$10 and 20 million annually (Legaspi and Mirkov 2000).

SYMPTOMS

Infested plants suffer poor growth and their leaves turn yellow.

Heavily infested plants ultimately die, and evidence of larval feeding can be seen on the stalks. Eggs can be detected on the underside of mainly dry leaves. Adult emergence holes can also be seen on infested stalks.

ABOVE | *Eoreuma loftini* adult moth. Photo by Moth Photographers Group, USA.

BELOW | Evidence of larval feeding by Mexican rice borer (Dr Francis Reay-Jones, Louisiana State University (LSU)).



BIOLOGY AND ECOLOGY

Most larvae and tunnels are located in the lower internodes regardless of the plant stage. Four to six generations per year are common in the field; larvae undergo diapause during autumn and winter months, and are able to tolerate freezing (Legaspi *et al.* 1997). Reay-Jones *et al.* (2003) showed that high levels of sodium and magnesium salt stress are usually associated with higher MRB damage in most cultivars.

LARVA

Larvae are cream in colour with four parallel purple-red lines along the body. The head capsule is orange-brown. Larvae undergo 5-6 moults and they measure about 2-2.5 cm in length when fully grown. Early larval instars feed on and inside the leaf sheaths, producing a red or purple hole. Larvae tunnel into the stem both vertically and horizontally in a girdling fashion, which may lead to stalk breakage. Tunnels are packed with frass and are, therefore, well protected from chemical and biological control agents. A mature larva constructs a pupation cell near the stalk surface and protects it by one or two layers of transparent leaf tissue (Legaspi *et al.* 1997).

ADULT MOTHS

The moth is about 1.25-2.0 cm long and creamy white. The adult is distinguished from other stalkborers by a dark spot in the centre of each forewing and the absence of other wing markings (Legaspi *et al.* 1997).

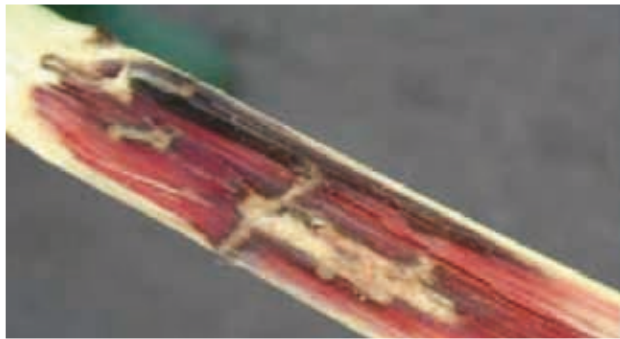
DETECTION METHODS

Light trapping can be used to detect adults. Checking leaves for egg masses, specially dry leaves, gives a good indication of presence. Stalk splitting to look for larvae and pupae in tunnels is a good method of detection. Pheromone traps also prove useful indicators of moth activity.

NATURAL ENEMIES

Due to the cryptic nature of MRB, biological control has not proven very effective. A few parasitoid species have been recorded on MRB in Texas and Mexico, but the overall impact is not clear.

- *Alabagrus stigma* (Brulle) (Hymenoptera: Braconidae): This species is a larval parasitoid that was introduced from Peru into the United States (Meagher *et al.* 1998).
- *Allorhogas pyralophagus* (*Parallorhogas pyralophagus*) (Hymenoptera: Braconidae): A larval parasitoid that was introduced from Mexico into USA, (Meagher *et al.* 1998; Harbison *et al.* 2001).
- *Chelonus sonorensis* Cameron (Hymenoptera: Braconidae): This species is an egg-larval parasitoid native to southern USA and Mexico.
- *Digonogastra solitaria* Wharton and Quicke (Hymenoptera: Braconidae): This is a larval parasitoid native to the American continent.
- *Lydella jalisco* Woodley (Diptera: Tachinidae): This species is a larval parasitoid that was introduced into USA from Mexico (Legaspi *et al.* 2000).



ABOVE | Split stem of sugarcane showing larval tunnel packed with frass (permission to publish photo granted by LSU).



ABOVE | Mexican rice borer larva collected in a rice field in Texas (photo by Nader Sallam).

MANAGEMENT

Chemical control

Confirm® (tebufenozide), an insect growth regulator (IGR), is used against *E. loftini* in Texas. However, of approximately 18,200 ha planted to sugarcane in south Texas, Legaspi *et al.* (2000) estimated that only about 80 ha are treated - this is because chemical control is widely regarded as ineffective. In rice fields in Texas, two applications of lambda-cyhalothrin (at the 5-cm panicle and heading stages) were effective in reducing damage (Reay-Jones *et al.* 2007). Neither are registered for use on sugarcane in Australia, but BSES has collated data to apply for an emergency-use permit if it arrives.

Farming practices

It was found that dry conditions increased the levels in sugarcane leaves of proline, histidine and isoleucine – amino acids essential for the growth and development of *E. loftini*. Therefore, good irrigation is a very important farming practice to minimise the chances of adults being attracted to cane plants, this also reduces larval growth and minimises plant damage due to water stress (Reay-Jones *et al.* 2005).

Pheromone trapping

Bucket-type pheromone traps are used in Louisiana. The traps are baited with a synthetic female sex pheromone lure (Luresept, Hercon Environmental, Emigsville, PA), which is replaced every 3 weeks. An insecticidal strip (Vaportape II, Hercon Environmental, Emigsville, PA) is placed in the bucket to kill trapped moths. The traps are attached 1 metre above the soil surface onto metal poles set at about 100 m intervals.

PLANT RESISTANCE

Studies in the USA showed that the cultivar HoCP85-845 lost some of its apparent resistance under heavy infestation, while CP70-321 was the most resistant. Results indicated that cultivar LCP85-384 was more susceptible than NCo310, traditionally the most susceptible cultivar commercially produced in Texas.

INTEGRATED PEST MANAGEMENT

A 2-year field study in Texas on the use of multiple control tactics showed that irrigation reduced injury in both susceptible (LCP 85-384) and resistant (HoCP 85-845) cultivars by 2.5 fold. Ample irrigation and planting of resistant cultivars combined with the application of tebufenozide decreased injury from 70% bored internodes to <10% during both years (Reay-Jones *et al.* 2005).

MEANS OF MOVEMENT

The most likely means of entry into Australia by this species would be by the introduction of infested planting material from Central America and southern USA.

- **Entry potential:** Medium – isolated from Australia, but readily transferred on infested planting material.
- **Colonisation potential:** High in all sugarcane growing areas – especially Central and Southern districts of Queensland.
- **Spread potential:** High - unless strict control imposed over movement of infested material.
- **Establishment potential:** High.



REFERENCES

Harbison JL, Legaspi JC, Fabritius SL, Saldana RR, Legaspi BC and Enkegaard A. 2001. Effects of age and host number on reproductive biology of *Allorhogas pyralophagus* (Hymenoptera: Braconidae) attacking the Mexican rice borer (Lepidoptera: Pyralidae). *Environmental Entomology* 30, 129–35.

Legaspi JC and Mirkov TE. 2000. Evaluation of transgenic sugarcane against stalkborers. Sugarcane pest management in the New Millennium; 4th *Sugarcane Entomology Workshop, International Society of Sugar Cane Technologists*, Khon Kaen, Thailand, 7–10 February 2000, pp. 68–71.

Legaspi JC, Saldana RR and Rozeff N. 1997. Identifying and managing stalkborers on Texas sugarcane. (<http://insects.tamu.edu/extension/bulletins/mp-1777.html>).

Legaspi JC, Legaspi BC, Irvine JE, Johnson J, Meagher RL and Rozeff N. 1999. Stalkborer damage on yield and quality of sugarcane in Lower Rio Grande Valley of Texas. *Journal of Economic Entomology* 92, 228–234.

Legaspi JC, Lauzière I, Legaspi BC and Jones WA. 2000. Jalisco fly for biological control of Mexican rice borer in sugarcane and other graminaceous crops. *Journal – American Society of Sugar Cane Technologists* 20, 64–68.

Meagher RL, Smith JW, Browning HW and Saldana RR. 1998. Sugarcane stem borers and their parasites in southern Texas. *Environmental Entomology* 27, 759–766.

Reay-Jones FP, Way MO, Setamou M, Legendre BL and Reagan TE. 2003. Resistance to the Mexican rice borer (Lepidoptera: Crambidae) among Louisiana and Texas sugarcane cultivars. *Journal of Economic Entomology* 96, 1929–1934.

Reay-Jones FP, Showler AT, Reagan TE, Legendre BL, Way MO and Moser EB. 2005. Integrated tactics for managing the Mexican rice borer (Lepidoptera: Crambidae) in sugarcane. *Environmental Entomology* 34, 1558–1565.

Reay-Jones FP, Way MO and Reagan TE. 2007. Economic assessment of controlling stem borers (Lepidoptera: Crambidae) with insecticides in Texas rice. *Crop Protection* 26, 963–970.

LEFT | Pheromone trap for detecting Mexican rice borers.