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Data Sheets on Quarantine Pests

Listronotus bonariensis

IDENTITY

Name: *Listronotus bonariensis* (Kuschel)
Synonyms: *Hyperodes bonariensis* (Kuschel)
Taxonomic position: Insecta: Coleoptera: Curculionidae
Common names: Argentine stem weevil, wheat stem weevil (English)
Charançon argentin des tiges (French)
Bayer computer code: HYROBO
EPPO A1 list: No. 168
EU Annex designation: II/A1

HOSTS

L. bonariensis mainly attacks *Lolium* spp., but also many other pasture grasses, such as *Anthoxanthum puelii*, *Agrostis capillaris*, *Dactylis glomerata*, *Festuca rubra*, *Phleum pratense*. Maize is a significant host, and *L. bonariensis* has been recorded on other cereals (barley, oats, wheat). It has also been recorded incidentally on seeds of legumes such as lucerne and *Trifolium* and crucifers such as rape, but *L. bonariensis* is not a significant pest of these crops.

The potential host range in the EPPO region would be pasture grasses and cereals.

GEOGRAPHICAL DISTRIBUTION

L. bonariensis originates in South America and has spread across the Pacific.
EPPO region: Absent.
South America: Argentina, Bolivia, Brazil, Chile, Uruguay.
Oceania: New Zealand (throughout since 1927; Kuschel, 1972) and Australia (New South Wales, South Australia, Tasmania, Victoria, Western Australia).
EU: Absent.

BIOLOGY

The biology of *L. bonariensis* has been extensively studied in New Zealand (Ferro, 1976; Goldson & Emberson, 1980; Goldson, 1981; Goldson *et al.*, 1982). (The time periods used here refer to New Zealand and thus to the southern hemisphere). Adult activity is very limited during the daytime and feeding occurs mainly during the hours of darkness. The upper leaf surfaces are preferred feeding sites. The lower leaf cuticle is often left intact. On South Island (Canterbury), adults overwinter in the crown of host plants, but may be active on calm sunny days in winter. Adults may live for several months, i.e. 62-179 days. In Canterbury, oviposition occurs from July through to mid-November.

Each female may lay up to 37 eggs in 40 days. Normally one to three but occasionally up to six eggs are laid in the leaf sheath tissue close to the soil surface. Eggs are always inserted under the top layer of the sheaths. Grasses are the preferred oviposition host. The

duration of egg development varies from 10 to 20 days in full summer to over 30 days in spring.

First-generation larvae are present in Canterbury from October through to mid-December. When the plants are in vegetative growth, the larvae tunnel into the tillers and feed downwards into the crown, only one surviving in each tiller. During and after flowering, larvae may enter the stems near any node from the 2nd to the 7th from the crown. There are four larval instars. Immediately prior to pupation the larvae chew out exit holes in the tillers, drop to the ground and form smooth-walled spherical cells 5-6 mm below the soil surface in which pupation occurs. Larval development lasts 50-66 days (August/October). Pupae from first-generation larvae are found from the end of November to mid-January in Canterbury.

Summer adults emerge in 7-15 days and are present on South Island from mid-December to the end of February. Dispersal flights occur at any time of the year, usually in bright sunlight. In Canterbury, second-generation eggs are present from mid-December to the end of March, second-generation larvae from January to April and pupae from March to May. Pupal/adult mortality is high if the soil is dry and powdery or waterlogged. A third generation occurs roughly once every 4 years on the South Island, often only partial. Diapause starts in the first two weeks of March.

On North Island the life cycle as described for Canterbury begins 1 month (or less) earlier and there is frequently a third generation in the warmer areas. In Auckland, eggs laid in November-December hatch in 9-12 days. Larval development in January lasts 14-21 days.

A base of 10°C gave the best fit to observed dates of first occurrence of larvae, pupae and adults over 5 site/years. Temperature sums (days above 10°C) were in eggs 32; larvae and prepupae 195; pupae 50; adult longevity 728.

In Europe, *Phyllobius* spp. and *Philopedon plagiarum* have analogous behaviour.

L. bonariensis is parasitized by: *Potasson atomarius* (Mymaridae), egg parasite; *Heterospilus* spp. (Braconidae), larval parasite; *Microctonus hyperodae* (Braconidae), an adult parasitoid (Chadwick, 1963).

DETECTION AND IDENTIFICATION

Symptoms

Adult feeding on leaves produces narrow rectangular holes near the leaf tips, giving a windowed appearance. Spots or stripes may also result. Instances of 'silvering' of foliage (resembling slug damage) have also been recorded. Adults produce fibrous frass deposits on the leaves. Larvae feeding in the lower parts of stems cause yellowing of young leaves of *Festuca rubra* tillers. Larval feeding in the tillers can be confused with damage by grass grubs (scarabs) although, unlike the latter, *L. bonariensis* leaves the roots intact and damages pasture uniformly rather than in distinct circular areas.

Morphology

Eggs

Minute, greenish-black and sausage-shaped or bean-shaped. Pale-green eggs may occur among greenish-black eggs (Goldson & Emberson, 1980).

Larva

Appear legless, cream to creamy-white with light to dark-brown heads and whitish-yellow elongated bodies tapering slightly to the posterior. The latter is sparsely covered with hairs. When fully grown, larvae are 5-6 mm long.

Pupa

Cream to light-brown or lemon coloured (first generation).

Adult

Colour variable from light grey-brown to dark-brown or black. Elongate (3 mm long), compact and hard bodied. Pronounced snout and characteristic white pronotal stripes. The body is covered with numerous hairs and white wax-like scales which tend to hold dust, producing a dirty-grey appearance (Ferro, 1976).

MEANS OF MOVEMENT AND DISPERSAL

The pest can disperse itself locally by flight. International movement would most probably be with seeds of pasture grasses (*L. bonariensis* was introduced into Australia as adults in ryegrass seed), and possibly with other seeds (cereals). In theory, it could be dispersed with rooted plants of host species, but the case hardly arises in practice. Pupae could be introduced in soil.

PEST SIGNIFICANCE

Economic impact

L. bonariensis is a serious pest of pastures in New Zealand (Ferro, 1976; Goldson & Emberson, 1980; Goldson, *et al*., 1982). Adults and larvae are oligophagous, feeding on most gramineous plants. They can severely damage pastures, particularly ryegrass. Adult damage *per se* is said to be insignificant although an adult infestation of 200 per m^2 leads to a large subsequent larval infestation. The high migratory potential of the adults means that pastures of any age can harbour large infestations. Newly sown pastures are most seriously affected, especially in dry seasons; the adults nipping off the seedlings at their bases. Systemic insecticides are used to prevent this, or sowing is delayed to ensure emergence after the weevils go into diapause (Goldson & Penman, 1979).

On grasses, larvae damage both the vegetative and reproductive tillers by feeding inside the stems and around the nodes causing tiller death, whiteheads (non-fertile seeds), stem break and lodging. Yield loss attributable to whiteheads is, however, said not to be serious. Larvae can also induce premature ripening or pinched seed. During a 3-year period ending in May 1958, instances of complete destruction of firstand second-year stands of ryegrass were recorded. Short-lived ryegrasses (cvs Manawa, Patoe and Tama) are often unable to tiller and keep ahead of larval attack; losses of up to 98% have been recorded. Other ryegrasses, *Festuca pratensis* and *Agrostis capillaris* are also susceptible to attack. During the summer, when first-generation larval attack on pastures is most severe (exacerbated by the retarding effects of drought on plant growth), the long-lived ryegrasses (cvs Ariki and Ruanui), *Dactylis glomerata* and *Phleum pratense* are the least affected. Second-generation larval attack on pastures is often masked by growth.

In *Lolium perenne*, the presence of *Acremonium* spp. as fungal endophytes confers resistance to *L. bonariensis* (Pottinger *et al.*, 1985). Feeding and oviposition behaviour of *L. bonariensis* adults are reduced by endophyte-infected ryegrass (Dymock & Hunt, 1987). Two components are recognized Peramine which confers the resistance and Lolitrem B which is poisonous to livestock (causing ryegrass staggers). Efforts are being made to develop grasses with a high Peramin component and a low Lolitrem B level.

Larvae cause severe damage to establishing maize and wheat crops and are an important pest of maize throughout the Waikata, South Auckland and Bay of Plenty areas of the North Island of New Zealand.

L. bonariensis is not known to be of any economic importance in South America, where it originates (Chadwick, 1963), but it does damage cereal crops in Brazil and probably short-rotation ryegrasses in Argentina and Chile (S.L. Goldson, pers. comm.).

Control

No special control measures are applied. Damage can be influenced by the application of nitrogen fertilizers. In New Zealand, the spring application of 50 kg N/ha (calcium ammonium nitrate) caused increased damage by *L. bonariensis* (Hunt *et al.*, 1988).

Phytosanitary risk

L. bonariensis is considered as an A1 quarantine pest for EPPO (OEPP/EPPO, 1989). In the EPPO region, *L. bonariensis* has considerable potential as a pest of pasture grasses and could possibly also affect cereals.

PHYTOSANITARY MEASURES

Restrictions are recommended by EPPO (OEPP/EPPO, 1990) on the importation of seeds of relevant host plants from New Zealand, Australia and South America. A phytosanitary certificate for seeds of Poaceae should be required for countries where *L. bonariensis* occurs.

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