

## **SITONA LEPIDUS GYLLENHAL NEWLY ESTABLISHED IN NEW ZEALAND: ASSESSMENT OF DISTRIBUTION IN THE NORTH ISLAND**

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### **ABSTRACT**

*Sitona lepidus* has recently established in New Zealand, being first recognised in pastures in the vicinity of Hamilton (Waikato) in March 1996. The distribution of this species in the North Island was ascertained from retrospective examination of curculionid samples collected from pastures during the period February 1995 to March 1996, and from a contemporary field survey of curculionids from pastures during March–April 1996. Collectively, these surveys provided coverage of the North Island from Te Hana, Northland to Masterton, Wairarapa. *S. lepidus* was confirmed as being widespread in the Auckland, north Waikato and coastal Bay of Plenty regions, but was not found south of these regions.

**Keywords:** *Sitona lepidus*, pasture, distribution

### **INTRODUCTION**

The genus *Sitona* Germar (Coleoptera: Curculionidae, Brachycerinae) has a natural Holarctic distribution and comprises a large number of species. Some are pests of forage and grain legumes, with several species being widely distributed and naturalised beyond their natural range. *Sitona discoideus* Gyllenhal has become widely distributed in New Zealand since first being reported in Napier in 1974 (Esson 1975). It rapidly became established in lucerne (*Medicago sativa* L.) crops throughout New Zealand, causing considerable crop losses (Kain and Trought 1982; Goldson and French 1983). This species also occurs widely in New Zealand in non-agricultural habitats, where other *Medicago* species are the primary host plants (Barker and Addison unpublished). In 1982, a parasitoid *Microctonus aethiopooides* Loan (Hymenoptera: Braconidae, Euphorinae) was introduced as a biological control agent for *S. discoideus* at several South Island sites (Stufkens *et al.* 1987). The parasitoid has become widely distributed throughout New Zealand (Stufkens *et al.* 1987; Ferguson *et al.* 1994; Barker and Addison unpublished) and provides good control of *S. discoideus* in South Island lucerne crops (Goldson and Proffitt 1986; Goldson *et al.* 1994).

In March 1996, it was confirmed that a second *Sitona* species, *S. lepidus* Gyllenhal, was present in New Zealand (Barratt *et al.* 1996). Its presence was first recognised in March 1996, when weevils of reproductive phenology inconsistent with that of *S. discoideus* were collected from pastures at the Ruakura Agricultural Research Centre dairy farm near Hamilton. Closer examination of specimens, including comparison of genitalia preparations, confirmed that the Waikato infestations were indeed not that of *S. discoideus* but that of another *Sitona* species. Dr G. Kuschel (Auckland, formerly Landcare) subsequently examined this material and confirmed it as *S. lepidus*.

*S. lepidus* is a Palaearctic species (Dieckmann 1987), that has become widely distributed in North America since establishment there in the 1870s (Bright 1994). It feeds on a range of legume species, particularly red (*Trifolium pratense* L.) and white (*T. repens* L.) clovers. Currently, it is not possible to predict the potential pest status of this species in New Zealand.

This paper documents the results of a survey undertaken to ascertain the distribution of *S. lepidus*. The primary objective was to determine whether *S. lepidus* was restricted to the site where it had initially been found, or whether it had established more widely in the North Island.

## METHODS

### Retrospective examination of Waikato and north North Island specimen material

Curculionid material was available from several surveys, allowing retrospective assessment of the distribution of *S. lepidus* at sites in the vicinity of Hamilton, prior to the recognition of this species at the Ruakura Agricultural Research Centre. The samples had been collected from pastures as part of a programme investigating the dispersal rate of the Argentine stem weevil (*Listronotus bonariensis* (Kuschel)) parasitoid *M. hyperodae* Loan. Pastures from up to a 25 km radius of Hamilton had been sampled using a suction apparatus at several dates during the period February 1995 to March 1996 and all Curculionidae from those samples were held at  $-20^{\circ}\text{C}$  at Ruakura Agricultural Research Centre pending identification and dissection.

Following confirmation of *S. lepidus* at sites beyond the initial site of discovery, curculionid material that had been collected more widely in the northern North Island was also inspected. This material had been collected from pastures in the Reporoa-Broadlands (Bay of Plenty) and Te Hana-Wellsford (Northland) districts, again to document *M. hyperodae* dispersal, at various dates from February 1995. In addition, a large number of pasture sites had been sampled in January-February 1996 to provide curculionid faunal assemblage data and to document habitat overlap between indigenous and naturalised species. This material had been collected by pitfall trapping and suction sampling and was held in 70% alcohol. Additionally, as part of extension activities, curculionid material had been collected opportunistically from various pasture sites by suction sampling and sweep net sampling since 1991. This material was held at  $-20^{\circ}\text{C}$ .

### Field survey

A survey was undertaken in Northland, Auckland, Waikato, Bay of Plenty, King Country, Taranaki, Manawatu, Wairarapa, Hawkes Bay, and Poverty Bay to provide for a more definitive assessment of the current distributional limits of *S. lepidus*. Pastures were sampled during the period 22 March to 1 May 1996 by suction apparatus, with a 100 m transect taken across the paddock. The presence of *S. lepidus* was recorded and all curculionids obtained were stored at  $-20^{\circ}\text{C}$ .

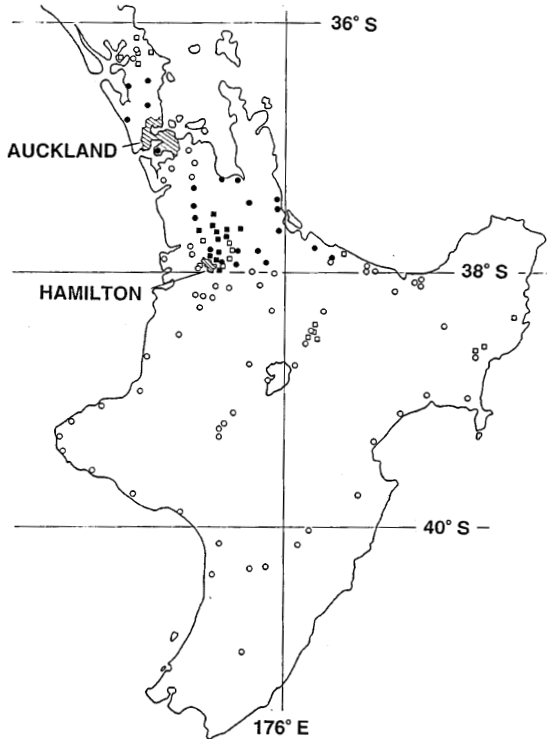
In each phase *S. lepidus* was distinguished from its congeneric *S. discoideus* using the diagnostic key developed by Barratt *et al.* (1996), with vestiture of the elytra, structure of the frons between the eyes, and the relative size and position of the eyes as the principal diagnostic external characters.

## RESULTS

The retrospective samples from the Waikato indicated that *S. lepidus* was distributed beyond the site at which it had been first recognised in March 1996. The stored samples showed that the species had been present in pastures in an arc of about 25 km radius, centred on Hamilton, from Ngaruawahia to Kaipaki during the period February to September 1995. Several sites within the 25 km radius to the west and south-west of Hamilton did not yield *S. lepidus* (Fig. 1). Pasture in the Waikato beyond the 25 km radius from Hamilton had not been sampled.

The retrospective samples from Te Hana-Wellsford (Northland) and Reporoa-Broadlands (Volcanic Plateau, Bay of Plenty) districts, Otamarakau (coastal Bay of Plenty), and Tolaga Bay, Waiohika and Patutahi (coastal Poverty Bay), taken in 1995, did not yield *S. lepidus* (Fig. 1).

The contemporary sampling, March-April 1996 (Fig. 1), showed *S. lepidus* to be widely distributed in the Waikato Basin, north of about latitude  $38^{\circ}\text{S}$ , and extending into the coastal Bay of Plenty. The species was recorded in dairy pastures adjacent to Auckland International Airport and extending north to Warkworth. Sampling at five sites in South Auckland failed to yield *S. lepidus*, indicating a zone of absence between the Auckland and Waikato centres of distribution.



**FIGURE 1: Distribution of pasture sites sampled in the North Island of New Zealand and the presence of *Sitona lepidus*. March - October 1995 samples: □ *S. lepidus* not detected, ■ *S. lepidus* present; January to April 1996 samples: ○ *S. lepidus* not detected, ● *S. lepidus* present.**

During the March-April 1996 survey, numbers of *S. lepidus* in samples varied greatly between sites. Given that sampling effort was similar for all sites, variation in abundance between sites is indicated. High abundance of *S. lepidus* (20-160 insects per 100 m transect) was indicated for sites in Auckland City and to the north, the Hauraki Plains, and the eastern and central Waikato basin. Low abundance (1-5 insects per 100 m transect) was indicated for pasture sites in the western Waikato and coastal Bay of Plenty.

## DISCUSSION

The collective results of the retrospective and contemporary surveys indicate that *S. lepidus* is widespread in the Auckland, north Waikato and coastal Bay of Plenty regions. Within this distributional range, there is an apparent zone of absence in South Auckland. The species is apparently absent from southern Northland, southern and western Waikato, southern Bay of Plenty (volcanic plateau), Taupo, King Country, Taranaki, Manawatu, Hawkes Bay and Poverty Bay regions.

Intensive sampling in the Waikato in the 1980s and early 1990s failed to indicate the presence of any species of *Sitona* in pasture (Barker and Addison unpublished). In February 1995, weevils, confirmed as *S. lepidus* in the current study, were obtained

from several pasture sites in an arc north-west through north to south-east of Hamilton. By the summer of 1995-96, *S. lepidus* had become common in pastures at Ruakura. Adult weevils were first detected in quantitative soil sampling in March 1996, at 14/m<sup>2</sup>, in a pasture sampled intensively since 1991 (Barratt *et al.* 1996). Recent establishment of *S. lepidus* and rapid increase in its numbers in pastures at Ruakura were indicated. The March-April 1996 survey indicated similarly high abundance at sites in Auckland City and to the north, the Hauraki Plains, and the eastern and central Waikato basin. In contrast, low abundance of *S. lepidus* was recorded for pasture sites in the western Waikato and coastal Bay of Plenty. The latter areas may represent sites of most recent colonisation.

### CONCLUSIONS

It is clear that *S. lepidus* is widely established in the northern North Island and therefore beyond the scope of an eradication programme. The date of introduction into New Zealand can not be determined from the available data. However, establishment in the vicinity of Hamilton within the last five years is indicated. The current dispersion and abundance pattern, with apparent absence of infestation in south Auckland, suggests two centres of establishment and spread, one centred around Auckland, the other in the Waikato.

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