SURVEY OF ARGENTINE STEM WEEVIL AND HESSIAN FLY IN PRAIRIE GRASS IN THE NORTHERN NORTH ISLAND

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SUMMARY

During November and December 1987, 34 pastures of 2-3 year old 'Grasslands Matua' prairie grass (*Bromus willdenowii*) were surveyed in the northern North Island. Hessian fly (*Mayetiola destructor*) and Argentine stem weevil (*Listronotus bonariensis*) occurred in all stands throughout the region and were responsible for poor stand persistence. Tillers killed by these two pests ranged from 24-74% (mean 50%). The effects of Hessian fly worsened during the summer, causing 78-88% tiller death by February. Effective, economic controls need to be developed for these pests, if prairie grass is to reach its promising potential.

INTRODUCTION

Recent DSIR surveys show that prairie grass (*Bromus willdenowii*) is the main non-ryegrass pasture species that farmers are interested in sowing (Sellers 1988). Prairie grass can outyield perennial ryegrass in summer/autumn and be as productive during winter/spring. Two other attributes of prairie grass that make it an attractive pasture grass are that it has a high reseeding capability and does not produce the animal health problems that may be associated with endophyte (*Acremonium lolii*) infected perennial ryegrass. 'Grasslands Matua' is the only cultivar commercially available.

The presence of Hessian fly (*Mayetiola destructor*) in prairie grass pasture was recorded for the first time by Prestidge *et al* (1987) in the volcanic plateau of the central North Island. In January 1987, 74% of tillers examined had larval damage. This insect had reduced the prairie grass pasture to a very low plant population and limited dry matter production. Other significant insect pests recorded on prairie grass have been Argentine stem weevil (Barker *et al* 1984) and black beetle (Thom *et al* 1988). This paper reports on a survey of Hessian fly and Argentine stem weevil in prairie grass pastures conducted in November and December throughout the northern North Island.

METHODS

Pastures 2-3 years old were surveyed in November and December 1987. All were sown with 'Grasslands Matau' prairie grass, established by broadcasting or drilling into a cultivated seedbed with red and/or white clover (*Trifolium perenne*, *T. repens*). Both sheep and dairy pastures were sampled. Stands which had very few prairie grass plants remaining or which had been sown with other grass species were not sampled. At three sites sampling continued until April to assess seasonal changes in insect numbers and damage.

Ten plants were sampled per paddock, chosen at random as being closest to a knife thrown diagonally 10 times across each paddock. Whole plants were removed at below ground level and, in the laboratory, each individual tiller was dissected and examined for the presence of larvae and pupae, insect feeding damage, and/or frass.

Larvae of the two insect species are easily distinguished from each other. Argentine stem weevil has a characteristic distinctive brown head capsule and yellowy white coloured body, whereas Hessian fly has no head capsule and is opaque white throughout the length of the body. Their feeding/mining behaviour also show considerable differences. Hessian fly is a passive feeder, located near the crown of a plant or just above a node of a reproductive tiller. The insect rasps plant cells and sucks out the cell contents. Areas of feeding show signs of bruising and have a spongy texture.

Proc. 41st N.Z. Weed and Pest Control Conf.

There are no obvious signs of frass. In comparison, Argentine stem weevil tunnels into the centre of a tiller, mines downwards towards the crown and chews an exit hole out of the tiller. Damaged tillers are usually severed from the youngest leaf first. Larval entrance and exit holes, and frass within the tunnels, may be visible.

Tillers killed by Argentine stem weevil were those turning yellow/brown with the youngest leaf severed, and exhibiting mining damage. Tillers killed by Hessian fly were those with two or more larvae present, and those non-green tillers with pupae or pupal cases present. Tillers with limited Argentine stem weevil mining, showing Hessian fly feeding damage but no larvae present or with one fly egg or one larva present were considered to be damaged rather than killed. Undamaged tillers showed no signs of insects or feeding activity.

RESULTS AND DISCUSSIONS

The locality of the pastures sampled is given in Table 1. The survey was restricted to the northern North Island region. Fewer pastures were surveyed in the Bay of Plenty and Northland than in the Volcanic Plateau and Waikato areas, due to a lack of suitable prairie grass pastures in those districts. Also, four pastures in each area contained so little prairie grass, 12-18 months after sowing, that they could not be sampled. In all these pastures the presence of Hessian fly and Argentine stem weevil was confirmed.

TABLE 1: The percentage prairie grass tillers killed by Hessian fly (HF) and Argentine stem weevil (ASW), and the percentage tillers undamaged, in the northern North Island in November/December 1987.

	No. sites	% tillers killed		% tillers undamaged
		HF ($\pm$ SE)	ASW ($\pm$ SE)	
Volcanic Plateau	9	54 (2)	19 (5)	15 (4)
Waikato	17	11 (2)	18 (2)	57 (2)
Bay of Plenty	2 ^a	35 (6)	39 (5)	13 (1)
Coromandel	5	18 (7)	33(11)	36 (9)
Northland	1 ^a	0	24	48

^aInsufficient prairie grass found in four other pastures.

The mean percentage of tillers killed by Hessian fly and Argentine stem weevil and the percentage of undamaged tillers are given in Table 1. Hessian fly caused considerable tiller death in the Volcanic Plateau and coastal Bay of Plenty regions. Argentine stem weevil was most important in the coastal Bay of Plenty and Coromandel. From these initial results, Argentine stem weevil was perceived as the more important pest. However, as the summer progressed, the effects of Hessian fly worsened, as shown by detailed sampling at three Waikato sites (Table 2). This probably reflected the greater number of generations of Hessian fly relative to Argentine stem weevil, the greater density of Hessian fly per square metre, and the increased stresses on the plant associated with summer grazing. Argentine stem weevil has only two larval generations per year and tiller death due to larvae is at two discreet periods (Barker *et al* 1984). As a consequence of insect attack plant populations at the Waikato sites were reduced from 120 plants/m² in spring 1986 to 25/m² in autumn 1988 (Thom and Prestidge 1988). The reseedling ability of prairie grass was also severely restricted.

Very little is known about Hessian fly on pasture grasses. In North America, it has been recorded in species of *Agropyron*, *Elymus*, *Phleum*, *Agrostis*, *Bromus*, *Hordeum* and *Aegilops* (Jones 1939). In New Zealand it has been observed on wild *Bromus sp.* growing along roadsides (Prestidge unpubl. data) which probably act as hosts from which infection of the commercially available, and volunteer, prairie grass occurs. It is an international pest of cereals and has several biotypes. In cereal crops the recommended forms of control are delayed planting, use of resistant cultivars, and systemic insecticides, and destruction of overwintering pupae by burning or deep ploughing the stubble (Morrill 1982). Although four parasitoids have been recorded from Hessian fly in New Zealand (R.P. MacFarlane, DSIR, Lincoln pers. comm.) only

Platygaster hiemalas has been recovered in the North Island. It is, as yet, unclear what effect this parasitoid may have on population regulation.

In prairie grass Argentine stem weevil larvae are primarily pests of seedlings and may kill 20-40% of tillers less than 12 months old (Barker *et al* 1984, Prestidge and van der Zijpp unpubl. data). The reseedling capacity of prairie grass, which sheds seeds from October to March, may ensure that susceptible hosts are nearly always available for Argentine stem weevil, even in mature stands.

Argentine stem weevil and Hessian fly together are almost certainly responsible for poor stand persistence in the northern North Island region. Unless effective, economic controls are developed for these insect pests, prairie grass is unlikely to reach its promising potential and farmers are likely to lose interest in sowing this grass.

TABLE 2: The percentage tillers killed by Hessian fly (HF) and Argentine stem weevil (ASW) at three sites in the Waikato.

Date	Site 1		% tillers killed Site 2		Site 3	
	HF	ASW	HF	ASW	HF	ASW
11.11.87	18 (3)*	5 (2)	14 (4)	15 (3)	29 (5)	7 (3)
17.12.87	69 (9)	18 (8)	60 (6)	14 (5)	50 (5)	3 (1)
7. 1.88	61 (5)	14 (5)	48 (5)	14 (1)	64 (4)	12 (4)
27. 1.88	58 (6)	11 (6)	86 (4)	11 (4)	84 (6)	0 (0)
15. 2.88	78 (4)	8 (3)	69 (4)	10 (2)	88 (4)	6 (2)
4. 3.88	71 (7)	11 (4)	88 (5)	1 (1)	87 (3)	3 (3)
17. 3.88	66 (4)	5 (2)	85 (4)	1 (1)	59 (5)	9 (4)
30. 3.88	52 (6)	3 (1)	67 (5)	4 (1)	38 (6)	5 (2)
12. 4.88	56 (8)	0 -	62 (6)	0 -	24 (6)	0 (1)

*() $\pm$ SE of mean.

ACKNOWLEDGEMENTS

Mr B. Willoughby and Ms C. Thomson for technical assistance. Dr E.R. Thom (Ruakura) and cooperating MAFTech consultants and farmers for access to survey sites.

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