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THE IMPACT OF BLACK BEETLE AND BLACK FIELD CRICKET ON NORTHLAND PASTURES

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Abstract

Black beetle (*Heteronychus arator*) and black field cricket (*Teleogryllus commodus*) may attack pastures in Northland, particularly in dry years. No appreciable pasture production responses to controlling black beetle with insecticides have been measured. In contrast, significant production increases have been obtained from controlling crickets. Crickets can be readily assessed using a simple flushing technique. Effective and economic control can be achieved using maldison grain baits. Drought or black beetle have been wrongly blamed for cricket damage. It is therefore important to correctly identify pest problems so that control measures can be successfully carried out.

Keywords: black beetle, black field cricket, damage, control.

INTRODUCTION

Pasture in Northland may be attacked by insect pests, particularly in dry years. Black beetle and black field cricket are the pests commonly blamed for causing this damage. This paper summarises aspects of damage and control of these two pests and discusses the need for the correct diagnosis of pest problems.

DAMAGE

Black Beetle

Black beetle larvae damage pastures by pruning roots. This root loss can result in pasture plants being pulled out of the ground by grazing stock where high densities of larvae are present. Soils which suit black beetle are primarily the lighter coastal sands and peats in which larvae can readily tunnel (Blank 1985). These soil types comprise approximately 11% of Northland.

TABLE 1: Black Beetle Summer Larval Populations and Pasture Production Responses to Insecticide Application (Insecticide-Untreated Plots) on Ryegrass and Kikuyu Pastures on a Red Hill Sand and Houhora Sand Soil.

	Ryegrass		Kikuyu	
	Larvae/m²	Response kg DM/ha	Larvae/m²	Response kg DM/ha
Redhill Sand				
1976	16	—	19	19
1977	8	-60	36	-1250
1978	14	195	19	-30
1979	29	105	65	1285
1980	40	-560	43	-90
1981	20	—	12	—
1982	37	—	64	—
1983	11	195	77	515
1984	5		12	220
1985	7	—	49	—
Houhora Sand				
1984	27	374	16	70
1985	9	85	112	210

Black beetle larvae have been shown to cause losses in the ryegrass *(Lolium* perenne) component of pasture and increases in the clover and weed components (King et al. 1982). Worthwhile increases in pasture yields after controlling black beetle larvae with insecticides have not yet been demonstrated in spite of intensive trial work (Table 1). For example, control by insecticides of a high larval population of 1 12/m^2 in a pasture dominated by kikuyu grass *(Pennisetum clandestinum)* on a Houhora sand during the dry 1985 season increased yields by 210kg DM/ha compared with untreated pasture. Larval populations of up to 40/m* on ryegrass pasture have caused no appreciable decline in pasture production on Red Hill sand.

Cricket

Black field crickets hide down cracks in the soil or under objects such as cow pats or in the base of the pasture. Cricket susceptible soils include all the sedimentary (clay) and andesite (semi-volcanic) derived soils (80% of Northland soils), which crack readily over dry summers to provide refuge (Blank 1985). Crickets feed on the green leaf portions of pasture plants. This continuous defoliation kills many plants, leaving only dead stalks behind. High populations of crickets can devastate large areas of pasture, even complete farms.

Pasture production losses caused by natural infestations of black field cricket were quantified on dairy pasture on clay or clay loam soils in Northland (Blank et. al. 1985b). In 1980 and 1981, summer and autumn rainfall was above normal and cricket densities were too low (2-5/m^2) to influence pasture production. In the dry 1979, 1982, and 1983 years, cricket populations were moderate (8-22/m^2) and significantly affected pasture production. Production losses occurred over the summer and autumn period when pasture growth was restricted by low soil moisture (Fig. 1). Responses from baiting crickets ranged from 0.4-1.3 kg DM/ha per cricket-day/m^2. A loss of 0.8 kg DM/ha per cricket-day/m^2 would mean that a field population of 20 crickets/m^2 would cause a pasture loss of 1600 kg DM/ha.

Crickets consume grass seed and damaged areas show very poor recovery from natural self-seeding (Blank and Bell 1982). Damaged pastures should be undersown with ryegrass as soon as crickets have died off in May.

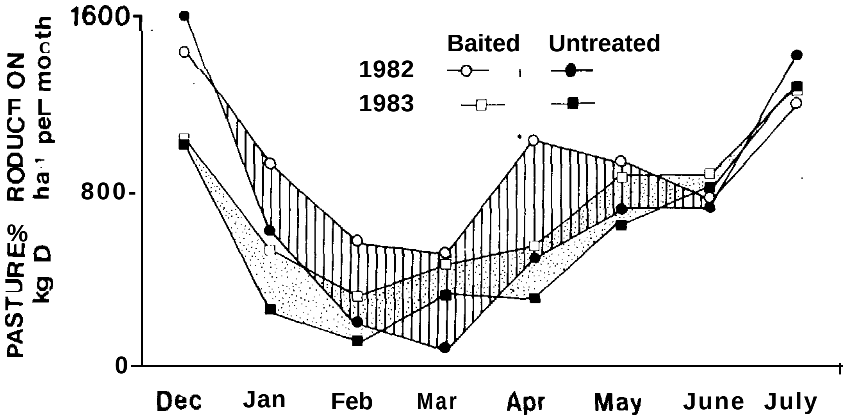

FIGURE 1: Pasture Production for Baited Plots with Average Cricket Populations of 3/m* Compared with Untreated Plots with 16 and 23/m* in 1982 and 1983 Respectively to Show the Loss Due to Cricket Attack.

CONTROL

Black Beetle

Insecticidal control of black beetle can be successful using half recommended rates (lkg active ingredient), provided that applications are made by early December while soil is moist, and then some rainfall follows (Blank et al. 1982). At present, farmers are unlikely to consider insecticidal control measures because the economics of control have yet to be demonstrated in terms of increased pasture production, let alone increased animal production. The requirement for early application of insecticides also means that adult black beetle densities need to be sampled in September or November and predictions made of summer larval populations before a decision on control measures can be made (Watson et *al.* 1980). Insecticidal control is thus not a practical or economic method of controlling black beetle.

There are a number of alternative management strategies which may help to minimise the impact of black beetle attack. Delaying grazing of damaged pastures until after the autumn rains may enable plants to re-establish roots and prevent being pulled out by stock. The establishment of resistant pasture species such as phalaris (*Phalaris* aquatica) or tolerant species such as kikuyu grass may also be considered (King 1976).

In preliminary studies, increasing pasture production by strategic application of nitrogen in spring or autumn has been shown to give worthwhile responses compared with the small responses from insecticide.

Cricket

Maldison treated grain baits give good economic control of crickets. Baits are best applied in January to prevent damage, but in wet seasons February applications may be more appropriate (Blank et *al.* 1984b). Cricket densities can be determined by pouring a 1% detergent solution down cracks and counting crickets which are flushed to the surface (Blank 1983). Measurement of cricket densities is important as this determines the rate of bait to be applied. Selection of the optimum baiting rate can have a greater effect on costs than methods of application (Blank et al. 1984a). Generally, aerial application is cheaper than ground applications. A single bait application usually provides adequate control but at high densities two applications may be necessary. Maldison grain baits can kill crickets for up to 4 or 8 weeks after application in wet or dry conditions respectively (Blank et *al. 1984c).*

DISCUSSION

Black beetle has been considered the major pasture pest in Northland, responsible for severe damage during the drought years of the 1970s. However, there is little evidence from damage assessment studies to support this view.

Widespread and severe pasture damage occurred on many farms in northern regions of Northland during the 1982/1983 drought. Eight farms were investigated where black beetle was implicated as being responsible for the damage (Blank et al. 1985a). Soil cores were taken from damaged areas and black beetle adults, black field cricket eggs and other insect pests extracted by hand sorting and wet sieving. The presence of black beetle larvae and crickets was also determined from an examination of frass and by noting the presence of tunnelling. Black beetle and crickets *were* the only insect pests found in abundance. Black beetle numbers were moderate ($35/m^2$) or high ($109/m^2$) on the two farms with sandy soils (yellow-brown sands) but were low ($14/m^2$) on the six farms with clay (northern yellow-brown earths) or semi-volcanic soils (brown and granular loams and clays). Black field cricket egg densities were greater than $1000/m^2$ and the frass recovered was predominantly from crickets on the six farms with clay and semi-volcanic soils. This suggested cricket populations had been 40-$100/m^2$ or greater. It was concluded that crickets were responsible for the severe pasture damage that occurred on the six farms with clay and semi-volcanic soils and that black beetle were associated with the severe pasture damage that occurred on the two farms with sandy soils.

Crickets can be easily assessed and damage prevented using techniques readily available. It is therefore important that farmers identify pest problems correctly so that appropriate control measures can be applied.

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