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Minimising impact of black field cricket in the Hawke's Bay.

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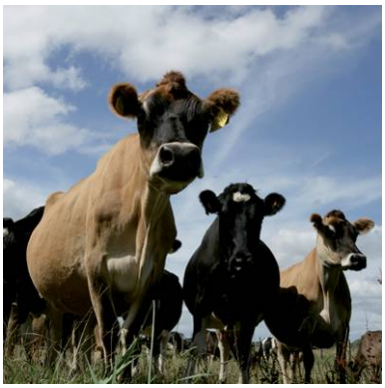

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1. EXECUTIVE SUMMARY

Farms on the pallic soils in Hawke's Bay can suffer severe damage from the sporadic pest, the black field cricket. This occurred in summer 2007/08 and 2008/09.

A trial was run on four farms in early 2010 to test the efficacy of three rates of cricket bait in providing control. The aim was to adapt monitoring methods and recommendations developed during a severe outbreak of black field cricket in Northland in the 1980s so that they are applicable for East Coast dryland farmers.

The trial was unsuccessful as the summer was unusually wet in Hawke's Bay. With stock removed in anticipation of the normal summer dry, there was abundant pasture and none of the conditions that predispose measurable levels of cricket damage.

It is recommended that the trial is repeated when summer conditions and cricket numbers are such that treatment responses could be observed.

2. BACKGROUND

The pallic soils in Hawke's Bay, which occur where there is a water deficit in summer-autumn and surplus in winter (<1000 mm/yr), are prone to cracking in periods of drought. This provides shelter for black field crickets and with the sequential droughts over the past three years, populations built up to economically-damaging levels in 2009. As well as reducing pasture cover at the hottest and driest periods of the year, the pattern of cricket feeding causes plant death around soil cracks, accentuating risk of erosion. This has economic consequences for the farmers and region, not to mention the social aspect of farmers watching the decimation of precious grass trying to recover from drought.

Summer 2009/2010 should have been an opportune time to develop a monitoring and control strategy that can be used by farmers against crickets. Crickets are present every year but only reach serious pest levels after a sequence of climatic events, such as successive droughts. The cricket egg burden present following three years of cricket population increases would have been high, providing a window of opportunity to work with this pest.

The sporadic nature of cricket outbreaks means that they are suited to control measures that can be used as required when pest thresholds are exceeded. This system using baits has been developed for cricket management in kikuyu pastures in the Far North as part of a MAF Sustainable farming fund project with financial input from the Northland Regional Council and Meat & Wool Innovation. However, as both climate and pasture composition varies between the far North and Hawke's Bay, the timing, application rates and pest thresholds used in the north may not be appropriate.

The aim of this project was to adapt monitoring methods and recommendations developed for black field cricket control in Northland in the 1980s so that they are applicable for East Coast dryland farmers.

3. METHODS

Paddocks on four properties were selected for the trial, each with similar terrain, a history of soil cracking and high populations of black field crickets in 2009. They were in the Wanstead/Wallingford districts, approximately 20 km SSE of Waipukarau.

The farmers were:

- Blair Eades, Murphy Road
- Andy Macklow, Awahiwi Road.
- Sam Morrah, Bird Road
- Don Withers, Porangahau Rd

Each paddock was divided into four approximately equal plots and randomly allocated one of four cricket bait treatments (Table 1).

- Control
- Standard bait rate
- Half standard bait rate
- Double standard bait rate

On the 28th January 2010 all plots were sampled by the AgResearch team to ensure crickets were present, and to ascertain base levels pasture height and composition prior to bait applications.

The pre-bait application sampling consisted of:

- Five 30 m suction samples/paddock taken at random using a modified blower vac. Native and black field cricket numbers in each sample were assessed in the laboratory.
- Pasture production/available pasture cover was estimated using a Jenquip folding plate pasture meter
- Pasture composition was estimated using a 33 x 62 cm quadrat randomly placed ten times in each plot.

Bait purchase and application was the responsibility of Ian Millner Hawke's Bay Regional Council. Cricket bait (barley treated with malathion) was applied on 18th March using a C DAX C-DiT 300 GT spreader towed behind a 4WD quad bike. Calibrations and adjustments were made depending on the steepness of the plots.

The post-bait assessments were carried out by AgResearch. The pre-baiting suction sampling was adequate for determining the presence of black field crickets but would underestimate populations as the agile and fast moving crickets can escape the suction machine by moving away or hiding down cracks. It had been intended to measure post treatment cricket densities by a flushing technique (Blank 1983) in which a measured solution of water and Tepol detergent at 0.01% is poured onto a known area and crickets emerging from cracks are counted. However, due to the unseasonably wet weather and resultant very low level of cracking, it was felt this method would not work. Therefore a sack sampling technique (Blank 1982) was used. Random areas of pasture within each plot were trimmed to approximately 4 cm in height. Over these patches new jute sacks folded in half (68 x 60 cm finished size) were placed and securely fixed by metal pegs at the corners. A week later the sacks were carefully lifted on two corners and the numbers of black field crickets quickly counted and recorded. The sacks were pinned back down and removed at the completion of the second sampling on 15th April.

4. RESULTS

4.1 Bait application

All baits were applied on 18 March, approximately six weeks after the intended date. The bait application proved difficult as the spreader malfunctioned and the operator needed to vary the quad bike speed to negotiate the difficult terrain safely. At the Eades and Macklow sites the rate applied was close to that planned, but the application at the other two sites was highly variable (Table 1). The Morrah site was especially steep.

Table 1: Plot size and estimated bait application rates at the four Hawke's Bay trial sites.

		Application rate (kg/ha)		
Site	Plot size (m)	Standard	half	double
Eaddes	100×50	14	6	28
Macklow	75×75	14	6	28
Morrah	80×23	~38	~16	~76
Withers	80×25	15	9	20

4.2 Pasture composition and cracking

The pasture quality at the time of the pre-treatment sampling was generally poor with 25%+ bare ground on three of the four sites and high weed density on the Morrah and Withers sites (Table 2). Significant cracking was evident only at the Macklow site in January.

Table 2: Pre-treatment pasture composition and ground area showing cracking at the four Hawke's Bay trial sites 18 Jan 2010.

	Pasture composition (%)				**cracking**
	grass	**clover**	**weed**	**bare ground**	**%**
Eaddes	59	1	3	37	0
Macklow	68	4	11	17	9
Morrah	44	6	25	25	1
Withers	48	5	21	26	0

In contrast to the usual summer dry, summer 2009/2010 rainfalls were well above normal in Hawke's Bay (NIWA 2010). This resulted in plentiful pasture growth (Table 3) at a time when stock numbers are low. There was a trend for the control plots to have lower dry matter than the treated plots but as this was evident in January, it cannot be attributed to the treatments applied. There was no significant difference between treatments at either assessment date.

Table 3: Standing pasture dry matter at pre-treatment and 4 weeks post treatment at the four Hawke's Bay trial sites

		Application rate					
		Kg dry matter/ha			Difference from control		
Site	control	Standard	half	double	Standard	half	double
28 Jan							
Eaddes	1896	2401	2306	2054	505	410	158
Macklow	1358	1485	1453	1548	127	95	190
Morrah	1706	1896	1738	1864	190	32	158
Withers	2022	2085	2338	2085	63	316	63
15 April							
Eaddes	2238	2717	2433	2496	479	195	258
Macklow	1674	2212	1422	1643	538	-252	-31
Morrah	1485	1738	1959	2054	253	474	569
Withers	1137	1580	1611	1738	443	474	601

4.3 Cricket populations

The pre-treatment populations of crickets at the four sites appear very low because of the sampling system used (Table 4). However, while suction sampling is not a recognised method for black field crickets (quickly moving insects that hide in cracks), it provided a quick assessment of the presence or absence of crickets to enable selection of sites within the time available.

Post -treatment effects on cricket densities were assessed only at two farms (Withers & Eaddes) because the sack sampling method is time consuming and there were strong indications that the wet summer had already rendered the trial a failure. The Wither's site appeared to show a treatment effect but highest cricket densities were present on the double rate sites at Eaddes.

Table 4: Pre-treatment cricket populations/m^2 as assessed at the four Hawke's Bay trial sites using suction sampling.

	Application rate			
Site	control	Standard	half	double
Black field crickets				
Eaddes	0.3	0.4	0.2	0.1
Macklow	0.2	2.1	0.1	0.5
Morrah	0.4	0.3	0.3	0.0
Withers	0.7	0.9	0.7	0.7
Other crickets				
Eaddes	1.1	2.8	1.7	0.7
Macklow	2.2	3.7	2.3	2.9
Morrah	0.4	0.5	0.3	0.4
Withers	0.2	0.3	0.5	0.3

Table 5: Post-treatment live crickets/m^2 recovered from under sacks 8th &15th April 2010.

		Application rate double rate at Eaddes.			
Date	Site	Control	Standard	half	double
8th April	Eaddes	2.5	0.6	2.5	5.5
	Withers	3.7	0	0	0
15th April	Eaddes	0	0	0	3.7
	Withers	2.5	1.8	1.2	0.6

5.

6. DISCUSSION

When this project was planned it was assumed that the coming season would follow the usual weather patterns for the Eastern Hawke's Bay with extended periods of hot fine weather, low pasture summer growth and cracking of pasture soil surface. This was not the case with the abnormally high rainfall. With the increased pasture cover available coupled with the low stock numbers (removed in anticipation of normal summer dry), the cracking of normally exposed ground did not occur.

The peak time of adult feeding is February and March and the application of baits in this trial in late March was too late. Ideally the bait treatment should have gone on immediately following the pre-treatment assessments in January to have any chance of a result. However, with the unseasonal year and feed in such abundance, it was very unlikely any response of significance to the baiting could have been measured. Similarly, getting an accurate indication of cricket density is also problematic when pasture is long and the species is highly mobile. Therefore this trial failed to produce the data required to adapt monitoring methods and recommendations developed for black field cricket in Northland in the 1980s so that they are applicable for East Coast dryland farmers.

This work also highlighted the difficulties in accurately calibrating and applying a product over challenging and often dangerous terrain.

7. RECOMMENDATIONS

- This trial is repeated under the hot dry conditions normally experienced in the Central Hawke's Bay region.
- Liaise with farmers to select sites amenable to bait application at precision required for experimental work and to ensure timely application of the bait.
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8. ACKNOWLEDGEMENTS

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