VISUAL ESTIMATES FROM FALSE COLOUR INFRARED PHOTOGRAPHY OF THE AREA OF GRASS GRUB DAMAGED PASTURE

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Summary

Aerial photography has proved a useful technique for recording and measuring areas of insect damage in pasture. Untrained eye assessments of photographs appear to over-estimate the proportion of damage.

INTRODUCTION

Grass grub (*Costelytra zealandica*) larvae feed on plant roots, causing visible turf damage from late February until mid winter. Since the larval population distribution is clumped, pasture damage appears as irregular shaped patches of dead or dying plants of varying sizes (Kain and Atkinson 1975). The area of stressed plants is readily detected on false colour infrared film, thereby giving a clear record of the damage. The proportion of a paddock damaged can be estimated accurately from aerial photographs by using a tracing, cutting out and weighing technique (Kain 1975). This paper reports efforts of untrained personnel to assess visually the area of pasture damage from false colour infrared prints.

METHOD

In 1972 a false colour infrared aerial photograph was taken of a grass grub infested paddock at Alford Forest in the Ashburton County. A 170 x 240 mm print of the whole paddock was developed, from which a 35 mm positive transparency was taken. This was projected onto white paper producing a 280 x 720 mm paddock image. The damaged areas were carefully outlined with a black felt tipped pen. The paper plan was trimmed to correspond with the fence lines and the patches representing damage burned out by a heated loop of 12 amp. resistance wire using 2-3 volts from a 6 volt transformer. Three distinct levels of infestation were apparent within the paddock and the paper plan was subdivided into these three portions, the area affected being measured by a weighing technique. Each portion was glued on to a firm black card giving three black and white mosaics (Fig. 1). The black areas depicted the grass grub damaged patches.

On three occasions, a farmers meeting at Dorie, a field day on the farm at Alford Forest and a science technician's course at Lincoln, the false colour infrared print of the paddock was displayed together with the three damage mosaics.

Each member of the audience at the three meetings was asked to make an eye estimate of the percentage of the area damaged in each mosaic. The occupations of the participants were noted and the visual estimates grouped into farmer, salesmen (chemical) and science worker categories.

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FIG 1. Mosaics of patches representing pasture damage.

RESULTS

The three different levels of grass grub damage were estimated, by weighing, to be 11, 26 and 34 percent for the mosaics A, B and C respectively (Fig. 1). On the visual assessment of the three mosaics each group of farmers, salesmen and science workers all tended to over-estimate the proportion of pasture damage by between 20-80 percent (Table 1).

TABLE 1: Comparison of the visually assessed percentage damage with the estimated damage obtained by cutting and weighing.

Occupations	Mosaics			
	Number	A	B	C
farmers	(71)	14.0**	38.1**	51.4**
salesmen	(5)	14.6	49.0*	44.8
science workers*	(49)	13.0*	36.5**	45.3**
estimated damage		11.0	26.0	34.0

Asterisks denote visual assessment significantly different from estimated damage — * $p < 0.05$, ** $p < 0.01$.

DISCUSSION

Accurate ground measurements of the area of pasture or crops damaged by grass grub is possible only where very low levels of infestation are present. One reason for this is the inability of the assessor to obtain a total view of the whole area. It was found that many farmers considered a paddock beyond repair because they overestimated the area of the paddock damaged. Interpretation of aerial photographs showed that when the grass grub damaged area was about 25 percent, farmers making ground estimates usually wanted to plough. This left 75 percent of the paddock relatively uninfested with grass grub and able to produce the normal amount of dry matter. When considered in relation to the capacity of pastures to recover from damage at this level, the trend to overestimate damage from ground observations is of national importance to the farming community in making decisions on economic thresholds. These in turn determine whether or not to plough a paddock or apply insecticide.

Aerial photography has proved a valuable method of assessing the extent of grass grub damage, but is subject to the same problems of exaggerated damage assessments as ground based visual estimates. Consequently the use of standard display ranges such as used by Folk (1951) would be invaluable in maintaining estimates within realistic limits.

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