

CONTROL OF ST. JOHN'S WORT (*HYPERICUM PERFORATUM*) BY
INSECTS AND/OR GRAZING ANIMALS

M.H. CAMPBELL and J.J. DELLOW

Agricultural Research and Veterinary Centre, Orange. 2800

Summary. Scattered St. John's wort (*Hypericum perforatum*) was controlled on two 80 ha paddocks by an integrated approach using insects (*Chrysolina quadrigemina*), grazing animals and pasture. The ground cover of the weed on 10 permanent quadrats was reduced: in paddock 1 (1978-1984), from 50% to 1% due mainly to insects and grazing; and, in paddock 2 (1980-1984), from 51% to 19% due mainly to grazing. Annual legumes smothered weed seedlings.

INTRODUCTION

Although St. John's wort (*Hypericum perforatum*) occurs in all states in Australia (Campbell and Delfosse, in press) it is only regarded as a serious weed in New South Wales and Victoria where it occupies large areas of pasture and forest land (Campbell 1977; Shepherd 1983). The most common methods of control include the sowing of improved pastures on arable (Moore and Cashmore 1942) and non-arable (Campbell *et al.* 1975, 1979) land, the use of insects (Wilson 1960), and grazing with sheep (Dodd 1920; Daley 1937). Grazing of dense stands has only yielded limited success because of the deleterious effect of the weed on animal health (Dodd 1920; Daley 1937). However grazing during or after defoliation by insects, or grazing light infestations could be successful because of the availability of other forage. Thus two investigations were undertaken between 1978 and 1984 to assess the effect of grazing by sheep on the control of scattered St. John's wort that was being attacked by *Chrysolina quadrigemina*.

MATERIALS AND METHODS

The site of the first investigation (1978-84) was an 80 ha paddock south of Trunkey, New South Wales that had scattered patches of St. John's wort (c.20% of the total area) and a moderate infestation of *C. quadrigemina*. The site of the second investigation (1980-84) was the adjoining 80 ha paddock that had c.15% ground cover of St. John's wort and a light infestation of *C. quadrigemina*. Both paddocks were non-arable. The pasture growing with the St. John's wort was dominated by annual grasses and legumes in winter and spring and native perennial grasses in summer and autumn. Superphosphate was aerielly distributed on both paddocks at 125 kg ha⁻¹ in 1977, 1978, 1979 and 1980 and seed of subterranean clover (*Trifolium subterraneum*) sown (1 kg ha⁻¹) in 1977. Annual rainfall at Trunkey (mm) was: 1978, 1261; 1979, 437; 1980, 693; 1981, 947; 1982, 361; and 1983, 925.

Grazing on paddock 1 was: November 1978 to November 1980 - 350 merino ewes and 35 Aberdeen Angus cows and calves; November 1980 to October 1982 - 350 merino ewes and 40 feral goats; June 1983 to April 1984 - 200 merino wethers. Grazing on paddock 2 was: November 1980 to June 1983 - 580 merino wethers; June 1983 to April 1984 - nil. Animals were removed from the paddocks for short intervals for shearing and other treatments.

Measurements taken from 10 permanent quadrats placed in each paddock in dense patches of St. John's wort were: percentage ground cover of resident vegetation; height of St. John's wort; damage caused by insects to St. John's wort; and grazing intensity. Insect damage was rated: 0, no damage; 1, slight damage - leaves at the top of most stems eaten; 2, moderate damage - 10% to 50% of leaves eaten on most stems; 3, heavy damage - 50% to 90% of leaves eaten on most stems; and 4, complete defoliation. Grazing intensity was rated from 0 - no grazing to 10 - bare ground.

RESULTS

Paddock 1. The ground cover of St. John's wort on the permanent quadrats was reduced from 50% to 1% during the investigation; the height of the weed was reduced from 70 cm to 1 cm with recovery of odd flowering stems for short periods to 30 cm; as a consequence the percentage ground cover of pasture increased (Fig. 1).

The initial decline in St. John's wort was due to the complete defoliation of the non-flowering stems by the larvae of *C. quadrigemina* in winter 1979 (Fig. 1). Prior to this little damage had been caused by the adult insects in spring-summer 1978-79 or by grazing animals in the same period.

After a partial recovery in summer 1979-80 the St. John's wort was heavily grazed by animals in the dry autumn and winter of 1980 and, combined with another attack by larvae of *C. quadrigemina*, the weed was almost eliminated (Fig. 1). The crowns of many plants were pulled 2-5 cm above ground level by the grazing animals and any regrowth eaten by them or by the insects.

No insect damage was recorded after 1980 but the weed was heavily grazed in the 1982 drought. Seedlings of St. John's wort that established in 1980 and 1981 were killed by strong pasture competition in spring 1981. Lax grazing during 1983-84 allowed any remaining plants of St. John's wort to recover but this only amounted to 1% ground cover. During the trial period the main pasture competition was annual legumes (a maximum of 63% ground cover in spring 1981) and perennial grasses (a maximum ground cover of 53% in autumn 1984).

Paddock 2. During 1980 to 1983 ground cover of St. John's wort on the permanent quadrats was reduced from 51% to 3% and height from 44 cm to 2 cm due to harsh grazing by merino wethers (Fig. 2). Serious damage was inflicted during dry periods. All foliage was eaten and crowns and main lateral roots pulled 2 to 10 cm above ground level; many crowns were pulled out completely.

Little damage was caused by adult *C. quadrigemina* in spring and no damage was caused by larvae in winter. Ground cover of pasture increased during the trial (Fig. 2) mainly due to the increase in annual legumes and native perennial grasses. Lax grazing during 1983-84 allowed the weed to partly recover.

Animals health was not seriously affected during the investigations. Some lesions occurred on sheep in paddock 1, but these cleared up during shearing when the animals were removed from the St. John's wort pasture for one month.

DISCUSSION

Results showed that both insects and animals can assist in controlling St. John's wort. Best results were obtained in paddock 1 by an initial knock-down with insects followed by heavy grazing with animals. However grazing alone (paddock 2) proved effective in substantially reducing the proportion of the weed.

Moore and Cashmore (1942) found both rotational grazing and set stocking assisted improved pastures to control St. John's wort. In each case harsh grazing ensured that animals ate the weed as well as the pasture. They concluded that improved pasture "correctly grazed" will control the weed. Obviously correct grazing is harsh grazing either for short or long periods.

The main difficulty with harsh grazing as a control technique is to maintain a sufficiently high grazing pressure so that animals are forced to eat the weed. Dry periods during our investigations made this possible. However, in wet periods when pasture was plentiful animals disregarded the weed. As Clarke (1953) found that St. John's wort was most susceptible to defoliation in spring, when the associated pasture is most plentiful, the possibility of maintaining high grazing pressure then can only be realised by substantially increasing the stocking rate. As it is not always possible to introduce sufficient new animals to ensure the weed is eaten in spring the alternative would be to graze heavily in winter and summer as well as in spring.

Moore and Cashmore (1942) found that pasture competition, especially the shading of the non-flowering stems by subterranean clover in winter, facilitated control. However, competition alone is not sufficient to control the weed as Campbell *et al.* (1975) found that flowering stems will grow through a dense ungrazed stand of subterranean clover in spring. Thus the best final solution could be integrated control using insects, competitive pasture and harsh grazing; the best grazing technique has yet to be devised (Campbell and Delfosse, in press).

Although animals were not affected by St. John's wort in these investigations, heavier infestations of the weed could cause problems. In these circumstances goats could be used as they are less affected than sheep (Hurst 1942).

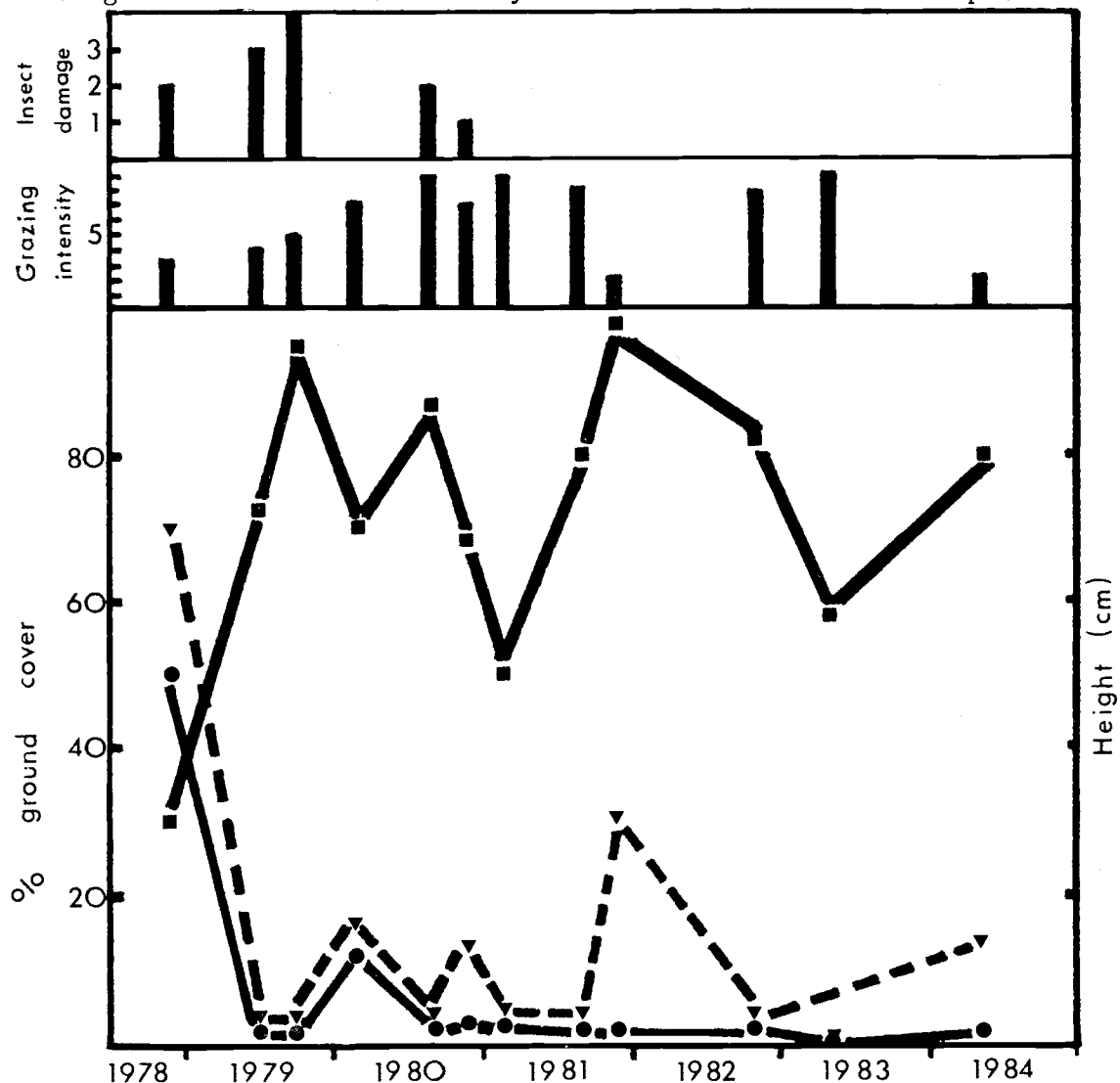


Figure 1. Effect of insects and grazing animals in paddock 1 on height of St. John's wort (■▼■▼) and ground cover of pasture (■—■) and St John's wort (●—●). Ratings for grazing (0 to 10) and insect damage (0 to 4) are above.

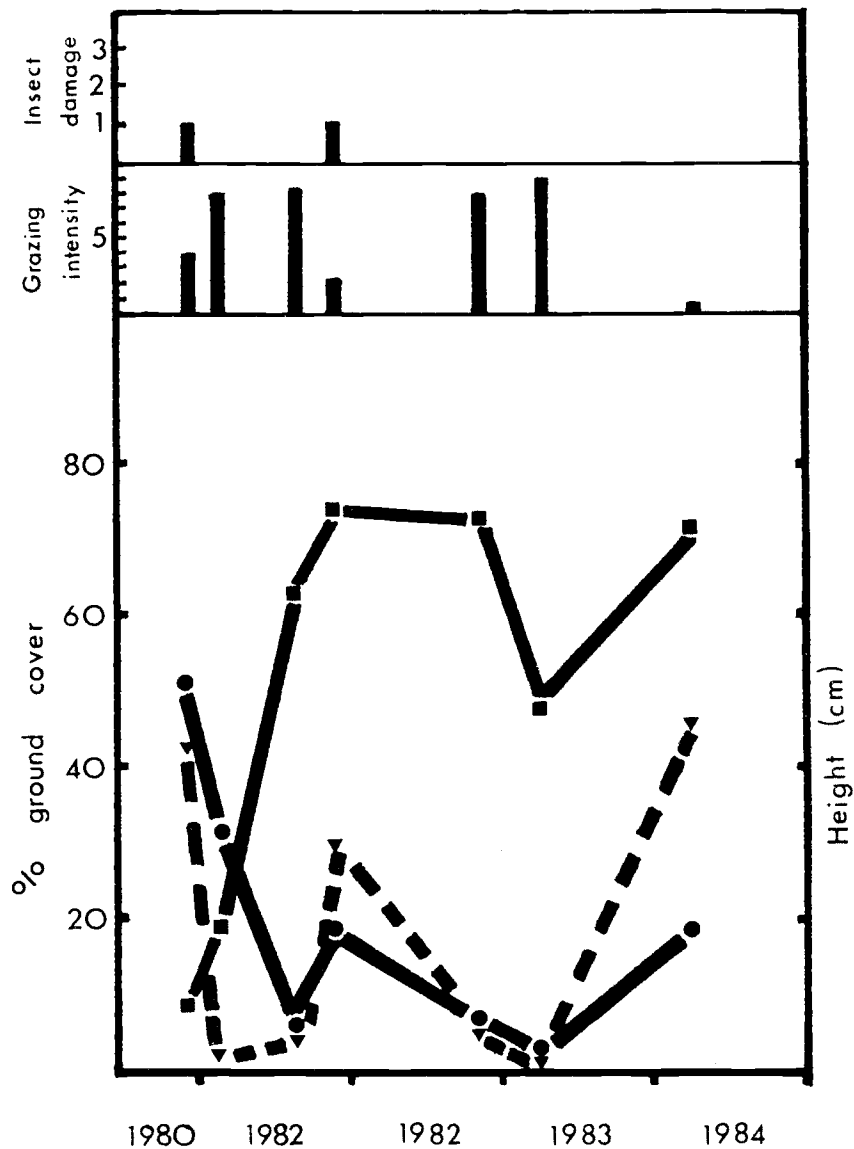


Figure 2. Effect of insects and grazing animals in paddock 2 on height of St. John's wort (\blacktriangledown — \blacktriangledown), and ground cover of pasture (\blacksquare — \blacksquare) and St. John's wort (\bullet — \bullet), from 1980 to 1984. Ratings for grazing intensity (0 to 10) and insect damage (0 to 4) are presented above.

LITERATURE CITED.

- Campbell, M.H. (1977). N.S.W. Dept. Agric. Tech. Bull. No.18.
 Campbell, M.H. and Delfosse, E.S. (in press). J. Aust. Inst. Agr. Sci.
 Campbell, M.H., Dellow, J.J. and Gilmour, A.R. (1979). Aust. J. Exp. Agric. Anim. Husb. 19: 746-8.
 Campbell, M.H., Flemons, K.F. and Dellow, J.J. (1975). Aust. J. Exp. Agric. Anim. Husb. 15: 812-7.
 Clark, N. (1953). Aust. J. Bot. 1: 95-120.
 Daley, C.J. (1937). Agric. Gaz. N.S.W. 48: 301-18.
 Dodd, S. (1920). Agric. Gaz. N.S.W. 31: 265-72.
 Hurst, E. (1942) 'The Poison Plants of N.S.W.' (Snelling Printing: Sydney).
 Moore, R.M. and Cashmore, A.B. (1942). Counc. Sci. Ind. Res. Bull. 151, 1-23.
 Shepherd, R.C.H. (1983). Aust. Weeds 2(4): 144-55.