

## References

- Arnott, R. and Campbell, M.H. (1994). Control of St. John's wort (*Hypericum perforatum* L.) in large paddocks on hill country by the aerial spray-sow technique and by grazing management. Proceedings 9th Conference Grassland Society NSW, Queanbeyan, pp. 98-9.
- Campbell, M.H., Briese, D.T. and Delfosse, E.S. (1996). *Hypericum perforatum* L. In 'The Biology of Australian Weeds', eds. R.H. Groves, R.C.H. Shepherd and R.G. Richardson, pp. 149-67. (R.G. and F.J. Richardson, Melbourne).
- Campbell, M.H. and Dellow, J.J. (1984). Control of St. John's wort (*Hypericum perforatum*) by insects and/or grazing animals. Proceedings 7th Australian Weeds Conference, Perth, Volume 1, pp. 109-17.
- Campbell, M.H., Flemons, K.F. and Dellow, J.J. (1975). Control of St. John's wort on non-arable land. *Australian Journal of Experimental Agriculture* 15, 812-7.
- Campbell, M.H. and Watson, R.W. (1994). St. John's wort. NSW Agriculture Agfact P7.6.1.
- Clark, L.N. and Clark, N. (1952). A study of the effect of *Chrysomela hyperici* Forst, on St. John's wort in the Mannus Valley, NSW. *Australian Journal of Agricultural Research* 3, 29-59.
- Clark, N. (1953). The biology of *Hypericum perforatum* L. var. *angustifolium* DC. (St. John's wort) in Ovens Valley, Victoria, with particular reference to entomological control. *Australian Journal of Botany* 1, 95-120.
- Daly, C.J. (1937). St. John's wort control by pasture improvement and grazing. *Agricultural Gazette NSW* 48, 301-18.
- de Fegley, C. (1994). Putting it all together—a productive perennial pasture system. Proceedings 9th Conference Grassland Society NSW, Queanbeyan, pp 74-6.
- Dodd, S. (1920). St. John's wort and its effects on livestock. *Agricultural Gazette of NSW* 31, 265-72.
- Henry, M. (1922). Feeding and contact experiments with St. John's wort. *Agricultural Gazette of NSW* 33, 205-7.
- Jessep, C.T. (1970). St. John's wort in New Zealand. *Tussock Grassland and Mountain Lands Institute Review* 20, 76-83.
- Kemp, D., Michalk, D.L. and Dowling, P.M. (1995). Managing pastures to improve composition and quality. Proceedings 36th Conference Grassland Society Victoria, pp. 113-23.
- Moore, R.M. and Cashmore, A.B. (1942). The control of St. John's wort by competing pasture plants. Council of Scientific and Industrial Research, Bulletin No. 151, pp. 23.
- Rogers, T.B. (1914). On the action of St. John's wort as a sensitizing agent for non-pigmented skin. *American Veterinary Review* 46, 145-62.
- Saul, G. (1994). Productive and profitable grazing systems in western Victoria. Proceedings 9th Conference Grassland Society NSW, Queanbeyan, pp. 67-73.
- Southwell, I.A. and Campbell, M.H. (1991). Hypericin content variation in *Hypericum perforatum* in Australia. *Phytochemistry* 30, 465-8.

## St. John's wort experiences at Birnam Wood

Richard Arnott, Birnam Wood, Coolah, New South Wales 2843, Australia.

### The property

The property Birnam Wood has an annual rainfall of 750 mm on lower parts and up to 800 mm on the high tableland. The soil is heavy basalt and it is steep country with an altitude of 610–1320 metres. It has been fertilized with gypsum, sulphur and sulphur fortified fertilizer (45% sulphur) since 1953 and so conditions are perfect for blackberry, briar and timber regrowth, which is in addition to a heavy infestation of St. John's wort.

### The problem

An ever increasing number of farmers are becoming aware of St. John's wort devastation to hilly country. Attempts at Birnam Wood to control and eliminate St. John's wort started in the late 1940s. It was first noticed after hay had been purchased from the Mudgee district during the 1946 drought, and seed germinated and was spread by cattle. Salt was thrown over the patches which could be seen and it was hoped this would kill it.

There was very little spreading until the wet years of the 1950s when fertilizer had been spread and suddenly the St. John's wort 'took off'. At that time 2,4-D amine was the only chemical available that was known of, and it had very limited success. Thousands of acres in steep hill country were hand sprayed two or three times a

week using the old type metal knapsack. It was later thought a great step forward when misters were introduced, and then plastic back sprays. As the weed spread, more country was given up as uncontrollable. The battle was lost paddock by paddock.

### The herbicide

2,4,5-T was used, mixtures of this and 2,4 D, combined with distillate was also used.

In desperation polyborchlorate and borascue were used as a soil sterilant. It was carried on horses in wheat bags hanging down over the seat of saddle, as it was very heavy. This poison only had the effect of killing everything on steep sides, causing some washing and the first plant to return was the St. John's wort. There were still a few patches where nothing else was growing except the St. John's wort and so it was given up.

In about 1958 *Chrysolina* beetles were made available from Michael Kidd, north of Tamworth. They took off and it seemed they were the answer as whole hillsides were eaten out, however this was not the case. The beetles are very seasonal, only effective in larger areas, and only appear in about one year in three. However, they are very useful as they give other grasses, especially natives, a chance to regenerate

when a patch of St. John's wort has been eaten out.

In the 1960s Tordon 50D came on the market and it seemed to do some good. Thousands of dollars were spent controlling St. John's wort where easy access could be gained and combined with even stocking pressure. However, on the steeper sides, in spite of walking every foot of the hills two or three times in a summer with back sprays or misters, St. John's wort still got away. The weed seemed to be coming under control and then following a wet spring the St. John's wort would reappear. The paddock would have been heavily grazed for some years and carrying stock well with very little sign of St. John's wort, then it would explode with patches appearing the size of tennis courts.

In paddocks where spraying had been stopped, and could not run sheep, even though there was an excellent cover of white and sub clover, the St. John's wort would come through the clover and by December the paddock would be a solid yellow mass of St. John's wort flowers.

Of course, without sheep the blackberry and briar increased very rapidly on the steep sides, (a drop of 80 metres).

The cattle grazing area available became more limited until it was regarded

as a write-off. Blackberry bushes grew to 400 or 500 metres long and 200 metres wide down gullies and there were patches of briar that could not be walked through.

Roundup, then Grazon came on the market. If these had been available in the beginning they could have stopped the weeds.

### The animals

It is 17 years now since the first load of feral goats arrived at Birnam Wood. The first load of goats in the late 1970s were kept quiet as goats were not the sort of thing that were bragged about with one's peer group.

It was very soon realized that the decision had been the right one, and all the jokes made were much easier to take. However it was eight to ten years before running goats was accepted as just another farm enterprise. Primarily they were run for weed control, starting off with a mob that gave a stocking rate of approximately 2 dse ha<sup>-1</sup> in mountain country which was heavily infested with blackberry, sweet briar and thistles.

The goats had a dramatic impact. After two years it was obvious that blackberry and briar were regarded by goats as a highly desirable fodder which they actively searched out and destroyed. The sight of goats on top of a large blackberry bush eating their way down was a sight to behold. They really meant business.

Unlike the western New South Wales country where goats certainly do compete for valuable feed with other native animals and sheep/cattle, and can pose a real problem to the environment if their numbers get out of hand, the tablelands are very different. Apart from lucerne, goats will select the more woody and fibrous plants, leaving young clover and pasture growth until they have cleaned up everything else. It is possible to run goats in newly aerial sown pasture to keep down thistle and other weeds, knowing that they will not touch the young seedlings.

Because the blackberry and briar disappeared, the cattle stocking rate was able to be increased and the country that had been given up as worthless is now carrying over 7 dse ha<sup>-1</sup>. Cattle can be run on the worst of the St. John's wort and there are no problems with photosensitization to any degree. Vealers are fattened on these paddocks and that is as good a proof as you could have.

*Sheep* Wethers are run on and off the worst country, but a close eye is kept on them. Lambs can be affected by St. John's wort very quickly, which was discovered at some expense. Lambs are marked five weeks after first lambs appear in late August, early September and this mob was visibly effected. Those lambs not showing symptoms were distressed when picked up and marked.

*Goats* Cashmere does kid on the St. John's wort and there has only been one year where there was visible scab. Kidding percentages are fine as well as weaning percentages. As well as controlling weeds, it is a relatively simple job to shear the cashmere fibre and this in itself can be a very worthwhile enterprise.

*Cattle* Very little trouble at all, calving, fattening vealers and steers on very heavy St. John's wort country.

The main disappointment now, of course, is being in the only area where there is a different strain of St. John's wort to the rest of the country, and the only area where *Aculus hyperici*, (the St. John's wort mite) will not establish which is certainly not for the lack of trying by many, not the least being Paul Jupp.

### Conclusions

Flat or easily fenced paddocks and even grazing pressure on the country tends to limit the St. John's wort problem. It will be seen in very wet years, but will disappear with the return to heavy, even, controlled stocking pressure.

However, in steep country St. John's wort will only be kept down along the creek flats and on the stock camps, because the sheep will leave until last the steep, hard to get at country. This gives the St. John's wort a head start and by that time it has a woody stem and the sheep will not eat it (although goats will). If the sheep are taken out the blackberry and briar get away.

Once the blackberry and briar have been cleaned up, cattle pressure will keep most St. John's wort down on steeper country, and I believe the physical damage has a lot to do with it. A light stocking or rotational stocking every year or so with goats will still be needed, unless chemicals are used. Goats are far cheaper and give a monetary return as well.

If an aerial established pasture is required, the goats can be run on the country straight after sowing and left there on the weeds. As long as there is something else to eat they will not touch the short green newly germinating pasture (the one exception perhaps being lucerne).

The above is what has been experienced at Birnam Wood, Coolah. However there is always something new waiting around the corner, and ideas may again have to be changed.

The time and money put into this weed control could have bought many other things including quite a bit more country. The thing is to know when a battle is lost, but not the war. Others in the district have persevered longer before throwing in the towel and in the process have done the land no favours with the amount of chemical poison applied to the pasture.

I have always been given very good support from all levels of Government, from CSIRO, NSW Agriculture, local weeds County Council officers and never pressured into 'taking measures to eradicate St. John's wort'.