LETTER TO THE EDITOR

Rugose Leaf Curl in Safari Kenya white clover

Dear Sir,

Most people associated with planting Safari clover (*Trifolium semipilosum*) will have experienced the unpredictability of establishment of this legume. Briefly, planted stands may establish rapidly into vigorous pastures and remain healthy or show apparent healthy establishment before degenerating to stunted, discoloured plants. Other plantings are stunted from germination. Affected pastures may recover after a period of from one or two months to up to 30 months while others are lost through grass competition or are ploughed out.

It is generally accepted that a large part of the problem is attributable to Rugose Leaf Curl (R.L.C.) disease. We are concerned that neither literature nor logic support this belief. We are not debating the susceptibilityof Safari to R.L.C. or the nature of the causal organism (Grylls *et al.* 1972, Behncken and Gowanlock 1976). We simply doubt that the *general* yellowing and reddening observed in Safari during the establishment phase is indeed R.L.C. Discolouration in R.L.C. affected plants is largely restricted to older leaves. The primary symptoms are stunting, leaf curling and twisting, and rugosity of the lamina (Behncken and Gowanlock 1976). "Rugose" means "wrinkled" or "corrugated", not "red" as is often thought.

Grylls *et al.* (1972) showed that Safari was susceptible to R.L.C., perhaps more so than was white clover (*T. repens*). However what is commonly overlooked is that the authors suggested the greater susceptibility to R.L.C. of *T. semipilosum* over *T. repens* in their work may, in fact, have been a better drought tolerance in *T. semipilosum* allowing it to express R.L.C. symptoms. The expression of these symptoms in white clover was inhibited by the drought conditions prevailing at the time. Jones and Date (1975) working on Safari nodulation showed that it nodulated easily and effectively with *Rhizobium* strain CB 782. They concluded that "most of the yellowing and reddening symptoms in *T. semipilosum* previously ascribed to poor nodulation were in fact due to infection by Rugose Leaf Curl Virus".

This conclusion, which has influenced the thinking of subsequent observers does not necessarily follow since they conducted no isolations of and reinfection by any microorganisam other than *Rhizobium*.

Our experience with Safari, spanning more than 12 years is:

1. Yellowing and reddening of leaves occur in most stands at some stage; this discolouration is rarely accompanied by leaf distortion of the type illustrated in the paper by Behncken and Gowanlock (1976).
2. Experiments conducted by the second author (unpublished) and field demonstration work have shown that applications of 30 to 100 kg of fertilizer nitrogen per hectare alleviate the problem, with no recurrence of symptoms. It is of interest that similar symptoms in young stands of *Aeschynomene americana* cv. Glenn and *Lotus pedunculatus* cv. Grasslands Maku have been overcome with fertilizer nitrogen.
3. The plant pathologists report following electron microscopic examination of discoloured, distorted, stunted material was, "No evidence of either rickettsia-like organism (rugose leaf curl) or mycoplasma-like organisms (little leaf disease) was found. It is therefore highly unlikely that your Safari problem in this case is a disease".
4. Field incidence of R.L.C. disease in alternate hosts such as *T. repens*, *T. pratense* and *Medicago sativa* is extremely low. There are often volunteer white clover plants growing among discoloured Safari clover plants. We have never seen these plants showing any of the symptoms shown by the Safari clover, yet both are susceptible to R.L.C.

5. In one experiment, root knot nematodes were shown to be implicated in causing stunting and discolouration in young Safari plants. However, the characteristic root galls have not been noted in other situations.
6. Observations during the establishment phase of another experiment (Quinlan and Shaw 1978) suggested that nodulation failure and molybdenum deficiency were indeed responsible for symptoms typical of those previously described.

It therefore appears that we have accepted a premise whose foundations, to say the least, are flimsy. As a consequence, we may have conjured up a large barrier to Safari establishment, when the real barrier may only be small. A large proportion of commercial plants fail, largely due to mismanagement during the period when plants are weak. Farmers are told that the problem stems from rugose leaf curl disease and time is the cure—farmers don't have time. Nitrogen application obviously holds part of the answer, but we need an understanding of the problem if we are to tackle it. If we cannot provide a formula for more certain and rapid success, Safari will cease to be used commercially, and this will mean the loss of a potentially valuable cultivar.

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Yours faithfully
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INFLUENCE OF STOCKING RATE ON THE RECOVERY OF LEGUME IN TROPICAL GRASS-LEGUME PASTURES

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ABSTRACT

A pasture of Gatton panic (Panicum maximum), *Tinaroo glycine* (Neonotonia wightii) *and Greenleaf desmodium* (Desmodium intortum) *stocked at 2 cows ha^{-1} for three years from 1977 to 1979 rapidly lost its legume content. In spring 1979 four management treatments were imposed and legume recovery measured for the next three years. Two reduced stocking rates (1 cow ha^{-1}, one with an extra 250 kg ha^{-1} yr^{-1} of superphosphate) and destocking led to a rapid recovery of legume yield by autumn 1980 and this continued to increase with time. Maintenance of the 2 cows ha^{-1} stocking rate led to a continuing decline in legume content and yield, decreasing from 28% (1055 kg DM ha^{-1}) in autumn 1977 to 3% (118 kg DM ha^{-1}) by autumn 1981. Following destocking of this area in spring 1981 legume recovery was also rapid. It is concluded that either destocking over summer or reducing the stocking rate will lead to the recovery of twining legumes from overstocked pastures.*

INTRODUCTION

Twining tropical legumes such as *Neonotonia wightii* cv. Tinaroo and *Desmodium intortum* cv. Greenleaf are not resistant to heavy grazing (Humphreys 1980). For the