

# Paper 4

## WEEDS IN LUCERNE, WHY ARE THEY THERE, WHAT HARM DO THEY DO

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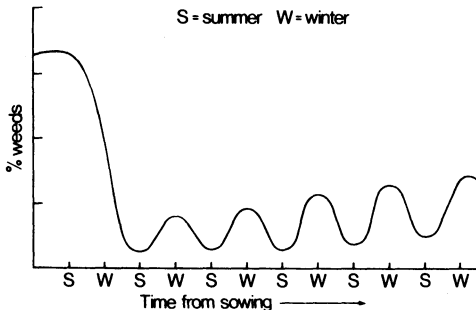
### THE LUCERNE WEED ASSOCIATION

The natural balance of lucerne/annual weeds/perennial weeds in a lucerne field from sowing in the spring through to old age and death of most of the lucerne usually takes the following course (Fig. 1). It begins with a high proportion of lucerne for the first week or so, to be followed by a dominance of summer annuals such as fathen (*Chenopodium album*), shepherd's purse (*Capsella bursa-pastoris*), and nightshade (*Solanum nigrum*) until the autumn after sowing. Winter annuals such as storksbill (*Erodium cicutarium*) or sub clover (*Trifolium subterraneum*) may take over for the winter after sowing, to be replaced by nearly pure lucerne after the first spring cut.

As the stand ages, the number of lucerne plants declines, and the gaps between them grow larger. These gaps are filled during the summer by the lucerne canopy, but there is room for more winter annuals. Finally, gaps become large enough to let in summer weeds and perennial grasses (Palmer and Wynn-Williams, 1976).

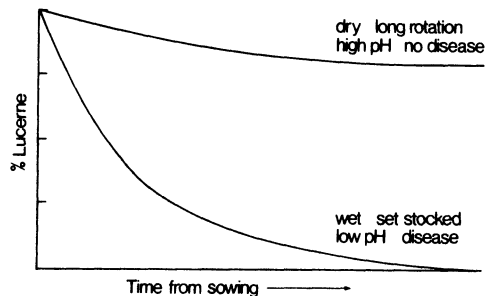
This is the succession on most lucerne areas, from lucerne, to summer lucerne plus winter annuals, to summer lucerne plus perennial weeds plus winter annuals, to perennial weeds and grasses. The succession can take place very rapidly, and on wet soils in high rainfall areas, under set stocking it can all happen within two years of sowing.

On the other hand, in low rainfall areas, on well drained high pH soils, with good rotational grazing and fertiliser treatment, and in the absence of disease, the field may stay in the summer lucerne plus winter annual stage indefinitely (Fig.2).



**Figure 1: Weed content of stands over time from sowing.**

From then on the lucerne will predominate in most summers, because if the lucerne is well managed with long periods between cuttings or grazings, it will out-compete summer weeds for light and moisture. During the winter, lucerne does not grow rapidly because of short days and low temperatures, and winter annuals fill any gaps left vacant by lucerne. The sorts and amounts of winter annuals vary with autumn moisture for germination, and with the amount of autumn cover on the lucerne which affects their establishment and early growth.



**Figure 2: Lucerne content of stands over time from sowing under different conditions.**

As one condition becomes unfavourable, it is necessary to pay closer attention to the others to maintain lucerne production and freedom from weeds.

This is one view of the lucerne/weed association. It sees weeds as a symptom, not as a cause, of lucerne decline. There is much evidence supporting this view. There is also evidence for the view that weeds themselves are a cause of lucerne decline, that weeds compete with lucerne and push it out, with the conclusion that getting rid of weeds out of runout lucerne stands will revive the lucerne. Both views are correct, depending largely on the state the lucerne weed association is at, and how much the environment and management favour weeds or lucerne.

## SEEDLING LUCERNE

In the first few months after sowing, lucerne is slow growing relative to most annual weeds and annual crops. Seedling lucerne not treated with herbicide becomes overtopped by annual weeds, and lucerne production during the sowing year is usually negligible. However, lucerne seedlings are seldom killed by annual weeds or by associated cover crops.

By the summer of the year after sowing, lucerne in which annual weeds have not been controlled will have as many lucerne plants, and produce as much lucerne, as if the weeds had been controlled in the seeding year. Similarly lucerne sown with cover crops will have as many plants and produce as much lucerne sown alone (Palmer, 1968; Clare and Mathews, 1969; Taylor, 1969a; Palmer and Wynn-Williams, 1972; Atkinson and Douch, 1973; Janson and Knight, 1973; Wynn-Williams, 1976a, 1976b; Wynn-Williams and Palmer, 1976).

On fertile soils, and under irrigation, lucerne may produce enough during its seeding year to make weed control profitable. For first year lucerne seed production, weed control from before sowing is essential. In most cases, however, weed control in seedling lucerne will not be profitable, and sowing with a cover crop will be a more profitable alternative than sowing lucerne alone.

During its first winter, herbage on young lucerne is often 90% or more winter annuals such as storksbill, sub-clover or chickweed (*Stellaria media*). Elimination of the weeds by spraying greatly reduced herbage production, without any long term benefits to the stand (Palmer, 1976).

## ANNUAL WEEDS

As stands age, the number of lucerne plants per unit area decreases. During spring, summer and autumn these plants fill all available space, but in winter there is room for winter annuals, which grow while the lucerne is dormant. These annuals are a mixed blessing. They increase production of high quality feed without greatly reducing lucerne production. But they produce seed heads which reduce pelt values, and they interfere with hay making and reduce the value of hay.

Almost all work shows that winter annuals increase the feed production from the lucerne stands in which they grow, or that spraying them out reduces herbage yields (Cassels and Upritchard, 1968; Meeklah, 1969; Logan and Arnst, 1973; Meeklah and McRobb, 1973; Rae and Patterson, 1973; Palmer, 1976).

In many cases spraying out winter annuals has increased lucerne yield in the first spring after spraying (Cassels and Upritchard, 1968; Meeklah, 1969; Taylor 1969b; Forgie, 1973; Logan and Arnst, 1973; Meeklah and McRobb, 1973; Rae and Patterson, 1973; Palmer, 1976), but not in others (Cassels and Upritchard, 1968; Meeklah, 1969; Logan and Arnst, 1973; Meeklah and McRobb, 1973; Rae and Patterson, 1973; Palmer, 1976). Spraying them out usually has no permanent beneficial effects on lucerne production (Cassels and Upritchard, 1968; Meeklah, 1969; Meeklah and McRobb, 1973; Palmer, 1976).

Lucerne has a much lower sodium content than clovers or annual weeds which commonly occur in lucerne stands. Lambs grow faster and are less likely to die on weedy lucerne than on clean lucerne (Joyce and Brunswick 1973, 1975; Jagusch *et al.*, 1977; Jagusch, Paper 9).

In summary, spraying winter annuals out of lucerne usually reduces and does not increase, the amount of spring feed available. Spraying often increases the amount of lucerne in the spring, but seldom has any lasting effects on lucerne production and may reduce feed quality. The main advantages from spraying winter annuals are a reduction in seed damage to pelts, and an increase in the market value of hay.

The present position is unsatisfactory. Winter annuals invade lucerne stands which have sufficient lucerne plants for high summer production. Spraying them out costs money, reduces total herbage production and has only temporary effects on the weed population. There is need for a less harmful winter annual, or compatible perennial to fill this gap.

## PERENNIAL WEEDS

There is a good deal of evidence that lucerne invaded by perennials will yield more lucerne if the perennials are eliminated. The evidence comes from herbicide trials (Stephen, 1964; Meeklah *et al.*, 1972; James and Atkinson, 1979), and from numerous trials of sown grass and lucerne associations which have almost invariably shown that perennial grasses depress lucerne yields (Cullen, 1965; Douglas and Kinder, 1973; Vartha, 1973).

Benefits from spraying will be greater and last longer if the basic conditions which have led to the weed invasion, such as poor grazing management, low fertility, or wet soil, are corrected (Stephen, 1964). Stands with 20 or more plants per square metre can be salvaged back to full production by appropriate management adjustment, aided by herbicides to start the process (Palmer, 1976).

## SUMMARY

After sowing, lucerne stands progress from lucerne plus summer annual weeds, to lucerne plus winter annual weeds, to pure lucerne in summer and lucerne plus annual weeds in winter, to lucerne plus perennial weeds, to perennial weeds without lucerne. The process is hastened by any factor which reduces lucernes competitive advantage; low pH, wet soil, inadequate fertiliser, and particularly poor grazing management and disease.

Spraying out annual weeds usually reduces total herbage production and reduces feed quality, but increases hay values and reduces damage to lamb pelts. It usually only temporarily increases lucerne production.

Spraying out perennial weeds can lead to permanent benefits if the basic causes of lucerne decline are corrected.

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## DISCUSSION

Q: How much of a threat is yarrow to a young lucerne stand?

Palmer: Young lucerne is non-competitive with perennial weeds. If there's twitch or yarrow present you shouldn't be sowing lucerne.