

WEED CONTROL IN LUCERNE

By T. G. SEWELL, Department of Agriculture, Gore

The principal difficulty with growing lucerne in Eastern Southland is its lack of persistency. Heavy soils of restricted drainage plus an evenly distributed rainfall provide conditions for restricted lucerne growth and abundant weed growth. Yarr (*Spergula arvensis*) and to a lesser extent fathen (*Chenopodium album*) and mouse-eared chickweed (*Cerastium glomeratum*) choke new stands, and grassy weeds *Poa annua*, Yorkshire fog (*Holcus lanatus*), and browntop (*Agrostis* spp.) invade established stands so that lucerne paddocks last about four to five years.

On the more favourable silt loams and stony soils alongside rivers lucerne grows strongly for a longer period of up to six or seven years, but it is still subject to grassy weed invasion.

WEED CONTROL BY MANAGEMENT

Lucerne is sown either after lea or a brassica crop, usually about November or December. Occasionally sowing is delayed until January to enable control of yarr or fathen by surface working.

Early sown crops have to compete with yarr in many instances. Providing the lucerne plants grow at the same speed as yarr, it is no problem. Where yarr gets ahead of lucerne, grazing with a large number of lambs reduces it and allows lucerne to compete. The following year the stand has established and is no longer troubled by yarr.

Occasionally fathen is troublesome. In practice it is usually left if the infestation is mild. If dense and liable to crowd out the young lucerne plants, topping with a mower will give control.

In established stands *Poa annua*, Yorkshire fog, and to some extent browntop start to invade the stand about the second or third year. Infestation becomes progressively worse and in about five or six years the lucerne has become unproductive or has run out.

The speed of infestation is quicker on the heavier, moister soils and *Poa annua* can invade strongly the year following sowing. On the lighter, more freely drained soils infestation takes longer. To check grassy weed infestation grubbing with a cultivator fitted with fine lucerne points has been used after the second and third cuts in the drier period of the year. One farmer has been doing this successfully for the last three or four years by giving four strokes 2 in. deep; two on the cross and two on the diagonal. There has been no reduction in yield and his cuts compare with the best obtained in the district. However, now the stand is four or five years old and he resorted to spraying with dalapon last season, 1959, to control *Poa annua*, Yorkshire fog, and browntop.

In general grubbing of lucerne stands is not advocated. Most farmers use the implement on hand which is usually a conventional cultivator with narrow tynes, but it is set in too deeply and lucerne plants as well as grassy weeds are ripped out. Furthermore, a shower of rain often occurs shortly after grubbing and grass plants reroot. It is regarded more as a kill or cure method of weed control after the stand has run out.

Grazing too has been advocated as a method of reducing grass weeds. Under the climatic conditions that prevail it is my opinion that the only time that grazing should be done is when the lucerne plants are dormant in late June and July, and stock should be removed at the end of July-early August before growth starts. Some grassy weeds may be removed. Earlier grazing in the autumn and early winter reduces the top growth of lucerne and lets in light which encourages grassy weed growth. Furthermore, the lucerne plant is weakened at a time when it is building up its root reserves and commencement of growth is delayed in the spring.

Dalapon has proved an effective means of removing most grass weeds from lucerne stands, but will be dealt with in detail later.

TOPDRESSING WITH POTASH

In the course of potash trials on lucerne it was observed that the heavier rates of potash of up to 3 cwt per acre gave vigorous growth responses and, more important, tended to suppress grassy weeds. On the control plots there was considerable *Poa annua* and Yorkshire fog among stunted lucerne.

The following year a trial was laid down in duplicate comparing rates of potash with and without dalapon. There was a basal dressing of 1 ton of lime and 3 cwt of superphosphate crossed by 1 cwt and 3 cwt of muriate of potash. Half of these plots were sprayed with 5 lb of dalapon per acre. The trial was laid down in late August 1958 and was topdressed with potash and superphosphate in early September 1959.

The plots with no dalapon and no potash have the typical appearance of a run out unthrifty stand that should be ploughed up. Where dalapon but no potash had been applied lucerne plants are still present, and there is very little *Poa annua* and fog, but there is little growth from lucerne. Where 1 cwt of muriate of potash has been applied with dalapon there is considerable improvement in lucerne and no grass, but where 3 cwt of muriate of potash has been applied without dalapon there is excellent growth of lucerne, as good as or better than 1 cwt of potash plus 5 lb of dalapon. The lucerne is growing vigorously and grass has been suppressed and offers no competition to the lucerne. Therefore, before spraying dalapon on unthrifty grass infested lucerne, it would be advisable to apply 1 to 3 cwt of muriate of potash, as the lack of vigour may be due to lack of the right plant nutrient rather than inability to compete with grassy weeds.

CHEMICAL WEED CONTROL

In the spring of 1956 some strips of dalapon and TCA were sprayed across a paddock of run out lucerne that was being used for grazing. There was no thought of keeping it for hay. The trial compared rates of a mixture of dalapon and TCA at 5 lb and 5 lb, 10 lb and 10 lb, and 12 lb and 12 lb each. It was inspected the following summer and autumn. Vigorous growth of lucerne had taken place and a cut of hay was taken. The main grasses were browntop, Yorkshire fog, and a little perennial ryegrass (*Lolium perenne*) and cocksfoot (*Dactylis glomerata*). All had been considerably reduced and there appeared to be little damage to the lucerne from any treatment.

Meanwhile five paddocks were treated in the spring of the same year with a mixture of 5 lb of dalapon and 5 lb of TCA. Again considerable success was obtained. Most of these early stands were treated in the vicinity of Waipahi and Waikaka Valley. The stands were well infested with *Poa annua*, Yorkshire fog, and browntop. Some of them were up to six and seven years old and at the stage when normally they would be ploughed up.

In all instances outstanding improvements resulted and the stands lasted a further two years.

The following year as a result of this early success with five paddocks, several hundred acres of lucerne were treated over a wide area from Waipahi in the north-east to Lumsden and Mossburn in the west, and spraying with dalapon has been continued on a similar scale over the last three to four years.

NEW STANDS

Meanwhile the butyrics came on the market and 2,4-DB was used in a similar fashion. One or two paddocks were tried out and then it was applied on a fairly wide scale. However, the area of young stands treated with 2,4-DB was small compared with areas treated with dalapon.

In young stands 2,4-DB has been used to control nodding thistle (*Carduus nutans*), Scotch thistle (*Cirsium lanceolatum*), fathen, and docks (*Rumex* spp.). Over a period of years it has been found that 2,4-DB is best used about 10 months after sowing. If it is used in the same season, for instance within two or three months of sowing, there is a fairly substantial check in the growth of lucerne. Therefore, it is expedient to leave it

until the following early spring. If this is done, Scotch thistle and fathen are no problem. Docks are still a problem. Most plants are regrowths from old roots and as such are not controlled by 2,4-DB. Therefore, the only weed that it is practical to control is nodding thistle. Thus it would appear that 2,4-DB has limited uses in the treatment of weeds in young stands in this area.

ESTABLISHED STANDS

By far the most important type of weed control in lucerne is the removal of grassy weeds. *Poa annua* and Yorkshire fog invade rapidly under moist conditions and the history of the paddock is most important in relation to the speed of grassy weed invasion. Out of lea *Poa annua* and Yorkshire fog invade the stand rapidly and in some instances need to be treated in the spring following sowing. But where lucerne is sown after one or two crops grassy weed invasion is not so rapid and the stand is relatively free for two or three seasons.

Another aspect which has already been stressed is the nature of the soil. On soils of high moisture content or heavy soils grass invades more rapidly, particularly Yorkshire fog and *Poa annua*.

The wet conditions tend to inhibit the growth of lucerne but encourage the rapid growth of *Poa annua* and Yorkshire fog and to some extent browntop. These grasses can invade the stand within 10 months of sowing.

In the drier areas on free draining soils grass starts invading about two to three years after sowing and if dalapon is applied there is good control for a further two to three years providing adequate topdressing is applied.

APPLICATIONS

Applications necessarily vary according to the variety of the principal weed grasses. On older stands where *Poa annua* and browntop are present 4 to 5 lb of dalapon in 15 gallons of water gives adequate control. Where Yorkshire fog and creeping fog (*Holcus mollis*) are present from 5 to 7 lb per acre is necessary. On the younger stands of one to two years 3½ to 4½ lb give adequate control where *Poa annua* or browntop are the principal species.

One further aspect is patch treatments. In the lower lying areas of any particular paddock *Poa annua* invades rapidly and could be treated annually. For instance there may be one acre in 10 and if left untreated the grass will spread rapidly from these centres. It has been found expedient to give an annual application to these patches, where *Poa annua* and fog are the principal grasses.

TIMES OF SPRAYING

Initially stands were treated in the early spring at the end of August or early September, but it has been found that the best time of application is in September or October after the grass and the lucerne have commenced active growth and both are at the optimum height of about 2 to 3 in. The type of season necessarily determines the time of spray application. In seasons of early spring growth September applications will give good control. On the other hand in a late spring treatment may have to be delayed until October. If treatments are carried out before the period of active growth, control can be good in the initial stages, but recovery of grass, namely *Poa annua*, browntop, and fog, can be rapid and it may be necessary to spray again the next year. Where large areas have to be treated by one operator it may be necessary to graze the height of, say, 2 to 3 in. to enable the dalapon to reach the grasses.

CHECKS IN GROWTH

All applications can check the growth and bulk of the first cut in the normal season and checks of up to half the yield have occurred, but the subsequent second and third cuts have been correspondingly better. The total yield for the three cuts is the same or slightly better than if left untreated.

The reduction in yield is due partly to the removal of the grass which cuts down the bulk and partly to the depressing effect of dalapon on the lucerne.

If prolonged dry spells occur after treatment, the effect on the lucerne appears to last over the second and the third cuts. However, owing to the nature of the soil in many of the areas the growth of lucerne is dependent to a large extent on rainfall, so that the slow growth of the second and third cuts could be due in large measure to the lack of rainfall rather than to the effect of the dalapon itself.

CONCLUSIONS

In conclusion there are various methods of controlling weeds in lucerne, by management, with chemicals, or by topdressing. Each method has a place under particular conditions and according to the weed present.

1. Yarr in new stands can be controlled by grazing.
2. Fathen can be controlled by mowing.
3. Scotch thistle is kept in check by normal hay cuts.
4. 2,4-DB has little place except for the control of nodding thistle.
5. Dalapon is valuable in controlling grassy weeds:
 - (a) Where *Poa annua* and browntop are present:
 - (1) In young stands of one to two years apply $3\frac{1}{2}$ to $4\frac{1}{2}$ lb of dalapon per acre.
 - (2) In older stands of two to three years or more apply 4 to 5 lb per acre.
 - (b) Where Yorkshire fog and creeping fog are present apply 5 to 7 lb per acre.
6. Before resorting to control it is very necessary to ensure that poor growth of lucerne and grassy weed infestation are not due to poor fertility caused by the lack of adequate topdressing, particularly potash.

ACKNOWLEDGMENTS

Mr A. L. Moore, weed spraying contractor, is thanked for the information given on the applied aspects of chemical weed control—2,4-DB and dalapon.

DISCUSSION

Q.—There appear to be district differences due to soil or climate perhaps in the effect of 2,4-DB on seedling lucerne. In my experience, unlike that mentioned in the paper, I have had good control of seedling weeds including docks in young lucerne without any detrimental effect on the crop.

A.—There is no particular advantage in using hormone weedkillers where other methods are successful.

Comment: Under very moist soil conditions 2,4-DB has a very severe effect on seedling lucerne.

Q.—What were the rates of 2,4-DB?

A.— $1\frac{1}{2}$ lb of 2,4-DB per acre.

Comment: I have done three to four years' work with 2,4-DB on seedling lucerne. Its action is very slight, 7 per cent reductions from up to 3 lb per acre on 1st cwt and do get a very marked subsequent increase on treated areas. It is very good for control of seedling fathen, much better than mower.

Q.—Have you any comparisons between good well-looked-after lucerne stands grazed and ungrazed?

A.—No direct comparison. Lucerne stops growing earlier than grasses and so grazing encourages the establishment of grasses.

Comment: In Auckland area there is a problem in establishing lucerne because of *Amaranthus*. $1\frac{1}{2}$ lb of 2,4-DB in seedling lucerne gave 100 per cent control with no effect on the lucerne.

Q.—Have you tried cutting old docks with a rotary hoe so that docks may be controlled with 2,4-DB? Do you think it may be useful?

A.—In practice it is not done, though it could be done.

Q.—Were your comments on the use of 2,4-DB based on district practice or experimental evidence? Overseas evidence as well as Department of Agriculture work shows weeds do most damage to lucerne while it is in the seedling stage. We have had very good results in trials with 2,4-DB.

A.—Results are based on district practice.

Comment: In North Island usual practice is to sow in autumn. With the use of 2,4-DB spring sowings can be made and a cut taken before autumn.

Comment: I agree with Mr Sewell that 2,4-DB knocks lucerne about without substantially controlling weeds.

Comment: In Taranaki we cannot establish spring lucerne without 2,4-DB.

Comment: I agree farm management can substantially reduce weeds in lucerne. I think annual weeds are an assistance in keeping out grass weeds which are the real trouble.

Comment: 5 lb of dalapon has been experimentally found to be very necessary for good weed control in lucerne.

A.—The most important thing to do is to go into the winter with plenty of top on. You will do more good with increased vigour than with weed-killers. Also get lucerne growing vigorously.