



DEPARTMENT OF AGRICULTURE, SOUTH AUSTRALIA

## Agronomy Branch Report

THE USE OF HERBICIDES FOR WEED CONTROL IN

PASTURE SEED CROPS

PART I - LEGUMES

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Report No. 28

DEPARTMENT OF AGRICULTURE - SOUTH AUSTRALIA

AGRONOMY BRANCH REPORT No. 28

THE USE OF HERBICIDES FOR WEED CONTROL IN PASTURE

SEED CROPS

PART I - LEGUMES

A report of work carried out by the Department of  
Agriculture and others from 1966 to 1971 mainly  
in the South-East of South Australia

by

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INTRODUCTION

Over the last few years there has been great interest shown in seed crop production as a means of diversifying farm enterprises. Growers very quickly realised the necessity for effective and economical weed control. This has become even more essential with falling prices for seed in increasingly discriminating markets, both local and export.

Mr. P.M. Kloot, Research Officer and Mr. J.H. Dawes formerly Field Officer in the Department of Agriculture have carried out a series of trials in recent years to ascertain suitable herbicidal techniques of controlling weeds in pasture seed crops. The reports of their trials on established lucerne and strawberry clover, seedling lucerne and annual legumes are recorded in this publication.

A second part dealing with weed control in pasture grass seed crops will be published in the near future. That volume will include a chemical and weed index for both parts.

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## ESTABLISHED LUCERNE SEED CROPS

The production of lucerne seed is the most widespread seed-growing enterprise in South Australia. Stands may be irrigated but in a large number of cases they are dryland. In the latter case yields are lower and the returns do not justify the use of expensive herbicides. As a number of varieties of lucerne are grown it would appear that the possibilities of different varieties in either a dryland or irrigated situation would greatly complicate these investigations. It has been found over the years, however, that in the South Australian environment, all present varieties of lucerne, irrigated or not, respond similarly to herbicides.

This has greatly reduced the experimental work required and simplified the issuing of recommendations. Slightly different recommendations are given for irrigated and dryland stands, but these are reflections of economic differences.

The weeds to be controlled in lucerne crops in South Australia include grasses, particularly barley grass, annual ryegrass and brome grasses and broadleaved weeds such as wireweed, capeweed, salvation Jane, a number of cruciferous weeds and various types of thistles. Sorrel is not a problem in established lucerne.

### I. NON-HERBICIDAL CONTROL METHODS

These methods do not involve the large cash outlay required in purchasing herbicides. They are therefore attractive to the dryland grower or to a non-specialist grower who does not have the expertise or equipment of the specialist.

#### Renovation

This is confined to dryland stands. It not only controls weeds, but invigorates the stand. It is generally carried out on heavy soils every two years, but at longer intervals say, three to four years on light soils.

#### Grazing and Mowing

Both these methods rely on the inability of annual weeds to regenerate late in the plant's life.

No experiments were carried out involving non-herbicidal control of weeds.

## II. HERBICIDAL CONTROL METHODS

Prior to the work reported here, the chemicals generally used were the bipyridyls - diquat and paraquat for controlling broad-leaved and grassy weeds respectively. The cost and the lack of residual action were the disadvantages of these chemicals.

Some informal preliminary work was carried out prior to 1968 by officers of the Pasture Section.

### 1968 WEED CONTROL IN ESTABLISHED LUCERNE SEED CROPS EXP. NO. WE 92 I (68)

This experiment consisted of a number of replicated logarithmic strips. The planning of the experiment was carried out by the Pasture Section.

#### Experimental

The trial was laid down at Kongal on a healthy even stand of irrigated Hunter River lucerne six years old. Logarithmic strips were applied using a landrover mounted Chesterford unit. The spraying was carried out on 14th May, 1968. The weather was fine with 60 per cent cloud cover, and a slight easterly breeze blowing. The soil was quite moist being close to field capacity. The lucerne had been grazed and regrowth was up to four inches high, a considerable weed germination had occurred and seedlings of the following species were noted; wireweed, sub. clover, capeweed, storksbill, sorrel, barley grass, lovegrass, annual ryegrass.

The chemicals applied at the respective peak doses were asulam 8 lb. a.i./acre, M & B 8882 8 lb. a.i./acre, carbetamide 6 lb. a.i./acre, terbacil 8 lb. a.i./acre, diuron 8 lb. a.i./acre. Observations were made periodically through the season.

#### Observations

Terbacil at rates from the peak dosage to about 2.5 lb. a.i. severely affected the lucerne. At lower rates weed control was still excellent, particularly of grasses. A rate of  $\frac{1}{2}$  lb. a.i. was apparently the lowest resulting in complete weed control. At lower rates, the lucerne was slightly retarded but later observations revealed a complete recovery.

Diuron gave a similar sort of result, except that there was a complete recovery of lucerne up to 6 lb. a.i. of applied chemical. Residual effects at lower rates were dissipated too quickly for the weed control observed at the early observations had disappeared by mid-spring. The range 1-2 lb. was most promising.

Carbetamide gave good grass control for almost the length of the plot. The promising rates were in the vicinity of 1 lb. a.i. Asulam gave a good result only at the highest rates. The lucerne tolerated the chemical at all rates, but the other chemicals were far superior at controlling weeds. M & B 8882 did not provide a satisfactory standard of weed control.

A further observation of interest is that on 11th June, 1969 (i.e. approximately 13 months after spraying) terbacil and high rates of diuron were still exerting a weed control effect.

As a further point of interest it was realised that in retrospect that observations made two months after spraying gave a satisfactory assessment of each herbicide's respective capabilities. Further observations only confirmed those made previously.

### Conclusions

It was decided to proceed further with the herbicides diuron, terbacil and carbetamide at the respective rates which appeared promising.

### 1969 WEED CONTROL IN ESTABLISHED HUNTER RIVER LUCERNE EXP.

WE 92 I (69)

More than any other pasture seed crop, lucerne, both irrigated and dryland is of particular importance in South Australia. It is the most widespread seed crop and there is a large and continuing demand for seed to sow fodder stands. A series of weed control trials in an established lucerne seed crop was commenced in 1968 when a number of herbicides were applied in logarithmic strips. This work was continued and this paper reports a subsequent replicated trial arising from the initial work. Comments about some further logarithmic strips are also included.

### Experimental

The trial was laid down at Kongal on a vigorously-growing, even stand of irrigated Hunter River lucerne (Medicago sativa cv. Hunter River). The stand was seven

years old. The plots were sprayed on May 29th, 1969. The day was mainly overcast with occasional sunshine; no rain fell for at least 24 hours before or after spraying. A slight cross wind was blowing. The air temperature was about 55°F. The soil, a clayey-loam, was approaching field capacity at the time.

At spraying, the crop was generally four to six inches high and the most common weeds were barley grass, ryegrass, bromegrass, sowthistle and wireweed. Generally, these were about two or three inches high at the time of treatment.

The following chemicals were used; carbetamide (Carbetamex (R)), a 30% w/v emulsifiable concentrate, diuron (Karmex (R)) and terbacil (Sinbar (R)), these latter two being 80% w/v wettable powders.

They were applied with a portable carbon dioxide pressure sprayer applied through a single jet at 30 p.s.i. The three chemicals were applied as follows:

	<u>Ounces a.i./acre</u>		
Carbetamide	8 (C1)*	16 (C2)	24 (C3)
Diuron	8 (D1)	16 (D2)	24 (D3)
Terbacil	8 (S1)	16 (S2)	24 (S3)
Control	(Cont.)		

\* Reference symbols for treatments as used in this paper.

This corresponded to the following product rates:

	<u>Rate of product per acre</u>		
Carbetamide	1 1/3 pt.	2 2/3 pt.	4 pt.
Diuron	1 1/8 lb.	1 1/4 lb.	1 7/8 lb.
Terbacil	1 1/8 lb.	15/16 lb.	1 1/4 lb.

The plots were one-thousandth of an acre in area and the experiment was replicated four times in a randomised block design.

Observations were made during the season and seed yields were taken from square metre quadrats. Samples from the yields were submitted for standard germination tests as required for certification by Seed Testing Station of the South Australian Department of Agriculture.



Two logarithmic strips were laid adjacent to the trial. These were bromacil (Hyvar X (R) ) at peak dosage 4 lb. a.i. per acre, and RH 315 (Kerb (R) ) at peak dosage 3 lb. a.i. per acre. Bromacil was investigated as it is a simpler analogue to terbacil and therefore is cheaper. These strips were laid on similar material to the main trial on June 11th, 1969 and were observed through the season.

## RESULTS

TABLE 1. THE EFFECT OF HERBICIDE TREATMENT UPON THE SEED YIELD OF HUNTER RIVER LUCERNE

Treatment	C1	C2	C3	D1	D2	D3	S1	S2	S3	Cont
Seed Yield <sup>+</sup> per quadrat (gm)	29.4	19.3	19.0	17.8	27.5	21.9	23.9	25.6	20.4	21.7

<sup>+</sup> Mean of four replicates.

TABLE 2. THE EFFECT OF HERBICIDE TREATMENT UPON THE NORMAL GERMINATION OF SEED OF HUNTER RIVER LUCERNE

Treatment	C1	C2	C3	D1	D2	D3	S1	S2	S3	Cont
Percentage <sup>+</sup> normal germination	65.1	69.4	70.1	63.9	64.8	70.1	66.9	67.6	66.8	60.1

<sup>+</sup> Mean of four replicates.

TABLE 3. THE EFFECT OF HERBICIDE TREATMENT UPON THE PROPORTION DEAD AND ABNORMAL SEED OF HUNTER RIVER LUCERNE

Treatment	C1	C2	C3	D1	D2	D3	S1	S2	S3	Cont
Percentage <sup>+</sup> of dead and abnormal seed	15.7	10.0	8.0	15.9	13.2	8.2	11.8	10.2	14.2	14.2

<sup>+</sup> Mean of four replicates.

TABLE 4. THE EFFECT OF HERBICIDE TREATMENT UPON THE PROPORTION OF HARD SEED OF HUNTER RIVER LUCERNE

Treatment	C1	C2	C3	D1	D2	D3	S1	S2	S3	Cont
Percentage <sup>+</sup> of hard seed	19.3	20.4	21.4	19.4	21.9	21.3	21.1	21.8	18.9	26.4

<sup>+</sup> Mean of four replicates.

It was noted that terbacil very quickly showed its superiority in controlling weeds. Even at the lowest rate the control obtained was most satisfactory. The two higher rates initially depressed the vigour of the crop, although the ultimate yield was not significantly affected (Table 1). Increasingly greater rates of diuron gave more complete weed control, but even at the highest rate, barley grass did appear again. At the lowest rate, wireweed again grew on the plots within a month of spraying.

Carbetamide did not control sow-thistles which grew quite prolifically on the plots in spring. They did not, however, in any way affect the harvesting. The two higher rates gave a clean crop, excepting thistles, but some crop suppression was apparent.

On the logarithmic strips it was found that bromacil at all rates did not provide a satisfactory degree of weed control. RH 315 gave very promising results. It appeared to stimulate the lucerne along the whole plot relative to unsprayed areas and weed control was satisfactory to 1 lb. a.i./acre for a seed crop and to 4 oz. a.i./acre for a commercial fodder stand. Composites and cruciferous weeds were not controlled.

The results were not conclusive as variation within treatments was very great. There were no significant differences between treatment and control figures for each of seed yield (Table 1), percentage germination (Table 2), percentage of dead and abnormal seed (Table 3) or hard seededness (Table 4).

In Table 3 it is apparent that the highest rates of carbetamide and diuron decreased the proportion of dead and abnormal seed to an extent almost significant at the 5% level. The reasons for this are unknown.

### Discussion and Conclusions

In the absence of significant differences in the results, our recommendations may be established on effectiveness of weed control and cost. Terbacil is most effective but diuron at half the price or less does an acceptable job. Both are therefore recommended and the grower may make his own decision. It is known that on a heavier soil rates must be higher. Our recommendations are:

Terbacil	0.5 - 1.0 lb. a.i.
Diuron	1.0 - 2.0 lb. a.i.
	(Higher rates for heavier soils).

For grass control, carbetamide is useful at rates between 16 and 24 oz. a.i.

### 1970 WEED CONTROL IN ESTABLISHED LUCERNE EXPT. NO. WE 92 I (70)

The experiment was planned to further investigate the promising results shown by RH 315 in 1969. As a standard treatment terbacil was used. Also, as in 1969 there had been reports that the formulation of diuron made by ICIANZ (Diurex (R)) did not perform as well as the original DuPont product (Karmex (R)) it was decided to compare these two products for controlling weeds in lucerne.

### Experimental

The trial was laid down at Kongal on a different portion of the same stand used for the 1969 trial. The plants were therefore eight years old. The plots were sprayed rather later than is normal as the previous crop had been harvested very late and trash removal was consequently delayed. It should be noted that the weeds were slightly delayed also, i.e. they were not as advanced as would be expected for the time of the year. The plots were sprayed on July 2nd 1970. The ground was at field capacity.

Chemicals were applied using a portable CO<sub>2</sub> pressure spray unit. Treatments were applied as follows:

RH 315	$\frac{1}{4}$ lb. a.i./acre	$\frac{1}{2}$ lb.	1 lb.	$1\frac{1}{2}$ lb.	2 lb.
Karmex (R)	$\frac{1}{2}$ lb. a.i./acre	1 lb.			
Diurex (R)	$\frac{1}{2}$ lb. a.i./acre	1 lb.			
Terbacil	$\frac{1}{2}$ lb. a.i./acre	1 lb.			
Control -	Unsprayed.				

The plots were one-thousandth acre and the treatments were replicated three times. Observations were made during the season but it was not possible to harvest the trial.

Logarithmic strips of the following chemicals at the respective peak dosages were also laid down (4th August 1970).

Fluometuron P.d.	5 lb. a.i./acre
H722	3 lb.
Lenacil	5 lb.
CP50144	4 lb.
GS14254	3 lb.
Asulam	4 lb.
VCS438	5 lb.
Methabenzthiazuron	2 lb.

### Observations

On September 14th, 1970 the trial was inspected. In the replicated trial it was found that the unsprayed plots were very grassy. The grasses present were mostly annual grasses - brome, ryegrass and barley grass. Some thistles and capeweed were observed and a few mustard and sorrel were present also.

Terbacil at the lower rate had removed all weeds with the exception of some large grass clumps which were well established at spraying. At the higher rate there was a total removal of all weeds leaving completely clean plots.

The two formulations of diuron gave similar results at equal rates. At the lower rate, a moderate reduction (about 30%) in the amount of grass was noted. At the higher rate, there was a greater reduction of grass (about 90%). Capeweed, however, was still prominent, only a very slight reduction being noted.

Except for the lowest rate of RH315, all rates gave good grass and wireweed control. At the top three rates (i.e. over 1 lb. a.i./acre) no grass or wireweed was present on any of the plots. Capeweed and thistles were growing vigorously, but no sorrel was apparent in the plots sprayed with RH315.

In the logarithmic strips no damage was recorded to the lucerne on any strips. However, H722, CP50144, asulam and methabenzthiazuron, while having a slight action on broad-leaved weeds, all left the grasses and there appeared to be little point in pursuing these.

Fluometuron to 4 lb. a.i., lenacil to about  $2\frac{1}{2}$  lb. a.i., GS 14254 to  $1\frac{1}{2}$  lb. a.i. and VCS 438 to  $2\frac{1}{2}$  lb. a.i. did remove seedling grass and left the plots quite clean. The latter three of this group did not however, give satisfactory control to grass clumps which had been well established at spraying.

On the 2nd November, 1970, observations confirmed earlier impressions. Except at the lowest rates RH 315 continued to give outstanding grass control but in the absence of competition, the resistant sowthistles were growing vigorously in the plots. The lucerne was competing strongly and by harvest the sowthistle would no longer be present to contaminate the sample. Although no measurements were made it is reasonable to assume that the lucerne would be checked to some degree by the competition.

On the control plots, by way of contrast, sowthistles were not prominent as the thick stands of brome and barley grasses had provided massive competition to any other species.

It was found that at both rates of terbacil the position had not changed. The well established grasses that had not been controlled by the low rate had continued to grow and had become quite large. Apart from these, there were no other weeds on the low rate plots and no weeds at all on the higher rate.

Both formulations of diuron at the low rate had allowed considerable reinvasion by grasses, at the high rate, control was fair.

On the logarithmic strips, fluometuron, lenacil and GS 14254 continued to provide adequate control at the high rates that had done so previously. VCS 438 however, had lost its usefulness and weeds had invaded the full length of the plot.

## Conclusions

In the absence of yield data, the following conclusions were reached on the basis of the visual observations.

Under the conditions of this trial there were no differences between the two formulations of diuron. It is understood that since the previous year, modifications had been made to the formulation technique of Diurex (R) and no further trouble need be expected. It is noteworthy that terbacil consistently performed better than diuron.

The performance of RH 315 was outstanding in controlling grasses at low rates. Coupling its abilities in this regard with its safety to the crop and also that it is selective for Rumex spp., it is obvious that this product would have a good potential in this State. Especially, so, in cases of severe dock infestation which occur in well-watered areas. The upsurge of broad-leafed weeds, especially composites, does present a problem.

Of the other chemicals, fluometuron, lenacil and GS 14254 showed promise but they did not possess any great advantages over diuron and were not as effective as terbacil in this situation. In the particular circumstances of this trial, the herbicides were applied late and more encouraging results may have been obtained if spraying had been earlier. This is most likely in the case of CP 50144.

It was shown that the crop tolerated up to 4 lb. a.i. of asulam which confirmed earlier work of May and Baker Pty. Ltd. The range of weeds controlled is not large and does not include grasses, however there may be some advantages to using this chemical in a dock-infested stand.

## 1971 WEED CONTROL IN ESTABLISHED LUCERNE EXPT. NO. WE 92 I (71)

Although it was planned to pursue some of the matters raised in the previous years' work, due to staff changes in the Department it was not possible for this work to proceed.

However, a co-operating grower at Marrabel in the Lower-North who had been using the diuron recommendation successfully, made an area available to various firms and ourselves to test our recommendation and other experimental material in another environment. The effects were quite similar to those recorded in the South-east. They are reported in an addendum at the end of this section.

Other Work Recorded

Since this Department has begun screening herbicides for pasture seed crops, various chemical companies have begun their own work. There has been close co-operation between the officers of this Department and their counterparts from industry at all times.

In the years under review, trials on established lucerne carried out by Geigy (Aust.) Pty. Ltd. (now CIBA - Geigy (Aust.) Ltd.) and May and Baker Pty. Ltd. were inspected. Also, various treatments applied by growers on an experimental basis were seen. From the more important of these the following points are noted:

1. Bromoxynil at 3 pints/acre applied towards the end of winter has no deleterious effect on lucerne and controls broad-leaved weeds over a wide spectrum. (Grower trial 1970).
2. GS14254 is a replicated trial controlled weeds more effectively than appeared in Expt. No. WE 92 I (70 above). The application was more timely. (2 trials - Geigy 1970).
3. At Marrabel carbetamide at 5 pt. product/acre applied in early winter removed grass and chickweed from established lucerne. The broadleaved weeds, capeweed, subterranean clover, salvation Jane and star thistles were however, not affected. At 4 pt./acre the weed control appeared equally effective.

On the same property, in a separate trial, 16 oz. a.i./acre bromoxynil completely removed salvation Jane and a range of cruciferous weeds without harming established lucerne. Erodium or storkbill was not affected and as a result of the decreased winter competition was thickening between the lucerne plants. (May and Baker 1970).

As a result of all of the work and observations reported above, and from information gleaned from other sources, recommendations for weed control in lucerne were published in February 1971 in "Weed Control in Established Lucerne Seed Crops". Journal of Agriculture (South Australia) 74: 102-108. This was reprinted as leaflet No. 3972 of the Department of Agriculture and distributed widely in the Seed Industry. Subsequently the article was republished in "Australian Seeds Review" Vol. 2 No. 1. Autumn 1971.

With some slight modifications (especially lowering the rate of terbacil) the recommendations were included in "Herbicides for Weed Control 1971-72" published in June 1971 by the S.A. Department of Agriculture.

ADDENDUM

1971 WEED CONTROL IN ESTABLISHED LUCERNE EXPT. NO. WE 92 I (71)

A number of treatments were applied by various firms and the landholder to a stand of Hunter River lucerne at Marrabel in the Lower North. This was a necessary step to test recommendations in another environment.

The treatments used are as follows:

Diuron 2 lb./acre product. This was the farmer's application over the greater part of the stand and it did an excellent job giving almost total weed control between the lucerne plants. Capeweed was completely removed but some grass remained.

Etazine 3851 3 lb./acre product. This is the commercial formulation of GS14254. Initially the lucerne yellowed but quickly recovered. Control of some grass and capeweed was slow but by mid-season there was less than one weed (usually capeweed) per square yard.

Carbetamide 4 pt./acre product. Complete grass control was obtained but a resulting upsurge in capeweed shows the necessity for a broad-leaved herbicide to be used in association.

Carbetamide 4 pt./acre product and 2,4-DB 2½ pt/acre product. This treatment completely controlled all weeds at the outset but later in the season capeweed appeared due to the lack of residual action on broadleaved weeds.

Bromoxynil 1¼pt. product/acre. Capeweed and salvation Jane was excellent but as soursob and storkskill are resistant these weeds thickened. The lucerne appeared to be checked slightly compared to other treatments.

2,4-DB 2½pt. product/acre. Broadleaf control was excellent. The advantage to the grass ensured that further broadleaf infestations were prevented. The lucerne was not adversely affected.



Terbacil 1 lb. product/acre. Weed control was complete except for capeweed which this product almost completely missed. The lucerne was not harmed but by mid-season, the plot was lucerne and capeweed.

Unsprayed. The ground was completely covered between the lucerne plants from early in the season with a mixture of annual grasses, capeweed, clover, storksbill, salvation Jane and some soursob. On another stand IPC 4 lb./acre WP gave very weak broadleaved weed control far inferior to diuron.

The above indicates that in the South-east, where capeweed is less of a problem in lucerne stands, terbacil is satisfactory. Diuron, however is better value because of the more complete control spectrum. There is a longer residual effect with terbacil so that attempts to formulate mixtures of the two should be worthwhile. On economic grounds, diuron is superior to terbacil anyway. The carbetamide/2,4-DB treatment is promising, but the lack of residual action is a disadvantage. Etazine 3851 (containing GS14254) is most promising and worked well here as in the South-east. It appears to be an acceptable alternative to diuron.

ESTABLISHED STRAWBERRY CLOVER SEED CROPS

Strawberry clover is not a very important seed crop in South Australia. It is of interest in that it is the only other perennial pasture legume at present grown regularly for certified seed in this State. In the period of this report a small amount of screening has been done. This work is reported below.

WEED CONTROL IN STRAWBERRY CLOVER WE 92 VIII (68)

This trial was planned by Officers of the Pasture Section. The chemicals and their rates of application were chosen on the basis of overseas performance.

Experimental

The trial site was a stand of O'Connors strawberry clover sown in 1966. In 1967, the area had been treated with diuron at 2 lb. product/acre. Six weeks prior to the experiment, the whole area including the trial site was sprayed with one pint of paraquat. At the time of spraying, a number of weeds had regrown and were half to one inch tall. The weeds on the site were barley grass, brome and annual ryegrasses, wireweed and silver grass. The crop although still dormant was well established and fairly dense.

The trial was sprayed on 7th August, 1968. The ground was saturated, and it was a cold, cloudy day with a slight wind blowing.

The chemicals applied through a portable CO<sub>2</sub> sprayer were:

Diuron	8	16	24 oz. a.i./acre
Norea	8	16	24 oz. a.i./acre

One treatment was handweeded, and the surrounding crop served as a control.

The rates of chemical corresponded to  $\frac{5}{8}$ ,  $1\frac{1}{4}$  and  $1\frac{7}{8}$  lb. respectively of each product.

Observations

First observations on 18th September, 1968 indicated that diuron had checked the crop but had given very good control. The result was clearer at the highest rate and less so at the other rates, but the control even at the lowest rate

appeared adequate. Norea also checked the crop. Grass control was adequate at all rates, but the control of wireweed was minimal. As wireweed is quite a problem the inability of the chemical to control wireweed is a liability.

Three months later, no effects due to chemicals were discernible apart from the general control of annual grasses given by the early application of paraquat.

No positive conclusions were drawn from this experiment and no work was done until 1970.

### WEED CONTROL IN STRAWBERRY CLOVER WE 92 VIII (70)

Having gained experience with other legume seed crops, attention was turned back to strawberry clover in 1970. A number of chemicals were investigated in logarithmic strips with a view to proceeding on in 1971 to replicated experiments designed to provide yield data and other measurements. Unfortunately this last step did not eventuate.

#### Experimental

A third year stand of Palestine Strawberry Clover at Struan was sprayed with logarithmic strips with a Chesterford mini-logarithmic sprayer. The crop was sprayed on 21st July, 1970. The area had been sprayed previously with MCPA. However a residual herbicide to cope with successive germinations of wireweed especially was needed. At the time of spraying, annual grasses and chickweed were present and thistles and wireweed were germinating. The chemicals applied and their respective doses were:

Dacthal	10 lb. a.i./acre
RH 315	3 lb.
Diuron	3 lb.
Floumeturon	4 lb.
Bromacil	3 lb.
Paraquat	8 oz.
Diquat	8 oz.
Diquat and Paraquat	8 + 8 oz.
MCPA	2 lb.
2,4-D amine	1 lb.
H 722	3 lb.
Methabenzthia- zuron	3 lb.
Bromoxynil	12 oz.

Terbacil	2 lb.
GS 14254	3 lb.
Diuron and	3 lb. and
Paraquat	2 oz.

### Observations

The herbicides, at the time of observation on 26th September came into two clear categories. The first group was those herbicides that adversely affected the crop even at the minimum rates required for satisfactory weed control. Products here were 2,4-D amine, diuron, fluometuron, diquat and paraquat mixture, diuron and paraquat mixture which retarded the crop and bromacil, H 722, terbacil and GS 14254 which inflicted severe damage on the strawberry clover.

The herbicides comprising the other groups did not harm the crop were dacthal, RH 315, paraquat, diquat, MCPA, methabenzthiazuron and bromoxynil. The effects of MCPA and diquat were barely noticeable on crop or weeds even at the highest rate. Methabenzthiazuron and bromoxynil gave complete control of broadleaved weeds without harming the crop but naturally left grasses. Dacthal also left grass and gave restricted broadleaved weed control, the most successful removal being chickweed at about 8-10 lb. a.i./acre. Paraquat gave good grass control but a strong regrowth was evident. The most satisfactory result came with RH 315 which gave continuing grass and wireweed control although composite weeds were left.

As a result of the observations, the landholder sprayed the rest of his crop with 1 pint bromoxynil on 25th October for wireweed control. Although the weather was warm, only a slight crop scorch occurred and the wireweed control was almost complete.

Later observations on 4th November, 1970 confirmed earlier findings. Bromoxynil and methabenzthiazuron treatments were free of broadleaved weeds including the main problem, wireweed. Dacthal had improved its performance and had given good wireweed control. Nevertheless RH 315 was superior. At approximately 1 lb. a.i./acre it gave 100% control of grass and wireweed and at  $\frac{3}{4}$  lb. a.i./acre the control achieved was considered commercially acceptable.

Conclusion

RH 315 is too expensive at present but it is an ideal herbicide for this crop. Bromoxynil, methabenzthiazuron and dacthal are useful for broadleafed weed control. Paraquat is useful for grasses. The rates required, as long as they are below the peak dosage used here, need only be adjusted to the rate required for particular weeds.

ANNUAL LEGUME SEED CROPS

Annual legumes i.e. subterranean clover (Trifolium subterraneum), Barrel medic (Medicago truncatula), strand medic (M. littoralis) and disc medic (M. tornata) have become important seed crops in this State although Western Australia has retained its superior position in producing them. Growers are attracted to these crops because there is little loss of flexibility in farm use with an annual crop.

As with all annual crops, weed control is vital. At establishment the crop is most vulnerable to weed competition. Thick stands of fast-growing annual grasses growing through the crop, or masses of wireweed crowding out the crop play havoc later in the season. Some weeds, especially wireweed, interfere with harvesting and until the advent of chemical weed control, crops ran the risk of becoming infested with this weed and being not worth harvesting.

The experimental programme was planned to seek chemicals for general weed control, especially grasses and wireweed. It was not considered essential in the early stages to seek chemicals suitable for specific weed problems (except as already mentioned) as at that stage it was felt that it was easiest to avoid such problems by not planting problematical areas.

A range of chemicals have been investigated over a number of annual legume seed crops and the reports of this work follow.

1968 WEED CONTROL IN ANNUAL MEDIC WE 9211 (68)(a) Jemalong Barrel Medic

This experiment consisted of a large number of logarithmic strips of herbicides being laid both prior to and following seedling emergence. The planning of the experiment was carried out by the Pasture Section.

Experimental:

The trial was laid down on a crop of Jemalong barrel medic at Kongal. The soil at the site was a clay loam. The site had been previously sown to medic seed crops of the same variety. The predominant weed at sowing was annual ryegrass about one inch high. At the time of the post-emergent treatments the following weeds were noted: Annual ryegrass, wireweed, winter grass, barley grass, wild mustard and capeweed.

The pre-emergent treatments took place on the day that the crop was sown i.e. May 14th, 1968. The post-emergent spraying was carried out on August 12th, 1968. On the first day the temperature at the time of spraying was 58°F, on the second 61°F. On the first day there was a breeze blowing but the second was calm. At the pre-emergence treatments, cloud cover was about 75%, but the second day was much clearer, the cloud cover being down to 10%.

The chemicals were applied with the Land-Rover mounted Chesterford Logarithmic sprayer. Each treatment was carried out twice. The herbicides applied at their respective peak doses were as follows:

Pre-sowing

Benfen	10 lb.a.i./acre	corresponding to	40 pint product
Trifluralin	8 lb.		16 pint
Eptam	8 lb.		8 $\frac{3}{4}$ pint

Post-sowing, pre-emergent.

Dacthal	20 lb.		27 lb.
Asulam	8 lb.		10 lb. 10 oz.
M & B 8882	8 lb.		10 lb. 10 oz.
OCS 21693	4 lb.		17 lb.
Ramrod (R)	26 lb.		40 lb.
Diallate	4 lb.		10 lb.
Nitrofen	5 lb.		16 pt.

Post-emergent

Paraquat	2 lb.		4 pt.
Diquat	2 lb.		4 pt.
Asulam	8 lb.		10 lb. 10 oz.
Carbetamide	6 lb.		16 pt.
Nitrofen	5 lb.		16 pt.
M & B 8882	8 lb.		10 lb. 10 oz.
Bromoxynil	1 lb.		4 pt.
Methabenz- thiazuron	3 lb.		4 lb.
OCS 21799	2 lb.		5 $\frac{1}{2}$ pt.

Benfen, eptam and trifluralin were rotary-hoed prior to sowing. Nitrofen at five rates was applied in two replicates on June 25th, 1968.

The rates were:

5 $\frac{1}{2}$ lb. a.i./acre	corresponding to	18 pints Tok E-25 (R)
4 $\frac{1}{2}$ lb.		14
3 lb.		10
2 $\frac{1}{2}$ lb.		8
1 $\frac{3}{4}$ lb.		6

Observations:

Early observations made on July 2nd, 1968 showed that both crops were slowed by the cold, wet weather, parts of the trial being waterlogged. The diallate treatment stood out prominently as along the plots there were no weeds between the medic plants.

The site was next inspected on September 18th, 1968. The most promising chemicals were benefin and trifluralin in the ranges 5-10 pints and 2-4 pints respectively. These both gave control of grass and wireweed although the resistance of capeweed was noted. All the other chemicals were either too severe on the crop or did not give a satisfactory control of weeds. The early promise of diallate did not carry through as the control of wireweed was unsatisfactory. Dacthal and nitrofen applied post-emergent showed promising broadleaved weed control and were tolerated by the crop. Carbetamide gave very good selective control of grass and wireweed at about 4 pints product per acre.

Towards the end of the season, on 16th December, 1968 the trial was again inspected. Generally, the earlier observations were confirmed.

Benefin and trifluralin successfully dealt with wireweed and annual grasses, and the crop set seed heavily along the strips. Eptam did not give such a striking result although the range of weeds controlled was similar.

Of the pre-emergent herbicides assulam was too severe on the crop at suitable weed-killing rates. M & B 8882, OCS 21693 and Ramrod gave very poor weed control or at least control over a very narrow spectrum at rates tolerated by the crop. Dacthal was useful on broadleaved weeds, especially wireweed, but grass control was poor. Diallate gave satisfactory ryegrass control but left the wireweed. Nitrofen had little effect on grasses in this trial, but the wireweed was removed satisfactorily.

Among the post-emergent herbicides, asulam, paraquat, diquat M & B 8882, methabenzthiazuron, OCS 21799 were unsatisfactory. Carbetamide at about 3 lb. gave a promising result. Bromoxynil, surprisingly, also gave good broad-leaved control with only minor crop damage. The results obtained by nitrofen in the replicated plots were very variable ranging from no apparent effect through to satisfactory control of weeds.



(b) Harbinger Strand Medic

This trial was very similar to that carried out on Jemalong Barrel medic described previously.

Experimental:

The trial was laid at Keppoch. The soil at the site is a sandy loam. Prior to 1968, the crop had been sown to Harbinger medic for at least two years. These crops had been severely affected with annual ryegrass and wireweed.

No living weeds were noted prior to planting although a number of dead weeds (from previous cultivations) were present in the surface. At the time of the post-emergent treatments, wimmera ryegrass, wireweed, winter grass, barley grass, capeweed fumitory and chickweed were present. These were  $1\frac{1}{2}$  to 2" high except for the capeweed (3-4" across) and the fumitory (2-2 $\frac{1}{2}$ " across).

The pre-emergent treatments took place on the day the crop was sown, i.e. 16th May, 1968. At spraying, the temperature was 56°F, with 70% cloud cover, slight wind. Ten points of rain had fallen in the twenty four hours prior to sowing. The post-emergent treatments were carried out in August 16th, 1968. At spraying the temperature was about 59°F. The day was bright and sunny with 5% cloud cover. A slight north-easterly wind was blowing.

The chemicals applied and their respective peak doses and the method of application were identical to those in the previous experiment except that methabenzthiazuron and nitrofen (post-emergent) were not used here.

Observations

At an early observation on July 2nd, 1968, the crop was seen to be growing very slowly. As with the Jemalong crop above, diallate appeared most effective.

Later observations followed the same pattern as in the previous experiment.

Conclusion

It was decided to proceed with further testing of benefin, trifluralin, dacthal, bromoxynil and carbetamide. Diallate although not further tested, appeared to have a place where wireweed was not a problem. It was decided, that the results obtained with nitrofen were too variable for further consideration.

1969 WEED CONTROL IN ANNUAL MEDIC WE 92 II (69)

A replicated trial was planned involving three rates of each of benefin, trifluralin, eptam and carbetamide followed by post-emergent applications of 2,4-DB. Due to an honest mistake, the rates of chemical applied were greatly in excess of those intended. The trial, therefore did not fulfill its intended purpose. However, some useful information about crop tolerances was obtained. This is summarised below. The trial was repeated in 1970.

The rates of chemical used were as follows:

Benefin	15	20	25 pt./acre	corresponding to	
				60	80 100 oz. a.i./ac
Trifluralin	2½	5	7½ pt./acre	corresponding to	
				20	40 60
Eptam	4.27	6.4	8.53pt./acre	corresponding to	
				64	96 128
Carbetamide	10	16.65	23.3 pt./acre	corresponding to	
				60	100 140

Control

Note that Eptam was applied at the correct rates. The soil was a loam. Half of each plot was sprayed after emergence with 2 pt. of 40% 2,4-DB. Although the rates, except for eptam were ludicrously high, by mid-October i.e. four and one half months after spraying, it is noteworthy that the crop had established reasonably well on the plots treated with the lowest rate of benefin, all rates of trifluralin and eptam. Germination was greatly retarded but the medic stand was reasonable by the end of the season.

The use of 2,4-DB, while necessary for controlling composites and cruciferous weeds left by the pre-emergence herbicides, leads to an interaction which caused a marked reduction in the growth of the stand. The use of 2,4-DB

by itself gives a similar though not as marked effect. The seed yield does not seem to be affected. With the high rates of chemicals used here, this depression in growth was very marked.

A second trial was laid on a spring sown crop of Jemalong medic. Due to circumstances beyond control of the authors, the seedbed preparation was poor and many clumps of established weeds remained. The chemicals gave excellent control of seedlings, especially wireweed, but the trial was not worth harvesting and did not yield any new information.

### 1970 WEED CONTROL IN ANNUAL MEDIC WE 92 II (70)

Trials involving benefin and trifluralin were laid down on three different medics in 1970. The crops were Harbinger, Jemalong and Tornafield medics. The trials were, in essence, very similar as they all were testing the pre-emergence herbicides by themselves and in conjunction with post-emergence applications of 2,4-DB.

Apart from differences in soil type and crop variety, the experimental details of the three trials were quite similar and it is convenient to treat them together.

#### Experimental

The three trials were laid down as follows: Harbinger strand medic in a light sandy loam at Keppoch; Jemalong barrel medic in a clay loam at Koppamurra and Tornafield disc medic in a clay loam at Kongal.

The herbicides benefin and trifluralin were applied with a portable CO<sub>2</sub> sprayer and incorporated in the recommended manner prior to sowing. The plots were 2/1000 acre in area and at a suitable time after emergence, half of each plot was sprayed with 2,4-DB. In each trial, each treatment was replicated three times.

Benefin	3 pints 12 oz.(B1)	4 pints 16 oz.(B2)	5 pints 20 oz.(B3)	6 pints 24oz.(B4)	product/acre a.i./ac
Trifluralin	1 pint 8 oz. (T1)	1½ pints 12 oz.(T2)	2 pints 16 oz.(T3)	2½ pints 20oz(T4)	product/acre a.i./ac

On the Jemalong medic only, a higher rate of trifluralin was included - 4 pint (product/acre (32 oz. a.i. (T5))).

2,4-DB 2 pint 40% product/acre (16 oz. a.i./acre). It should be noted that the Jemalong medic received this spray at a later stage (11-12 leaf) than is normally recommended.

Observations were made during the season and yields taken at harvest. The Jemalong medic burr proved impossible to thrash in an experimental situation. In this case, the burr weight was taken as a guide to yield. For the other crops, the seed was successfully thrashed, weighed and sent for analysis by the Seed Testing Station of the Department of Agriculture.

### Observations and Results

The Harbinger medic was sprayed and sown on June 17th, 1970. As a measure of the effect of trifluralin on crop establishment, three months later on September 15th, 1970, counts were made of medic numbers. This revealed the following:

Control	18.9 plants/unit area
Trifluralin	
	1 pint 26.1
	1½ pint 23.4
	2 pint 40.8
	2½ pint 18.9

The figures shown against the rates of 1½ and 2 pints of trifluralin are the mean of two observations, the others are means of eight. To draw a most conservative inference from these figures is to conclude that there is no deleterious effects on crop establishment with this chemical. It was found that the application of 2,4-DB had no apparent effect on crop plant numbers.

In the Harbinger medic untreated areas revealed annual ryegrass and other annual grasses, poppy, mustard and wireweed. The whole areas had been commercially treated in 1969 with 1½ pints of trifluralin but no residual effect was apparent twelve months later. The results observed with these chemicals was as expected. At the lowest rate of benefin, ryegrass control was inadequate. At the lowest rate of trifluralin, control was poor but this is more likely to be a reflection of the difficulties of incorporation rather than any deficiencies in the chemical. At other rates of both herbicides ryegrass and wireweed control was excellent with the usual increase in mustard and other cruciferous weeds.

A strong interaction with these chemicals and 2,4-DB was observed. The growth of the crop appears to be arrested and the slight but noticeable twisting of the medic stems and leaves leads to spaces in the canopy. As by this time the effects of the pre-planting herbicides are beginning to

fade, there is a resurgence of grass especially at lower rates of benefin and trifluralin. It should be noted that 2,4-DB gave complete control of the mustard.

Two months later it was found that the two lowest rates of benefin had been ineffective and grass had successfully reinvaded. The 2,4-DB interaction had grown out except at the highest rate of benefin and the two highest rates of trifluralin.

Plants not sprayed with 2,4-DB tended to be taller and ranker but in the landholder's opinion likely to yield less than the more squat, bushy plants that had been sprayed.

The observations made on the two crops during the season were basically the same.

At Kongal, these logarithmic strips were laid down on Tornafield medic. The herbicides were sprayed with a Chesterford mini-log sprayer.

They were as follows:

Nitralin	4 lb. a.i./acre p.d.
H722	3 lb. a.i.
RH 315	3 lb. a.i.

It was found that nitralin was tolerated by the medic and some subterranean clover (cv. Clare) that was present. Its range of activity was identical to that of trifluralin. H722 was far too severe on crop at rates that were effective on weeds. RH315 applied pre-emergence gave excellent selective grass control at rates of 1 lb. and less. However at these rates wireweed control was poor. At higher rates it was severe on the crop, unlike lucerne.

The yield results are as follows:

Yield of Tornafield medic seed in gms/quadrat (mean of 3 reps).

Treatment	T1	T2	T3	T4	B1	B2	B3	B4	Cont.
Weight of seed (gms)	4.5	6.3	4.6	3.8	5.8	4.2	5.1	4.7	3.9

It was not possible to harvest all the plots that had been sprayed with 2,4-DB but the following are the main treatments of interest.

	T1	T4	B3	Cont.
Weight of + 2,4-DB seed (gms)	4.0	6.0	6.4	3.7
seed (gms)- 2,4-DB	4.5	3.8	5.1	3.9

The figures shown in the first table reveal no significant differences in seed yields, although there is a trend indicating optimum rates of  $1\frac{1}{2}$  pint trifluralin per acre. Benefin does not reveal this trend.

The lower yields associated with higher rates of trifluralin could be due to a combination of a stronger crop effect which is detrimental in itself and also indirectly in that the resistant crucifers are permitted to grow more vigorously thereby exerting a stronger competitive effect. Removal of the crucifers at a high rate of trifluralin and perhaps also bending was much more important than at low rates as shown in the second table.

The seed was analysed according to the routine procedures of the Seed Testing Station of the Department of Agriculture but no correlation was found between treatments and germinability or hardseededness.

After the Jemalong medic had been harvested it was found, as mentioned above, impossible to thresh with the equipment available. The samples were therefore, dried out and the trash sieved off to leave a clean sample of burr. It is fully appreciated that because of the variation in burr thickness and density, the weight of burr is only a relative guide to seed yield. However it was felt to be better than nothing.

Yield of Jemalong medic burr - gms/plot (mean of 3 reps.)

Treatment

	B1	B2	B3	B4	T1	T2	T3	T4	T5	Cont.
Yield in gms	115.8	122.2	141.**	150.**	124.6	102.**	104.**	110.9	124.3	122.2

+ 2,4-DB

Yield in gms		124.9			116.6				153.**	134.3*
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L.S.D. (5%) = 11.5 gm.

L.S.D. (1%) = 16.9 gm.

For the reasons given above, these figures must be treated very warily. A possible explanation for the large increases attributed to high rates of benefin could be that benefin gives a thicker seed coat which would increase the weight of burr.

Mr. R. Badman suggested this possibility some years ago. The reasons for the yields of the trifluralin treated plots and also the great differences both positive and negative obtained with 2,4-DB are quite obscure.

Turning to the Tornafield medic, uneven establishment led to a high degree of variability, which could not be rectified as the trial involved pre-emergence materials.

During the season, a similar reaction to 2,4-DB was observed as had been found in other medics. There was no adverse effects on crop growth noted from the use of trifluralin or benefin.

After harvest the burr was threshed and the following yields obtained.

Yield of Tornafield seed gms/plot (mean of 3 reps.)

Treatment	B1	B2	B3	B4	T1	T2	T3	T4	Cont.
Yield in gms	8.2	34.2	35.9	23.2	19.1	12.2	13.1	10.5	23.1

No treatment different significantly from the control. It should be noted however, that a depression in yield (not significant in this case) does occur with trifluralin. The data suggests that benefin would be safer for this crop.

A similar situation to the Harbinger medic, reported above, arises from the use of 2,4-DB as a post-emergent spray to control weeds resistant to benefin and trifluralin.

Effect of 2,4-DB on the yield of Tornafield seed gm/plot (mean of 3 reps.)

Pre-sowing treatment	T1	T4	B3	Control
Yield - 2,4-DB (gm/plot)	19.1	10.5	35.9	23.1
Yield + 2,4-DB (gm/plot)	12.8	34.0	41.9	8.9

Little significance should be attached to the rather outstanding increase obtained with 2,4-DB on the T4 treatment. The unevenness of the crop would have resulted in a misleading impression. The clear trend referred to previously where trifluralin has depressed the yield relative to that obtained with benefin is a much more consistent effect.

Other work recorded

Apart from the experiments reported above, other work was inspected during the period. The most important items are -

1. Mr. G.B. Baldwin, at the time Research Officer (Cereal Herbicides) drew our attention to the possible usefulness of methabenzthiazuron as a result of his observations on crops undersown with medic and subterranean clover (1968).
2. The use of IPC and CIPC has been investigated by a number of farmers led by Mr. R. Badman. In the present writers' opinion the results obtained did not seem to be as good as results claimed in the U.S.A. Other chemicals available here do a better job especially considering that IPC and CIPC are not capable of controlling wireweed in medic stands.
3. In 1969 Mr. A. Rowe of Kaniva, Victoria experimented with benefin and trifluralin on Paragosa medic. Weights of seed from the harvester were as follows:
 

Control	Equivalent to	251 lb./acre
3 pt. benefin	"	316 lb./acre
2 pt. trifluralin	"	419 lb./acre

The following comments on the above and some post-emergent herbicides are also of interest.

"In the cases of Balan and Treflan incorporation took place immediately with 5 row harrows and then followed with 2 way disc before sowing with combine. Balan at 3 pints, and Treflan at 1 pint per acre gave poor control of wild oats, but good control of poppy and sheepweed, almost complete control of wireweed. At 6 and 2 pints respectively wildoats control was good, although not quite as good as 2 $\frac{1}{4}$  pints of straight Avadex. Spear thistle, slender thistle and hedge mustard were not controlled by Treflan or Balan.

"Some setback appeared to the medic at 6 pints of Balan but this was not measured. Half pound of prometryne gave poor control of all but very small sheepweed, and fair control of poppy. Little setback appeared in medic or wireweed. One pound of the chemical gave good control of larger sheepweed (6 + true leaves) and no set back to medic. Half pint of bromoxynil gave better control of all three weeds than prometryne at half pound although this was still good.



"Yield differences in the above figures would be accentuated because the successfully treated areas produced a much cleaner sample, and probably enhanced the chance of getting most of the seed in one run over.

"Wild oat control is a problem with Treflan and Balan, because of germination from below the treated areas and Avadex seems a better chemical for the purpose".

4. On Jemalong medic at Mr. R. Badman's property, Koppamurra  $\frac{1}{2}$  lb.  $\frac{3}{4}$  lb. and 1 lb. product methabenzthiazuron were used. It was found that the middle rate was useful. At the low rate weed control was unsatisfactory, at the 1 lb. rate the crop was adversely affected and the weeds were dominating. At the middle rate a balance had been achieved whereby the weeds were sufficiently affected for the crop to grow above them and control was achieved mainly by competition.

Normally this chemical is not recommended for Jemalong barrel medic because of the lack of selectivity. However, the trials that this warning is based on were not carried out in this area but in the Northern cereal belt where the winter is much milder.

Perhaps the lower temperatures of the South-East may give selectivity not obtained elsewhere.

5. Jemalong barrel medic sprayed with 0.5 pint paraquat just prior to flowering completely devastated the crop. (Bordertown, 1969).
6. At a number of sites, commercial applications of diallate at varying rates up to 3 pt./acre of 40% product, controlled wild oats more effectively, and ryegrass reasonably. The various medic crops inspected were not apparently adversely affected by the treatment. The farmers concerned were satisfied with the results but the resistance of wireweed to diallate is a telling point against that chemical compared to benefin or trifluralin.

1968 WEED CONTROL IN SUBTERRANEAN CLOVER SEED CROPS WE 92 III (68)

This trial was similar to that carried out on medic crops in 1968. A number of chemicals were assessed for promise with respect to weed control in subterranean clover. The experiment was planned by the Pasture section.

Experimental

The trial was laid at Kongal on a stand of subterranean clover cv. Howard. The soil was a clay loam. At sowing annual ryegrass about one inch high was present. The crop was sown on May 14th, 1968. The pre-sowing herbicides were applied on that day and the post-sowing pre-emergent herbicides were applied the following day. The soil which had been worked a number of times previously was almost at field capacity at sowing. The temperature on both days was near 60°F and both days were overcast with a light breeze.

The chemicals were laid down with Land-Rover mounted Chesterford logarithmic sprayer. Each treatment was carried out twice.

The chemicals applied and their respective peak doses were as follows:

Pre-seeding

Benfen	10 lb. a.i./acre	corresponding to	40 pint product.
Trifluralin	8 lb.		16 pint

Post-seeding

Ramrod (R)	8 lb.	10 lb.
M & B 8882	8 lb.	10 lb. 10 oz.
Asulam	8 lb.	10 lb. 10 oz.
Dacthal	20 lb.	27 lb.
Nitrofen	12 lb.	40 pt.
Metoxymarc	2 lb.	4 lb.

It was planned to apply post-emergent herbicides but the ground waterlogged and became impossible to traverse at the appropriate time.

Observations

The crop was retarded very severely in mid-winter because of the severe cold and waterlogging of the soil. By September 18th the crop had come away strongly and the results of the treatments were quite obvious. As with the medics it was

found that diallate had given good ryegrass control but missed wireweed. Trifluralin and benefin appeared to give substantial control of annual grasses and wireweed at rates tolerated by the crop. Dacthal worked well on wireweed but grasses were little affected. The other chemicals proved too severe on the clover at weed-killing rates or did not perform anywhere as well as those enumerated above.

Observations toward the end of the season confirmed those made earlier. As in the medic, the efficacy of diallate displayed earlier proved transitory. Benefin, trifluralin and dacthal continued to provide control as mentioned previously. Asulam, M & B 8882, metoxymarc while providing adequate weed control did not do so selectively. Ramrod (R) and diallate (by the end of the season) did not provide satisfactory weed control at all.

It was concluded that benefin, trifluralin and dacthal were the most promising herbicides to carry on for further testing. That subterranean clover seemed to react as the medic did to these chemicals simplified planning.

#### 1969 WEED CONTROL IN SUBTERRANEAN SEED CROPS WE 92 III (69)

A trial identical to that planned for medic WE 92 II (69) was intended but the same errors were made. Experimental details are identical to those given under the experiment referred to. The crop in this case, however, was subterranean clover cv. Mt. Barker. The trial was repeated in 1970.

To save cross reference the chemicals and rates are given here.

Benefin	15	20	25 pt./acre	corresponding to			
				60	80	100	oz.a.i./acre
Trifluralin	2½	5	7½pt./acre	20	40	60	
Eptam	4.27	6.4	8.53pt./acre	64	96	128	
Carbetamide	10	16.65	23.3pt./acre	60	100	140	
Control							

Note that Eptam was applied at the correct rates. The soil was a clay loam. Half of each plot was sprayed after emergence with 2 pt. of 40% 2,4-DB.

The crop was sown under abnormally dry conditions although it was late June. By November, most plots had recovered but except for the lowest rates, ground cover was not complete. The 2,4-DB treatment was particularly effective on capeweed, 75% control being generally obtained.

Adjacent to this debacle, some observation plots were laid out using the following chemicals, in a post-emergent treatment.

MCPB	1 lb. a.i./acre.			
Methabenzthiazuron	0.35	0.52	0.70 lb. a.i./acre of 70% wettable powder.	
RH315	1	2	3 lb. a.i./acre of 75% wettable powder.	
Nitrofen	4	6	8 lb. a.i./acre of 50% wettable powder.	

Also nitrofen granules (7.0%) approximately 30 lb. granules/acre.  
 RH315 granules (3.6%) approximately 50 lb. granules/acre.

The granules, being applied by hand, can only be given as approximate rates.

The co-operating landholder had used benefin in most of the crop (5pt./acre) and part of the area had been treated with dacthal (10 lb. product/acre).

The main weeds were annual grasses especially ryegrass, wireweed and capeweed. Chickweed and storksbill were minor weeds. It was found that RH315 granules gave a similar result to the wettable powder. However, it did not seem as effective on wireweed as the latter. Nitrofen granules did not have any apparent effect on crop or weeds. The farmer's application of benefin was most successful but the paddock was thick with sow thistles by the end of the season vividly showing the necessity of a post-emergent treatment with this chemical. Dacthal gave good wireweed control but its inability to deal with ryegrass indicated its serious shortcomings in such a situation.

Of the other observation plots, little effect if any, could be discerned on the MCPB or the nitrofen plots. RH315 gave excellent grass control at all rates but capeweed was able to gain the advantage. Methabenzthiazuron at all rates gave reasonable capeweed control although failures here could be attributed to the lateness of spraying. Both of the latter two chemicals seemed quite safe on the crop at all rates tested.

At another location, a logarithmic strip of RH315 (peak dosage 3 lb. a.i./acre) was applied pre-emergence to subterranean

clover cv. Clare. Initially the clover was stunted between 2 and 3 lb. but it recovered by mid-season. It was estimated that commercially acceptable weed control was obtained in the vicinity of 0.75 lb a.i./acre.

1970 WEED CONTROL IN SUBTERRANEAN CLOVER SEED CROPS  
WE 92 III (70)

This trial was laid down in place of the abortive investigation of 1969. However Eptam was deleted and only benefin and trifluralin used.

Experimental

The trial was laid at Kongal on a stand of subterranean clover cv. Clare. The soil, a clay loam was quite moist at sowing. The treatments were applied on the day that the crop was sown, May 14th 1970. The chemicals were sprayed through a portable CO<sub>2</sub> sprayer and incorporated as recommended. There were three replicates.

The chemicals and their rates of application were

Benefin	3pt.(B1)	4pt.(B2)	5pt.(B3)	6pt.(B4)	product/acre.
	(12oz.	16oz.	20oz.	24oz.	a.i./acre)
Trifluralin	1pt.(T1)	1½pt.(T2)	2pt.(T3)	2½pt.(T4)	product/acre.
	( 8oz.	12oz.	16oz.	20oz.	a.i./acre)

Half of each plot was sprayed with 2 pint 40% 2,4-DB (16oz. a.i./acre) at the appropriate stage.

Observations were recorded through the season. In September, counts were made to determine effects of herbicides on plant number. The plots were sampled at the conclusion of the season to assess seed yield. The seed was submitted for standard germination tests.

A number of herbicides both pre and post-emergent were screened on the crop adjacent to the main trial. They were applied with a Chesterford mini log sprayer and the peak dosages were as follows:

Pre-emergent

CP50144	P.d.	4lb. a.i./acre
H722		3lb. a.i./acre
RH315		3lb. a.i./acre

Post-emergent (no pre-treatment)

RH315	3 lb. a.i./acre
Methabenzthiazuron	3 lb. a.i./acre

Post-treatment (over 1 pint trifluralin/acre-commercial application).

Methabenzthiazuron	2 lb. a.i./acre
Bromoxynil	12 oz. a.i./acre
Prometryne	16 oz. a.i./acre
2,4-DB	32 oz. a.e./acre
2,4-D	16 oz. a.e./acre
MCPA	16 oz. a.e./acre
MCPA amine 50%	16 oz. a.e./acre

Observations and Results

After planting, unsprayed areas were thick with toadrush and ryegrass and scattered wireweed, capeweed and crucifers. At the first inspection in early July, the lowest rates of both benefin and trifluralin did not effectively control the ryegrass. The highest rate and two highest rates of benefin and trifluralin respectively retarded the crop compared to other treatments and untreated plots.

The effects described above continued and were observed in early September also. By then the effect of the post-emergent application of 2,4-DB was obvious. It was noted that higher rates of trifluralin and benefin interacted with 2,4-DB to make the crop "stand still" an effect that has been noted in previous years. Weed control was satisfactory at these rates.

Plots sprayed with 2,4-DB were a darker shade of green than the other plots. Epinastic effects were seen in the clover. The twisting of the stems broke the surface of the canopy enabling light to penetrate resulting in a light reinfestation of grass (mainly ryegrass). This was particularly noticeable on the plots sprayed with 2,4-DB and low rates of trifluralin or benefin.

By the last inspection in November these effects were still noticeable. Epinastic effects persisted in the clover and grass infestations had thickened on the plots sprayed with 2,4-DB.

During September, counts of crop plants and ryegrass were made. These were taken for the control and the plots treated with trifluralin as there was a particular interest in ascertaining crop tolerance to this herbicide. The counts

were as follows:

Control	32.8 plants/quadrat
1 pt. trifluralin/acre	38.3
1½ pts	46.9
2 pts.	46.6
2½ pts.	55.3

The control and highest rate are means of twelve replicates. The other three figures are means of eight replicates.

Considering overall effects the use of trifluralin decreased ryegrass counts from 13.1 to 2.2 plants per plot. Furthermore the total effect of 2,4-DB over all treatments was to marginally increase crop plant number from 43 to 44. This would indicate that the effects noted above due to 2,4-DB are more apparent than real.

The yield results were as follows:

Yield of Clare sub clover seed in gms/quadrat (mean of 3 reps.)

Treatment	B1	B2	B3	B4	T1	T2	T3	T4	Cont.
Weight of seed (gms)	14.0	12.6	15.9	13.9	10.7	10.4	11.9	8.7	5.7

The influence of 2,4-DB may be seen on the following selected treatments.

Effect of 2,4-DB on the yield of Clare sub clover seed (gm/quad.) (mean of 3 reps)

Pre-sowing treatment	T1	T4	B3	Cont.
Yield - 2,4-DB (gm/quad.)	10.7	8.7	15.9	5.7
Yield + 2,4-DB (gm/quad.)	9.7	9.4	21.8	5.0

L.S.D. 5% (for both tables) 10.5 gm.

It was quite clear that while both benefin and trifluralin increase seed yields over the untreated plots, gains due to the former are much greater. In combination with a post-emergent treatment of 2,4-DB, the treatment B3 (5 pint product/acre) does a most satisfactory job.

Concerning the herbicides tested in logarithmic strips the following points are of interest.

Pre-emergent

CP50144 gave good weed control and initially had no adverse effect on the crop. By September the crop appeared depressed at rates suitable for weed killing. Towards the end of the season however, the crop had recovered and appeared to yield well.

H722 was extremely toxic to the crop at rates effective on weeds.

RH315 gave a striking grass control as has been seen elsewhere. The resistance of crucifers and composites, in this instance capeweed, is a considerable problem.

Post-emergent (no pretreatment)

As would be expected, methabenzthiazuron gave excellent broadleaf weed control which was quite selective. In this plot, the grass was thick. However, where trifluralin was used (see below) this was no problem.

RH315 was not as effective at the rates applied as was the pre-emergence treatment.

Post-emergent (pretreatment)

Methabenzthiazuron, bronoxynil and the MCPA gave satisfactorily selective broadleaved weed control. Amine 2,4-D, surprisingly caused less damage to the crop than did 2,4-DB. Prometryne was too severe on the crop at weed killing rates. Bromoxynil and methabenzthiazuron gave slightly more effective weed control than did the hormone types. However it is a moot point whether the extra cost involved would have been covered by the small additional returns gained by them over the hormone types. In subterranean clover crops, the extra tolerance inherent in the species (compared to medics) could make careful post-emergent application of 2,4-D and MCPA very profitable.

Other work recorded

During the years under review, from the various trials and demonstration inspected apart from our own the following points are of interest.



1. Under this heading for medics, the use of methabenzthiazuron and experimental use of IPC and CIPC have been referred to. In both cases the accounts there, apply here.
2. Bromoxynil and methabenzthiazuron on subterranean clover cv. Clare, Koppamurra 1969. Rates of 1 pt. and  $\frac{1}{4}$  lb. product respectively gave satisfactory weed control without seriously affecting the crop. Lower and higher rates of methabenzthiazuron ( $\frac{1}{2}$  and 1 lb. product) gave unsatisfactory weed control and crop suppression respectively. Higher rates of bromoxynil tended to depress the crop. On the same site, nitrofen (2 pt./acre) controlled capeweed, poppies, chickweed and stinging nettle. This was the most successful application of nitrofen seen in three years.

By the end of the season, all plots treated with the above chemicals yielded heavily. The  $\frac{1}{2}$  lb. rate of methabenzthiazuron seemed to have suppressed the weeds sufficiently for the crop to compete successfully.

3. RH315 on subterranean clover cv. Clare logarithmic strip, pre-emergence, peak dosage 3 lb. a.i./acre at Kongal. Quite satisfactory result except at highest rates where crop was stunted.
4. Commercial Crops of Clare sub-clover at Keppoch 1970. Crop had been treated with  $1\frac{1}{2}$  pt. product trifluralin. To control a dense mustard infestation, 2 pt. 40% 2,4-DB was used. As the landholder was impatient with the result, he followed this treatment with  $\frac{1}{4}$  lb. product methabenzthiazuron. The mustard was completely controlled, but the crop was yellow and rather stunted. By the end of the season, the crop was extremely healthy and had grown vigorously. It had, however, become infested with shepherd's purse.
5. Commercial stand of Shaftal clover - Keppoch 1970.

The area was pretreated with benefin at 6 pt. product/acre. The following logarithmic strips were applied to the crop post-emergence.

MCPA	P.d.	8 oz. a.e./acre
MCPB		16 oz. a.e./acre
2,4-D amine		8 oz. a.e./acre
2,4-DB		16 oz. a.e./acre

Methabenzthiazuron	32 oz. a.i./acre
Bromoxynil	12 oz. a.i./acre
Nitrofen	1.5 lb. a.i./acre

It was found that nitrofen had little effect on crop or weeds. Bromoxynil and methabenzthiazuron were unacceptably severe on the clover. 2,4-DB depressed the crop. Amine 2,4-D and MCPB gave temporary crop suppression and the most effective herbicide allowing for crop safety was MCPA. A suitable rate is about 6 oz. a.e./acre corresponding to about 1 1/3 pt. of 27% product.

\* \* \* \* \*

Our results indicate that generally medics are more sensitive to herbicides than subterranean clover. This fact is not new but this work extends it over a number of newer herbicides. Particularly, this applies to the post-emergent herbicides. Paraquat and bromoxynil should not be used on medics although they have a place on subterranean clover. Methabenzthiazuron has a restricted place on medics. It is interesting that shaftal clover appears to have rather different tolerances to herbicides used safely on subterranean clover. If this crop expands in South Australia more work will need to be done.

Probably the major weed problem in the main seed growing areas as far as annual legumes are concerned is wireweed. Dense infestations, which are common, render the crop useless for harvest in many instances. The control obtained by the use of trifluralin, dacthal and benefin is therefore a much appreciated benefit to seed growers.

On examining the yield figures of the various trials, it is apparent that dacthal, being weak on annual grasses, ryegrass in particular, is variable in its performance. Spring sowings, because of the minor nature of ryegrass, show this chemical in a more favourable light.

Benefin and trifluralin in controlling grasses as well as wireweed are very useful chemicals. The yield figures indicate that benefin is superior and in our experience the greater tolerance shown by crops give further support. However by using trifluralin the growers saves approximately \$10 per acre on chemicals. If he was to spend the extra amount, then if the crop returns 10¢/lb. clear, he would require an extra yield of 100lb./acre to cover the cost of chemical.

For a return of 20¢/lb. the extra yield required would be 50lb. It must be remembered that to gain an advantage the actual increase needs to be greater than these figures.

Except for the top ten growers, the yield per acre of Jemalong barrel medic in 1969-70 was below 500 lb./acre. For these growers, their level of expertise would probably not ensure the extra returns required when using benefin. For subterranean clover, yields are lower (although returns are higher) but again the extra yield required would probably not be obtained. Therefore, except for the most efficient growers obtaining high yields/acre, the extra cost of benefin is probably not justified. It is for this reason that the Department is pressing for the registration of trifluralin for seed crops.

Initially both in our trials and in commercial situations, the use of trifluralin was not fully understood. High rates ( $1\frac{1}{2}$ - $2\frac{1}{2}$  lb./acre) did not achieve as effective weed control as did one pint more recently. The difference is due to a realization of the necessity to thoroughly incorporate the herbicide. It has become obvious that one pint incorporated twice (the second time preferably at right angles to the first) is sufficient for effective weed control in annual legumes and seedling lucerne in this State. This treatment has wider utility as the chemical is useful in cruciferous and composite crops for wireweed and annual grass control.

It was noticed in the course of this work that annual legume crops treated with either benefin or trifluralin virutally stopped growing during spells of cold weather. When the weather improved growth slowly resumed and the crops began progressing again. Recent work by the C.S.I.R.O. in Canberra indicates that these chemicals interfere with the nodulation of legumes so this stationary phase in cold weather could be the result of nitrogen deficiency. This phenomenon is not seen with the comparable herbicide, diallate.

Following on from the trials recorded above, recommendations for weed control in annual legume seed crops were published in May 1971 in "Weed Control in Annual Pasture Legume Seed Crops". Journal of Agriculture (South Australia) 74: 174-7. This was reprinted as leaflet No. 3976 of the Department of Agriculture and received wide distribution.

Subsequently the recommendations were included in "Herbicide for Weed Control 1971-72" published in June 1971 by the S.A. Department of Agriculture.

SEEDLING LUCERNE SEED CROPS

After becoming involved with established lucerne seed crops it was not long before the difficulties caused by weeds in establishing lucerne were drawn to our attention. Work commenced in the spring of 1968 and continued for the three years under review. This is reported hereunder.

1968 WEED CONTROL IN SEEDLING LUCERNE SEED CROPS WE 92 VI (68)

The purpose of this trial was to establish, by means of logarithmic strips the promising chemicals and the respective rates for weed control in seedling lucerne.

Experimental

The trial was put down on a stand of DuPuits lucerne near Naracoorte. The soil in the area is a sandy loam. The main weed to be contended with was wireweed at first, but summer growing grasses, thistles and some late crucifers subsequently appeared. In the following year, the usual range of winter growing weeds germinated beneath the crop.

The stand was sown on October 15th, 1968. The chemicals were applied with the Landrover mounted Chesterford logarithmic sprayer at the respective peak doses.

Pre-planting (Applied October 10th, 1968)

CP 50144	Peak dosage 4 lb. a.i./acre corresponding to	6-2/3 pint product
Trifluralin	2 lb.	4 pint
Ramrod (R)	5.2 lb.	8 lb.

Post-planting (October 23rd, 1968)

Nitrofen	4 lb.	13-1/3 pint
Dacthal	10 lb.	13 3/4 lb.

Post-emergence (November 11th, 1968)

Diuron	2 lb.	2 1/2 lb.
OCS 21799	2 lb.	6-2/5 pint
Bromoxynil	12 oz.	3 pint
Prometryne	1 lb.	2 lb.

Late Post-emergence (December 12th, 1969)

2,4-DB (over Ramrod (R) treatment)	1 1/2 lb.	3 pint.
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The trial was sprayed with DDT to control pink cutworm. The landholder treated the rest of the stand with benefin 6 pt. product per acre prior to sowing.

### Observations

Approximately two months after the first spraying (17th December, 1968) it was found that diuron and OCS 21799 had killed all species along the complete length of the plot. The Ramrod/2,4-DB treatment, nitrofen, bromoxynil and prometryne gave substantial weed control but all were too severe on the lucerne. CP 50144 had little apparent effect on crop or weeds. Trifluralin, dacthal and the commercial treatment with benefin gave satisfactory results. At that time of the year, wireweed is the foremost problem in a seedling lucerne stand and the control obtained with these three chemicals was most striking. The apparently useful rates for these chemicals were about 2 pints of trifluralin, 10 lb. product of dacthal and the commercial treatment of 6 pt. benefin.

These effects continued into the next season. In the following August, although weeds had invaded the diuron, OCS 21799 and prometryne plots, no lucerne had reappeared indicating that a total destruction of the lucerne had occurred.

On the other plots, the lucerne had recovered to a greater or lesser extent and by mid-June the bromoxynil treatment appeared as good as the trifluralin and dacthal strips. The others, however, were very weedy.

### Conclusions

It was decided to pursue benefin, dacthal and trifluralin as suitable treatments for seedling lucerne. It was realised that certain gaps in the weed spectrum would need to be covered with another herbicide. As a start 2,4-DB was chosen.

### 1969 WEED CONTROL IN SEEDLING LUCERNE SEED CROPS WE 92 IV (69)

Following from the previous year's work a replicated trial was planned for Spring, 1969.

Experimental

The trial was carried out in a seedling stand of Hunter River Lucerne at Padthaway. The soil is a red-grey sandy loam. The main weeds in spring-sown stands are wire-weed, lovegrass and fathen. The pre-sowing treatments were carried out on October 23rd, 1969. The weather was quite warm, the maximum temperature being 79°F. The crop was not sown until late November i.e. about one month after the herbicide treatments were applied. The chemicals were applied with a portable CO<sub>2</sub> sprayer.

It was planned that a post-emergence treatment of bromoxynil would be applied. Furthermore, the pre-sowing treatments were applied in 3/1000 acre plots. It was planned that one-third of each plot would be treated with  $\frac{1}{2}$  pt. paraquat and that another third be treated with 2 pt. 40% 2,4-DB. All the post-emergence treatments were abandoned as at the time the trial was being maintained from Adelaide and at the appropriate stage to spray these three chemicals, a strong north wind set in for some days.

The chemicals applied and their respective rates were:

Benefin	12	16	20 oz. a.i./acre corresponding to	3	4	5	pt. product
Trifluralin	8	16	24 oz. a.i./acre corresponding to	1	2	3	pt. product
Dacthal	4	6	8 lb. a.i./acre corresponding to	5-1/3	8	10-2/3	pt. product

The treatments were replicated three times.

Observations

Even before the crop was sown, the control exerted by the chemicals was very clear. In particular when the plots were examined (November 6th, 1969) grass control exerted by benefin and trifluralin was very noticeable.

At the next inspection on December 23rd, 1969, it was obvious that the germination of the lucerne was very patchy. Much subterranean clover emerged with the lucerne and it was quite clear that the stand was only second-rate. The plots also had these faults and apart from the incomplete execution of the trial plan, the trial was of doubtful value

as a precise experiment. Dacthal failed at all rates on the grasses (ryegrass and lovegrass). Trifluralin and benefin gave very satisfactory grass control, but only the higher rates of trifluralin gave adequate control of fathen. Dacthal gave variable control of fathen. All chemicals at all rates gave excellent control of wireweed. The crop was vigorous over all plots (apart from the patches mentioned above). Some sow thistle was scattered over the area.

By January, 19th, 1970 the highest rate of trifluralin was the only treatment that was still providing anything even close to adequate control. These plots were still quite weed-free, but the others had become masses of wireweed and lovegrass the latter being in head about two feet tall. Fathen had come in onto plots previously free of it.

The crop as a whole was not acceptable for seed certification in the first year although in the second year it could be cleaned up readily using diuron.

### Conclusions

This trial raised some interesting points about the use of these chemicals under warm to hot conditions. Are higher rates required under these conditions? If so is it because of increased breakdown by ultraviolet or microbial degradation in warm moist soils?

If the breakdown for whatever reasons, is so much greater in warm weather then the active life will be shorter. Obviously the long delay between treatment and sowing was the worst possible situation. It is of interest therefore to note how effective was the highest rate of trifluralin under these exacting condition.

As the trial was not satisfactory it was decided to repeat it in 1970.

### 1970 WEED CONTROL IN SEEDLING LUCERNE SEED CROPS WE 92 VI (70)

The trial was almost identical to the previous year except that some minor changes were made to the rates applied.

Experimental

A seedling stand of Du Puits lucerne near Naracoorte was used for the trial. The soil is a sandy loam, the main weeds being wireweed and summer growing annual grasses. The crop was sown on October 12th 1970. The chemicals were applied with a portable CO<sub>2</sub> sprayer.

The treatments were replicated three times. Each plot was 1/1000 acre. At a suitable time post-emergence, half of each plot (i.e. 1/1000 acre) was sprayed with 2 pt. 40% 2,4-DB.

The chemicals applied and their respective rates were:

Benefin	12	16	24 oz. a.i./acre	corresponding to
	(B1)	(B2)	(B3)	3 4 6 pt. product
Trifluralin	8	16	32 oz. a.i./acre	corresponding to
	(T1)	(T2)	(T3)	1 2 4 pt. product
Dacthal	6	8	10 lb. a.i./acre	corresponding to
	(D1)	(D2)	(D3)	8 10.7 13.4 lb. product

Five logarithmic strips were applied post-emergence (when the cotyledons had emerged). They were applied with a Chesterford mini-logarithmic sprayer.

They were

Asulam	P.d. 2 lb. a.i./acre
H722	2 lb. a.i./acre
Nitralin	4 lb. a.i./acre
Prometryne	2 lb. a.i./acre
RH315	2 lb. a.i./acre

Observations

These were carried out at approximately six week intervals, i.e. December, February and April.

The observations recorded at the first inspection were confirmed at the later inspections except with the prometryne strip where the lucerne started to recover at the lower rates.

Asulam - The weed control was poor, but the crop tolerance was good. A slight suppression occurred at high rates, but the crop recovered by the second inspection.

H722 - A complete kill of crop and weeds.

Nitralin - Severe suppression at high rates, weed control variable.



Prometryne - As for nitralin, but crop recovered at rates of  $\frac{1}{4}$  lb. a.i. and below. Weed control not good.

RH315 - Crop tolerance good, weed control good except for sow thistle.

In November, stalk counts were taken as an indication of the early effects of the herbicide used on the vigour of the lucerne. Two quadrats per plot (i.e. six quadrats per treatment) were counted. The counts were as follows:

No. of lucerne stems per quadrat:

B1	B2	B3	D1	D2	D3	T1	T2	T3	Cont.
37.2	33.8	25.2	33.7	28.3	30.0	24.5	28.8	32.3	26.3

The effect of 2,4-DB was as follows:

	B1	B2	B3	T1	T2	T3
- 2,4-DB	37.2	33.8	25.2	24.5	28.8	32.3
+ 2,4-DB	41.5	20.0	17.5	39.5	43.5	29.5

The figures shown for +2,4-DB are means of two reps only and are not really comparable to the other figures. Although trends are evident, the differences are not significant.

The yield figures at the end of the season were as follows:

Seed yield of seedling lucerne gms. plot (mean of 3 reps)

Treatment	B1	B2	B3	D1	D2	D3	T1	T2	T3	Cont.
Yield/ quadrat	6.9	7.1	5.1	4.4	4.2	4.3	5.1	4.9	4.9	3.7

The effect of 2,4-DB was as follows:

Yield of lucerne seed gms/plot (mean of 3 reps)

Pretreatment	B3	D3	T3	Cont.
- 2,4-DB	7.1	4.2	4.9	3.7
+ 2,4-DB	5.9	4.6	4.7	3.8

In these figures, again trends are evident but differences are not significant. It is quite clear that seed yield at the end of the season bears no relation to stem number as counted earlier. It is also clear that 2,4-DB has little effect on final seed yields and the apparent depression in the B3 treatment stands at odds with similar treatments on medics and clover. While some gain is apparent from the use of trifluralin, greater yields are obtained with dacthal and benefin. Dacthal is favoured in a spring sowing because ryegrass problems are minimised.

The conclusion of this work is that seedling lucerne behaves similarly to medics and clovers when treated with pre-emergence but it may be more sensitive to application of 2,4-DB.

On the logarithmic strips the following points are of interest.

Asulam - Where specific weed problems are likely to be encountered i.e. sorrel or dock, this chemical could be useful.

H722, nitralin, prometryne - Too severe for use on seedling lucerne at rates required for efficient weed control.

RH315 - Very suitable for this situation where broadleaf weeds, apart from wireweed are unlikely to be a problem. This chemical has an advantage over trifluralin, in that no incorporation is required and timing is not as critical.

A problem which was not tackled in these trials was sorrel control in seedling lucerne which is an increasing problem in many parts of the State. At the time of writing, work is in progress and will be published at a later date.

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It is a pleasure to record our thanks to the many property owners who have co-operated with us in the performance of the various trials. Their keen interest has always been greatly appreciated.

At all times the closest liaison has been maintained between representatives of chemical companies and ourselves. The exchange of results and the interplay of ideas have been, extremely profitable from our side and we trust that our colleagues in industry feel the same way.

Thanks are also due to Officers of the Pasture Section, Seed Testing Station and Weed Section of the Department of Agriculture for the help they have given to this work.

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