DEPARTMENT OF AGRICULTURE, SOUTH AUSTRALIA

Agronomy Branch Report

INVESTIGATIONS INTO THE USE OF HERBICIDES AS AIDS TO PASTURE ESTABLISHMENT OR SKELETON WEED LAND IN THE MURRAY MALLEE

R. McR. WOOD

Report No. 32

EXPERIMENT 12C. THE EFFECT OF PICLORAM RESIDUES ON THE ESTABLISHMENT AND GROWTH OF STUBBLE SOWN ANNUAL LEGUMES

ANNUAL LEGUMES SOWN INTO A WHEAT STUBBLE ON SANDY MALLEE SOIL.

LOCATION:

C.H. Johnson, Parilla
Section: 2 Hundred: Parilla

SOIL TYPE:

Sandy mallee - not yet infested with skeleton weed

RAINFALL:

Mean 13.82"
Total for 1967 = 6.80"
Total for period April 1967-April 1968 = 830
Total for 1968 = 15.96" April-Oct 1968 = 1,192
Total for 1969 = 16.91" April-Oct 1969 =

DURATION OF EXPERIMENT:

April 1968-December 1969

PERSONNEL:

R. McR. Wood

BACKGROUND:

On 23/3/67, the trial area was treated with picloram formulations at 1 and 2 ozs. a.e./acre (See WE34, experiment 12). The ground had been worked in preparation for sowing in February. A crop of Insignia 49 wheat was sown on 8/6/67. The treatment layout is identical with WE33 Experiment 11B, i.e. Randomised blocks of 12 treatments, with 4 replications.

DESIGN (1968):

Harbinger medic x Two seed treatments

Geraldton sub. clover 1. Plain seed
2. Inoculated and lime pelleted.

These species were sown across the 1967 picloram-wheat plots in 1968.

PLOT SIZE:

20 row Trash Seeder x 84' = 12' x 84'
Individual pasture plots receiving same treatment in 1967 = 12' x 6'.

ASSESSMENTS:

1. Visual assessment of legume vigour (August 1968).

2. Estimate of production - (pasture samples, dry matter) in September 1968.

3. Estimate of seed set from natural establishment in 1969. Plots will be topdressed April 1969.

METHODS:

The annual legumes were sown on 30/4/68 using a Shearer Trash Seeder. A known quantity of small seed was mixed with a known amount of fertiliser in the box. Sowing rate was approximately 5 lbs./acre.

Fertiliser (Superphosphate + $CuSO_4$ 3½ lb. + $ZnSO_4$ 3½ lb.) was applied at 176 lbs./acre (= 169 lbs. superphosphate/acre).

A cover crop of Noyep barley was sown at 20 lbs./acre.

No initial ground perparation was carried out and the legumes were sown direct into the wheat stubble remaining.

The area was fenced off in mid May to control grazing.

RESULTS:

When the trial was inspected on 18/9/68, the area was overrun with Capeweed and Geranium. The area had been ravaged by rabbits and the annual legumes were growing only poorly.

The fence was opened up to allow the excess growth to be grazed, but there was no improvement, the trial was concluded in early 1969.

The trial did not yield any results on pasture establishment.

EXPERIMENTS 13A AND 13B — A COMPARISON OF SEVERAL HERBICIDE MIXTURES CONTAINING PICLORAM, DICAMBA AND/OR 2,4-D, FOR THEIR EFFECT ON SKELETON WEED, FOLLOWED BY RESIDUE ASSESSMENTS ON THE GROWTH OF ANNUAL MEDICS

LOCATIONS:

13A Mr. D.G. Dutschke
Section: 44
Hundred: Marmon Jabuk

13B Mr. C.H. Johnson
Section: 2
Hundred: Parilla

SOIL TYPES:

Both solodized solonetz, heavily infested with skeleton weed.

RAINFALL:

	Karoonda	Parilla
Means:	13.43"	13.82"
Sept. 1967-April 1968	4.76"	4.90"
April-October 1968	10.91"	11.92"
Sept. 1967-April 1969	23.96"	26.25"

DURATION OF EXPERIMENTS:

September 1967-December 1969

PERSONNEL:

R. McR. Wood and Field Assistant

BACKGROUND:

These experiments were originally designed to compare picloram herbicides applied at 2.0 oz. a.e./acre peak dosage in a logarithmic trial at three different times of the year on skeleton weed. However, dry seasonal conditions over the summer of 1967-68 following the drought over 1966-67 resulted in the chemicals being applied only once, - viz. in September 1967.

The sprayed log strips were then cross sown in 1968 under different conditions at each site. See "Methods 1968", dealt with separately for each site.

1967 Treatments:

The following table lists the herbicide treatments imposed in September 1967. They were identical at each site.

1967 Treatments

Herbicide Formulations	Active Constituents	%	Form	Peak Dosage (oz. a.e./acre)
1. I.C.I. mix "A"	Picloram	1.0	-	2.0
	Dicamba	2.0	-	4.0
	2,4-D	15.0	-	30.0
2. I.C.I. mix "B"	Picloram	1.0	-	2.0
	Dicamba	2.0	-	4.0
	MCPA	15.0	-	30.0
3. I.C.I. mix 3133 P1x1	Picloram	0.7	-	2.0
	Dicamba	0.7	-	2.0
	MCPA	22.5	-	64.0
4. Tordon M	Picloram	1.5	potassium	2.0
	MCPA	20.0	salts	32.0
5. Tordon M2878	Picloram	1.25	triisopropanolamine	2.0
	2,4-D	20.0	salts	32.0
6. V-25	MCPA	50.0	dimenthylamine salt	32.0
7. Amoxone 50	2,4-D	50.0	triethanolamine salt	32.0
8. Banex	Dicamba	20.0	dimenthylamine salt	4.0

METHODS (1967):

The above treatments were applied on 26th and 28th of September 1967 using the Chesterford logarithmic spray unit. The water was 28 gallons per acre.

Plots were 100 feet long, enabling the concentration of herbicides to be decreased to 1/16 of the peak dose.

ASSESSMENTS:

No assessments of skeleton weed control were taken during the period from spraying till mid 1968.

AIM:

To compare the herbicidal activity of the above treatments on skeleton weed and to determine whether the residues will affect legume growth in the following year.

DESIGN:

(a) Statistical: Randomised log strips
8 treatments x 2 replications = 16 plots.

(b) Treatments: 1967 - See above table
1968 - dealt with separately for each experiment

(c) Plot Size: 15 feet wide x 100 feet long

(d) Assessments.
1. Skeleton weed control. Visual assessments and density counts - 1968
2. Effect of chemical residues on pasture establishment.

PROJECT 3 EXPERIMENT 13A KAROONDA

METHODS, 1968:

The log strips were cross sown on 29/4/68 with 5 lbs. per acre of Barrel medic, with 180 lbs. of superphosphate, Cu 3½ lb., Zn 3½ lb. A cover crop of Noyep barley was sown with equipment kindly loaned by Mr. Dutschke.

Assessments of medic growth and skeleton weed control were taken on 17/7/68.

The trial area was grazed throughout summer 1968/69 and a heavy covering of skeleton weed rosettes was present in Autumn. The whole area was topdressed and sown with 5 lb./acre of Harbinger medic. (187 lbs./acre of Superphosphate, Cu 7 lb., Zn 7 lb., Mo 2 oz. was used). A disc drill was loaned by the farmer.

The trial was visually assessed on 24/6/69, and again on 24/9/69.

RESULTS:

Skeleton weed density counts were taken at 0, 25, 50, 75 and 100 feet from the Peak Dosage end of each plot. Two 4 sq. link quadrat counts were taken at each position. The means are given in the following table from one replication only:

Skeleton Weed Density (Rosettes/sq. link) 17/7/68
(Distance along Plot in Ft.)

Treatment	0	25	50	75	100	Mean
1. I.C.I. A	1.3	0.8	5.0	6.3	10.3	4.7
2. I.C.I. B	3.5	0.8	2.0	7.5	11.8	5.1
3. I.C.I. 3133	0.5	2.5	9.3	6.0	11.5	6.0
4. Tordon M	1.8	5.5	6.8	11.3	10.8	7.2
5. Tordon M2878	1.3	7.0	7.3	8.5	10.0	6.8
6. MCPA	7.0	12.0	5.8	20.0	16.3	12.2
7. 2,4-D	1.3	10.5	10.0	17.0	13.0	10.4
8. Banex	6.3	15.0	11.8	16.8	14.0	12.8
9. (Control)	13.3	16.8	15.5	14.5	15.0	15.0

Although there is insufficient data for statistical analysis of these counts, an obvious trend can be seen from them.

The picloram-dicamba mixtures, (treatments 1-3) have given satisfactory control of skeleton weed for at least 50 feet along the plots. This distance corresponds with approx. 0.5 oz. of picloram a.e. per acre.

Tordon M and Tordon M2878 (treatments 4 and 5) appeared to be slightly less toxic to the weed.

The remaining treatments gave only marginal reduction compared with untreated areas.

Legume growth during 1968 was retarded on the picloram plots, and this was apparent for the whole length of 100 feet early in the growing season. The best growth of sown barrel medic was seen on the dicamba plots.

Visual assessments on 24/6/69 showed that Harbinger medic sown in April 1969 was affected by chemical plots.

	Distance from Peak Dosage End (feet)*	Estimated Original Dosage (ozs. a.e./acre)	
I.C.I. Mix A	95	0.14	picloram
I.C.I. Mix B	80	0.20	"
I.C.I. 3133 P1X1	100	0.13	"
Tordon M	70	0.30	"
Tordon M2878	72	0.28	"
MCPA V-25	13	22.40	MCPA
2,4-D amine	10	24.40	2,4-D
Banex	12	2.90	dicamba

*Distance along the plot at which legume growth appeared unaffected by chemical residues.

Some medic plants were surviving at the Peak Dosage end of all plots, and no differences were evident between picloram formulations at the highest rates. The I.C.I. mixtures, all of which contain dicamba seem to have a more severe long term effect on legume pasture growth.

Visual assessment of pasture growth on 14/9/69 (24 months after spraying) revealed an improvement of medic growth on each plot. Both Barrel medic and Harbinger medic were present.

The barrel medic has persisted well on plots where no picloram had been previously applied, and its presence reflects good seed set in the 1968 season.

Harbinger medic has established on the picloram plots in 1969, with only a slight depression noted at the high dosage end. Elsewhere there is no obvious effect of picloram residues on the remainder of these plots.

Patches of poor establishment seem to bear no relationship with the past herbicide treatments.

DISCUSSION:

The difficulty in interpretation of logarithmic herbicide trials must be borne in mind; especially long term residue assessments. The technique of cross sowing of plots is partly to blame for patchy results and other factors, including sowing techniques, are likely to have some effect.

The experiment has shown that 1-2 ozs. of picloram taken up to 18 months to "break down" or leach beyond a depth likely to affect annual medics. Any medic sown within this period will not produce enough seed to regenerate the following year, but a reasonable establishment may be expected if the area is resown before the second winter. The 24 inches of rain recorded from September 1967-April 1969 inclusive was about 3 inches above average. This is largely due to above average rain in February 1969. This rainfall would have aided leaching of picloram below the root zone.

PROJECT 3 EXPERIMENT 13B PARILLA

METHODS 1968:

The log strips were cross sown in June 1968 with Harbinger medic and Geraldton sub. clover sub none established. This failure cannot be directly attributed to the herbicide treatments. Skeleton weed density was visually assessed on 5/6/68.

The area was resown on 18/4/69 after the area had been grazed over summer. It was necessary to make three runs with a trash seeder to enable seeding. Superphosphate (173 lbs.) plus 7 lb. Cu, Zn and 2 oz. Mo were applied. (187 lbs. of trace element/ super mixture per acre).

10 lbs. per acre of Harbinger medic was sown, mixed with the fertiliser. A cover crop of Noyep barley was sown at 20 lbs. acre.

Treatment for red legged earthmite was carried out on 25/6/69. The area was inspected briefly in September 1969.

RESULTS:

Visual assessments of skeleton weed control 5/6/68
(Distance along the plot where skeleton weed was controlled)
(feet from P.D. end)

Treatment	Block 1	Block II	Average	Estimated Dosage (ozs. a.e./acre)
I.C.I. Mix A	33	21	27.0	0.95 (picloram)
I.C.I. Mix B	33	36	34.5	0.80 "
I.C.I. Mix X	36	39	37.5	0.70 "
Tordon M	24	30	27.0	0.95 "
Tordon M2878	30	33	31.5	0.86 "
MCPA V-25	0	0	0	32.0 MCPA
2,4-D amine	10	10	10.0	24.3
Banex	0	0	0	4.0

The herbicide formulations containing picloram satisfactorily controlled skeleton weed above 1.0 oz. a.e. picloram per acre. MCPA and dicamba were totally ineffective although the 2,4-D had a slight effect.

By April 1969, most of the plots had skeleton weed regrowth present plus volunteer species notably Erodium spp. and Taraxacum sp. Slight reduction in skeleton weed was still evident at the picloram peak dosage.

The establishment of Harbinger medic was satisfactory on all plots, indicating adequate leaching of the picloram from the root zone. There were no obvious advantages or disadvantages from the picloram spray treatments.

The trial was concluded in October 1969 when cattle grazed the area before any final assessment was undertaken.

PROJECT 3 EXPERIMENT 14A — A COMPARISON OF SEVERAL PICLORAM FORMULATIONS AND 2,4-D FOR SKELETON WEED CONTROL, FOLLOWED BY ANNUAL MEDIC AND LUCERNE ESTABLISHMENT

LOCATION:

H. Petras, Karoonda
Section 41 Hundred of Hooper

SOIL TYPE:

Solodized solonetz, infested with Skeleton Weed

RAINFALL:

Mean 13.65" annually
April-October 1968 = 9.44" Total 1968 = 13.09"
April-October 1969 = 6.38" Total 1969 = 13.83"
Total 1970 =
August 1968-April 1969 (inclusive) = 11.76"

DURATION:

August 1968-December 1970

PERSONNEL:

R. McR. Wood and A.W. Lewis

BACKGROUND:

Experiments with low rates of picloram for skeleton weed control were carried out in 1966 and 1967 - both years of below average rainfall. (See Project 3 Expts. 10-13). It was noted that legumes pastures subsequently sown on treated areas were adversely affected by picloram residues in the soil.

Experiments 14A, 14B and 14C were initiated in 1968 to provide further information on the residual effects of a variety of picloram formulations, including picloram-dicamba-MCPA mixtures where some synergism has been claimed in the past. Time of application of these herbicides in relation to stage of weed development and rainfall may also be important. There is evidence from past experiments (Orchard 1956, Cuthbertson 1967) that 2,4-D applied at the commencement of skeleton weed runup is more effective than applications earlier or later than this stage.

AIMS:

1. Compare picloram at low rates ($\frac{1}{8}$-1 oz. a.e./acre) using different formulations containing dicamba MCPA and 2,4-D.

2. Compare the results from two times of application on skeleton weed.

3. Assess residual effects of the spray treatments on the establishment and growth of Harbinger medic and Hunter River Lucerne.

DESIGN:

(a) Statistical 12 spray treatments x 2 replications x 2 times of application. = 48 spray plots.
Treatments randomised within each block.

(b) Treatments 1968 TABLE I

CODE	HERBICIDE	FORM	RATE PER ACRE	PRODUCT
A.	Picloram + dicamba	Potassium salt Dimethylamine salt	0.25 oz. a.e. 0.75	Tordon 22K* Banex (R)
B.	Picloram + dicamba	as above "	0.5 0.2	as above "
C.	Picloram + dicamba	as above "	0.75 0.25	as above "
D.	Picloram	Potassium salt	1.0	Tordon 22K*
E.	Picloram + dicamba + MCPA	Potassium salt Dimethylamine salt Sodium salt	0.125 0.125 4.0	" Banex (R) Methoxone 30 (R)
F.	Picloram + dicamba + MCPA	 as above 8.0	0.25 0.25	as above " "
G.	Picloram + MCPA	Potassium salt Potassium salt	0.125 2.0	Tordon M (R) "
H.	Picloram + MCPA	as above	0.25 4.0	Tordon M (R) "
J.	Picloram 2,4-D	trisopropanolamine salts	0.5 2.0	Tordon 50-D " (R)
K.	2,4-D	triethanolamine salt	12.0	Amoxone 50 (R)
L.	Control	-	-	
M.	Control	-	-	

R = Registered name * = Experimental formulation

These treatments were applied to two blocks in late winter (August) and to two blocks in spring. (October-November).

The trial plots were border pegged 30' wide x 100 ' long. The actual width sprayed depended on the equipment - 24 feet wide in August and 15 feet in October.

The 1969 pasture plots, sown across the sprayed areas were 25 feet wide and 1500 feet long.

ASSESSMENTS:

Visual assessments of knockdown and control of skeleton weed. (October 1968). Applies to early spray treatments only. A comprehensive visual assessment in December 1968.

Counts of skeleton weed density and lucerne emergence (August 1969).

Visual assessment of Harbinger medic growth - Spring 1969. Counts of lucerne survival and skeleton weed density to be taken in 1970. (May and November).

METHODS:

The site was selected and pegged on a sandy rise in July 1968, and the first spray treatments were applied on 5/8/68 using a Toyota mounted boomspray delivering 10 gallons of spray per acre. Two runs side by side were made to give 24 feet sprayed width.

The herbicide concentrates were mixed in 2.5 gallons of water immediately before spraying, in the small tank on the unit. It was later found that this quantity was marginal and resulted in excessive frothing and loss of pressure on some plots.

The second series of spray treatments were to be applied on 15/10/68, but owing to a structural failure, only treatment K was applied on that day. Skeleton weed was in the very early run-up stage.

The remainder of the spray work was completed on 31/10/68 using a trailed boomspray and short wheelbase Landrover, delivery 10 gallons per acre. The boom width was reduced to 15 feet. As 2,4-D had been applied on 15/10/68, this treatment was sprayed onto one of the control treatments (L) on 31/10/68; so that it could be compared with the remaining treatments.

The August sprayed plots were visually assessed on 15/10/68, and a full scale assessment was carried out on 12/12/68, when the weed was commencing to flower.

The area was worked up with a disc plough in early May 1969 in preparation for sowing the pasture.

On 22/5/69, the area was worked back just before sowing, but difficulty was experienced with excess skeleton weed trash on the surface. The 9 hoe Mitchell combine used for sowing was used for this working.

Harbinger medic and Hunter River lucerne was then sown under a light cover crop (20 lbs./acre) of Noyep barley. The small seeds were sown using a small seeds box with hoses tied in pairs behind the rear tynes of the combine. Sowing rates were 10 lbs./acre of Harbinger medic and 5 lbs./acre of lucerne (inoculated and lime pelleted 6 days before sowing). No difficulty was experienced sowing lime pelleted seed through the small seeds box. Cover harrows were not used in order to leave the soil ridged.

Fertilisers - The whole trial was topdressed first with 140 lbs. per acre of superphosphate + trace elements. (7 lbs. Cu, 7 lbs. Zn and 2 oz. Mo per 187 lb. sack). Half the trial was sown with the lucerne and the remainder with Harbinger medic. Half of each pasture plot received 60 lbs./acre of Ammonium Sulphate at sowing. This was accomplished by sowing with 118 lbs./acre of 1:1 Super-ammonia, and the superphosphate application as balanced by applying 65 lbs./acre of plain Super on the remaining plots.

Insect control - Redlegged earthmite infestations were treated on 5/6/69 using 4 fl. oz./acre. Imidan 15 (R) using a commercial misting machine delivering 3 gallons/acre. The area was treated on 25/10/69 with 12 fl. oz. of 25% D.D.T. product per acre to control pink cutworm.

Pasture Assessments
The initial density of lucerne seedlings was counted on 6/8/69. Skeleton weed rosette density was obtained at the same time, using a 0.5 sq. metre quadrat.

Visual assessment of pasture growth in 1969 were made on 24/6/69, 31/7/69, and 23/9/69.

Half of each lucerne plot was sprayed with 12 oz. a.e. 2,4-DB per acre on 12/8/69 when the lucerne plants had 3-5 trifoliate leaves. Application was by trailer boomspray, delivering 10 gallons per acre (split plot treatment).

RESULTS:

Table 2 shows visual ratings of the spray treatments taken on 12/12/68, based on skeleton weed control.

Rating: 0 = No skeleton weed

9 = Dense skeleton weed (Same as control)

TABLE 2 Visual Assessment of Skeleton Weed Control

(12/12/68)

TREATMENTS (as for table 1)	Sprayed 5/8/68		Sprayed 31/10/68	
	BLOCK 2	BLOCK 4	BLOCK 1	BLOCK 3
A	6	5	9	9
B	3	1	8	8
C	1	0	8	9
D	0	3	9	9
E	6	4	9	9
F	4	3	8	9
G	8	9	9	9
H	6	3	9	9
J	2	1	9	9
K	5	4	1*	1*
L	9	9	9**	9**
M	9	9	9	9

* Sprayed 15/10/69 at very early runup stage. (2,4-D)
** Sprayed with 2,4-D on 31/10/69

Much more noticable effects on skeleton weed could be seen in the August sprayed blocks but it was considered too early to expect any results from the late sprayed plots. However, the 2,4-D applied in mid October had prevented skeleton weed growth after that date and the effect was most pronounced in December. By contrast, the same rate of 2,4-D applied on 31/10/69 had practically no effect on skeleton weed.

Looking at the plots treated in August, the most effective control of skeleton weed was observed where 0.5 a.e. picloram had been applied and no advantage or synergism due to dicamba was evident. Treatments C (0.75 oz. picloram + 0.25 oz. dicamba) D (1.0 oz. picloram) and J (0.5 oz. picloram + 2.0 or 2,4-D) were notably the best treatments with practically no skeleton weed growth present on these plots in December 1968. Treatments with 0.125 and 0.25 oz. a.e. picloram were of some benefit but no better than the 2,4-D treatment (K). The picloram treatments G and H reflect a poorer result per unit of picloram than expected. Skeleton weed was beginning to regrow at the lowest picloram rates and on 2,4-D plots.

A visual assessment at the time of the second spraying, indicated that volunteer legume growth was affected by the August treatments. The least tolerance was shown to picloram at 0.5 oz. and greater rates. The 2,4-D treatment reduced legume growth, but to a lesser extent. Legume tolerance appeared to be slightly better in treatments containing dicamba and MCPA as well as picloram e.g. F. However tolerance to these formulations can only be classified as "low" compared with untreated areas.

Inspection of the trial on 24/6/69 revealed that the lucerne had emerged well and most seedlings had a unifoliate leaf. The density of sowing appeared to be variable and this seemed to be caused by excess trash present at sowing. The Harbinger medic had emerged strongly although depth of sowing was rather uneven towards the base of the rise. Brome grass (Bromus rigidus) was growing strongly and a competition problem could be foreseen. A response of the Noyep barley cover crop to Nitrogen at sowing was evident.

Skeleton weed rosettes had emerged over the trial area but no trends in density were evident at the time.

Inspection of the Harbinger medic for symptoms of the spray residues on 24/6/69 revealed that even the lowest picloram rate ($\frac{1}{8}$ oz.) was affecting medic growth. The symptoms were severe cupping of the leaves with stunting at higher rates. See table 2.

The density counts for skeleton weed rosettes and lucerne seedlings were taken on 6/8/69 from +N and -N areas. The skeleton weed density was not obtained from the Harbinger medic area. Figures are given in tables 3 and 4.

Table 3 indicates a high degree of variability between treatments although each mean is based on four counts. It would be unwise to try and draw any conclusions from them, especially from the October treatments.

Table 4 shows that the lucerne establishment has been affected by the spray treatments applied in August 1968, especially where the higher rates of picloram had been applied. There is a suggestion that the 2,4-D treatment is beneficial for lucerne establishment the following year. The variability is much greater in the October sprayed plots.

The trial area was slashed with a flail type slasher on 17/2/70 to clear the dense growth of skeleton weed present. This would allow greater freedom of movement when topdressing in May.

On 4/5/70, the trial was assessed and lucerne density was counted. Results are given in Table 5. The lucerne establishment was very patchy, especially where 2,4-DB had been applied in 1969.

Table 5 reflects the patchy nature of the lucerne established on this experimental area. The variability was greater on the two blocks sprayed in August 1968 (Blocks 2 and 4). Lowest lucerne densities were counted on treatments B, C, D, H, J, K. The adverse effect of treatment K is unexplained, as 2,4-D should have a much shorter residual life in the soil than picloram.

The 2,4-DB treatment in 1969 has had an adverse effect on lucerne on these two blocks. This treatment more than halved the number of surviving plants.

Lucerne growth on the October sprayed blocks (blocks 1 and 3) was more even with a greater overall establishment. The October 1968 sprays were less severe, with the exception of treatments B, C and D. 2,4-D had no noticeable effect on these blocks.

On 11/5/70, the area was topdressed with superphosphate at 100 lbs./acre. Inspections in June and July showed no need to treat for red legged earthmites or lucerne flea.

During inspection in October 1970, it was decided to conclude the trial because of very uneven lucerne establishment and dense skeleton weed. Much of the trouble with this trial was poor seedbed preparation prior to lucerne being sown in May 1969.

Taking into account the variation caused by faulty establishment, it would be reasonable to conclude that

1. 2,4-DB was of no value as an aid to lucerne establishment
2. Traces of the picloram applied in August and October 1968 adversely affected legume establishment.

The Harbinger medic, sown in May 1969 did not set sufficient seed that year for a vigorous stand in 1970.

WE 33 Expt. 14A

Table 2 VISUAL ASSESSMENT OF HARBINGER MEDIC ON 24/6/69

1. = no visable symptoms
2. = moderate leaf distortion. Not stunted
3. = severe leaf distortion. Stunted growth

TREATMENT	OCTOBER SPRAYED		AUGUST SPRAYED		AVERAGE
	BLOCK 1	BLOCK 3	BLOCK 2	BLOCK 4	RATING
A	2	3	2	2	2.5
B	3	3	3	3	3.0
C	3	3	3	3	3.0
D	3	3	3	3	3.0
E	1	2	2	3	2.0
F	2	2	2	2	2.0
G	1	2	2	2	1.8
H	2	3	2	2	2.3
J	3	3	3	3	3.0
K	1	1	1	1	1.0
L	1	1	1	1	1.0
M	1	1	1	1	1.0

Table 3. SKELETON WEED ROSETTE DENSITY 6/8/69
(Rosettes per 10 sq. links)

TREATMENT AUG. 1968	BLOCK 2 +N	BLOCK 2 -N	BLOCK 4 +N	BLOCK 4 -N	N TOTALS +N	N TOTALS -N	TOTAL OVERALL	MEAN PER 12 SQ. LINKS	PER CENT OF MEAN CONTROL DENSITY
A	1	0	11	35	12	35	47	11.8	52
B	0	0	0	0	0	0	0	0.0	0
C	0	0	11	2	11	2	13	3.3	14
D	27	13	0	23	27	36	63	15.8	70
E	7	7	21	12	28	18	47	11.8	52
F	0	5	13	0	13	5	18	4.5	20
G	47	46	2	5	49	51	100	25.0	110
H	29	10	1	6	30	16	46	11.5	51
J	3	1	1	2	4	3	7	1.8	8
K	2	0	3	11	5	11	16	4.0	18
L	17	30	3	11	20	41	61	15.3	-
M	53	54	17	8	70	62	132	33.0	-
					269	1281	550		

TREATMENT OCT. 1968	BLOCK 1 +N	BLOCK 1 -N	BLOCK 3 +N	BLOCK 3 -N	N TOTALS +N	N TOTALS -N	TOTAL OVERALL	MEAN PER 10 SQ. LINKS	PER CENT OF MEAN CONTROL DENSITY
A	52	18	7	25	59	43	102	25.5	113
B	4	5	6	32	10	37	47	11.8	52
C	6	0	24	0	30	0	30	7.5	33
D	13	12	34	44	47	56	103	25.8	114
E	0	0	2	62	2	62	64	16.0	71
F	13	2	48	0	61	2	63	15.8	70
G	0	3	8	41	8	44	52	13.0	58
H	6	0	2	3	8	3	11	2.8	12
J	12	23	25	4	37	27	64	16.0	71
K	0	0	30	38	30	38	68	17.0	75
L*	37	15	58	2	95	17	112	28.0	124
M	0	14	25	39	25	53	78	19.5	-
					412	382	794		

(Mean density on control plots = 22.6 rosettes per 10 sq. links)

*Treated with 12 oz. a.e. 2,4-D when October spraying was completed.

Table 4. LUCERNE SEEDLING DENSITY 6/8/69

TREATMENT AUG. 1968	BLOCK 2 +N	BLOCK 2 -N	BLOCK 4 +N	BLOCK 4 -N	N TOTALS +N	N TOTALS -N	TOTAL OVERALL	MEAN PER 10 SQ. LINKS	PER CENT OF CONTROL
A	5	14	29	10	34	24	58	14.5	111
B	5	2	4	2	9	4	13	3.3	25
C	0	2	3	10	3	12	15	3.8	29
D	0	2	1	1	1	3	4	1.0	8
E	4	8	13	9	17	17	34	8.5	65
F	6	6	18	9	24	15	39	9.8	75
G	14	3	16	8	30	11	41	10.3	80
H	13	6	27	8	40	14	54	13.3	102
J	6	3	5	2	11	5	16	4.0	31
K	24	19	17	24	41	43	84	21.0	162
L	13	2	22	14	35	16	51	12.8	-
M	17	2	38	7	55	9	64	16.0	-
					300	173	473		

TREATMENT OCT. 1968	BLOCK 1 +N	BLOCK 1 -N	BLOCK 3 +N	BLOCK 3 -N	N TOTALS +N	N TOTALS -N	TOTAL OVERALL	MEAN PER 10 SQ. LINKS	PER CENT OF CONTROL
A	9	20	25	0	34	20	54	13.3	102
B	0	8	5	3	5	11	16	4.0	31
C	5	4	20	4	25	8	33	8.3	64
D	2	2	9	7	11	9	20	5.0	38
E	10	19	3	0	13	19	32	8.0	62
F	14	12	15	18	29	30	59	14.8	114
G	12	10	0	2	12	12	24	6.0	46
H	10	6	26	21	36	27	63	15.8	122
J	4	11	4	21	8	32	40	10.0	77
K	9	14	25	1	34	15	49	12.3	95
L*	3	24	14	24	17	48	65	16.3	125
M	21	4	10	5	31	9	40	10.0	-
					255	240	495		

* Treated with 2,4-D amine (12 oz. a.e./acre) when the remaining treatments were applied.

Table 5. LUCERNE DENSITY 4/5/70

Plants per 10 sq. links

TREATMENT AUG. 1968	BLOCK 2 +N 2,4-DB −	BLOCK 2 +N 2,4-DB +	BLOCK 2 −N 2,4-DB −	BLOCK 2 −N 2,4-DB +	BLOCK 4 +N 2,4-DB −	BLOCK 4 +N 2,4-DB +	BLOCK 4 −N 2,4-DB −	BLOCK 4 −N 2,4-DB +	TOTAL	MEAN PER 10 SQ. LINKS
A	4	0	3	0	1	0	0	0	8	1.0
B	3	0	1	0	0	0	0	0	4	0.5
C	0	0	0	0	1	0	0	0	1	0.13
D	0	0	0	0	0	0	1	0	1	0.13
E	1	0	3	0	1	0	11	3	19	2.4
F	0	0	1	0	0	0	7	0	8	1.0
G	0	0	0	0	2	0	0	0	2	0.25
H	3	0	1	0	0	0	0	0	4	0.5
J	0	0	3	0	0	0	0	2	5	0.6
K	2	0	2	2	0	0	0	0	6	0.75
L	1	0	0	2	3	0	0	4	10	1.25
M	0	0	0	0	1	0	0	7	8	1.0
	14	0	14	4	9	0	19	16	76	

TREATMENT NOV. 1968	BLOCK 1 +N 2,4-DB −	BLOCK 1 +N 2,4-DB +	BLOCK 1 −N 2,4-DB −	BLOCK 1 −N 2,4-DB +	BLOCK 3 +N 2,4-DB −	BLOCK 3 +N 2,4-DB +	BLOCK 3 −N 2,4-DB −	BLOCK 3 −N 2,4-DB +	TOTAL	MEAN PER 10 SQ. LINKS
A	2	4	0	1	0	0	0	2	9	1.13
B	1	0	0	0	0	1	0	0	2	0.25
C	0	0	2	1	1	0	1	1	6	0.75
D	0	0	0	0	1	0	1	0	2	0.25
E	0	0	1	5	0	0	0	2	8	1.0
F	1	1	0	0	6	0	1	2	11	1.4
G	0	6	2	4	0	0	0	3	15	1.9
H	4	0	0	0	3	1	0	1	9	1.13
J	0	0	3	0	2	0	3	0	8	1.0
K**	9	0	0	0	0	0	0	0	9	1.13
L*	0	7	4	0	0	1	0	1	13	1.63
M	0	2	0	0	0	0	1	2	5	0.6
	17	20	12	11	13	3	7	14	97	

** 2,4-D, 12 oz. a.e/acre 15/10/68

* 2,4-D, 12 oz. a.e/acre 31/10/68

EXPERIMENT 14 B A COMPARISON OF SEVERAL PICLORAM FORMULATIONS AND 2,4-D FOR SKELETON WEED CONTROL, FOLLOWED BY ANNUAL MEDIC AND LUCERNE ESTABLISHMENT

LOCATION:

R.T. Fearn, Parrakie
Section 22, Hundred of Price

SOIL TYPE:

Solodised solonetz (?) Infested with skeleton weed. Dunes low, rounded and frequent, with flats of light brown sand over yellow clay.

RAINFALL:

Mean = 14.83 annually

April-October 1968	= 14.26"	Total 1968	= 19.26"
April-October 1969	= 8.04"	Total 1969	=
		Total 1970	=
August 1968-April 1969 (inc.)	= 17.05"		

DURATION:

August 1968-December 1970

PERSONNEL:

R. McR. Wood and A.W. Lewis

BACKGROUND:

As for Expt. 14A

AIMS:

As for Expt. 14A

DESIGN:

As for Expt. 14A
Plot size increased in length to 200'

METHODS:

The site, a heavily infested sandy rise, was selected and pegged in late July 1968. Soil samples were taken for nutrient and pH determinations. The first spray treatments were applied on 6/8/68; using a Toyota mounted boom spray delivering 10 gallons per acre. Two runs with the 12 foot wide boom were made side by side in each plot = 24' total spray width.

Herbicide concentrates were mixed in 5 gallons of water in the small spray tank, and this quantity was ample for each treatment.

The second series of spray treatments were applied on 1/11/68; using the trailer boom spray with a 15 ft. boom width. On this occasion all treatments except treatment K (2,4-D) were applied.

Visual assessments of spray effects were recorded on 17/10/68, and again 12/12/68. Skeleton weed density counts were recorded on 10/12/68.

PASTURE SOWING 1969:

Following good rains in February and March, the ground was worked up by Mr. Fearn in early April. The trial area had been heavily grazed until the working, and there was little trash present on the area.

Harbinger medic was sown at 10 lb./acre on 16/4/69 using Mr. Fearn's combine. Hoses from the small seeds box were dangling free, followed by light harrows. The area was first top-dressed with 140 lb./acre of super plus trace element mixture*, and then the medic was sown under a light cover crop (20 lb./acre) of Noyep barley. Half the Harbinger was sown with 1:1 super ammonia mixture at 100 lb./acre and the remainder was sown with 50 lb./acre of plain super.

The Hunter River lucerne was sown on 21/5/69 after another working back to control brome grass. The soil was reasonably moist at 2" depth. A 9-Hoe Mitchell combine fitted with a small seeds box with its hoses tied in pairs behind the rear tynes. The fertiliser procedure was similar to that used in April. After an overall top-dressing with Super plus trace elements* (140 lb./acre), half the lucerne area was sown with 118 lb./acre of 1:1 super ammonia. The remainder was sown with 65 lb./acre of plain super.

The lucerne seed was lime pelleted and inoculated 5 days prior to sowing. The sowing rate was 5 lb./acre. A cover crop of Noyep barley was sown at about 20 lb./acre. (*Trace elements were as follows:- 7 lbs. Cu, 7 lbs. Zn, and 2 oz. Mo per 187 lb. sack).

INSECT CONTROL:

Red legged earthmite infestations were treated with "Imidan" R 4 fl. oz./acre on 2/6/69 and 9/7/69.

A DDT treatment to control Pink cutworm was applied on 29/10/69. (= 12 oz. a.e. 2,4-DB per acre)

2,4-DB TREATMENT:

"Embutox 40" R at 1½ pts./acre was applied to the lucerne at the 3-5 trifoliate leaf stage, on 18/8/69. (= 12 oz. a.e. 2,4-DB per acre).

INSPECTIONS AND ASSESSMENTS 1969:

The growth of legumes was inspected visually on 25/6/69, 7/8/69 and 25/9/69.

The density of lucerne seedlings and skeleton weed rosettes were recorded on 5/8/69. 96 10 sq. link quadrats were counted - two from each 1968 spray plot.

Samples were cut from some Harbinger medic plots on 19/8/69. Two 10 sq. link quadrats were cut from each of the following picloram rates in each block:- nil, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, 1 oz./acre. Samples were only cur from the area sown without added nitrogen at sowing. The dry weight of each sample was determined.

RESULTS:

The soil samples taken systematically on 23/7/68 were analysed to provide information on the likely fertiliser requirement for lucerne establishment during the 1969 season. The following table gives the results:

Depth Zone	Total Nitrogen %	pH	Exch. K m. eq./100 g.	Avail. P (ppm) ($NaHCO_3$ ext.)
0- 6"	0.035	7.4	0.17	8
6-12"	0.012	7.6	0.14	6
12-18"	0.006	7.9	0.13	6
18-24"	0.008	8.9	0.19	4

These figures indicate deficiency of nitrogen, acute deficiency of phosphorous and a weekly alkaline soil pH. (the deficiency in phosphate required correction with at least 187 lb. of superphosphate per acre when the lucerne was sown).

Visual assessments of skeleton weed control taken on 12/12/68 are recorded in the following table:-

Visual rating 0 = No skeleton weed present
9 = Dense skeleton weed (same as control)

Table 6. VISUAL ASSESSMENTS OF SKELETON WEED GROWTH 12/12/68

TREATMENTS (as on Table 1)	SPRAYED 6/8/68		SPRAYED 1/11/68	
	Block 2	Block 4	Block 1	Block 3
A	6	3	6	6
B	1	0	4	4
C	0	0	3	3
D	0	0	0	0
E	6	6	6	4
F	3	3	3	4
G	9	6	9	9
H	4	3	6	7
J	0	0	3	3
K	4	7	9*	9*
L	9	9	9	9
M	9	9	9	9

* Not sprayed with 2,4-D as intended

Results were generally better on the early sprayed plots than on those sprayed later.

This is confirmed by table 7 which shows skeleton weed density figures recorded on 10/12/68. The variability within plots was high, but the early spray treatments gave better results than those applied later. The later treatments probably had insufficient time to give a maximum effect.

Picloram at ½ oz. a.e./acre or greater gave complete control of skeleton weed from August until later February when heavy rains stimulated regrowth of rosettes. Apart from the low rate of Tordon M, (treatment G) the weed was strongly suppressed at ⅛ and ¼ oz. a.e. picloram per acre. The 2,4-D, applied in August only did not give very strong suppression of the weed, and rain 15 hours after spraying may have reduced its effectiveness.

Effects of spray treatments on volunteer legume growth were assessed on 17/10/68 indicated the severity of the formulations containing picloram used. Even ⅛ oz. of picloram a.e./acre caused a visible setback, but this is not surprising when applied post-emergence.

1969 ASSESSMENTS:

Tables 8, 9 and 10 summarize the assessments in August, 1969 of skeleton weed density, lucerne seedling density and Harbinger medic growth (visual assessment).

Generally, variability within treatments was high and the effects of the previous years treatments on skeleton weed density had practically disappeared. (Table 7). The number of rosettes seemed to have increased on the ⅛ oz. Tordon M plots (treatment G) and a consistently lower number of rosettes was present on the 1.0 oz. Tordon 22K (treatment D) plots. Because of the variability most comparisons in skeleton weed density have little meaning. There were generally fewer rosettes on the August treated plots than on the November treated plots due, apparently, to the increased uptake efficiency of picloram in August. This does not appear to be due to a lack of rainfall after the November application, bacause 75 points were recorded on 2nd November.

In Table 9, it is evident that most of the spray treatments applied in 1968, excepting the 2,4-D (treatment K) reduced the number of lucerne seedlings when counted in August 1969. Treatment B (½ oz. picloram + ½ oz. dicamba) did seem to aid establishment more than ½ oz. picloram alone (treatment J). The amine 2,4-D, which was only applied in August, appeared to improve establishment but a statistical test of this technique is required in future experiments.

Visual assessments of the plots, recorded in Table 10 show that skeleton weed had rapidly regrown since the opening rains on most plots. However, there are generally less growth on plots treated with ½ oz. of picloram or more in 1968.

The Harbinger medic growth was reduced, especially where greater than ½ oz. of picloram had been applied. Plants which had grown fairly well, still showed leaf cupping of varying severity: especially in the picloram treatments of ½ oz. or more. Symptoms were more noticeable on the November sprayed plots.

Table 11 below shows the dry weight of Harbinger medic cut from 10 sq. link quadrats on 19/8/69. The samples were taken from treatments M, G, H, J, C, and D.

Table 11. DRY WEIGHT OF HARBINGER MEDIC, CUT AT FLOWERING (figures in grams per 10 sq. links) 19/8/69

Picloram rate 1968	Sprayed Nov., 1968			Sprayed Aug., 1968		
	Block 1	Block 3	Mean	Block 2	Block 4	Mean
nil	20.5*	22.0	21.3	37.5	40.0	38.7
⅛ oz.	38.0	58.0	48.0	37.5	34.0	35.7
¼ oz.	24.5	12.5	18.5	13.0	1.0	17.0
½ oz.	24.0	6.5	15.3	16.5	17.5	17.0
¾ oz.	1.5	6.0	3.8	11.0	20.5	15.7
1	1.0	2.0	1.5	7.0	7.0	7.0
		TOTAL	108.4		TOTAL	131.1

* each figure is a mean yield for two 10 sq. link quadrats.

These cuts were taken only to obtain approximate levels of pasture production and no statistical test was attempted. The amount of variation due to unknown causes was high, e.g., compare the means from Blocks 1 and 3 with the means from Blocks 2 and 4. Apart from the minor discrepancies however, pasture production was better on the August sprayed plots and was probably a reflection of extra leaching of herbicide residues. The dry weights suggest that ¼-½ oz. of picloram in November or August will reduce pasture growth by about half in the following year. Higher rates, especially in November have a more severe residual effect.

In Table 11 A, these results have not been set out in lbs. DM/acre and Kg. DM/acre.

When considering the effects of picloram residues on pasture production, the rainfall from spraying to sowing must be taken into account. Rainfall recorded at Parrakie township in the period 7/8/68 to 30/4/68 was 16.7" while only 10.6" were recorded from 2/11/68 to 30/4/69, a difference of 6.1". The rainfall recorded

in the above periods was at least 6" above average for Parrakie, and therefore, in an average season, more severe residual effects from picloram would be expected. The effect of sulphate of ammonia at sowing was not evident at the time of Harbinger medic was sampled and if anything, medic growth was better where this fertiliser had not been used. The cover crop of Noyep barley however visibly responded to the extra nitrogen early but this is of doubtful value due to brome grass competing with the cereal.

TREATMENTS AND ASSESSMENTS 1970:

The whole trial area was slashed during February 1970 to remove skeleton weed top growth. (This was to enable a combine to be used for topdressing in May without trash causing blockage of the implement).

On 5/5/70, the density of established lucerne was counted, and results are given in table II.

Variability was high throughout the trial area within plots, between plots and between blocks. No consistent effects of the 1968 spray treatments were showing in these counts, but there was a depression in density on plots sprayed with 2,4-DB. A slight benefit from the use of nitrogenous fertiliser on lucerne establishment could be seen.

The harbinger medic failed to regenerate on the area, although ample seed was set in 1969. This failure cannot be explained, because plenty of seed pods could be seen on the ground this year. In contrast, Cluster Clover (Trifoluim glomeratum) established quite readily in the 1970 season.

On 27/10/70, lucerne growth was visually assessed (Table 12). Overall establishment was better on Blocks 2 and 4 (Sprayed August 1968). Most of the sprayed plots showed more lucerne than the unsprayed controls, with the exception of treatment D (picloram 1 oz.). Treatments G, H, K and M gave poorer results than expected.

The November sprayed blocks (1 and 3) supported less lucerne, reflecting poorer control of skeleton weed and possibly greater residues of picloram. (See treatments C, D, and J).

Generally, the 2,4-DB applied to the seedling lucerne in 1969 was of no benefit in its establishment. The suppression of skeleton weed by this herbicide was not evident after the end of 1969. It is likely that many of the lucerne plants were adversely affected as well, because of their phyiological maturity.

CONCLUSION:

The use of herbicides to suppress skeleton weed over the spring, summer period in the year before sowing lucerne did not show a distinct advantage in this experiment. Poorest growth was noted on unsprayed controls and on the November picloram plots. Exceptionally good leaching rains fell early in 1969. Without these rains, residues would probably have caused more damage than was noted.

When sprays were applied in August 1968, conditions were more suited for herbicide action - particularly as picloram was leached into the root zone of the skeleton weed fairly quickly. By November-December of that year, the effective suppression of the weed was clear, and this condition remained through 1969 - when only a few plants regrew.

The rainfall in February 1969 largely prevented any expression of improved moisture storage on the sprayed plots by the growth of subsequent pasture or cover crop. However, had this rain not fallen, legume suppression due to picloram residues would have been more serious.

It was unfortunate that the November 2,4-D treatment was not applied, as this has given promising results elsewhere.

TABLE 11A DRY WEIGHT OF HARBINGER MEDIC, CUT AT FLOWERING 19/8/69 PARRAKIE

	RATE OF PICLORAM APPLIED		Expressed as LBS DRY MATTER/ACRE		Expressed as Kg DRY MATTER/HECTARE	
	oz. a.e./acre	gm. a.e./ahectare	Block 2	Block 4	Block 2	Block 4
Sprayed August, 1968	0	0	825	880	925	985
	0.125	8.75	825	748	925	840
	0.25	17.5	286	462	321	518
	0.50	35.0	363	385	407	432
	0.75	52.5	242	452	272	506
	1.00	70.0	154	154	173	173
			Block 1	Block 3	Block 1	Block 3
Sprayed November 1968	0	0	452	482	506	544
	0.125	8.75	835	1275	940	1432
	0.25	17.5	540	275	605	308
	0.50	35.0	528	143	594	156
	0.75	52.5	33	132	37	148
	1.00	70.0	22	44	25	49

Table 7. SKELETON WEED DENSITY COUNTS (10/12/68)

Rosettes per ½ sq. meter

TREATMENT August, 1968	BLOCK 2 a	BLOCK 2 b	BLOCK 4 a	BLOCK 4 b	AVERAGE PER SQ. METER
A	2	4	2	0	4.0
B	0	0	0	1	0.5
C	0	0	0	0	0
D	0	0	0	0	0
E	2	1	7	2	6.0
F	2	0	2	0	2.0
G	41	16	47	31	67.0
H	1	0	15	8	12.0
J	0	0	2	1	1.5
K	8	6	0	79	46.0
L	19	50	17	19	53.0
M	1	55	19	55	65.0

TREATMENT November, 1968	BLOCK 1 a	BLOCK 1 b	BLOCK 3 a	BLOCK 3 b	AVERAGE PER SQ. METER
A	26	1	11	6	22.0
B	3	8	15	11	18.5
C	7	1	1	10	9.5
D	3	0	3	1	3.5
E	14	31	1	16	31.0
F	0	6	15	15	18.0
G	59	42	22	5	64.0
H	9	0	6	18	16.5
J	8	2	18	12	20.0
K	3	30	16	4	26.5
L	6	11	8	8	16.5
M	19	9	14	30	36.0

Table 8. SKELETON WEED ROSETTE DENSITY (5/8/69)

(Rosettes per 10 sq. links

TREATMENT Aug., 1968	BLOCK 2 +N	BLOCK 2 -N	BLOCK 4 +N	BLOCK 4 -N	N TOTALS +N	N TOTALS -N	TOTAL OVERALL	MEAN PER 10 SQ. LINKS	% OF MEAN CONTROL DENSITY
A	2	1	0	3	2	3	5	1.25	6.3
B	0	0	6	5	6	5	11	2.75	13.8
C	2	4	4	4	6	8	14	3.50	17.5
D	0	0	1	0	1	0	1	0.25	1.3
E	1	13	6	23	7	36	43	10.75	54.0
F	2	0	7	11	0	11	20	5.0	25.0
G	35	14	13	21	48	35	83	20.7	103.5
H	0	4	32	9	32	13	45	11.25	56.4
J	0	0	6	2	6	2	8	2.0	10.0
K	23	6	6	18	29	24	53	13.25	66.5
L	29	3	16	8	45	11	56	14.0	
M	4	53	34	34	38	87	125	31.25	-
					223	235	464		

(Mean density on control plots = 19.95)

TREATMENT Nov., 1968	BLOCK 1 +N	BLOCK 1 -N	BLOCK 3 +N	BLOCK 3 -N	N TOTALS +N	N TOTALS -N	TOTAL OVERALL	MEAN PER 10 SQ. LINKS	% OF MEAN CONTROL DENSITY
A	1	12	9	0	10	12	22	5.5	27.5
B	8	7	24	21	32	28	60	15.0	75.0
C	16	13	6	5	19	18	37	9.25	46.3
D	6	14	0	0	6	14	20	5.0	25.0
E	33	11	8	7	41	18	59	14.75	74.0
F	25	3	1	14	26	17	43	10.75	54.0
G	57	31	78	14	135	45	180	45.00	225.0
H	10	9	10	28	20	37	57	14.25	71.0
J	14	12	9	38	23	50	73	18.25	91.5
K*	42	8	12	12	54	20	74	18.50	-
L	23	3	32	8	55	11	66	16.50	-
M	6	46	11	15	17	61	78	19.50	-
					483	331	769		

* Control

Table 9. LUCERNE SEEDLING DENSITY (5/8/69)

(Seedlings per 10 sq. links)

TREATMENT Aug. 1968	BLOCK 2 +N	BLOCK 2 -N	BLOCK 4 +N	BLOCK 4 -N	N TOTALS +N	N TOTALS -N	OVERALL TOTAL	MEAN PER 10 SQ. LINKS	% OF MEAN CONTROL DENSITY
A	32	34	14	33	46	67	113	28.25	74
B	39	48	5	68	44	116	160	40.00	105
C	11	32	9	30	20	62	82	20.50	54
D	29	24	17	52	46	76	122	30.50	80
E	41	22	11	21	52	43	95	23.75	62
F	31	30	10	57	41	87	128	32.00	84
G	18	35	21	38	39	73	112	28.00	73
H	59	21	44	14	103	35	138	34.50	90
J	39	23	28	35	67	58	125	31.25	82
K	66	70	35	30	101	100	201	50.25	131
L	41	43	22	31	63	74	137	34.25	-
M	39	41	34	27	73	68	141	35.25	-
					695	859	1554		

Mean density of lucerne on the control plots = 38.25/10 sq. links

TREATMENT Nov. 1968	BLOCK 1 +N	BLOCK 1 -N	BLOCK 3 +N	BLOCK 3 -N	N TOTALS +N	N TOTALS -N	OVERALL TOTAL	MEAN PER 10 SQ. LINKS	% OF MEAN CONTROL DENSITY
A	17	14	49	33	66	47	113	28.25	74
B	85	32	16	61	101	93	194	48.50	127
C	23	14	13	23	36	37	73	18.25	48
D	11	31	4	25	15	56	71	17.75	46
E	25	27	45	44	70	71	141	35.25	92
F	41	30	23	46	64	76	140	35.00	91
G	32	19	27	45	59	64	123	30.75	81
H	16	45	26	10	42	55	97	24.25	64
J	31	8	19	26	50	34	84	21.00	55
K	43	56	34	58	77	114	191	47.75	-
L	28	42	31	15	59	57	116	29.00	-
M	48	35	38	59	86	94	180	45.00	-
					725	798	1523		

* Control

Table 10. VISUAL ASSESSMENT OF SKELETON WEED AND HARBINGER MEDIC GROWTH (7/8/69)

TREATMENT Aug. 1968	SKELETON WEED BLOCK 2	SKELETON WEED BLOCK 4	HARBINGER MEDIC BLOCK 2	HARBINGER MEDIC BLOCK 4	ANNUAL MEDIC SYMPTOMS BLOCK 2	ANNUAL MEDIC SYMPTOMS BLOCK 4
A	5	-	4	6	2	2
B	4	4	5	6	3	3
C	2	4	2	6	3	3
D	5	2	2	2	3	3
E	7	5	6	6	1	2
F	7	4	5	6	2	2
G	6	6	6	6	8	1
H	8	7	6	6	1	2
J	4	3	5	6	3	2
K	8	6	5	8	1	1
L	8	8	5	8	1	1
M	7	7	5	7	1	1

TREATMENT Nov. 1968	SKELETON WEED BLOCK 1	SKELETON WEED BLOCK 3	HARBINGER MEDIC BLOCK 1	HARBINGER MEDIC BLOCK 3	MEDIC SYMPTOMS BLOCK 1	MEDIC SYMPTOMS BLOCK 3
A	5	7	4	6	2	2
B	4	7	2	4	3	3
C	4	5	1	3	3	3
D	3	3	1	2	3	3
E	6	8	8	7	2	2
F	7	8	4	6	3	2
G	8	6	8	7	2	1
H	5	5	5	4	3	3
J	5	5	2	4	3	3
K	8	7	7	7	1	1
L	6	6	5	7	1	1
M	7	8	7	7	1	1

Ratings 1-10
1 = nil present
10 = dense skeleton weed
= maximum pasture growth equal to untreated

Ratings 1-2-3 Severity of picloram symptoms:-
1 = nil
2 = slight leaf cupping
3 = severe cupping

Table 11. LUCERNE DENSITY 5/5/70
Plants per 10 sq. links

TREATMENT AUG. 1968	BLOCK 2				BLOCK 4				MEAN PER 10 SQ. LINKS
	+ N		- N		+ N		- N		
	-2,4DB	+2,4DB	-2,4DB	+2,4DB	-2,4DB	+2,4DB	-2,4DB	+2,4DB	
A	10	0	7	0	16	2	8	5	6.0
B	4	3	7	6	12	2	3	8	5.6
C	9	0	0	0	7	0	7	2	3.1
D	0	0	6	0	4	0	1	5	2.0
E	11	0	3	2	13	1	13	15	7.3
F	12	4	0	1	1	0	11	15	5.5
G	0	2	7	4	6	0	3	1	2.9
H	2	1	9	0	9	1	11	0	4.1
J	0	0	1	0	23	0	1	9	4.3
K	7	7	4	4	5	3	4	0	4.3
L	0	1	5	1	15	3	3	3	3.9
M	8	1	2	1	2	15	1	0	3.8
	63	19	51	19	113	27	66	63	
	82		70		140		129		

Table 11. (Cont.) LUCERNE DENSITY 5/5/70
Plants per 10 sq. links

TREATMENT Nov. 1968	BLOCK 1 + N -2,4DB	BLOCK 1 + N +2,4DB	BLOCK 1 - N -2,4DB	BLOCK 1 - N +2,4DB	BLOCK 3 + N -2,4DB	BLOCK 3 + N +2,4DB	BLOCK 3 - N -2,4DB	BLOCK 3 - N +2,4DB	MEAN PER 10 SQ. LINKS
A	10	7	13	2	7	1	3	9	6.5
B	6	0	2	0	2	0	7	11	3.5
C	6	0	0	8	0	7	1	0	2.8
D	2	9	1	1	2	6	0	1	2.8
E	21	3	1	7	5	0	0	0	4.6
F	23	2	15	1	1	2	3	4	6.4
G	11	18	0	12	13	4	2	7	8.4
H	2	3	6	0	2	10	0	0	2.9
J	5	0	12	0	2	1	16	0	4.5
K*	1	0	21	0	20	2	12	8	8.0
L	4	3	0	0	0	1	1	0	1.1
M	10	4	3	3	1	2	0	2	3.1
	101	49	74	34	55	36	45	42	
	150		108		91		87		

* Not sprayed as originally intended = Control plot.

1. The use of nitrogen at sowing of lucerne did not benefit the establishment to a worthwhile degree.
2. In all each mean lucerne densities were reduced by 2,4-DB

Table 12. LUCERNE VISUAL ASSESSMENTS 27/10/70

TREATMENT Aug. 1968	BLOCK 2	BLOCK 4	AVERAGE RATING
A	8	6	7.0
B	6	7	6.5
C	7	6	6.5
D	4	3	3.5
E	8	7	7.5
F	8	8	8.0
G	8	4	6.0
H	9	3	6.0
J	7	5	6.0
K	8	2	5.0
L	3	4	3.5
M	4	2	3.0

TREATMENT Nov. 1968	BLOCK 1	BLOCK 3	AVERAGE RATING
A	3	5	4.0
B	4	5	4.5
C	1	1	1.0
D	1	1	1.0
E	4	3	3.5
F	4	1	2.5
G	4	4	4.0
H	6	4	5.0
J	1	2	1.5
K	4	3	3.5
L	4	2	3.0
M	2	2	2.0

Ratings 0 = no lucerne present
9 = excellent growth (best for the site)

EXPERIMENT 14C. A COMPARISON OF SEVERAL PICLORAM FORMULATIONS AND 2,4-D FOR SKELETON WEED CONTROL, FOLLOWED BY ANNUAL MEDIC AND LUCERNE ESTABLISHMENT

LOCATION:

J. Fuller, Parilla Section 114: Hundred of Parilla

SOIL TYPE:

Solodised solonetz. Infested with Skeleton Weed

RAINFALL:

Mean = 13.94" annually
April-October 1968 = 11.89" Total 1968 = 16.71"
April-October 1969 = 7.10" Total 1969 = 16.86"
Total 1970 = 12.50"
August 1968-April 1969 (inclusive) = 16.26"

DURATION:

August 1968-December 1970

PERSONNEL:

R. McR. Wood and A.W. Lewis

BACKGROUND:

As for Expt. 14A

AIMS:

As for Expt. 14A

DESIGN:
As for Expt. 14A except plot size increased in length to 200'.

METHODS:

The site, heavily infested with skeleton weed was chosen in late July, 1968. There was evidence of past wind erosion, but the density of skeleton weed was fairly unifrom overall. Soil samples were taken on 24th July, 1968.

The first spray treatments were applied on 15th August, 1968 using the Toyota mounted boomspray, delivering 10 gallons per acre. Two runs side by side were made with the 12' boom to give a total sprayed width of 24'.

The herbicide concentrate was mixed in 5 gallons of water for each treatment. This quantity was sufficient to spray two plots 24' x 200'.

The second spray treatments were applied on 1st November, 1968 using the trailer boomspray with 15' boom width.

The August sprayed plots were assessed visually on 16th October, 1968, and the whole trial assessed again with density counts on 11th December 1968.

SEEDBED PREPARATION:

The area was worked up after rains in March 1969 when the remainder of the paddock was worked in preparation for a crop.

SOWING PROCEDURE:

Harbinger medic was dry sown on 16th April, 1969, using Mr. Fuller's Shearer combine and small seeds box. Super plus trace elements* was applied to the area first at 140 lbs. per acre. Half the Harbinger was sown with 100 lbs./acre of 1:1 Super Ammonia and the remaining half was sown with 50 lbs. plain super per acre. A cover crop of Noyep barley was sown at 30 lbs. per acre. The Harbinger medic was sown at 10 lbs./acre, and the hoses from the small seedsbox were tied in pairs behind the rear tynes. No harrows were used.

The Hunter River lucerne was sown on 20th May, 1969, using the 9 hoe Mitchell combine on loan from the cereals section. The lucerne was inoculated and lime pelleted four days prior to sowing. The sowing rate was 5 lbs. of seed per acre, sown with hoses tied in pairs behind the rear tynes. No harrows were used. A light cover crop of Noyep barley was sown 20 lbs./acre.

Fertiliser applications were similar to those applied when the Harbinger medic was sown. The super plus trace element mixture was topdressed first at 140 lbs./acre. Half the area was then sown, using 120 lbs./acre 1:1 Super-Ammonia and the remainder sown using 65 lbs. of plain Super/acre.

(*Trace elements were as follows: 7 lbs. Cu, 7 lbs. Zn and 2 oz. Mo per 187 lb. sack).

INSECT CONTROL:

Red legged earthmites were treated with Imidan^{R} at 4 fluid oz. per acre on 3rd June, 1969, and 9th July, 1969.

2,4-DB TREATMENT:

Embutox 40^{R} at 1½ pts./acre (= 12.0 oz. 2,4-DB a.e.) was applied on 18th August, 1969. Two runs were made with a 15 feet wide trailer mounted boomspray. (An attempt to spray was made on 13th August, 1969 but adverse weather conditions made the later treatment necessary.) The lucerne had reached the 3-5 trifoliate leaf stage.

INSPECTIONS AND ASSESSMENTS 1969:

The legume growth was visually assessed on 25th June, 1969, and 13th August, 1969.

Counts of lucerne density and skeleton weed rosette density were recorded on 7th August, 1969 (before the 2,4-DB treatment).

RESULTS:

The results of tests made on soil samples taken in July 1968 are set out in the following table.

Depth of Sampling	Total nitrogen %	pH	Exch. K M. eq./100 g	Avail. P (ppm) ($Na\ H\ CO_3$)
0- 6"	0.012	7.5	0.18	10
6-12"	0.008	7.4	0.14	6
12-18"	0.005	8.0	0.13	6
18-24"	0.004	8.1	0.13	4

These analyses confirmed the suspicion of acute Nitrogen and Phosphorus deficiency on the site (a heavily infested sandy rise which had suffered in the past from severe erosion).

Visual assessments of skeleton weed recorded on 16th October, 1968 revealed the effectiveness of the August picloram treatments.

With the exception of treatment G, all picloram treatments reduced skeleton weed to practically nil. For an unknown reason, the Tordon M (treatment G) was the least effective of the picloram formulations. The amine 2,4-D gave moderate skeleton weed suppression compared with untreated plots, and was less damaging to volunteer legume growth on the plots. No legumes were present on the picloram plots.

Table 13 (below) shows the visual ratings recorded on 11th December, 1968.
0 = no skeleton weed
9 = dense skeleton weed

Treatments (as on table 1)	Sprayed 15/8/68		Sprayed 1/11/68	
	Block 2	Block 4	Block 1	Block 3
A	3	4	9	8
B	0	0	7	7
C	0	0	7	6
D	0	0	7	7
E	0	3	8	8
F	1	3	8	8
G	4	6	8	9
H	3	2	9	8
J	2	0	7	7
K	5	6	8	8
L	9	9	9	9
M	9	9	9	9

At the time of this visual assessment, skeleton weed control was far superior from the August treatments compared with the November treatments. The latter sprayed did not have sufficient time for maximum effect.

0-1 = excellent skeleton weed control
2-4 = good skeleton weed control
5-6 = fair skeleton weed control
7-8 = poor skeleton weed control
9 = no visual effect of spray treatment

As was observed at an earlier assessment of this trial, Tordon M (treatments G and H) did not perform as well as other formulations containing picloram at the same rates per acre. August applications of picloram from ½-1 oz. a.e. per acre almost completely controlled skeleton weed until the opening rains in 1969. Amine 2,4-D at 12 oz. a.e. per acre did not produce the spectacular results obtained with picloram but it suppressed the weed enough to prevent run up and flowering. The results of the later applications showed almost complete lack of activity when inpsected in December.

Density counts, taken on the August plots on 11th December, 1968, are recorded for each treatment from blocks 2 and 4 in the following table.

Table 14. SKELETON WEED DENSITY COUNTS

Treatment Aug. 1968	BLOCK 2		BLOCK 4		Mean Rosettes per M^2
	a	b	a	b	
A	33	4	5	2	22.0
B	0	0	0	1	0.5
C	0	0	0	0	0
D	0	0	0	0	0
E	4	0	4	2	5.0
F	0	0	0	4	2.0
G	12	3	45	68	64.0
H	0	0	7	0	3.5
J	0	0	0	0	0
K	36	57	54	43	95.0
L	56	40	74	49	104.5
M	76	70	69	51	133.0

Two random graduates (a and b), 0.5 M^2 in area, were counted in each plot. These figures put the visual assessment in Table 13 on a quantitative basis.

1969 ASSESSMENTS:

Visual assessment of the Harbinger medic on 25th June, 1969 revealed a high level of variability in the picloram toxicity symptoms. Generally, leaf cupping was severe on plots treated with ½ oz. or more picloram per acre, although some plots in block 4 appeared normal or only slightly affected. The overall

growth and production from the Harbinger medic was very good. However, because of the variability which seemed unrelated to picloram residues, no dry weight determinations were attempted.

Table 15 shows the effects of the 1968 treatments on the density of skeleton weed rosettes present in August 1969. All the picloram treatments had held the rosette density below the untreated control plot density. The level of significance is doubtful with some treatments, and the effects of the 2,4-D (treatment K) was not visible at the time. The best treatments appeared to be treatments J, C and D ($\frac{1}{2}$, $\frac{3}{4}$, and 1 oz. a.e. picloram per acre) at both spraying times. It appears that $\frac{3}{4}$-1 oz. a.e. of picloram, applied in August will result in a 30% skeleton weed reduction 12 months after spraying.

Table 16 does not show any consistent reduction in lucerne seedling density that can be attributed to the 1968 treatments except for treatments C and D applied in November. Treatments J ($\frac{1}{2}$ oz. picloram) applied in August appeared to allow greater density of lucerne seedlings, as did the 2,4-D treatment applied in November.

Table 17 sets out visual assessments of Harbinger medic and skeleton weed. The figures shows a high degree of variability and do not show any clear trends. The medic leaf symptoms were more apparent on the late sprayed blocks, especially for treatments B, C, D, J, H.

Although the above tables do not reveal any effect from the use of ammonium sulphate at sowing time, there was a definite increase in the cover crop vigour where it had been applied. There appeared to be a slight negative effect on the Harbinger medic growth.

TREATMENTS AND ASSESSMENTS 1970:

The site was slashed to keep down the skeleton weed regrowth in February, prior to assessments on 8/5/70. Sheep had access to graze the trial when the rest of the paddock had been reaped.

On 15/5/70, the Harbinger medic area was lightly worked with by combine, applying 100 lbs./acre superphosphate. A light cover crop of barley was sown.

The area was fenced to exclude stock on 25/5/70.

Inspections of the plot were made on 11/6/70, 8/7/70, 6/8/70, 13/8/70, 1/10/70 and 27/10/70. On this latter occasion, the following assessment was made:

Lucerne had failed to establish - only a few scattered plants over the whole area. The harbinger medic had also failed to regenerate in 1970, despite the large seed set in 1969. One reason for this may have been the depth of working in May when the cover crop was sown in May. The barley cover crop failed because of eelworm infestation.

The effects of the August 1968 sprays on skeleton weed were still evident on the 0.25, 0.5, 0.75 and 1.0 oz. picloram treatments. Rosettes were less dense, but individual survivors were growing vigorously.

The experiment, having yielded little information during 1970 was concluded and the fence was opened to allow stock to graze the weed.

CONCLUSION:

Of all three sites where this type of experiment was conducted, this site showed the most effective chemical control of skeleton weed. This was particularly so on the plots sprayed in August 1968 where the weed was completely controlled during the summer-autumn period of 1968-69 at picloram rates as low as 0.25 oz. a.e. per acre.

As mentioned above, the residual effect of picloram on the growth of Harbinger medic during 1969 was not very consistent, even when assessed in August. Generally growth on plots sprayed with ½-1 oz. a.e. picloram was affected to some degree, with more noticeable stunting on the November sprayed plots. No symptoms (leaf cupping) was noted on treatments G, K, L, and M, indicating that dragging of picloram contaminated soil from picloram sprayed plots to adjacent plots was insignificant. The very patchy results are likely to be associated with variable leaching due to water repellance in the sand.

The failure of the lucerne was not associated with the herbicide treatments in 1968. Seasonal conditions, faulty seeding and fencing off too late were factors more likely to cause this failure. The emergence was not good from the start.

Failure of the Harbinger medic to regenerate on practically all plots suggests that herbicide residues were not responsible. The most likely explanation was working up too deep in May 1970.

As in Expt. 14B, results do not suggest any economic value of herbicide spraying the year before sowing pasture. The use of 2,4-D at the early runup stage (October-November) would probably benefit pasture establishment in a year when summer and autumn rains are insufficient. This treatment will prevent the skeleton weed from running up and make sowing easier anyway.

Table 15. SKELETON WEED ROSETTE DENSITY 7/8/69
(Rosettes per 10 sq. links)

Treatment Aug. 1968	Block 2		Block 4		N Totals		Overall Total	Mean per 10 sq. links	% of * control
	+N	-N	+N	-N	+N	-N			
A	80	34	30	27	110	61	171	42.8	65
B	16	19	24	28	40	47	84	21.8	33
C	18	24	18	34	36	58	94	23.5	36
D	17	28	9	10	26	38	64	16.0	24
E	32	33	29	34	61	67	128	32.0	48
F	39	27	47	58	86	85	171	42.8	65
G	23	49	33	40	56	89	145	36.3	55
H	24	50	30	17	54	67	121	30.3	46
J	33	41	2	29	35	70	226	56.5	86
K	61	44	54	67	115	111	226	56.5	86
L	65	78	101	33	165	111	276	69.0	-
M	42	65	99	47	141	112	253	63.3	-

Treatment Nov. 1968	Block 1		Block 3		N Totals		Overall Total	Mean per 10 sq. links	% of * control
	+N	-N	+N	-N	+N	-N			
A	68	54	48	24	116	78	194	48.5	73
B	35	62	40	26	75	88	163	40.8	62
C	21	1	7	18	28	19	47	11.8	18
D	10	10	13	23	23	33	56	14.0	21
E	39	15	43	21	82	36	118	29.5	45
F	94	32	53	16	147	48	195	48.8	74
G	35	15	67	55	102	70	172	43.0	65
H	57	55	30	48	87	103	190	47.5	72
J	21	28	45	41	66	69	135	33.8	51
K	57	69	48	44	105	113	218	54.5	82
L	131	93	70	52	201	145	346	86.5	-
M	64	43	47	28	111	71	182	45.5	-

* Mean density per 10 sq. links compared with a control mean density of 66.1 rosettes per 10 sq. links.

Table 16. LUCERNE SEEDLING DENSITY 7/8/69
(Seedlings per 10 sq. links)

Treatment Aug. 1968	Block 2		Block 4		N. Totals		Overall Total	Mean per 10 sq. links	% of * control
	+N	-N	+N	-N	+N	-N			
A	16	10	7	5	23	15	38	9.5	77
B	11	16	2	9	13	25	38	9.5	77
C	10	9	0	4	10	13	23	5.8	48
D	33	21	0	0	33	21	54	13.5	109
E	3	9	5	24	8	33	41	10.3	83
F	14	5	8	18	22	23	45	11.3	91
G	33	18	4	1	37	19	56	14.0	113
H	31	22	4	4	35	26	61	15.3	123
J	36	70	2	13	38	83	121	30.3	224
K	23	21	10	2	33	23	56	14.0	113
L	36	30	3	27	39	57	96	24.0	-
M	14	6	2	1	16	7	23	5.8	-

Treatment Nov. 1968	Block 1		Block 3		N Totals		Overall Total	Mean per 10 sq. links	% of * control
	+N	-N	+N	-N	+N	-N			
A	4	1	20	24	24	25	49	12.3	100
B	7	5	6	17	13	23	36	9.0	73
C	0	5	4	6	4	11	15	3.8	31
D	3	4	0	5	3	9	12	3.0	24
E	2	5	11	11	13	16	29	7.3	59
F	20	3	11	16	31	19	50	12.5	100
G	14	12	23	14	37	26	63	15.8	128
H	11	12	9	21	20	33	53	13.3	108
J	5	1	2	29	7	30	37	9.3	75
K	30	18	39	26	69	44	113	28.3	228
L	0	6	10	6	10	12	22	5.5	-
M	0	11	16	30	16	41	57	14.3	-

* Mean density per 10 sq. links compared with a control mean density of 12.4 seedlings per 10 sq. links.

Table 17. VISUAL ASSESSMENT OF SKELETON WEED AND HARBINGER MEDIC GROWTH 13/8/69

Treatment Aug. 1968	Skeleton Weed		Harbinger Medic Growth		Annual Medic Symptom	
	Block 2	Block 4	Block 2	Block 4	Block 2	Block 4
A	6	2	2	3	1	2
B	5	2	4	4	3	2
C	4	3	3	7	3	1
D	4	1	4	1	2	3
E	6	3	4	5	1	1
F	5	2	3	4	2	1
G	5	6	5	6	1	1
H	5	4	6	8	1	1
J	4	1	4	3	2	2
K	7	6	3	8	1	1
L	6	4	3	6	1	1
M	7	9	6	4	1	1

Treatment Nov. 1968	Skeleton Weed		Harbinger Medic Growth		Annual Medic Symptom	
	Block 1	Block 3	Block 1	Block 3	Block 1	Block 3
A	6	7	4	3	1	2
B	7	6	5	5	2	3
C	2	6	2	0	3	3
D	6	1	0	0	3	3
E	7	7	6	3	1	1
F	8	7	5	4	2	2
G	6	8	9	5	1	1
H	2	5	3	4	2	2
J	2	5	6	2	2	2
K	5	7	5	5	1	1
L	4	6	3	4	1	1
M	2	7	8	3	1	1

Ratings 0-9 0 = nil skeleton weed or annual medic

9 = dense skeleton weed rosettes and/or maximum annual medic growth.

Symptoms of picloram residue toxicity

1 = no symptoms. Leaves normal shape
2 = slight leaf cupping
3 = severe cupping

EXPERIMENTS 15A AND 15B LOGARITHMIC COMPARISON OF EIGHT HERBICIDES FOR CONTROL OF SKELETON WEED OVER SUMMER, TO BE FOLLOWED BY SOWING OF MEDIC PASTURE

BACKGROUND:

There is a need to study various herbicides for their ability to suppress skeleton weed over the summer months to conserve soil moisture and nutrients. In fact, this is a study of chemical fallow, which should ideally be commenced in August-September.

It is important to be able to establish legumes in the Autumn after spraying. Picloram is known to severely affect legumes, although it is effective in controlling skeleton weed. 2,4-D amine will work on skeleton weed satisfactorily if applied just at the first sign of runup. Other herbicides such as amitrol and fenac have not been trial on skeleton weed in this situation in South Australia, but some success if reported from Victoria (Wells, 1967 Victorian Journal of Agriculture.)

Previous experiments have involved cross sowing of sprayed plots, causing some cross contamination of soil. It is intended that these trials be sown in the same direction as spraying.

AIM:

To compare the herbicides chosen below for their ability to suppress skeleton weed and thus aid legume pasture establishment.

DESIGN:

(a) Statistical 8 treatments randomised x 2 replicates = 16 plots.

(b) Treatments

A. Fenac Peak dosage 4 lbs. a.e./acre
B. Dicamba " " " "
C. Amitrol (plus NH_4CNS) P.D. 4 lbs. a.i./acre
D. 2,3,6-TBA P.D. " a.e./acre
E. Amitrol/Atrazine Mixture P.D. " a.i. amitrol/acre
F. Picloram + 2,4-D P.D. 4 oz. a.e. picloram/acre
G. 2,4-D P.D. 4 lbs. a.e./acre
H. OCS21799 P.D. 4 lbs. a.i./acre

Products used in the above treatments

A. "Fenatrol"^{R} 20% a.e. Fenac (Sodium Salt)
B. "Banex"^{R} 20% a.e. Dicamba (Amine Salt)
C. "Weedazol TL plus" R 25% a.i. amitrol

D. "Trysben 200" R 20% a.e. 2,3,6-TBA (Dimethylamine Salt)

E. "Vorox AA" R 40% a.i. amitrol plus 40% a.i. atrazine

F. "Tordon 50-D" R 5% a.e. picloram plus 20% a.e. 2,4-D (triiso propanolamine salts)

G. "Weedar 77"^{R} 48.4% 2,4-D (trienthanolamine salt)

H. OCS21799 80.0% - potassium salt (Velsicol Experimental Herbicide)

(c) Plot size 15' x 100' sprayed
20' x 100' pegged

(d) Assessments

1. Skeleton weed density at spraying time November 1969 on adjacent control plots.

2. Visual assessments of herbicide effects on skeleton weed - 1970.

3. Assessment of Harbinger medic growth on the plots 1970.

4. Assessment of Harbinger medic regrowth during 1971 after topdressing.

EXPERIMENT 15A

LOCATION:

Karoonda. Section 44 Hundred of Marmon Jabuk (D.G. Dutschke)

SOIL TYPE:

Solodized solonetz - infested with skeleton weed.

RAINFALL:

Mean 13.65"
Sept.-Dec. 1969 = 2.8"
Total 1970 = 12.2" (to 22/12/70)

DURATION:

October 1969-October 1971

PERSONNEL:

R. McR. Wood and A.W. Lewis

METHODS:

The site was selected, pegged out and sprayed on 7/10/69. Skeleton weed was showing the first signs of running up, and was the predominant plant present. Some mature burr medic and grasses were present, but cultivated species were absent.

Spraying was carried out in late afternoon, in fine conditions with a light easterly breeze. The last treatment to be applied (Treatment H) was applied early next morning.

The landrover mounted Chesterford Logarithmic Spray Unit was used. Its water output was 42 gallons/acre, and half dosage distance was 17.2 feet (5.25 metres). On an adjacent trial area skeleton weed density was counted on 19/11/69. A mean density of 70 flowering stalks per square metre was recorded.

The site was fenced off to exclude stock on 11/3/70, and the area eas worked up for sowing in April. On 12/5/70, 10 lbs./acre of Harbinger medic was sown through a small seeds box on a 9 hoe combine. Superphosphate + 7 lbs. Cu, 7 lbs. Zn and 2 oz. Mo was applied at 180 lbs./acre, and Noyep barley was sown as a cover crop at 20 lbs. per acre. Hoses from the small seeds box were allowed to swing free and the medic was covered by light harrows.

Red legged earthmites were treated with Imidan on 11/6/70, but complete control was not obtained due to patchy rainfall conditions through the growing season.

Assessments of skeleton weed control and medic growth were made on 1/10/70 and 27/10/70.

RESULTS TO DATE:

The mean density of skeleton weed stalks at spraying time was 70 rosettes per sq. metre.

The following table summarises assessments taken on 1/10/70 and 27/10/70.

	TREATMENT	1/10/70 DISTANCE (ft)*	VISUAL RATINGS** 27/10/70 (0-9) Skeleton Weed	Harbinger Medic	Cover Crop	Comments
	A	10	3	0	4	Crop distorted
	B	20	3	7	9	
	C	0	6	9	1	
BLOCK	D	16	2	0	6	Crop distorted
I	E	0	9	9	2	
	F	30	2	0	7	
	G	0	8	9	7	
	H	0	9	9	1	
	A	18	1	0	3	Crop distorted
	B	0	1	8	5	
	C	0	9	9	2	
BLOCK	D	8	4	0	3	Crop distorted
II	E	8	9	9	1	
	F	36	1	0	3	
	G	0	9	9	1	
	H	0	9	9	1	

* Distance in feet (measured from peak dose end) where the treatment completely controlled skeleton weed.

** Visual rating 0 = no growth present
9 = dense growth of rosettes,
= vigorous medic or cover crop growth

PROGRESS REPORT:

1. Effects on Skeleton Weed

From the assessment on 1/10/70, treatment F, (picloram) showed greatest activity on skeleton weed. Treatment D (2,3,6-TBA) gave a consistent depression of the weed, but treatment B (dicamba) did so on only one block. Treatment A (fenac) was also quite effective.

The visual ratings recorded on 27/10/70 indicate that treatment F was best on skeleton weed, followed by treatments A, B, and D. Treatments C, E, G, and H were ineffective in controlling the weed over the 12 month period.

2. Effects on Harbinger medic
Treatments A, D and F completely prevented establishment in May 1970. On all remaining plots, residual effects were negligible.

3. Barley Cover Crop Growth
Effects were a little less consistent, but the best growth was recorded on treatment B, followed by treatments F and G.

Weakest growth was noted on treatments C, E, and H, while distorted growth was present on treatments A and D.

Summing up these results to date, the best overall effect was obtained with treatment B i.e. best control of skeleton weed with maximum growth of medic and cover crop. Results of the assessment on 1/10/70 for this chemical show a marked difference between blocks.

It is intended that the experimental area be topdressed with superphosphate in April-May 1971, so that regeneration of the medic can be assessed.

EXPERIMENT 15B

LOCATION:

Parrakie Section 22 Hundred of Price (R.T. Fearn)

SOIL TYPE:

Solodized solonetz. Infested with skeleton weed.

RAINFALL:

Mean = 14.83"
September-December 1969 = 2.81"
Total for 1970 = 12.33"

DURATION:

October 1969-October 1971

PERSONNEL:

R. McR. Wood and A.W. Lewis

METHODS:

The site was selected, pegged and sprayed on 8/10/69. Skeleton weed centre stalks were just appearing. A landrover mounted Chesterford log spray unit was used, delivering 42 gallons per acre. The half dosage distance was 17.2 ft. (5.25 metres).

Calm conditions with no cloud prevailed during the late afternoon when spraying was conducted.

Skeleton weed density was counted with 0.5 in 2 quadrats on an adjacent trial area on 18/11/69. The site was worked up by R. Fearn on 14/4/70 and inspected 8/5/70.

Harbinger medic was sown at 10 lbs./acre on 14/5/70, using a 9 hoe Mitchell combine fitted with a small seeds box. Superphosphate + 7 lbs. Cu, 7 lbs. Zn and 2 oz. Mo was applied (180 lbs./acre), and a cover crop of 20 lbs. Noyep barley was sown. Hoses from the small seeds box were allowed to swing free, followed by light harrows to cover the seed.

On 27/5/70 the area was fenced off to exclude stock. Conditions were dry and some red legged earthmite were present. The area was treated with 4 fl. oz./acre "Imidan (R)" on 11/6/70, but an inspection on 8/7/70 showed that some earthmites were still present. Conditions were dry.

On 2/10/70, the length of control along each plot was recorded. At that stage, moisture levels had improved and medic growth hat recovered. Further assessments were recorded on 27/10/70.

RESULTS TO DATE:

The mean density of skeleton weed stalks on unsprayed plots on 18/11/69 was 30 + 5 per square metre. Variability was very high (C.V. + 100%)

Treatments		2/10/70 Distance (ft)*	VISUAL RATINGS 27/10/70** Skeleton Weed	Harbinger Medic	Cover Crop
	A	36	0	1	Prolific
	B	15	1	10	
	C	0	4	10	
BLOCK	D	20	1	1	
I	E	0	7	8	
	F	25	0	1	Prolific
	G	0	3	10	
	H	0	4	10	
	A	25	1	1	Prolific
	B	20	4	5	
	C	0	4	7	
BLOCK	D	40	0	1	Prolific
II	E	0	6	10	
	F	50	0	1	Prolific
	G	0	6	10	
	H	0	7	2	

* Distance in feet from peak dose end where the treatment completely controlled skeleton weed.

** Visual rating 0 = no growth present
9 = dense skeleton weed rosettes
= vigorous medic or cover crop growth

PROGRESS REPORT:

1. Effects on Skeleton weed
Distance of full control along the plot, assessed 2/10/70 shows treatment F (picloram) as the most active herbicide, followed by treatments A (Fenac), D (2,3,6-TBA) and B (Dicamba). This observation was verified by observations on 27/10/70.

2. Effects on Harbinger medic growth
Growth was least affected by residues of treatments G (2,4-D) E (Amitrol + Atrazine Mixture), C (Amitrol) and B (dicamba). Treatments A, D, and F severely reduced medic growth.

3. Effects on the cover crop
Treatments A, D, and F tended to improve cover crop growth, but distorted heads were seen at the highest rates of 2,3,6-TBA and Fenac.

The growth on the plots was very weedy - Brome grass and Erodium sp. were prominent.

Summing up to date, the control of skeleton weed varied widely between treatments. This was shown in the variation of 100% on the control plots on an adjacent experiment. However, treatment B, C, G, and H show some promise of skeleton weed control without adverse residue effects on medic pastures. The weed growth on this trial tended to make observations difficult.

The area should yield some medic regeneration data if topdressed and assessed in 1971.

Literature Reference

For a list of literature reference see Appendix III of Agronomy Branch Report No. 33.