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## Part 3 Lupin cultivar - comparison

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1972 EXPERIMENTAL SUMMARY

PART 3 : LUPIN CULTIVAR COMPARISON

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COMPARISON OF LUPIN VARIETIES

The 1972 experimental results provide a good comparison between Unicrop and Uniharvest lupin under low rainfall conditions. While most trial results have to be examined in the knowledge of low rainfall confounded with high weed competition, some useful and practical conclusions can be drawn.

The following table summarises the best yield obtained for the lupin varieties at each site.

May to October Rainfall (cm)	Location	Varieties Yield (kg/ha)		
		Uniharvest	Unicrop	Weiko 111
51.6	Mt. Barker R.S. (1971)	1,838	1870	
48.3	Kojonup (1971)	1,560		
46.6	Mt. Barker R.S.	1,779	1571	917
40.7	Eneabba	1,380	1003	917
40.7	Narrogin (1971)	1,660		
40.7	Gairdner River (1971)	1,170		
39.0	Badgingarra(1971)	3,545	4,040	
37.7	Watheroo	1,510	1,556	474
36.8	Naraling	539	936	
34.0	Kulilup	1,340	1,156	
32.8	Mingenew	118	629	
32.8	Casuarina	541	502	
32.8	Chapman (1971)	1,400		
30.5	East Gibson	598	661	
30.5	Coomalbidgup	1,846	1,450	
30.5	Allanooka (1971)	1,300		
29.7	Eradu		1,300	
29.7	"		1,564	
29.7	"	565	589	
27.8	Mokine	711	750	
27.8	"	603	566	
26.8	Williams	433	404	
26.0	Irwin	431	856	
25.4	Takalarup	528	600	
25.4	Avondale (1971)	800		
23.9	Bokal	1,167		
18.5	East Narrogin	Failed	Failed	
17.7	Jacup	338	697	
14.7	Lake Grace	484	492	
13.7	Nth Kukerin	211	308	

Figure 4 illustrates my interpretation of these results. It is realised that soil type (eg difference in Uniharvest yield between Mingenew red loam and Casuarina yellow sand with equal rainfall), weed competition and cultural practice (eg low yield at Williams due to seeding too deep) all interact with the yield response to rainfall received. In addition, the requirement of Uniharvest lupin for vernalisation imposes a limitation to its use in the area north of Perth. The length of the growing season often isn't long enough to obtain the necessary cumulative low temperatures for high yields.

In Figure 4 the hatched area indicates superiority of Unicrop yield over Uniharvest, found between the rainfall limits of 10 cm to 42 cms in a six month growing season. It is postulated that it is not profitable to grow Uniharvest lupin in areas receiving 20 cms or less rainfall.

#### Comparison of gross margin analysis

As indicated, some trials were not harvested because of drought, thus the varieties were not economic to cultivate. Of the harvestable trials, the cereals were economic to produce and at one site only (Watheroo) the lupins were more profitable than Gamenya wheat.

At Watheroo, Mt. Barker and Naraling it was more profitable to grow lupins than rape. For the rest of the trials, lupins and rape were equally profitable or unprofitable. Of academic interest is the better return from Field Pea over lupins at Mt. Barker.

No. 72 MO 10

TITLE: Grain legume variety trial

LOCALITY: Scott Bros., "Yo-Espro", Watheroo  
1972 Rainfall : May to October; 37.7 cm.

SOIL : Yellow brown sand over gravel at  
10-15 cm. pH from 5.3 to 6.1.

VEGETATION :

HISTORY : Clover pasture for several years  
First crop 1972.

RECORD : The lupin varieties were seeded on the 25th May at 72 kg seed/ha. The other species were seeded on the 22nd June after one working back. The field peas were seeded at 75 kg/ha, the vetch at 56 kg/ha, the Rape at 7 kg/ha (mixed with the fertilizer) and the cereals at 50.4 kg/ha.

Base fertilizer for all plots was 246.4 kg super Cu-Zn-Mo-Co. mix/ha. On the 14th July, the early sown lupins had a large weed (Dwalganup subclover and bromegrass) population. The rest of the trial had some grass weeds, but not as numerous. Stand density for Sandplain lupin (hardseeds) and Weiko III lupins (50% of the other lupin stands) was very poor.

By the 5th October, the weeds had choked out the rape plots, combined with severe aphid attack. The field peas were overrun by barley grass, capeweed and erodium. The peas haven't sufficient density to provide competition against the weeds although individual growth is good. The cereal plots are not economic crops because of the weed competition.

The lupins had put on excellent growth (90cm tall) with high stand density to overcome the weed Uniwhite and Uniharvest had 25% pod set with 6-9 pods on primary spike. Unicrop had 50% pod set with 7-10 pods on the primary spike. Weiko III had 25-40% set with 12 pods on the main spike.

The lupin varieties (excluding Sandplain) and the Gamenya wheat were the only plots which could be satisfactorily harvested.

Grain Yield (kg/ha) - Machine harvested and cleaned

Variety	Mean Yield	Gross Margin(\$/ha)
Uniwhite lupin	565	6.89
Uniharvest lupin	1,510	73.04
Unicrop lupin	1,556	76.26
Weiko III lupin	474	10.10
Gamenya wheat	718.7	7.29

2800 -

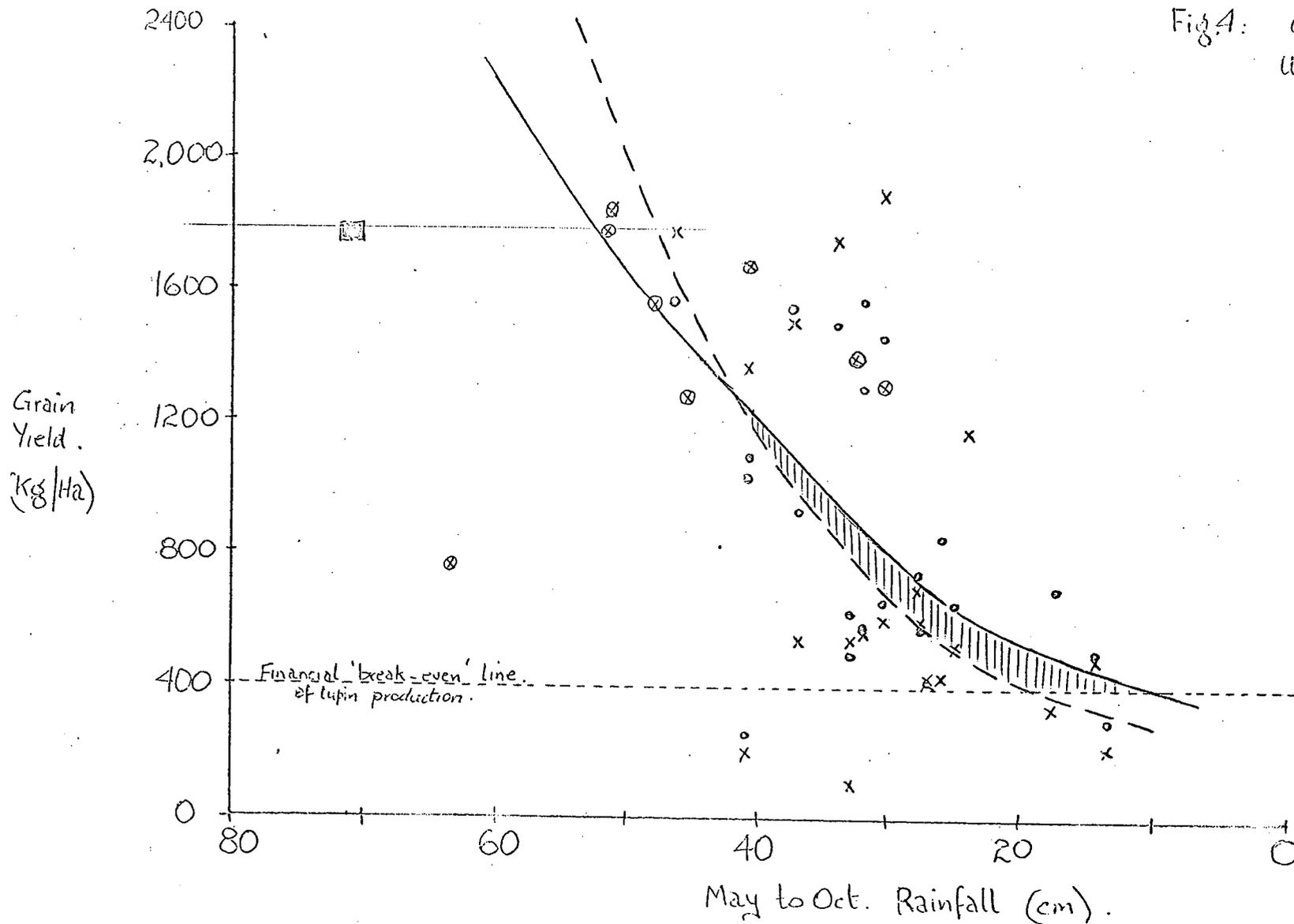


Fig. 4: Comparison of Unicrop and Uniharvest lupin varieties.

x 1972 Uniharvest (---)  
o 1972 Unicrop (—)  
⊗ 1971 Uniharvest (H.M.F)

No. 72 MT 33

TITLE: Grain legume variety trial

LOCALITY: Paddock S2, Mt. Barker Research Station  
1972 Rainfall : May to October : 46.6cm.

SOIL : Gravelly sand, pH = 6.3

VEGETATION: Redgum

HISTORY : High super history. Second crop site 1972

RECORD:

The legume varieties were sited on an area of 1971 Rape crop. The rape varieties were located on 1971 lupin crop adjacent to each other. Barley was sown into both situations.

The trial was sown on the 10th June with a base fertilizer application of 250.9 kg super Cu-Zn-Mo-Co mix per hectare. The cereal and rape plots had 138.9 kg Urea/ha topdressed at seeding. The lupins were seeded at 63.8 kg/ha, the field peas at 67.2 kg/ha, the vetch at 57 kg/ha, the rape at 7.3 kg/ha (mixed with the fertilizer) and the Dampier barley at 49.3 kg/ha.

On the 24th July, all the treatments had good germination with no weeds. The lupins looked quite unthrifty with a brown leaf spot symptom.

By the 6th September, the lupins had overcome their unthrifty appearance. All varieties had excellent growth. On the 13th October, the Arlo had almost finished flowering and the Turret rape was in full flower. The Uniwhite, Uniharvest and Weiko III lupins were in full flower on main spike, the Unicrop had young pods on primary spike with flowers on the first laterals; Lupin height only 30 cm. The Nyabing vetch was 45-60cm tall and finished flowering, and the field peas had finished flowering.

The rape plots were harvested on the 4th December 1972, the peas and vetch the next day. The Dampier barley was harvested on the 7th December while the lupins were taken off on the 3rd January 1973.

Variety	Grain Yield (Mean kg/ha)	Gross Margin (\$/ha)
Uniwhite lupin	885.7	29.70
Uniharvest lupin	1,778.7	87.21
Unicrop lupin	1,571.3	77.70
Weiko III	917.0	50.23
Dun field pea	2,297.0	83.31
White Brunswick	2,592.7	98.09
Derrimut pea	2,522.0	94.56
Buckley pea	2,663.3	101.62
Nyabing vetch	2,353.3	86.12
Turret rape	986.7	52.32
Arlo rape	930.3	46.68
Dampier barley	3,875.0	108.42

No. 72GE12

TITLE: Grain legume variety trial

LOCALITY: S. Harris, Naraling

1972 Rainfall: May to October; 36.8 cm.

SOIL : Grey sand over gravelly clay at  
18-60cm pH 6.1-6.6

VEGETATION:

HISTORY : Second crop site

RECORD:

Trial was sown on the 27th June, with 193.8kg super Cu-Zn-Mo No.2 mix per hectare. In addition, the rape and cereal plots were topdressed with 90.7kg Urea/ha at seeding.

Rate of seeding; lupins, 68.3 kg/ha; Field peas, 69.4 kg/ha; Rape, 6.7 kg/ha, Gamenya wheat, 45.9 kg/ha; Dampier barley, 49.3 kg/ha.

On the 1st August, it was observed that some insect damage to the rape had occurred although the trial had been sprayed. Arlo had slightly better germination than Turret rape. All plots had good germination except Sandplain lupin (hardseededness).

On the 3rd October, the Arlo rape had formed pods while the Turret was still in flower. Considerable aphid damage. The Field Peas had dried off almost completely, with pods on all varieties. Good growth on the lupins, but the Uniwhite and Uniharvest are only just starting to develop pods. Poor pod set on the Unicrop primary spike.

The lupin, rape and cereal plots were machine harvested on the 12th December. The field pea varieties were extensively damaged by budworm attack and not harvested.

Variety	Mean Grain Field (kg/ha)	Gross margin (\$/ha)
Uniwhite lupin	345.7	-3.59
Uniharvest lupin	539.0	9.94
Unicrop lupin	936.0	37.73
Turret rape	141.0	-21.04
Arlo "	244.7	-10.67
Gamenya wheat	1,888.0	60.04
Dampier barley	1,832.0	40.64

72GE 13

TITLE : Grain legume variety trial

LOCALITY: A.J. Gillam, Irwin

1972 Rainfall : May to October; 26 cm.

SOIL : Grey sand, pH 6.1-6.3, over gravel at depth.

VEGETATION :

HISTORY : Pasture for previous 5 years.  
First crop paddock

RECORD:

Trial sown : 5th July 1972

Base fertilizer : Super Cu-Zn-Mo No. 2 mix at 190.4 kg/ha.

Urea : Topdressed on cereal and rape plots at seeding at 90.7 kg/ha.

Seeding Rates : lupin: 63.3 kg/ha. Field peas, 69.4 kg/ha; rape, 6.7 kg/ha; wheat, 45.9 kg/ha; barley, 49.3 kg/ha

1st August : Rape varieties chewed by unseen insects, surviving plants are very small. Lupins have been sandblasted a bit, slow crown nodulation.

4th October: Cereals not tillered very well. Rape plants have had aphid damage and not worth harvesting. Uniwhite and Uniharvest in full flower, Unicrop has reasonable pod set (20-30%) on primary spike, plants 60 cm tall. Field peas drying off rapidly with little pod development.

19th December: Lupin plots harvested. Approximately 30% of Uniwhite pods had shattered.

Variety	Mean Yield (kg/ha)	Gross margin(\$/ha)
Uniwhite lupin	338	- 3.49
Uniharvest "	431	3.02
Unicrop "	855.7	32.75

No. 72GE14

TITLE: Grain legume variety trial

LOCALITY: I. Thomas, Mingenew

1972 Rainfall: May to October; 32.8cm.

SOIL : Red sandy loam; pH 6.2 - 7.1.

VEGETATION: Jam.

HISTORY : Cleared 30 years, approx. 1,100 kg super/ha since 1961. Pasture for previous 6 years. First crop 1972.

RECORD:

The trial was sown on the 30th June following two cultivations.

Fertilizer : Super Cu-Zn-Mo No 2 mix at 190.4 kg/ha

Urea topdressed onto cereal and rape plots at 90.7 kg/ha.

Seeding rates: lupins at 63.3 kg/ha; Field peas at 69.4 kg/ha  
Rape at 6.7 kg/ha; wheat at 45.9 kg/ha, barley at 49.3 kg/ha.

1st August 1972: Good germination of all treatments. Nodulation taking place on the legumes. No insects seen.

4th October Lupins 60 cm tall, wilting badly. The Unicrop is actually taller than Uniharvest and has 6-7 pods on primary spike. Uniharvest has only young pods developed and few lateral branches formed.

Field peas are still green but wilting badly, especially under heavy doublegee competition. Rape and cereals have grown very well. Turret in full flower, Arlo has finished.

15th January 1973: The lupins, rape and cereal plots machine harvested.

Variety	Mean Grain Yield (kg/ha)	Gross margin (\$/ha)
Uniwhite lupin	113.3	-19.22
Uniharvest lupin	118.0	-18.89
Unicrop lupin	629.0	16.88
Turret rape	0	-35.14
Arlo rape	479	12.76
Gamenya wheat	2,085.3	69.41
Dampier barley	2,564.7	101.09

No. 72GE11

TITLE: Grain legume variety trial

LOCALITY: J. Eckermann, Casuarina Enterprises  
Pty. Ltd., The Casuarinas.

1972 Rainfall : May to October; . 32.8 cm

SOIL : Yellow sandplain ; pH 6.5-7.0

VEGETATION : Casuarina, grevillea

HISTORY :

RECORD:

Seeded : June 19th, 1972.

Fertilizer: Super Cu-Zn-Mo No. 2 mix at 199.4 kg/ha. Urea  
topdressed on cereal and rape plots at 90.7 kg/ha.

Seeding Rates: As for 72GE12

1st August : Some turnip and Wimmera ryegrass in plots. Turret  
rape has slightly lower plant density than Arlo.  
A few insects in the rape after spraying. Unicrop  
lupin plant density seems a bit less than the  
others. All legumes nodulated.

4th October: Very weedy plots except for lupins which had made  
good growth. Rape plots very thin. Lupins -  
good growth, Uniwhite and Unihar vest have 4 pods  
on primary inflorescence, Unicrop has better pod  
set. Field peas have very weedy plots. Poor  
application of nitrogen on cereal plots with very  
patchy areas of good and poor growth.

5th December Only the lupin plots harvested. The three  
replications of the lupins were bulked together at  
harvesting.

Variety	Gross Margin(\$/ha)	Mean Grain Yield(kg/ha)
Uniwhite	-25.63	21.8
Uniharvest	10.77	541.7
Unicrop	8.39	502.2

No. 72LG7                      TITLE: Grain legume variety trial

LOCALITY: A. Slarke, Lake Grace

1972 Rainfall : May to October; 14.7 cm.

SOIL : 0-15cm, yellow brown loamy sand over yellow clay sand. pH 6.0-6.6

VEGETATION: Scrubplain

HISTORY : New land, fallow 1970, First crop 1971  
Second crop site 1972.

RECORD:

Seeded : 20th June 1972

Fertilizer: Super Cu-Zn-Mo-Co Mix at 255.4 kg/ha.  
Urea topdressed onto cereal and rape plots at 82.9 kg/ha.

Seeding Rates: Lupins at 71.7 kg/ha, Field Peas at 67.2 kg/ha, Vetches at 58.2 kg/ha, rape (mixed with super) at 6.7 kg/ha and cereals at 44.8 kg/ha.

14th August : Good stand density on all plots, no weeds and legumes have good nodulation. Languedoc vetch has twice the growth of Nyabing.

10th October : Soil very dry, trial invaded by radish.  
Cereals in grain filling stage; Turret rape has flowers and young pods, Arlo has many pods. Lupins about 37cm tall, good growth. The later maturing varieties are in mid-flowering, the Unicrop at early pod development.  
The vetches are 30-37 cm tall and are in the pod-fill stage. Languedoc has best growth. Field peas have good growth (60cm), early pod-fill stage.

11th December: The rape and cereal varieties were machine harvested. The legume varieties were quadrat sampled because the peas and vetches had shed badly. The yields of the peas and lupins were heavily reduced by cutworm attack in spring, although the plots were sprayed.

Variety	Mean Grain Yield (kg/ha)	Gross margin (\$/ha)
Uniwhite lupin	241.9	-16.32
Uniharvest lupin	483.8	0.62
Unicrop lupin	492.3	1.21
Dun Field pea	268.8	-18.29
White Brunswick pea	530.9	-5.19
Derrimut pea	544.3	-4.52
Buckley pea	490.6	-7.20
Turret rape	373.7	-2.41
Arlo rape	239.7	-15.81
Gamenya wheat	887.7	8.13
Dampier barley	1155.7	10.83

No. 72LG10

TITLE: Grain legume variety trial

LOCALITY : G. Mitchell, North Kukerin

1972 Rainfall: May to October; 13.5 cm.

SOIL : 0-10cm brown loamy sand with some gravel;  
10-35cm yellow gravelly sandy loam,  
35 cm + orange clay loam. pH 6.2-7.3

VEGETATION: Mallee, morrell and salmon gum

HISTORY : Old land, poor clover 1968-70, Barley crop 1971.

RECORD :

Seeded : 27th June 1972, into moist soil.

Fertilizer: Super - Cu-Zn-Mo-Co Mix at 255.4 kg/ha.  
Urea topdressed on cereals and rape plots at 137.8kg/ha

Seeding Rates: As for 72LG7.

14th August : Good stand density in all plots.

Healthy nodulation in legumes.

Languedoc vetch better grown than Nyabing. Arlo rape has slightly better germination and growth than Turret.

10th October: Soil very dry and compacted.

Arlo rape will yield but not Turret which is in full flower. Cereals have yet to fill the grain. The field peas vary from pod-full to flowering. Lupins in flowering stage only.

14th December: The lupin, rape and cereal plots machine harvested. The field peas and vetches were not suitable for harvesting because of the poor season and cutworm damage.

Variety	Mean Grain Yield (kg/ha)	Gross margin (\$/ha)
Uniwhite lupin	191.7	-19.83
Uniharvest lupin	211.0	-18.48
Unicrop lupin	308.0	-11.69
Turret rape	120.0	-32.43
Arlo rape	134.0	-31.03
Gamenya wheat	1,176.7	17.21
Dampier barley	944.0	-1.25

No. 72 TS 10

TITLE : Grain legume variety trial

LOCALITY : J. Scott, Eneabba

1972 Rainfall : May to October; 40.7 cm.

SOIL : Grey sand over clay at 25-30 cms.

VEGETATION: Christmas tree

HISTORY : Old clover land.  
First crop after pasture 1972

RECORD:

Seeded : 19th June 1972

Fertilizer : Super-Cu-Zu-Mo-Co. Mix at 201.6 k g/ha.

Urea topdressed on cereal and rape plots at 145.6 kg/ha

Seeding Rates : lupins at 67.2 kg/ha, Field peas at 67.2 kg/ha,  
Rape at 6.7 kg/ha and cereals at 50.4 kg/ha.

3rd August : Ripgut brome completely swamping the trial. The lupins and peas are the only cultivars that have sufficient density and growth to overcome the weed.

The legumes were not inoculated in this trial. The lupins appear to have picked up some bacteria but the peas are yellow.

2nd October : Lupin plots have good growth but pod set is poor. Weeds have taken over the rest of the trial.

18th December: Lupin plots machine harvested.

Variety	Mean Grain Yield (kg/ha)	Gross margin (\$/ha)
Uniharvest	207.5	-11.52
Unicrop	264.9	- 7.50

No. 72N09                    TITLE: Lupin variety trial - First crop site.

LOCALITY : J. Chipper, Mokine

1972 Rainfall : May to October; 27.8cm.

SOIL : Red loam.

VEGETATION: York gum

HISTORY : Old clover land  
First crop after clover pasture ley.

RECORD:

Seeded on June 19th 1972. Sprayed one week later with DDT

Fertilizer: Topdressed with 100.8 kg plain super/ha by farmer,  
then 179.2 kg super/ha drilled with the seed.

Seeding rate: Lupins at 67.2 kg/ha and clipper barley at  
50.4 kg/ha.

Trial harvested on December 12th

Variety	Mean Grain Yield(kg/ha)	gross margin(\$/ha)
Uniharvest lupin	711.0	23.57
Unicrop lupin	750.3	26.32
Clipper barley	2,771.0	84.03

No. 72 NO 10            TITLE : Lupin variety trial - Second crop site  
                          LOCALITY : J. Chipper, Mokine  
                          1972 Rainfall : May to October, 27.8cm.  
                          SOIL : Red loam  
                          VEGETATION : York gum  
  
                          HISTORY : Old clover land, stubble paddock 1972.

RECORD:

Seeded on June 19th 1972, sprayed with DDT one week later.

Fertilizer : Topdressed with 100.8 kg plain super/ha prior to seeding. 179.2 kg plain super/ha drilled with the seed.

The barley plots had 162.4 kg Ammonium Nitrate applied per hectare.

Seeding rates: Lupins at 67.2 kg/ha, clipper barley at 50.4 kg/ha.

Trial was machine harvested on the 12th December

Variety	Mean Grain Yield (kg/ha)	Gross margin (\$/ha)
Uniharvest lupin	602.7	15.99
Unicrop lupin	566.0	13.42
Clipper barley	2,008.0	45.41

The second crop site had more weeds than the first crop site

Other grain legume variety trials which were not harvestable for lupin varieties.

Trial No	Location	Reason for failure
72ES9	M. Kleinig, Coomalbidgup	Waterlogging from August to October
72AL10	C. Campbell, Tenterden	Cultivers grazed off by emus
72LG8	J. Hendry, Sth Pingaring	drought
72LG9	R. McBurney, E. Nyabing	drought on heavy soil type
72WH9	Wongan Hills Research Station	drought and ryegrass
72TS11	T. McDonald, Coorow	drought and no nodulation
72NA10	E. O'Shaunessy, Narrogin	drought
72NA11	P. Sieber, Narrogin	drought

Costs and prices used for gross margin analysis

base \* cost of production for lupin at 67.2 kg seed/ha = \$22.00/ha  
 Rape at 6.7 kg seed/ha = \$22.00/ha  
 Peas and Vetches at 67.2 kg seed/ha = \$21.00/ha  
 Wheat at 50.4 kg seed/ha = \$16.50/ha  
 barley at 50.4 kg seed/ha = \$14.30/ha

\* includes cost of inoculating legume seed (at 6.6 c/kg), sprays, cultivation, harvesting. Allowances were made for difference in rate of seeding. Does not include cost of fertilizer.

Cost of fertilizer; plain super 1.5c/kg/ha  
 Super Cu-Zn-Mo No. 2 mix = 2.8c/kg/ha  
 Super Cu-Zn-Mo-Co mix = 4.2  
 Urea = 8.5<sup>c</sup>/kg/ha  
 Ammonium nitrate = 6.3c/kg/ha

Prices : lupins = 7c/kg/ha  
 Weiko = 9c/ " "  
 Rape = 10c/kg/ha  
 Peas & Vetch<sup>+</sup> = 5c/kg/ha  
 Wheat = 4.75c/kg/ha  
 barley = 3.4c/kg/ha

+ Calculated on a unit protein basis assuming that there was a market for stock feed milling.