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1971 Dealing with lupin agronomy and field pea establishment

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SUMMARY OF 1971 EXPERIMENTAL RESULTS

DEALING WITH LUPIN AGRONOMY AND
FIELD PEA ESTABLISHMENT.

G.H. WALTON
PLANT RESEARCH DIVISION

Precis:

1. Pilot work for the establishment of L. angustifolius cultivars Uniharvest and Unicrop.
2. Preliminary seed yield evaluations of recently developed L. angustifolius, L. cosentini and L. albus cultivars.
3. Results of one trial dealing with establishment technique for Field Peas (Pisum spp.)

1.

No. 71 BA 19 TITLE: Lupin Variety x Time of Planting

LOCALITY: Paddock 2C
Badgingarra Research Station

SOIL: Well drained grey sand, 1971 Growing Season
loaminess increasing
with depth. RAINFALL: (May to Oct.)

VEGETATION: Banksia. 1537 pts

HISTORY: Old clover land, Paddock cropped in
1969 and 1970, giving a 13 bag
barley yield in 1970.

RECORD:

Grain Yield, 1971 (machine harvested). Area harvested
(kg/ha) 5 lks x 1 chain.

Cultivar	Sowing date	Seeding Rates (kg/ha)				
		22.4	44.8	67.2	89.6	112.0
Unicrop	May 5th	2,418.6	3,149.3	3,257.7	4,039.9	4,042.2
	June 16th	1,008.6	1,364.8	1,864.4	1,722.5	1,888.1
Uniharvest	May 5th	1,936.4	2,599.0	2,802.5	3,545.1	3,472.3
	June 16th	678.9	919.9	811.4	1,265.1	1,525.5

A July time of sowing was included, but not harvested because of complete swamping by capeweed. (Appendum 1)

Trial sprayed on May 6th, June 17th with DDT against R.L.E.M. Very heavy infestation of Budworms (Heliothis spp.) was sprayed on November 5th with DDT. Sprayed for aphid control end of August.

There was no difference in lupin plant density between cultivars in their response to rate of seeding treatments or time of planting except for Uniharvest, May sown at 112 kg/ha having only 2/3rds plant density of Unicrop.

Unicrop, May sown plots commenced flowering August 10th. Uniharvest May sown plots commenced flowering 21 days later.

Unicrop compared with Uniharvest gave half the total number of flowers but almost twice the percentage of flowers setting pods. The ability to set pods is very sensitive to competition, both interplant and intra-plant. (Appendum 2).

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No. 71 MT 34 TITLE: Lupin Variety x Time of Planting

LOCALITY: Paddock N.b.1.
Mt Barker Research Station.

SOIL: Well drained 1971 Growing Season
red loamy
sand. RAINFALL: (May to Oct.)

HISTORY: Old clover 2033 pts.
land. Cropped 423 pts in November.
with cereal variety
trials in 1969 and 1970.

RECORD:

1971 Grain Yield; machine harvested; Area harvested
(kg/ha) 5 lks x 1 chain.

Cultivar	Date of Planting	Seeding Rate (kg/ha)				
		26.9	41.4	62.7	87.4	107.5
Unicrop	May 6th	995.1	1,095.7	1,167.7	1,358.5	1,174.0
	June 17th	1,298.2	1,703.5	1,299.1	1,223.9	1,870.7
	July 28th	702.7	632.5	823.7	1,334.6	1,031.5
Uniharvest	May 6th	1,102.0	1,279.3	926.3	1,285.7	1,200.2
	June 17th	1,125.4	1,435.6	1,330.8	1,421.0	1,838.4
	July 28th	522.9	479.7	775.7	984.2	1,102.8

Excellent weed control achieved on this trial.

Data for lupin plant density shows no significant interaction between the two cultivars and rate of seeding treatments. Time of planting treatment produced significantly lower plant numbers with later plantings, with Uniharvest having lower plant density than Unicrop with the May and July times of planting.

The grain yield from this trial is considerably less than was anticipated from the plant growth in Spring. The yield was very considerably reduced by the occurrence of Brown Spot (Pleiochaeta setosa) and Sclerotinia Diseases which were enhanced by the extended season, (well into December 1971). (Appendum 3.)

The flower abortion data (Appendum 4) is similar to that obtained from 71BA19. With earlier time of sowing, Unicrop lupin is able to set pods on a higher proportion of flowers than Uniharvest lupin although the total number of flowers formed are half that formed by Uniharvest. Uniharvest develops considerably more number of higher order lateral inflorescence than Unicrop thereby increasing intra-plant competition for assimilates. At the July time of planting, with curtailed plant development, the percentage flowers setting pods are quite similar for both cultivars.

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No. 71BA 18 TITLE: Sweet Lupin Cultivar evaluation trial.

1971 Growing Season
(May to Oct.)

RAINFALL: 1537 pts

LOCALITY: Paddock 2C
Badgingarra Research Station

SOIL: Well drained grey sand,
loaminess increasing
with depth.

VEGETATION: Banksia

HISTORY: Old clover land; paddock
cropped in 1969 and 1970,
giving a 13 bag barley crop
in 1970.

RECORD: Seed Yield 1971 - Mean per sample row of 50 plants(gms).

Unicrop, white flowered	422.0
"Unicrop", blue "	473.8
Uniharvest, white "	449.7
"Uniharvest", blue "	482.4
Fest (bitter,) blue "	448.8

The cultivars were sown on May 12th, and the trial immediately sprayed with DDT for R.L.E.M. control. A further spraying at end of August for aphid control. The Unicrop rows commenced flowering August 2nd, the Uniharvest rows commenced flowering August 30th. The "Fest" lupin was three days later than Uniharvest in maturity. The "Fest" lupin, at the time of hand harvesting had quite a number of pods dehisced.

71MT 31 TITLE: Sweet lupin cultivar evaluation trial.

1971 Growing Season
(May to Oct.)

RAINFALL: 2033 pts
423 pts in November.

LOCALITY: Paddock N.b.1

SOIL: Well drained red loamy sand.

HISTORY: Old clover paddock, cropped to cereal
variety trials in 1969 and 1970.

RECORD:

Cultivar	Seed Yield (gms)*	Days from seeding to first flowers +
Unicrop, white flowered	409.4	137
"Unicrop", blue "	386.5	136
Uniharvest, white flowered	503.2	146
"Uniharvest", blue "	367.9	141
Fest, (bitter), blue "	541.0	138

* Mean per sample row of 50 plants.

+ 2nd October = 136 days.

The trial was sown May 18th and immediately sprayed with DDT (20 oz/ac) for R.L.E.M. control. A further spraying with Metasystox on 15th June at 12 oz/ac was for aphid control.

The growing season extended well into December in 1971, which enhanced the infection of Brown leaf Spot (Pleiochaeta setosa) which probably resulted in a substantial reduction in grain yield.

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No. 71C 12 TITLE: Sweet lupin cultivar evaluation trial.

1971 Growing Season
(May to Oct.)

RAINFALL: 1292 pts
68 pts in November

LOCALITY: Paddock 5D
Chapman Valley Research Station

SOIL: Well drained red sandy loam.

HISTORY: Old land, down to Geraldton pasture
for the previous three years. Ploughed
just prior to seeding of the trial.
2,400 lbs superphosphate applied since 1956.

RECORD:

Cultivar	Genetic Composition	Alkaloid Content	Seed Yield (gms)*	Days from seeding to flowering +
<u>L. cosentini</u>				
CB2	Bo,xe,ma	"Bitter"	173.5	84
CB4	xe, ma	"	198.2	102
N2832	ma	"	181.8	112
CB10	SW1, Bo,xe,ma	"Sweet"	109.1	84
CB11	SW1, xe,ma	"	99.7	102
CB12	SW1, ma	"	147.3	112
CB19	SSW1, xe,ma,	Semi-sweet	196.5	102
<u>L. angustifolius</u>				
Unicrop			276.1	91
<u>L. albus</u>				
WB1			249.4	102
WB2			263.2	84

* Mean per sample row of 50 plants.

+ August 5th = 84 days.

SW1 = fully sweet; SSW1 = semi-sweet; Bo = Earliness,
xe = earliness, ma = reduced shedding.

Trial was seeded on May 13th 1971.

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The "sweet" *L. cosentini* cultivars CB10, CB11 and CB12 gave lower percentage germination figures than the other cultivars and exhibited much lower seedling vigour. These three cultivars showed a prostrate early growth habit, which with a low plant vigour rendered them highly susceptible to R.L.E.M. attack. The only aphid infestation during the year was found on cultivars CB10 and CB11. The trial was sprayed with Metasystox in early September for aphid control.

Examination of plant growth in October showed Unicrop and the L. albus cultivars to be the most prolific.

Unicrop had 4 lateral branches.

WB2 " 3 lateral "

WB1, CB11 }
CB4, CB2* } had 2 " "
and CB10* }

CB19 " 1 " "

N2832, CB12 had NO lateral branches.

* poor plant growth.

On 30th November, the rows were hand harvested. There was evidence of considerable cutworm damage to pods. Cultivar CB2 had some pods dehisced.

It was estimated that some 20 to 30% of seed yield could have been lost while harvesting the L. cosentini cultivars due to the ready splitting of the pods when touched.

No.71 WH 21 TITLE: Sweet lupin cultivar evaluation trial.

1971 Growing Season
(May to Oct.)

RAINFALL: 611 pts

LOCALITY: Paddock 3.E.B.
Wongan Hills Research Station.

SOIL: Well drained, yellow loamy sand.

HISTORY: Area was virgin in 1968, cleared and
put down to Geraldton subclover for 1969
and 1970.

RECORD:

Cultivar	Seed Yield (gms) *	Days from seeding to flowering +
<u>L. cosentini</u>		
CB2	407.6	96
CB4	410.8	101
N2832	551.0	103
CB10	75.4	94
CB11	110.0	102
CB12	219.5	104
CB19	365.2	93
<u>L. angustifolius</u>		
Unicrop	685.6	103
Uniharvest	581.5	113
<u>L. albus</u>		
WB1	357.0	97
WB2	430.2	100

* Mean per sample row of 50 plants.

+ August 18th = 93 days.

The trial was sown on May 14th. A month later it was noticed that the "sweet" cultivars CB10, 11 and 12 had suffered badly from R.L.E.M. attack, as well as exhibiting poor plant vigour.

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These same cultivars also came under relatively severe aphid infestation early in September; while the other cultivars were not attacked; Aphid infestation rated 0-3.

CB10	1.67
CB11	0.5
CB12	1.8
CB19	0

The trial was sprayed with metasystox for aphid control in September.

The less vigorous CB10, CB11 and CB12 cultivars were rapidly overshadowed during the spring growth by their more vigorous neighbours. This has undoubtedly resulted in suppressed yields.

A comparison of percentage pod retention on the primary inflorescence indicates that the L. albus cultivars, WB1 and WB2, gave the greatest retention.

A phenomenon of the seed coat failing to completely cover the embryo was observed in this trial at the time of hand-harvesting. Such seeds naturally exhibit no hardseededness and are readily germinated.

No. 71 A17 TITLE: Field Pea establishment trial.

1971 Growing Season
(May to Oct.)

LOCALITY: 5A2, RAINFALL: 947 pts
Avondale Research 90 pts in November.
Station.

SOIL: Red sandy loam.

HISTORY: Old paddock, approx. 2,000 lbs/ac
superphosphate since 1925. Annual
super application of 45 kg/ha.

RECORD: Trial was seeded on June 2nd with 67.2 kg/ha super applied. The seed was not inoculated or lime-pelleted to keep the trial in accordance with district practice. From subsequent observation this was a mistake and most probably a substantial benefit would have resulted from inoculation. The seed was treated with Rogor for R.L.E.M. control. The Derrimut cultivar had a germination of 84% compared to the White Brunswick and Buckley cultivars of 95%. Therefore the seeding rates were adjusted for equal plant density.

Plant numbers per metre row

	45	67	90	112	135	kg/ha Seed Rate
Derrimut	3.9	4.6	6.5	7.5	8.6	
Buckley	3.7	6.5	10.0	10.8	10.7	
White Brunswick	2.8	4.2	6.3	8.5	10.1	

At three highest seeding rate treatments, Buckley field pea has significantly greater stand density than the other two cultivars.

The trial had a heavy infestation of self sown oats and doublegees.

The White Brunswick cultivar was the earliest maturity (mid-September) with Buckley a few days later. Derrimut cultivar commenced flowering early but pod development was 3 weeks later than White Brunswick.

The plots were quadrat sampled for dry matter and seed yield on November 15th. Considerable damage had been done to the grain by Pea Weevil and Budworm attack as well as damage to the Derrimut grain resulting from Ascochyta (Stem Rot) disease.

Mean Grain Yield estimates
(kg/ha)

Area sampled = 120 cms
x 210.7 cms.

Cultivar	Seeding Rates (kg/ha)				
	45	67	90	112	135
Derrimut	1,235.0	1,764.3	1,899.9	1,940.7	1,473.3
Buckley	1,354.8	2,038.1	2,038.1	1,886.1	1,864.4
White Brunswick	1,689.3	1,616.9	1,534.5	2,029.0	2,504.3

Harvest Index *

Cultivar	Seeding Rates (kg/ha)					% Protein (Dry Wt Basis)
	45	67	90	112	135	
Derrimut	0.304	0.368	0.328	0.344	0.332	26.54
Buckley	0.357	0.425	0.435	0.381	0.494	25.92
White Brunswick	0.464	0.435	0.429	0.470	0.447	26.48

* { Seed Yield
 { Total above ground plant D.M. }

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APPENDUM 1 WEED INFESTATION RATING 71 BA 19Rating 0 = trace of weeds (turnip, wild oats)

1 = up to 20% weed infestation.

2 = 21 to 40%

3 = 41 to 60%

4 = 61 to 80%

5 = 81 to 100% (capeweed)

Cultivar	Planting Date	Seeding Rate (kg/ha)				
		22.4	44.8	67.2	89.6	112.0
Unicrop	May 5th	1.0	0.7	0.3	0.3	0
	June 16th	3.7	2.7	3.0	1.7	2.0
	July 27th	4.7	4.7	4.7	4.0	4.7
Uniharvest	May 5th	1.0	0.7	0	0	0
	June 16th	3.1	2.7	2.7	1.7	1.7
	July 27th	5.0	5.0	4.7	4.7	4.7

APPENDUM 2 FLORET ABORTION DATA 71 BA 19

All data on a 'mean per plant' basis. Five plants per replicate, with three replications.

May 5th Planting -

Cultivar	Rate of Seeding (kg/ha)	Nos. florets				Nos. pods				Flowers % setting pods		
		I*	II*	III*	Total	I*	II*	III*	Total	I*	II*	III*
Unicrop	22.4	27.2	46.2	43.3	116.7	7.1	16.4	24.4	47.9	26.1	35.5	56.3
	44.8	27.1	34.9	23.8	85.5	5.5	10.8	12.8	39.1	20.3	30.9	53.8
	67.2	27.6	34.7	25.0	87.3	5.7	15.8	13.6	35.1	20.6	45.5	54.4
	89.6	22.7	34.6	25.1	82.4	5.0	8.4	10.9	24.3	22.0	24.3	43.4
	112.0	28.0	33.9	22.8	84.7	5.1	8.7	11.2	25.0	18.2	25.7	49.1
Uniharvest	22.4	50.7	101.4	33.2	185.3	9.1	27.8	14.7	51.6	17.9	27.4	44.3
	44.8	48.6	72.6	20.0	141.2	6.3	17.1	6.9	30.3	13.0	23.5	34.5
	67.2	53.1	92.9	24.9	170.9	6.5	20.4	10.9	37.8	12.2	22.0	43.8
	89.6	46.0	56.9	12.2	115.1	4.9	13.7	5.4	23.0	10.6	24.1	44.3
	112.0	50.2	100.6	24.0	174.8	6.9	20.2	4.3	31.4	13.7	20.1	17.9

* I = Primary Inflorescence II = First order lateral inflorescence
 III = Second " " " "

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June 16th Planting - 71BA19

Cultivar	Rate of seed (kg/ha)	Nos. florets				Nos. pods				% Flowers setting pods		
		I	II	III	Total	I	II	III	Total	I	II	III
Unicrop	22.4	22.9	43.5	20.5	86.9	6.4	13.9	9.4	29.7	27.9	31.9	45.8
	44.8	20.1	26.9	12.9	59.9	5.2	10.3	4.0	19.5	25.9	38.3	31.0
	67.2	20.3	26.1	11.4	57.8	4.7	11.0	5.3	21.0	23.1	42.1	46.5
	89.6	19.0	20.5	8.4	47.9	4.5	8.3	3.5	16.3	23.7	40.5	41.7
	112.0	22.1	22.2	8.5	52.8	4.1	8.4	2.6	15.1	18.5	37.8	30.6
Uniharvest	22.4	45.7	56.1	17.8	119.6	7.8	12.7	1.8	22.3	17.1	22.6	10.1
	44.8	43.0	55.6	15.5	114.1	8.2	11.9	1.3	21.4	19.1	21.4	8.4
	67.2	43.3	36.5	9.1	88.9	5.9	10.5	0.4	16.8	13.6	28.8	4.4
	89.6	40.7	33.3	7.3	81.3	6.3	7.1	0.2	13.6	15.5	21.3	2.7
	112.0	40.7	28.1	7.1	75.9	5.7	6.2	0.2	12.1	14.0	22.1	2.8

APPENDUM 3RATING FOR INTENSITY OF BROWN SPOT INFECTION 71 MT 34

0 = normal matured plant fawn colour of stalk.

to 5 = chocolate coloured stalk bearing withered pods.

Intermediate ratings based on degree of brown discolouration

Cultivar	Date of Planting	Seeding Rates (kg/ha)				
		26.9	41.4	62.7	87.4	107.5
Unicrop	May 6th	4.0	4.0	4.7	4.7	4.7
	June 17th	2.3	2.0	2.7	2.7	2.3
	July 28th	1.0	1.7	1.0	0.7	1.3
Uniharvest	May 6th	4.3	4.3	5.0	4.7	4.7
	June 17th	2.3	3.0	3.3	3.3	2.3
	July 28th	0.7	1.0	1.3	1.0	1.7

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APPENDUM 4

FLORET ABORTION DATA

71 MT 34

All data on a 'mean per plant' basis. Five plants per replicate and three replications.

Cultivar	Rate of Seeding (kg/ha)	May 6th						June 16th					July 27th			
		1*	2*	% Flowers Setting Pod			1*	2*	% Flowers Setting Pods			3+	4+	% Flowers Setting Pods		
				I	II	III			I	II	III			I	II	III
Unicrop	26.9	151.8	27.7	26.5	20.1	15.2	72.5	28.0	33.3	28.8	55.8	42.0	11.5	12.0	42.6	
	41.4	104.9	18.1	24.6	14.7	16.1	77.4	20.6	24.7	17.7	42.2	28.6	7.4	8.4	46.6	
	62.7	105.0	16.6	17.0	15.9	15.0	65.3	15.6	18.7	20.5	34.8	22.5	7.9	16.5	52.6	
	87.4	95.7	20.9	19.1	19.7	25.1	53.3	9.6	7.3	17.6	45.4	31.4	8.0	8.8	45.4	
	107.5	87.0	11.2	15.7	11.8	18.2	54.1	14.7	21.7	21.2	44.4	24.1	5.9	9.8	45.9	
Uniharvest	26.9	269.5	40.0	13.1	11.6	22.4	123.8	27.5	13.3	19.2	42.1	53.8	12.1	13.3	32.3	
	41.4	285.2	33.4	10.3	9.4	16.1	101.0	20.8	13.6	10.4	54.3	51.0	10.2	9.1	31.6	
	62.7	202.2	23.9	6.5	8.9	24.2	90.7	15.1	10.7	9.5	54.9	35.9	7.8	15.7	30.2	
	87.4	155.9	18.6	8.8	9.3	27.9	84.2	13.9	7.4	8.7	55.7	41.8	9.0	13.0	33.0	
	107.5	133.4	17.4	6.9	9.1	42.1	76.0	12.1	10.9	10.4	47.3	35.9	6.3	11.7	24.5	

* 1 = Total Nos. florets in primary and first two lateral inflorescence orders.

* 2 = Total " pods " " " " " " " " " " " "

+ 3 = Total Nos. florets in primary and first order inflorescence

+ 4 = Total Nos. pods " " " " " " " " " " " "

February 21, 1972

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