1972

Part 5 Comparison of genetic components in lupin species

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1972 EXPERIMENTAL SUMMARY

PART 5 : COMPARISON OF GENETIC COMPONENTS IN LUPIN SPECIES

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Abstract :

Influence of genetic components on harvest index.
(note the conclusions from these results are especially subject to Statistical Analysis)

1. At three sites out of the four, the acquisition of 'early' gene(s) improved the harvest index. Mount Barker was the exception to this. This was true for both the cosentini, albus and angustifolius varieties.

   In 1971, when the spring was wetter than 1972, the plant maturity was much less of an influence upon the harvest index.

2. The alkaloid content of the plant in L. angustifolius doesn't seem to have a consistent influence upon the harvest index. This was the same experience in the 1971 trials.

   In the L. cosentini varieties, the bitter types consistently give better harvest index than the sweet ones, but the sweet varieties are better than the semisweet variety. Thus susceptibility to insect damage doesn't seem to be the difference between varieties of different alkaloid content.

3. The gene for white flowers and seed in L. angustifolius may reduce the plants vigour and capacity to set seed when the plant is under abnormal stresses.

No. 72A 17 TITLE: Sweet lupin pilot trial

LOCALITY : Paddock 9c Avondale Research Station

1972 Rainfall : May to October, 23cm.

SOIL : Sandy soil over quartz conglomerates at depth.

VEGETATION:

HISTORY : Barley crop 1971

RECORD :

Individual rows seeded by drill on the 15th June 134.4 kg super Cu-Zn-Mo Mix per hectare drilled with the seed.

The inter row plant density was very low for the L. angustifolius cultivars.

29th September : L. albus cultivars are really showing signs of drought stress. Lower leaves have yellowed and withered, other leaves have curled up.

WB2 has pods on the primary inflorescence L. angustifolius cultivars are not showing much drought signs yet. All cultivars flowering.

No insect damage.

Harvest Index (from 5 plants per replicate)

Cultivar			Incidence of split-seed
L. angustifolius	Unicrop	0.423	-
	Uniharvest	0.343	-
	Fest	0.346	-
	AB9	0.376	+
	AB12	0.418	-
L. albus	WB1	0.278	-
	WB2	0.261	-

Sweetness	+ (iuc)				-
White flowers	+ (leuc)				-
earliness	+ (ku)	-	+ (ku)		-
ta le moll	0.423	0.343	0.418	0.376	0.346

Early maturing gene (ku) gives better reproductive performance
White flower gene (leuc) gave slightly poorer " "
Sweetness gene (iuc) gave better " "
Probably no significant difference between WB1 and 2

No. 72BA16 TITLE: Sweet lupin plot trial

LOCALITY: Paddock 2D, Badgingarra R.S.

1972 Rainfall : May to October;. 41 cm

SOIL : Gravelly sand to 20 cm over coarse gravelly sand to 60 cm.

VEGETATION: Banksia

HISTORY : Second crop paddock 1972

RECORD:

The rows seeded with a drill on the 7th June 1972. The length of the rows was reduced by not starting the seed cogs early enough before moving onto the trial. The seeds were sown into a dry soil.

Fertilizer : 134.4 kg super Cu-Zn-Mo-Co Mix per hectare.

13th July : L. albus : WB2 better growth than WB1

L. cosentini : CB 42, 45,46 and 48 have low plant numbers due to high hardseededness (all seeds were scarified) or R.L.E.M. damage (noticeable that the cosentini cultivars were susceptible to this insect)

2nd October: Thick capeweed undercover

L. angustifolius very poor pod set on primary inflorescence (3-5 pods) AB12 has better pod No. than Unicrop. The later flowering cultivars pod Nos are very poor.

L. albus - both cultivars greatly affected by moisture stress.

L. cosentini - CB 42, 45, 22 and 19 have good growth and pod set.

CB46 has relatively lower growth and reasonable pod set.

CB48 has low growth with good pod set on primary inflorescence.

HARVEST INDEX (from 5 plants per replicate).

L. cosentini		L. angustifolius		L. albus	
CB 45	0.088	Unicrop	0.078++++	WB1	0.094
CB 46	0.150	Uniharvest	0.066++++	WB2	0.122
CB 48	0.201	Fest	0.168 +		++++
CB 42	0.244	AB9	0.096 +++		
CB 22	0.127	AB12	0.094++++		

+ = No. of replicates in which the split-seed coat problem found.

Genetic comparison of H.I.

L. cosentini

Sweetness	SW1			SSW1	-
Early gene(Xe)	+		-	+	-
" " (Bo)	+	-	-	-	-
Reduced shattering(Ma)				0.133	
" " (CO Ma)	0.201	0.150	0.088		0.244
" " with White seeds(Co Ma Col 3802)					0.127

Bitter type (CB42) was more successful than its sweet counterpart,(CB45), because of greater seed yield. The semi-sweet CB19, was probably not significantly different than its sweet counterpart CB46. The accumulation of early genes gave better harvest index.

L. angustifolius :

Sweetness(iuc)	+				-
White flowers(leuc)	+		-		-
earliners (ku)	+	-	+	-	-
soft seeds, reduced shattering (moll, ta le)	0.078	0.066	0.094	0.096	0.168

Bitterness type (Fest) gave superior value because the plant growth was reduced without a reduction in seed yield.

No other factors significant.

L albus : Earlier WB2 gave bitter seed yield.

Remarks : The L. cosentini cultivars show better adaptation to this site in 1972 than those of L. angustifolius.

The 1971 trial at Badgingarra did not include L. cosentini cultivars and the Fest cultivar gave significantly superior harvest index than the other narrow-leaf lupin cultivars.

No. 72 WH 17 TITLE: Sweet lupin pilot trial

LOCALITY : Paddock 2HD. Wongan Hills R.S.

1972 Rainfall : May to October; 25.4 cm.

SOIL : Wongan loamy sand

VEGETATION: Grevillea

HISTORY: Second crop after barley 1971.

RECORD:

Seeded on June 2nd 1972 using 6 row cone seeder.

Fertilizer: 112 kg super Cu Zn Mo Co Mix per hectare.

10th August: Some rabbit damage to sweet angustifolius cultivars CB42 and 46 are outstanding in their plant height.

5th October: L. albus - both xultivars wilting badly.
WB2 has very poor pod set on primary (0-6 pods)
WB1 has from 3-5 pods set on primary inflorescence.

L. cosentini - Leaves curled up at midday to reduce moisture loss.
Very poor pod set on first lateral inflorescences.
CB45 and 22 have large growth with 15-17 pods.
CB48 has smallest growth, with 12 pods.
CB19 and 42 have tall growth, with 9-12 pods.
CB46 has medium growth with 8-10 pods.

L. angustifolius Uniharvest is wilting badly.
Fest tallest height with 3-4 pods.
Uniharvest and AB 9, next tallest with 2-3 pods.
AB12 and Unicrop have smallest height with 2-9 pods on AB12, Unicrop pod set is very variable.

HARVEST INDEX

L. cosentini		L. angustifolius			L. albus
CB45	0.245				
CB 46	0.266	Unicrop	0.298	++++	WB1 0.233
CB 48	0.261	Uniharvest	0.139	+++	WB2 0.271
CB42	0.267	Fest	0.179	++	
CB22	0.295	AB9	0.199		
CB 19	0.258	AB12	0.316		

\+ = No of replications in which the split seed coat problem was found.

Genetic comparison of H.I.

L. cosentini

sweetness	SW1			SSW1	-
earliners(Xe)	+		-	+	-
" (Bo)	+	-	-	-	-
reduced shattering(Ma)				0.258	
" "(Co Ma)	0.261	0.266	0.245		0.267
(Co Ma col 3802)					0.295

The bitter types (CB42,22) have given better yields.
The accumulation of earliness genes improved the performance in 1972.

L. angustifolius

sweetness (iuc)	+				-
White flowers(leuc)	+		-		-
earliness (ku)	+	-	+	-	-
table, moll	0.298	0.139	0.316	0.199	0.179

The blue flowered cultivars (AB 9,AB12) gave better yield than the white flowered cultivars.

The earlier maturing cultivars (Unicrop and AB12) gave superior yield than the later maturing cultivars, in 1972.

L. albus : The earlier WB2 was better than WB 1.

Remarks :

The trial at Wongan Hills, in 1971 gave no significant differences in harvest index between these cultivars.

No. 72 MT 28 TITLE: Sweet lupin pilot trial.

LOCALITY : Paddock S2, Mt. Barker R.S.

1972 Rainfall : May to October; 46.6 cm.

SOIL : Gravelly loamy sand on slope with southern aspect.

VEGETATION : Redgum

HISTORY: Rape stubble

RECORD:

Seeded 20th June 1972 with a drill.

Fertilizer: 119 kg sup er Cu Zn Mo Co Mix per hectare.

24th July : The angustifolius cultivars have second pair of leaves while the luteus cultivars are germinating much later, only have first pair of leaves.

6th September: Plant grow quite slow, the 48483 cultivar of L. luteus is more prostrate and darker in colour than Weiko III or 48486.

Reproductive observations:

		Harvest Index		Flowering Date	Days from Seeding
L. angustifolius	Unicrop	0.413	++	3-10-72	105
	Uniharvest	0.424	+	6-10-72	108
	Fest	0.408		6-10-72	108
	AB9	0.390	++	10,11-10-72	112-113
	AB12	0.355		5-10-72	107
L. luteus	Weiko III	0.253	+	9-10-72	111
	48486	0.235		9-10-72	111
	48483	0.226		11,12-10-72	113-114

+ = No replications in which the split-seed coat Problem was found

Genetic comparison of H.I.

L. angustifolius

Sweetness (iuc)	+				-
White flowers (leuc)	+		-		-
earliness (ku)	+	-	+	-	-
ta le, moll	0.413	0.424	0.355	0.390	0.408

L. luteus

Erect growth habit	+		-
Speckled seed	+	-	-
Sweet, soft seeded	0.235	0.253	0.226

Remarks :

Probably no significant difference in harvest index between Bitter and Sweet cultivars of augustifolius.
White flowered cultivars gave better values than the blue flowered cultivars.

The earliness gene produced a slight decline in the harvest index.

In 1971, a similar trial gave no significant difference in harvest index between the effects of these genes.

L. luteus - the erect growth habit gave better harvest index than the normal prostrate type of growth. The delayed germination of the Yellow lupin cultivars probably had an effect on the later flowering cultivar 48483.

No. 72C14 TITLE : Sweet lupin pilot trial.

LOCALITY : Paddock 5D, Chapman R.S.

1972 Rainfall : May to October; 36.8 cm.

SOIL : Red sedimentary loamy sand.

VEGETATION :

HISTORY :

RECORD :

Seeded : 8th June 1972 with drill into dry seedbed.

Fertilizer : 134 kg super Cu-Zn-Mo-Co mix per hectare.

31st July: Plots infested with doublegees.

The albus cultivars are vigorous, and the blue flowered angustifolius cultivars are next in line.

L. cosentini - CB42, 45,46 and 48, look poor.
Caterpillers attacking the sweet cosentini cultivars.

3rd October : Wild radish and doublegees have taken over the trial, capeweed underneath.

L. albus - WB1, 90cm tall, 8-12 pods on primary infl.
WB2, 60 cm tall, 6-8 " " " "
some pods on first laterals.

L. angustifolius- Unicrop has good plant growth
Uniharvest, very low pod set on primary infl.
AB/2 - good growth and pod set.

Fest, AB 9 - a little better pod set than Uniharvest.

L. cosentini - CB22, 60 cm tall, very good pod set on primary, good pods developing on first laterals.

CB42, 60cm tall, same as for CB22

CB 19, good pod set on primary, some pods on first laterals.

CB46, 60 cm tall, reasonable pod set on primary;4-7 pods on first laterals.

CB45, 60cm tall, reasonable pod set on primary, flowers on first laterals.

CB48, Very poor pod set on primary, 8 small pods on first laterals.

Trial not harvested.

No. 72E15. TITLE : Sweet lup in pilot trial

LOCALITY : Paddock W7, Esperance Downs R.S.

1972 Rainfall : May to October, 30.5 cm.

SOIL ; Sand overlying gravelly soil. (Fleming gravelly sand)

VEGETATION : Chittick

HISTORY : First crop after pasture ley.

RECORD:

Seeded : 22nd June 1972 with drill into moist seedbed.

Fertilizer: 134 kg super Cu-Zn-Mo-Co mix per hectare.

15th August: plots infested with Wimmera ryegrass. The L. angustifolius and albus are the most vigorous.

11th October : W.R.G. above the general level of lupins.

L. luteus - full flowering on main spike, Weiko III has some interveinal chlorosis.

L. cosentini - CB46, 22 and 42 have shown good competitive ability. CB22 is in full flower on primary inflorescence. CB42 has virtually 100% pod set on primary spike with full flower on the first laterals.

L. angustifolius - Unicrop and AB12 ha ve 60-80% floret abortion on main inflorescence, pods on first laterals. Uniharvest and AB9 have no floret abortion at this stage.

L. albus - WB2, 4-6 pods formed on main inflorescence and 50% floret abortion. Pods on first laterals.

WB1, 2-3 pods on main inflorescence and 80% floret abortion. Flowers on first laterals.

Trial not harvestable.