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## Grain legume agronomy

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DEPARTMENT OF AGRICULTURE

WESTERN AUSTRALIA

EXPERIMENTAL SUMMARY

1978 PROGRAMME

GRAIN LEGUME AGRONOMY

G.H. Walton  
Plant Research Division

EXPERIMENT NO. 77A21

FILE 2992 EX

TITLE: Wheat yield following Ultra and Unicrop lupin.

Locality: Paddock 5A1, Avondale Research Station

Rainfall: M-0; 310 mm

Soil Type: Gritty loam

Vegetation: York gum

History: Old land, high fertilizer history. Plots sown to Ultra at 250 kg/ha and Unicrop at 100 kg/ha seed in 1977 at six times of sowing.

Basal Fertilizer: 60 kg plain superphosphate per hectare.

Sowing: Gamenya wheat at 45 kg/ha on June 12.

Wheat grain harvest, December 28, from harvested area 60 m x 1.8 m.

| Time of Sowing<br>Treatments 1977 | Ultra   | Unicrop |
|-----------------------------------|---------|---------|
|                                   | (kg/ha) |         |
| May 21                            | 1 852   | 1 926   |
| June 15                           | 1 963   | 2 120   |
| June 30                           | 2 167   | 2 333   |
| July 15                           | 2 389   | 2 231   |
| July 28                           | 2 259   | 2 120   |
| Aug. 12                           | 2 018   | 2 037   |

- Comments:
1. No visual growth or crop colour differences at September 19.
  2. Any small yield differences probably a response to difference in soil-moisture storage. The early sown, higher yielding (in 1977) lupin plots depleted the subsoil moisture more than the later sown plots.

Kg grain/plot - yield averaged from three replicates.

| Species         | Cultivar  | Grain Yield (kg) | D.M. Yield (kg/ha) | Remarks   |
|-----------------|-----------|------------------|--------------------|---|
| Lupin           | Unicrop   | 9.23             | 5 607              | Ave 18 pods per plant<br>Ave 5 " on main stem<br>only |
|                 | Ultra     | 8.63             | 4 621              |   |
| Field Pea       | Derrimut  | 13.43            | 6 361              | 60% pods shattered                                    |
|                 | White     |                  |                    |   |
|                 | Brunswick | 12.13            | 5 781              |   |
|                 | Early Dun | 8.83             | 5 549              |   |
|                 | TRC - 1   | 9.27             | 5 491              |   |
|                 | Torsdag   | 8.23             | 4 099              |   |
|                 | Rovar     | 2.97             | 3 461              |   |
|                 | Pamaro    | 8.10             | 4 389              |   |
|                 | Blue      |                  |                    |   |
|                 | Boiler    | 5.22             | 4 505              |   |
|                 | Pennant   | 13.78            | 5 607              |   |
|                 | Minnesota | 5.05             | 5 839              |   |
|                 | Green     |                  |                    |   |
| Vetch           | Cotyledon | 9.70             | 4 911              |   |
|                 | Lanquedoc | 10.38            | 4 621              |   |
|                 | Popany    | 3.18             | 4 331              |   |
|                 | Adeza 46A | 1.45             | 3 171              |   |
|                 | " 46B     | 0.47             | 2 997              |   |
|                 | " 46C     | 0.30             | 3 432              |   |
|                 | " 64      | 3.47             | 3 606              |   |
| " 118           | 6.92      | 4 273            |                    |   |
| <u>Lathyrus</u> | 300001    | 2.53             | 2 649              |   |
| <u>Cicera</u>   | 300004    | 3.15             | 3 925              |   |
|                 | 300010    | 5.10             | 3 403              |   |
|                 | 300017    | 4.92             | 3 635              |   |
|                 | 310021    | 1.47             | 2 823              |   |
| Sativa          | 310028    | 1.27             | 3 055              |   |
|                 | 310041    | 4.25             | 3 519              |   |
|                 | 320001    | 1.75             | 2 823              |   |
| Ochrus          | 320004    | 5.45             | 2 736              |   |
|                 | 320010    | 2.57             | 2 823              |   |

- Comments:
1. Grain yield of lupins is poor due to the dry season (August to October).
  2. The field peas Pennant, Derrimut, White Brunswick, Green Cotyledon and TRC - 1 outyielded the lupin in grain.
  3. Of the Vetch and Lathyrus species, only Lanquedoc outyielded the lupins, a few of the others approached high grain yields.

EXPERIMENT NO. 78B9

FILE 3083 EX

TITLE: Grain legume species comparison  
Locality: Bramley Research Station, Paddock 2  
Rainfall: M-0, 980 mm  
Soil Type: Gravelly brown loam  
Vegetation: Redgum/Jarrah  
History: Old pasture paddock, lupin crop 1976,  
oilseed crop 1977.  
Basal Fertilizer: Plain superphosphate at 200 kg/ha.  
Sowing: All plots sown May 12. Lupins at 80 kg/ha,  
peas at 120 kg/ha, Vetches at 47 kg/ha.

The Dry Matter yield was estimated on October 25 using the pasture meter calibration method.

The plots were heavily infested with ryegrass. The vetches and peas suffered severely from Chocolate Spot (Botrytis) and Black Spot (Ascochyta), weed competition and R.L.E.M. attack.

The plots were harvested for Grain Yield on December 20 with a Hege machine, cutting width 1.25 m.

The Miniplots were sown with a cone seeder, the plot dimensions were 0.8 m x 10 m. The entire plot was harvested with the Hege.

72A15 - Mid-season lupin line.

P21255 - Early flowering selection from Uniharvest.

EXPERIMENT NO. 78E10

FILE 3083EX

TITLE: Grain legume species comparison  
Locality: Paddock W5, Esperance Downs  
Rainfall: M-0, 374 mm  
Soil Type: Grey sand over gravel with clay  
Vegetation: Chittick, Mallee  
History: Clover pasture for 3 years  
Basal Fertilizer: 150 kg/ha Manganese Super  
Sowing: Sown June 21, lupins at 80 kg/ha, field peas at 125 kg/ha and vetches at 45 kg/ha.  
The soil was saturated during winter and it appeared that root pathogens might be a problem.

Grain Yield harvested December 12 with a Hege. The area sampled was 1.25 m x 60 m.

The Miniplots were sown with a cone-seeder and the plot size was 0.8 m x 10 m. All the plot was harvested.

Key to lupin cultivars:

- 72A15 - Mid-season lupin line.
- P21255 - Early flowering selection from Uniharvest.
- P22612 - Very early flowering line.

EXPERIMENT NO. 78HA4

FILE 3250 EX

TITLE: Cicer variety comparison

Locality: V. Pitter, Coolup

Rainfall: M-0, 760 mm

Soil Type: Heavy brown loam

Vegetation: Red gum, Jarrah

History: Grass pasture paddock

Basal Fertilizer: Topdressed 200 kg/ha plain super and 100 kg/ha potash.

Sowing: Plots sown May 30 with 4-row cone-seeder. Six days previous, the site had been sprayed with "spray-seed".

All Chickpea lines grew well, with very little disease or insects. Severe ryegrass contamination of the rows.

Grain Yield harvest with Hege on December 4.

20 m plot length

| Variety  | Grain (g/m row) | Variety | Grain (g/m row) |
|----------|-----------------|---------|-----------------|
| 56567    | 9.8             | H208    | 12.5            |
| PCA      | 10.0            | PC6003  | 10.0            |
| Ex Spain | 10.8            | PC1625  | 12.5            |
| PC22     | 10.0            |         |                 |
| Cyprus A | 27.5            |         |                 |
| PC11     | 15.0            |         |                 |
| CPF      | 15.8            |         |                 |
| PC5006   | 26.2            |         |                 |
| K223     | 12.5            |         |                 |
| PC81     | 3.1             |         |                 |
| PC1511   | 13.1            |         |                 |
| 52984    | 13.1            |         |                 |
| PC1585   | 7.5             |         |                 |
| PC1502   | 13.1            |         |                 |

All lines except PC1502 are white or brown seeded. The majority of lines are kabuli (large) seed size.

A range of grain yields, with two high yielding lines relative to others.

EXPERIMENT NO. 78M4

FILE 3250 EX

TITLE: Miscellaneous legume species comparison

Locality:

Rainfall: M-0, 181 mm

Soil Type:

Vegetation:

History:

Basal Fertilizer:

Sowing:



The average split-seed was:-

25% Split testa  
 25% Incipient  
 50% Normal

*L. angustifolius* Grain Yield (kg per plot)

| Cultivar                         | MnSO <sub>4</sub> Application (kg/ha) |                 |                         |                 |                         |                 |
|----------------------------------|---------------------------------------|-----------------|-------------------------|-----------------|-------------------------|-----------------|
|                                  | Nil                                   |                 | 15                      |                 | 45                      |                 |
|                                  | Grain<br>Har-<br>vested               | Grain<br>Sample | Grain<br>Har-<br>vested | Grain<br>Sample | Grain<br>Har-<br>vested | Grain<br>Sample |
| Uniharvest<br>(Sweet, White fl)  | 1.00                                  |                 | 2.23                    |                 | 3.12                    |                 |
| Fest<br>(Bitter, Blue fl)        | 3.50                                  |                 | 3.85                    |                 | 3.60                    |                 |
| P20633<br>(Alt. Sweet, White fl) | Pods shattered                        |                 |                         |                 |                         |                 |

Grain Yield (kg/plot) - Single row (20 m) plots at nil Mn.

Fest

Lower alkaloid mutants M.4.3.6  
 M21.1.1  
 M.17.9.6

Comments: Both Uniharvest and P20633 developed Split Seed symptoms on 60-70% of seeds. Fest gave very little split seed. The grain yield data reflect the level of split seed in each cultivar. The application of manganese reduced split seed and increased yield in Uniharvest.

Since it is thought that P20633 has a different genetic background to reduced alkaloid content than Uniharvest, the conclusion is that low alkaloid per se enhances the split seed problem rather than the incundus gene being specifically responsible.

L. cosentinii grain yield - none of these cultivars exhibited any split seed symptoms.

EXPERIMENT NO. 77MO17

FILE 2992 EX

TITLE: CB49 Agronomy (continuing experiment)

Locality: N. Monks, Cervantes

Rainfall:

Soil Type: White sand over clay

Vegetation: Banksia, E.

History: Young paddock, Lupins in 1977

Basal Fertilizer: 147 kg/ha plain superphosphate.

Sowing: Clipper barley sown at 45 kg/ha within the boundaries of the 1977 lupin plots. Sown June 21.

Comment: Very poor growth, not harvested.

EXPERIMENTAL NO. 78MT10      FILE 3250 EX

TITLE: Faba Bean evaluation  
Locality: Paddock E1, Mt. Barker Research Stn  
Rainfall: M-0, 555 mm  
Soil Type: Gravelly, sandy loam  
Vegetation: Redgum forest  
History: Rape crop 1977  
Basal Fertilizer: 145 kg/ha plain superphosphate  
Sowing: Treflan applied at 1.5 l/ha and incorporated prior to the first sowing May 18.

Soil conditions very wet in winter, plants had poor nodulation, weed problems and serious disease.

Grain harvested 18/12/78 with Hege. The entire plot harvested 18/12/78. The entire plot harvested (0.8 m x 10 m).

Only plots with pod-bearing plants surviving were harvested.

| Cultivar | Date Sown           |         |          |          |
|----------|---------------------|---------|----------|----------|
|          | May 18              | June 20 | July 17  | Aug 15   |
|          | (g/m <sup>2</sup> ) |         |          |          |
| 100107   | 46.7                | 22.0    | 1.2      | 6.5      |
| 100020   | 23.5                |         |          |          |
| 100143   | 97.0                |         |          | 6.1      |
| 100029   | 198.9               |         |          | 8.4      |
| 100010   | 93.5                |         | Not sown | Not sown |
| 100067   | 76.2                |         |          |          |
| 100089   | 16.1                |         | Not sown | 2.7      |
| 100063   | 43.9                | 12.1    |          |          |
| 100134   | 78.2                | 7.1     |          | 5.4      |
| 100031   | 12.7                |         | Not sown |          |

EXPERIMENT NO. 77NA25

FILE 3278 EX

TITLE: Undersowing crops with subclover  
(Cereal phase)

Locality: T. Sands, Cuballing

Rainfall: M-0, 421 mm

Soil Type: Brown sandy loam over mottled clay

Vegetation: White gum

History: New land, lupin/cereal or subclover 1977.

Basal Fertilizer: 200 kg/ha plain superphosphate

Sowing: Clipper barley sown at 45 kg/ha in the  
1977 plots. Trial sown June 19.

Plots soil sampled for nitrogen and carbon analysis.

Pasture plots burr sampled in March.

| 1977 Crop        | Seaton Park Seed Rate |     |     |     |    |
|------------------|-----------------------|-----|-----|-----|----|
|                  | 2                     | 4   | 8   | 16  | 32 |
|                  | (kg/ha)               |     |     |     |    |
| Nil              | 55                    | 166 | 183 | 167 | 87 |
| Egret Wheat      | 9                     | 5   | 7   | 9   | 10 |
| Uniharvest lupin | 11                    | 24  | 26  | 104 | 32 |

Significant subclover seed reduction with cover crop, but 2 kg subclover under crop produced sufficient seed (8 kg/ha) for a 'reasonable' pasture stand after the crop year.

Barley Grain Yield harvested December 22.

| 1977 Crop   | Seaton Park Seed Rate |      |      |      |      |      | Main Yield | Mean D.M. Nitrogen Yield (Oct) (kg/ha) |
|-------------|-----------------------|------|------|------|------|------|------------|--|
|             | 0                     | 2    | 4    | 8    | 16   | 32   |            |  |
|             | (kg/ha)               |      |      |      |      |      |            |  |
| Nil         |                       | 1269 | 1624 | 1676 | 1663 | 1793 | 1605       | 27.6                                   |
| Egret Wheat | 1009                  | 1207 | 1014 | 1228 | 1043 | 1198 | 1116       | 16.9                                   |
| Uniharvest  | 1449                  | 1636 | 1759 | 1753 | 1700 | 1790 | 1681       | 25.9                                   |

Cereal yield after lupin or high subclover rates greater than after wheat or low subclover rate.

Drill Sown Plots

Miniplots

| Species | Cultivar        | Grain Yield |                     | Cultivar                | Grain Yield (g/m <sup>2</sup> ) |
|---------|-----------------|-------------|---------------------|-------------------------|---------------------------------|
|         |                 | (kg/ha)     | (g/m <sup>2</sup> ) |                         |                                 |
| Lupin   | 72A14           | 413         | 41                  | 72A14                   | No plants                       |
|         | Unicrop         | 215         |                     |                         |                                 |
|         | Marri           | 196         |                     |                         |                                 |
|         | Uniharvest      | 187         |                     |                         |                                 |
| Pea     | WP-3            | 831         |                     |                         |                                 |
|         | WP-7            | 460         |                     |                         |                                 |
|         | TRC-1           | 263         |                     |                         |                                 |
|         | White Brunswick | 223         |                     |                         |                                 |
| Vetch   | Derrimut        | 298         |                     |                         |                                 |
|         | Lanquedoc       | 80          | 8                   | Lanquedoc               |                                 |
|         | Popany          | 206         | 21                  | Popany                  |                                 |
|         |                 |             |                     | Adeza 46A               |                                 |
|         |                 |             |                     | " 46B                   |                                 |
|         |                 |             |                     | " 46C                   |                                 |
|         |                 |             |                     | " 64                    |                                 |
|         |                 |             |                     | " 118                   |                                 |
|         |                 |             |                     | <u>Lathyrus</u> 300001) |                                 |
|         |                 |             |                     | Cicera 300004)          | No yield                        |
|         |                 |             |                     | 300010)                 |                                 |
|         |                 |             |                     | 300017)                 |                                 |
|         |                 |             |                     | Sativa 310021           | Poor pod set                    |
|         |                 |             |                     | 310028                  |                                 |
|         |                 |             |                     | 310041                  |                                 |
|         |                 |             |                     | Ochrus 320001)          | Pods shattered                  |
|         |                 |             |                     | 320004)                 |                                 |
|         |                 |             |                     | 320010)                 |                                 |

Comment: Field pea WP.3 and WP.7 outyielded virus affected 72A14 lupins.

Grain harvested 22/11/78 - total plot harvested with Hege, area taken 0.8 x 20 m.

| Cultivar  | Date Sown           |        |        |         | CV Mean |
|-----------|---------------------|--------|--------|---------|---------|
|           | April 27            | May 19 | June 1 | June 26 |         |
|           | (g/m <sup>2</sup> ) |        |        |         |         |
| P22612    | 50.4                | 19.7   | 70.1   | 5.1     | 36.3    |
| 72A14     | 44.3                | 24.3   | 76.9   | 5.1     | 37.6    |
| 72A15     | 26.6                | 14.3   | 47.7   | 8.5     | 24.3    |
| P21255    | 31.1                | 10.1   | 37.7   | 1.9     | 20.2    |
| Marri     | 21.8                | 10.8   | 23.9   | 6.6     | 15.8    |
| Phrenson  | 20.5                | 3.9    | 18.4   | 1.2     | 11.0    |
| Farewell  | 9.4                 | 3.4    | 13.5   | 0.8     | 6.8     |
| Mean Date | 29.2                | 12.4   | 41.2   | 4.2     |         |

The July 24 sowing produced so few pods, it was not harvested.

Plant reproductive development:-

| Cultivar | Sown        |  | May 19      |  | June 1        |  | June 26       |  | July 24      |  |
|----------|-------------|--|-------------|--|---------------|--|---------------|--|--------------|--|
|          | Apr 27      |  |             |  |               |  |               |  |              |  |
| P22612   | (a)4 (b)4.5 |  | (a)2.5 (b)3 |  | (a)3.5 (b)7.5 |  | (a)2.5 (b)1.5 |  | (a)1.5 (b)NL |  |
| 72A14    | 5 5         |  | 2 2         |  | 3.5 6         |  | 2 -           |  | 1.5 NL       |  |
| 72A15    | 4 3         |  | 3.5 0.5     |  | 3 5           |  | 2.5 NL        |  | 1.0 NL       |  |
| P21255   | 3 2.5       |  | 3 4         |  | 3.5 7         |  | 1.5 NL        |  | - NL         |  |
| Marri    | 4 -         |  | 3 0.5       |  | 3.5 1.5       |  | 2.5 NL        |  | - NL         |  |
| Phrenson | 5.5 -       |  | 2 NL        |  | 4.5 3         |  | 0.5 NL        |  | - NL         |  |
| Farewell | 5 -         |  | 2.5 NL      |  | 3.5 1.0       |  | 1.0 NL        |  | - NL         |  |

(a) = No. pods on M.S.      (b) = No. pods on 1<sup>o</sup> laterals.

- = No pods      NL = No laterals developed.

Comments: 1. The two earliest cultivars gave similar grain yield even though P22612 was 3-4 nodes (7-10 days) in advance of 72A14.

2. Some anomalies exist between the recorded reproductive development and harvested grain yields.