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2015GE08 National lupin breeding NVT

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GRDC Project DAW00237

Purpose:	Evaluation of Lupin stage 3/4 advanced lines for National Variety Testing
Location:	Dandaragan
Soil Type:	Sandy
Soil Test Results:	Lupin site as per canola site
Rotation:	Lupin site as per canola site

BACKGROUND SUMMARY

The Lupin Breeding Program based at DAFWA breeds narrow-leafed lupin for national release based on key criteria. New varieties with advances in yield, quality or disease characteristics are critical to growers and agri-industry in terms of export market share. For lupins, targeted characteristics include; tolerance to the fungal diseases anthracnose, phomopsis and grey leaf spot; tolerance to herbicide damage by metribuzin; tolerance to virus diseases and aphid infestation; maintainence of high seed protein and low seed alkaloid levels. The program also breeds for low alkaloid and resistance to pod shattering under hot, dry season finishes. In conjunction with National Variety Testing (NVT), DAFWA undertakes testing of new cross-breeds at 16 WA grainbelt sites in order to determine suitability for commercialisation and adoption by industry.

Annual results are reviewed in March and crossbreds at any stage of variety evaluation are discarded if yield and other trait standards are not achieved. After a minimum of two years, lines may be recommended for release (through a 'Release Advisory Group') as new cultivars.

The 2015 Dandaragan trial demonstrated relatively high yields. However the trial statistical analysis revealed a high level of variation in the results, thus rendering the findings of lower value than average in terms of attempting to select best performing breeding lines or cultivars.

TRIAL DESIGN

Plot size: 10m x 1.5m

Machinery use: Cone seeder

Repetitions: 4

Crop type and varieties used: *Lupinus angustifolius* (Narrow-leafed lupin, NLL), 7 control varieties, 1 new cultivar released 2015 (PBA Jurien), 40 WALAN test lines

Seeding rates and dates: 08-May-2015

Fertilizer rates and dates: District practice for lupins

Herbicide rates and dates: District practice for lupins
Other applications/ treatment rates and dates: Harvest date: 15-Dec-2015

Table 1. TRIAL LAYOUT

	1	2	3	4	5	6
1	PBA Barlock	WALAN2428	WALAN2506	WALAN2580	WALAN2577	WALAN2550
2	Tanjil	WALAN2581	Danja	WALAN2558	WALAN2559	WALAN2540
3	WALAN2582	WALAN2553	WALAN2578	WALAN2572	WALAN2543	WALAN2555
4	Jenabillup	WALAN2385	WALAN2522	WALAN2564	WALAN2579	Filler
5	WALAN2567	WALAN2565	Mandelup	WALAN2560	WALAN2533	WALAN2437
6	WALAN2571	WALAN2561	WALAN2556	Filler	WALAN2566	WALAN2546
7	WALAN2573	WALAN2563	WALAN2562	WALAN2557	WALAN2552	Coromup
8	WALAN2576	WALAN2574	WALAN2448	PBA Gunyidi	WALAN2569	WALAN2568
9	WALAN2550	WALAN2581	WALAN2566	WALAN2569	Coromup	WALAN2573
10	WALAN2437	WALAN2568	WALAN2564	WALAN2571	WALAN2506	WALAN2552
11	WALAN2570	WALAN2567	WALAN2561	WALAN2448	WALAN2558	WALAN2522
12	Jenabillup	WALAN2556	WALAN2555	WALAN2563	Mandelup	WALAN2557
13	WALAN2562	WALAN2580	PBA Gunyidi	WALAN2576	WALAN2428	WALAN2565
14	WALAN2575	WALAN2543	PBA Barlock	WALAN2553	WALAN2540	Danja
15	WALAN2533	WALAN2582	WALAN2546	WALAN2579	WALAN2578	WALAN2385
16	WALAN2559	WALAN2560	WALAN2577	Tanjil	WALAN2574	WALAN2572
17	WALAN2553	WALAN2559	WALAN2565	WALAN2576	WALAN2556	Tanjil
18	WALAN2577	WALAN2552	WALAN2540	WALAN2582	WALAN2550	WALAN2567
19	WALAN2568	Danja	WALAN2580	Filler	PBA Gunyidi	WALAN2385
20	WALAN2555	WALAN2437	WALAN2448	WALAN2428	Jenabillup	WALAN2574
21	WALAN2578	WALAN2571	Coromup	Filler	Mandelup	WALAN2566
22	WALAN2569	WALAN2522	WALAN2560	WALAN2506	WALAN2581	WALAN2562
23	WALAN2557	WALAN2546	WALAN2563	WALAN2533	WALAN2564	WALAN2543
24	WALAN2579	WALAN2572	WALAN2558	PBA Barlock	WALAN2573	WALAN2561
25	WALAN2558	WALAN2557	WALAN2533	WALAN2581	WALAN2555	PBA Barlock
26	WALAN2569	WALAN2428	WALAN2572	WALAN2437	WALAN2580	WALAN2563
27	Mandelup	WALAN2579	WALAN2550	WALAN2559	WALAN2561	WALAN2568
28	WALAN2543	WALAN2540	WALAN2385	WALAN2546	WALAN2560	WALAN2556
29	WALAN2574	Coromup	WALAN2575	WALAN2567	WALAN2553	WALAN2522
30	WALAN2552	PBA Gunyidi	WALAN2570	WALAN2562	WALAN2571	WALAN2582
31	WALAN2576	WALAN2566	WALAN2573	WALAN2577	Jenabillup	Danja
32	WALAN2564	WALAN2506	Tanjil	WALAN2578	WALAN2565	WALAN2448

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RESULTS/STATISTICS

Trial yield results at the WMG Dandaragan site (Agzone 1) for the set of 48 genotypes showed a site mean yield of 3.97 t/ha, which was the second highest yielding site among 16 WA sites, the top yielding site being Walkaway (also Agzone 1). The Dandaragan site data had a large coefficient of variation (19.7%), indicating high experimental variation, and therefore the variety mean yield values had an associated high LSD value. The reasons for this are not clearly obvious, however there appeared to be variable seedling establishment and there was some competition with WA Blue lupin weeds.

Table 2 shows the highest yielding WALAN lines along with control cultivars in the Dandaragan trial. Results indicate some yield advance in new breeding lines, however results must be taken in the context of the high LSD(0.05) value (1.15 t/ha). Only the 3 lowest yielding varieties are significantly different.
When yields were averaged across all three Agzone 1 sites (Dandaragan, Walkaway, Mingenew), PBA Jurien was the highest yielding cultivar, with WALAN2540, 2546, 2533 as the leading breeding lines (Table 3).

When averaging results across the 16 NVT sites in WA in 2015, the newly released PBA Jurien was the best performing named cultivar, with only one WALAN line (WALAN2546) performing slightly better.

Table 2: Yield results for the best 10 WALAN lines shown with 8 cultivars (Dandaragan)

Variety Name	Yield t/ha	Yield %Mandelup
WALAN2553	4.83	110
WALAN2533	4.74	108
WALAN2571	4.73	108
WALAN2522	4.61	105
WALAN2540	4.57	104
WALAN2574	4.57	104
WALAN2546	4.56	104
WALAN2543	4.50	103
WALAN2437	4.47	102
PBA Barlock	4.45	102
PBA Gunyidi	4.45	102
WALAN2562	4.39	100
Jenabillup	4.38	100
Mandelup	4.38	100
PBA Jurien	4.32	99
Tanjil	3.89	89
Coromup	3.49	80
Danja	3.24	74
LSD(0.05)	1.15	

Table 3: Yield results averaged across three Agzone 1 sites (NVT sites Dandaragan, Walkaway, Mingenew) for the best 10 WALAN lines shown with 8 cultivars

Variety Name	Agzone1 t/ha	Agzone1 %Mandelup
WALAN2540	4.54	105
WALAN2546	4.42	102
WALAN2533	4.39	101
PBA Jurien	4.39	101
WALAN2553	4.37	101

WALAN2562	4.34	100
Mandelup	4.33	100
WALAN2560	4.29	99
WALAN2574	4.27	99
WALAN2556	4.23	98
WALAN2571	4.21	97
WALAN2570	4.19	97
Tanjil	4.04	93
PBA Gunyidi	3.97	92
PBA Barlock	3.89	90
Jenabillup	3.74	86
Coromup	3.50	81
Danja	3.29	76

OBSERVATION/ DISCUSSION/ MEASUREMENTS

Some plot establishment variation was seen and there was some competition for WA Blue lupin plants within the plots.

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