New Strand Medics for the Eyre Peninsula and Murray Mallee - Early Results

RESEARCH

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Location: Minnipa Ag Centre
Roy Latta / Ian Richter
Rainfall
Av. Annual: 325 mm
Av. GSR: 242 mm
2010 Total: 410 mm
2010 GSR: 346 mm
Yield
Actual: > 6t/ha (rising plate meter est 28/9/10)
Paddock History
2009: Wheat
2008: Wheat
2007: Cereal
Soil Type
Calcareous sandy loam, pH 8.5
Plot size
6 m x 1.6 m x 3 reps
Yield Limiting Factors
None apparent
Environment impacts
Soil Health
Disease levels: None detected
Chemical use: flumetsulam, quizalofop-p-ethyl

Location: Arthurton
Neville & Ashleigh Rowe
Rainfall
Av. Annual: 375 mm
Av. GSR: 275 mm
2010 Total: 477 mm
2010 GSR: 359 mm
Yield
Actual: > 6t/ha (estimated by rising plate meter)
Paddock History
2009: Canola
2008: Lathyrus
2007: Durum wheat
Soil Type
Clay loam, pH 8.2
Soil test
Colwell P - 68 ppm, organic carbon - 3.4%
Diseases
P. neglectus (RLN)
Yield Limiting Factors
Naturalised burr medic. RLN

Key messages

- **New powdery mildew resistant hybrids have performed very well agronomically at three sites in SA (despite absence of significant powdery mildew infection this year).**
- **The insecticide/nematicide aldicarb, increased medic dry matter at Arthurton by 15%.**
- **Lines with putative tolerance to root lesion nematodes showed reduced root damage but overall were not as productive as the powdery mildew resistant hybrids.**

Why do the trial?

The broad aim of this SAGIT funded project is to assess the potential of a range of multi-trait breeders' lines for commercial development.

More specifically we want to:

• evaluate in the field for the first time, the agronomic performance of 27 strand medic hybrids possessing various combinations of new traits including SU tolerance, larger seed size, nematode tolerance, improved nitrogen fixation capacity and powdery mildew resistance;

• determine the benefit that Pratylenchus neglectus root lesion nematode (RLN) tolerance has on medic production and measure the change in nematode populations after growing these medic lines.

How was it done?

Trial sites were selected in three target zones; Eyre Peninsula (Minnipa), Yorke Peninsula (Arthurton) and the Murray Mallee (Karoonda) (Table 1). The Arthurton site, which was dry sown, was specifically selected for its high level of RLN (30/g soil) and nematicide treatments (plus/minus) were applied in an attempt to quantify RLN field tolerance. The 27 strand medic hybrid entries plus a range of cultivar controls were assessed for dry matter production, maturity, and pod and seed yield. At Arthurton initial RLN numbers were also quantified and root damage assessments made for selected genotypes. Seedling regeneration will be monitored to gain valuable hardseed breakdown data and additional agronomic performance data.

What happened?

Plant establishment at Arthurton and Minnipa was very good, helped by good rain shortly after sowing. At these two sites, spring dry matter production of many lines was excellent and exceeded 5 t/ha in many cases. At Karoonda the establishment was staggered with at least 4 distinct germination events as a result of patches of non-wetting sand failing to wet up sufficiently given the many small rainfall events. In June and July there were 28 rain days recorded by the on-site NRM weather station for a total of only 49 mm rainfall. Notwithstanding this, with a good spring finish the final production of the best lines at Karoonda was also very good (> 5 t/ha).

It is only early days for this project with seed yields still being processed and final nematode populations to be assessed. However the main finding so far this year has been the excellent dry matter production at all sites of a small set of powdery mildew (PM) resistant hybrids which also have SU tolerance, aphid resistance and large seeds. They had superior early vigour and have outperformed Herald and Angel by 20% for winter and spring dry matter growth (Figure 1), even in the absence of any significant powdery mildew infection this year.

Table 1 Herbicides and rates used for each break crop treatment

Site	Sowing Date	Sowing Rate (kg/ha)	Plot Size (m)	Reps	Entries	Nematicide applied (+/-)
Arthurton	21/5/2010	10	3 x 1.2	4	36	yes
Minnipa	31/5/2010	10	6 x 1.6	3	33	no
Karoonda	1/6/2010	10	4 x 1.2	3	32	

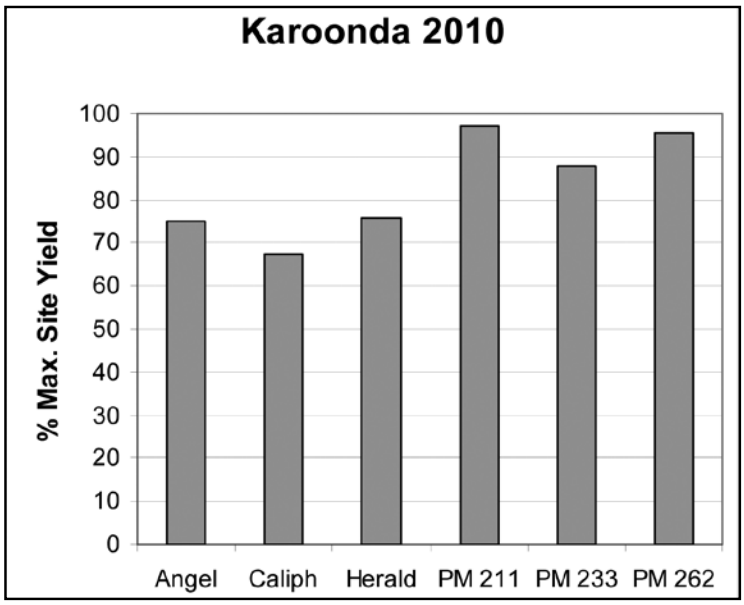

Figure 1 Winter-spring dry matter production (average of % maximum site yield over three assessments) at Karoonda of cultivar controls and selected powdery mildrew resistant lines (PM).

Another observation from the Karoonda site was that plants were poorly nodulated and reinforces a number of similar anecdotal reports of poor nodulation of medics growing on some Mallee soil types (eg non-wetting sandy rises, low organic matter). Nodulation of the regenerating plots will be monitored in 2011.

At Arthurton (high RLN site), positive growth responses to the nematicide aldicarb (applied at sowing) were frequently measured in the field (on average 15%). However, because there was no change in nematode number shortly after sowing, only small reductions in visual root damage and the responses to nematicide were generally consistent across the medic lines, it is likely the effect of the nematicide extended beyond nematode control. Impacts on other soil flora and nutrient availability are often reported where nematicides are used. Nematicide effects aside, the medic line RH-1 (nematode tolerant parent) and Z-2365 (bred line) showed significantly reduced root damage compared to the variety Herald, indicating that a useful level of nematode tolerance has been incorporated into some of the bred lines. But overall the RLN tolerant hybrids were less productive than the powdery mildew hybrids that produced exceptional growth. In the longer term it may be possible to cross the nematode tolerance trait into the highly productive powdery mildew lines.

What does this mean?

Seed yield data (pending) will be important to supplement the dry matter assessments but we are encouraged so far by the consistently good performance of a small group of material sharing the same genetic background. This material has never been evaluated in the field before but has done well at three field sites with quite different soil and seasonal characteristics (EP, YP & MM). The lines are derived from a cross made with a line originally selected for powdery mildew resistance and Angel strand medic. Although powdery mildew (PM) was not a factor in this year's trials, genetic gains in early vigour and adaptation to sandy soils may have resulted from the larger seeded PM parent. Further selections have be made on this material to stabilise traits and if the level of agronomic improvement can be confirmed at additional 'sites x years' there are good prospects for a commercial release as a result of this project.

In additional work, final RLN numbers are being assessed at Arthurton to measure what effect the different medics have had on their population. A second site has also been set up at Arthurton in collaboration with Dr Alan McKay, where nematode levels were manipulated in 2010. This will be used to further assess the nematode tolerance of the best lines.

Subject to the final analyses of the 2010 data, a shortlisted selection of the best lines will be re-sown at additional sites.

Acknowledgements

We gratefully acknowledge the funding by South Australian Grains Industry Trust; technical assistance from Jeff Hill, Barbara Morgan, John Heap and Ian Richter, SARDI; and collaborators, Roy Latta (Minnipa), Neville Rowe (Arthurton) and Peter & Hannah Loller (Karoonda).