New medics show promise in the northern wheatbelt

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New medicsshow promise in thenorthern wheatbelt

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For more than 20 years Cyprus barrel medic has been the mainstay of pastures grown on the medium to heavy red clay loams of Western Australia’s low rainfall northern wheatbelt. However, since the early 1980s its resistance to aphids has declined followed by reduced productivity and persistence.

Fortunately, a six-year research program at Tenindewa, near Mullewa, is on target to prove the superiority of Parabinga barrel medic and a mixture of Serena and Santiago burr medic. These varieties, which had not been widely tested in the region, generally out-perform Cyprus in all aspects because of their higher tolerance of aphids.

In 1991 and 1992, the second and third years of pasture, Parabinga barrel medic had up to two and a half times the medic dry matter available compared with Cyprus while its seed yield ranged up to four times that of Cyprus.

In a wheat-pasture rotation, the superiority of Parabinga and Serena/Santiago over Cyprus was obvious. Both pastures had nearly four times the medic dry matter available compared with Cyprus in 1992, the first year after crop. They also had much larger seed banks, especially Serena/Santiago, which had five times the soil seed reserves of Cyprus at the end of 1992.
Aphid damage
Cyprus barrel medic can produce excellent growth in August but in many years has been devastated by aphids in September. This means that it sets little seed, reserves are being depleted and Cyprus-dominant pastures are becoming rare.

Pasture legumes on red clay loams
The Department of Agriculture is seeking well adapted crop and pasture legumes for all soils. Yields of narrow-leaved lupins and field peas have been unreliable. Research to identify crop legumes suited to heavy soils in low rainfall areas is only in its infancy. The potential for new medic varieties in this and other regions highlights the value of the Western Australian medic evaluation program. New medic variety are highly valuable because of their versatility in both tight rotations and long-term pasture with infrequent crops.

Medium to heavy red clay loams are largely unsuitable for subterranean clover because the soil surface is often hard setting and prevents burial of burrs. Subterranean clovers do not persist well under the frequent cropping that suits this excellent wheat-growing country. Medic can cope more successfully as they produce their burrs above ground.

Parabinga barrel medic possesses virtually all of the desirable traits once held by Cyprus, but is more tolerant of aphids. Its potential for the low rainfall wheatbelt was identified in small plot work in the late 1980s when ungrazed Parabinga plots produced the most spring dry matter and excellent seed yields.

Serena and Santiago burr medic are also excellent seed producers and regenerate well after cropping. Although not as aphid tolerant as Parabinga, they are superior to Cyprus. Serena matures slightly earlier than Santiago, so sowing them as a mixture should take advantage of Serena's early maturity and Santiago's later maturity with late rains.

Experimental program
The program covers 55 ha, to be similar to farm conditions. It aims to evaluate sheep and wool production and pasture persistence under both permanent pasture and a one-to-one rotation with wheat. The 33 plots are 1 ha or 1.6 ha, depending on stocking rate. Each experimental treatment is repeated three times with a minimum of five Merino hoggets per plot.

Grazing on permanent pasture is compared at high and low stocking rates. Actual stocking rates vary from year to year with the low stocking rate held at 60 per cent of the high stocking rate.

In 1990, the year of establishment, the plots were grazed at 3 and 5 sheep/ha from 3 July (when runners started to develop on the medic) until 12 September (when they were removed to allow the medic to set seed).

In 1991, the plots were stocked on 11 June with 3 and 5 hoggets/ha, but because of good pasture growth, more sheep were added to give stocking rates of 5 and 8 sheep/ha until grazing ceased on 12 November.

In 1992 grazing commenced on 7 May. The pastures in cropping rotations were stocked at 5 hoggets/ha to graze the green pick and stubble residues until 9 July when the rate was reduced to 3 sheep/ha. Stocking rates on the permanent pastures were kept at 3 and 5 sheep/ha, but due to lack of rain, hay was fed from late May until mid-June. The sheep on all pastures in cropping rotations had to be removed for two weeks in early September but there was not enough growth on the Cyprus plots for the sheep to be returned until four weeks later. The sheep at 5 sheep/ha on permanent pasture also had to be removed for seven weeks (mid-July until the end of August).

In contrast to the winter, the spring was unusually wet which allowed the sheep to be carried on the plots until 14 December for the Cyprus in rotation, 13 January for the Serena/Santiago at high stocking rate, 22 February for the rest of the rotation treatments and the permanent Cyprus plots and 22 March for the Parabinga at 5 hoggets/ha. The Parabinga at 3 hoggets/ha carried sheep comfortably until 7 April.

The more normal season of 1993 allowed continuous stocking from 2 June to 15 December for the Cyprus rotational pastures at 3 head/ha and the Serena/Santiago plots at 5 head/ha. At 11 January 1994 sheep were removed from Serena/Santiago and Cyprus permanent plots at 3 head/ha and Parabinga at 5 head/ha. They were removed on 25 January on Parabinga and Serena/Santiago rotation plots at 3 head/ha while Parabinga permanent pasture at 3 head/ha carried sheep to 5 February 1994.
Highlights of results

The pastures established well and are now in the fifth and last growing season of the project. Detailed plant and animal measurements were taken for the first four years. All varieties established well and the initial superiority of the new varieties is apparent.

Overall, Parabinga and the Serena/Santiago mixture appear superior to Cyprus (see Table 1). Seed production of Cyprus was only 17-70 per cent of the other pasture types and this was generally reflected in plant numbers, legume content, dry matter production available and the number of sheep grazing days obtained (see Table 2). Field observations of aphid damage in late spring each year provided additional evidence that these results are associated with differences in aphid tolerance.

The favourable growing season in 1991 resulted in more winter dry matter available than 1992 when there was a late start and patchy winter rainfall. However, repeated rains to finish the 1992 season resulted in a good seed-set, even for Cyprus, given that the seasonal conditions did not allow a large build-up of aphids.

Because the Parabinga plots carried the sheep longer into the 1992-93 summer, there were differences in the numbers of sheep grazing days obtained. Compared with other varieties, Parabinga gave 15-33 per cent more sheep grazing days for the permanent pastures. In cropping rotations, Parabinga provided an equal number of grazing days to Serena/Santiago and 54 per cent greater than Cyprus.

The most relevant comparison is that Parabinga at the high stocking rate compared with Cyprus at the low stocking rate - the "best-bet" compared with the traditional. Parabinga yielded 67, 60, 55 and 67 per cent more grazing days per hectare than Cyprus in 1990, 1991, 1992 and 1993 respectively. Given that wool production per head and wool quality were very similar, these increases should apply also to the wool returns per hectare.

The greater numbers of sheep grazing days/ha were achieved on the Parabinga pastures generally with no less liveweight gain than sheep on the other pastures. In fact, the Parabinga sheep often gained slightly more weight.

Although this work is likely to lead to recommending Parabinga for long-term pastures, the choice between Parabinga and Serena/Parabinga has hairy leaves with serrated edges, similar to other barrel medic.
Santiago in rotations is not so clear. Both have produced excellent results and much more data will be evaluated before making recommendations.

**Wool quality**

Some concern exists within the wool industry that the longish spines of Parabinga burrs will hook into the wool and cause a vegetable matter fault and consequent price penalty. Over the years there have been few complaints about Cyprus burrs, which are very similar to Parabinga. Parabinga’s spines tend to be longer than those of Cyprus and they protrude straight out from the pod. CSIRO tests on fleeces from the project suggest that the Parabinga burrs are removed during early stage processing and are not a major problem.

Any discount caused by burrs in the wool will be offset by Parabinga’s greatly increased stocking rate and higher soil fertility, which will boost crop yields. It seems unlikely that Parabinga could be rejected as a pasture legume simply because it has spiny burrs.

**Other barrel medics**

Parabinga is best suited to the 350–450 mm annual rainfall zone. Other barrel medics for the same soils and farming practices perform well outside this rainfall zone. Caliph barrel medic suits areas as dry as 250 mm, and Paraggio barrel medic grows well in the 500 mm zone.

All three varieties have similar aphid tolerance, the main difference being in the time taken to flowering. Caliph flowers earliest and can persist in shorter growing seasons. Parabinga flowers later and can take advantage of delayed rains, while Paraggio flowers later again and can use even longer growing seasons.

Farmers in low rainfall areas could sow a mixture of Caliph and Parabinga, while medium rainfall farmers may choose a mixture of Parabinga and Paraggio.

Caliph was bred in South Australia before being released commercially in 1991. The Western Australian Department of Agriculture had limited experience of it before release and insufficient seed was available for inclusion in the current project.

A large demonstration plot of Caliph has since been sown a few kilometres from the main trials and is being monitored with interest. We have also sown some Caliph adjacent to the project plots to monitor its performance in the same paddock.

Paraggio is of less interest in the northern wheatbelt because it is suited to the higher rainfall areas mainly found further south.

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**Table 2. Sheep production from Cyprus barrel medic and possible replacement varieties**

<table>
<thead>
<tr>
<th>Year</th>
<th>Sheep grazing days/ha</th>
<th>Average liveweight (kg) gained by sheep</th>
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</thead>
<tbody>
<tr>
<td><strong>Permanent pasture, light stocking rate</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cyprus</td>
<td>213</td>
<td>590</td>
</tr>
<tr>
<td>Serena/ Santiago</td>
<td>213</td>
<td>590</td>
</tr>
<tr>
<td>Parabinga</td>
<td>213</td>
<td>590</td>
</tr>
<tr>
<td><strong>Permanent pasture, heavy stocking rate</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Serena/ Santiago</td>
<td>335</td>
<td>944</td>
</tr>
<tr>
<td>Parabinga</td>
<td>335</td>
<td>944</td>
</tr>
<tr>
<td><strong>Crop-pasture rotation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cyprus</td>
<td>213</td>
<td>crop</td>
</tr>
<tr>
<td>Serena/ Santiago</td>
<td>213</td>
<td>crop</td>
</tr>
<tr>
<td>Parabinga</td>
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