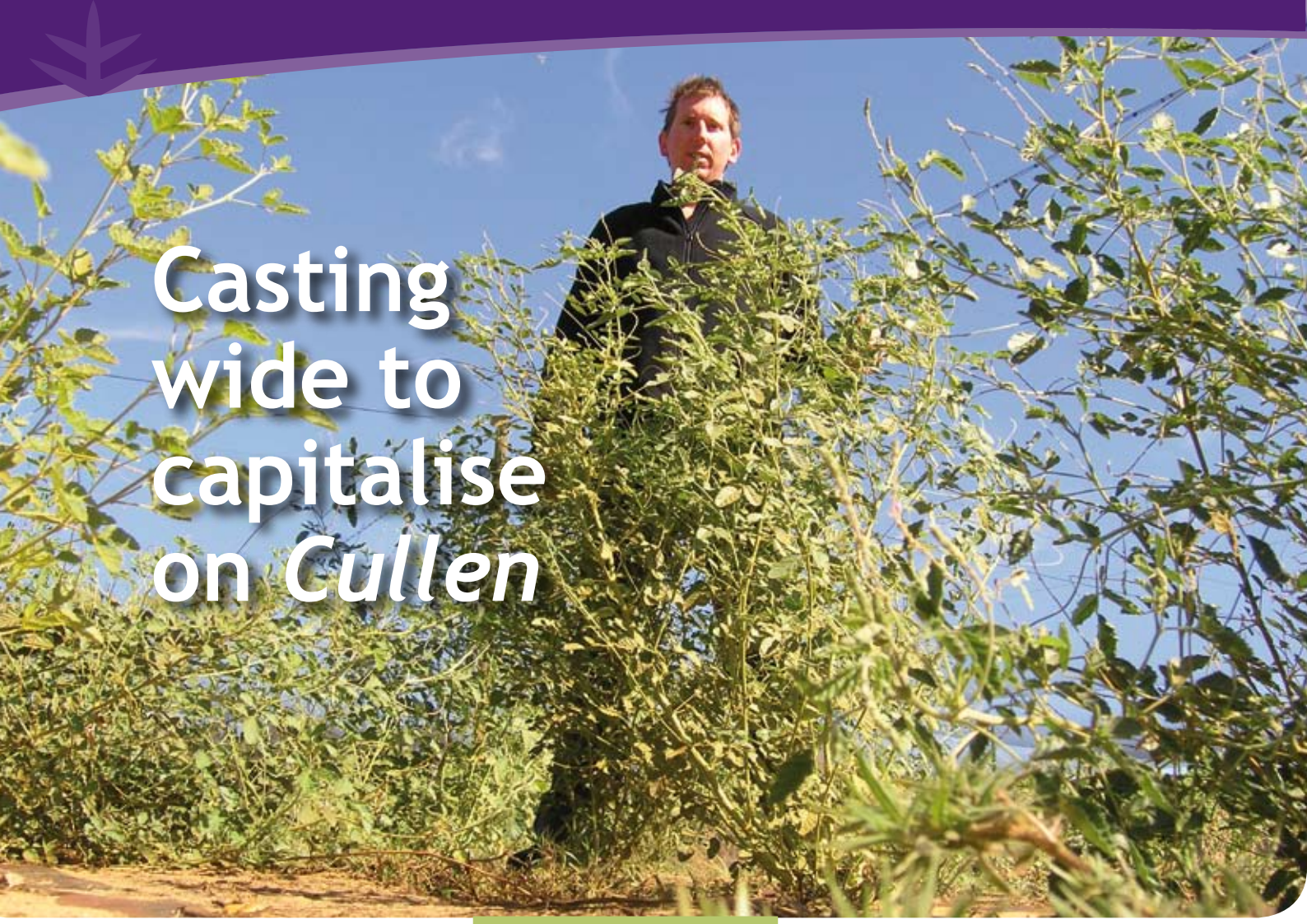
Casting wide to capitalise on *Cullen*



By Richard Bennett

ABOVE: Richard posing with Cullen australasicum *at the Shenton Park trial site*

A current University of Western Australia (UWA) PhD project has identified accessions and *Cullen* species that can survive and produce valuable green fodder during the summer drought period on deep sandy soils.

A group of Australian native legumes from the *Cullen* genus already have demonstrated their potential as useful perennial pastures in difficult climates and soils in Australia's wheatbelt areas. Some work is currently underway to select lines suitable for use on alkaline loams in eastern Australia, but the focus is on one species, *Cullen australasicum*. UWA PhD student Richard Bennett plans to cast the net a little wider and select lines from a number of species that will provide perennial legume options for sandy acid soils in low rainfall areas of Western Australia's wheatbelt, an area where existing perennial legumes are not suited.

key points

- Native *Cullen* species could provide new drought-tolerant perennial pastures for areas where lucerne is not adapted
- Germplasm from collected species has diversity in agronomic traits, offering opportunities for selection and breeding
- Trials in WA's wheatbelt found two species to be more productive and persistent than lucerne during summer drought.

Several collection trips funded by the CRC Salinity *Using native Perennials in Agriculture* project during the past few years have built up a pool of germplasm from promising *Cullen* species. Richard is working to characterise the variation in morphological and agronomic traits within this collection and other collections from Genetic Resource centres in Adelaide (AMGRC) and Queensland (AusTrCFGRC). He will also test their potential to provide a profitable perennial pasture system on acidic or waterlogged soils of low rainfall areas in WA's wheatbelt.

"Our research consists of five stages," explained Richard.

" We have carried out an ecogeographic study to predict which species will be naturally adapted to the target environment and have a number of wheatbelt field trials testing the adaptation to the target environment."

"A common garden experiment will allow us to measure the amount of diversity in the existing germplasm collection and we will select a core collection and carry out glasshouse studies to identify tolerance to acid soils and waterlogging."

Progress to date

Richard reveals that the two trial sites at Shenton Park and Buntine (north-east WA wheatbelt) are progressing well.

"There has been a high enough level of drought stress during summer and autumn to enable a clear ranking of accessions which are well suited and those that are not well suited to growth and survival in the target environment," Richard said.

Figure 1 shows the most recent survival data plotted against the productivity ratings during April (toward the end of the 2007 dry-season) of selected accessions of several *Cullen* species, along with the two lucerne cultivars as controls.

Five species of *Cullen* survive better (*C. australasicum, C. cinereum, C. discolor, C. pallidum*) or are more productive (*C. australasicum, C. cinereum, C. patens*) than the best performing lucerne cultivar. In addition, 13 accessions from *C. australasicum*, and 3 accessions of *C. cinereum* both displayed better survival and productivity over summer than lucerne.

Measurements of the Shenton Park trial site experiment have shown a large amount of diversity in growth habit among the collection and there is sufficient variation in this character to select lines with a desirable habit (see Figure 2).

"Research from Queensland in the 1980s has shown that more prostrate types tolerate grazing better while erect types can be more productive," Richard said.

The phenology of the collection of *Cullen australasicum* has also been measured and there appears to be two main groups.

"In the first group, 33 accessions took less than 122 days (after sowing) to flower. Twenty four of these actually took less than 91 days to flower."

"The second group is made up of seven accessions which all took more than 216 days to flower, and three of these took more than 256 days."

Further results will be collected during the next two years and two glasshouse trials to test the ability of the collection to survive in acid soils and waterlogged conditions will provide further information.

FIGURE 1. A scatterplot of productivity rating in April vs. survival in June of selected *Cullen* species and accessions and two lucerne cultivar controls. Dotted lines are centred over the most productive lucerne cultivar. NB. Lower portion of axes have been truncated.

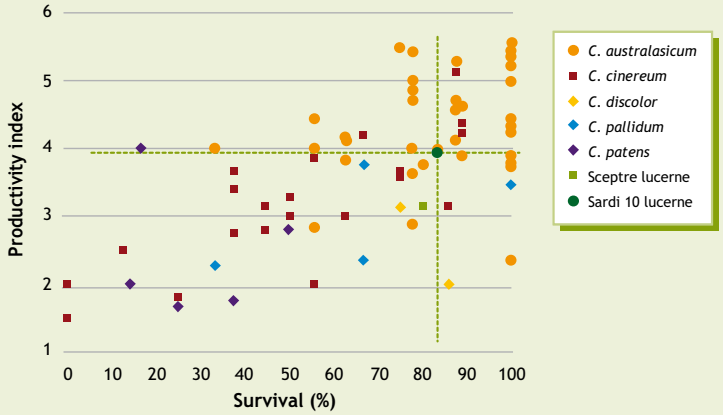
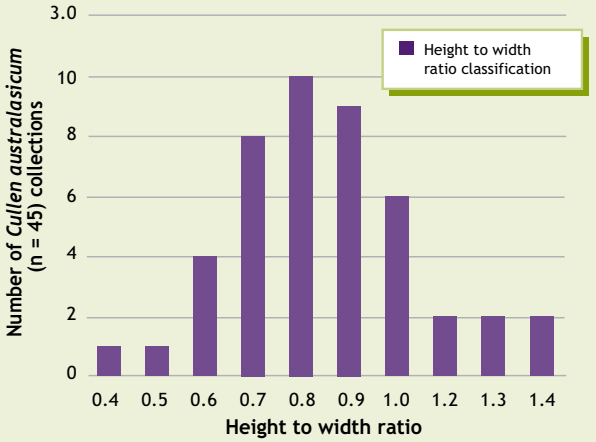


FIGURE 2. The growth habit (height to width ratio) of *C. australasicum* accessions growing under irrigation at Shenton Park trial site.



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