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## ***Bituminaria bituminosa* var. *albomarginata* (Lancelot trefoil), a Novel Perennial Forage Legume for Low-Rainfall Mediterranean Environments in Western Australia**

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**Presenter Information**

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## ***Bituminaria bituminosa* var . *albomarginata* (Lancelot trefoil) , a novel perennial forage legume for low-rainfall Mediterranean environments in Western Australia**

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**Key words** : *Bituminaria bituminosa* , low-rainfall , drought tolerant , perennial

**Introduction** *Bituminaria bituminosa* (L.) Stirt. is a herbaceous perennial legume widely distributed in the Mediterranean Basin and Macaronesia. In the Canary Islands the species presents a larger diversity with 3 botanical varieties found in habitats ranging from the coastal semiarid areas on Lanzarote Island with an annual rainfall of 150mm to 300mm (var . *albomarginata*) to the high elevation subhumid area of Tenerife with up to 500 mm annual rainfall (var . *crassiuscula*) (Mendez et al . , 1990) . The third var . *bituminosa* has a wider adaptation across the Canary Islands and is the only one present in other parts of the Mediterranean basin . Var *albomarginata* (Lancelot trefoil) and var *crassiuscula* (Teide trefoil) have recently been accepted for introduction by Biosecurity Australia and can now be evaluated as potential pasture species in Australia .

**Materials and methods** In 2006/7 , the research with Lancelot trefoil commenced in Western Australia in 5 key areas : 1) *Rhizobium* matching and cross nodulation with Australian native legumes ; 2) determination of breeding system and developing hand-crossing techniques ; 3) field evaluation at 5 sites with Mediterranean-type climate receiving less than 400 mm of annual rainfall and with contrasting soils ; 4) grazing tolerance and forage quality and 5) seed increase and flowering pattern studies .

**Results and discussion** A root nodule bacterium isolated from Canary Islands soil , and probably of the genus *Meso-rhizobium* has been shown to effectively nodulate Lancelot trefoil . Cross-inoculation trials with root nodule isolates from Australian *Cullen* species indicated no nodulation of Lancelot trefoil . The self-pollinated breeding system of the plant (Juan et al . , 2004) was confirmed and a crossing technique was developed . The year 2006/7 was particularly dry , almost the driest on record in south-western Australia and Lancelot trefoil not only persisted , but it grew well and was productive during summer . A noticeable attribute was its ability to retain green leaves during the dry period . This characteristic will allow strategic grazing by farmers who value a source of green feed during the dry season . A pilot grazing experiment showed that sheep grazed the plants in the presence of other palatable forages and recovery of Lancelot trefoil after grazing was excellent . Forage of this leafy legume had digestibility values of 70% -75% and crude protein of 15% -20% . These plants were able to compete with the common annual pasture species (i.e . *Arctotheca calendula* Levyns and *Trifolium subterraneum* L.) without the aid of herbicides . Flowering pattern was monitored monthly and seeds of 15 available accessions were hand-harvested during summer .

**Conclusions** Lancelot trefoil is showing wide adaptation in the Mediterranean regions of Western Australia . Future research will be focused on breeding this species and developing an agronomic management strategy for its use in the low-rainfall Mediterranean regions of Australia , particularly for areas where lucerne (*Medicago sativa* L.) is not well adapted .

### **References**

- Mendez , P . , Fernandez , M . , Santos , A . , 1990 . Variedades de *Bituminaria bituminosa* (L.) Stirton (Leguminosae) en el archipiélago canario . *Pastos* 20-21 , 157-166 .
- Juan , A . , Monino , I . , Correal , E . , Mendez , P . , Crespo , M .B . , 2004 . Comparacion de las tasas de fruitificacion de *Bituminaria bituminosa* (Leguminosae) bajo condiciones de cultivo en canarias y la peninsula Iberica . In : *Criado , B .G . , Cuidad , A .G . , Aldana , B .R .V .d . , Zabalgozcoa , I . (Eds .) , Pastos y ganaderia extensiva* . pp .111-115 .