

## Selection of Australian root nodule bacteria for broad-scale inoculation of native legumes

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**Introduction** The unique and diverse native Australian perennial legumes are under current investigation for use as pastures in Australian agriculture. Identification of root nodule bacteria (RNB) that can fix nitrogen effectively for the plant is a critical factor for the success of a legume species in agriculture (Howieson *et al.*, 2000). Some legumes under investigation are relatively promiscuous (Lange, 1961). This trait may allow the development of a single, broad-scale inoculant that could allow inoculation of multiple species of agricultural importance, whilst more effective, specific RNB are developed in time. Aimed to identify strains that can form effective symbioses with several native legume species of potential interest to agriculture, this experiment screened putative indigenous RNB on 5 native legumes.

**Materials and methods** *Acacia acuminata* Benth. (Aa), *Jacksonia sericia* Benth. (Js), *Kennedia coccinea* Vent. (Kc), *Nemcia capitata* (Benth.) Domin (Nc) and *Swainsona formosa* (G. Don) Joy Thomps. (Sf), 5 native legume species, were inoculated with 20 indigenous RNB, 7 fast and 13 slow-growing strains (visible colony growth within 3 and 7 days, respectively). The plants were grown for 14wks under sterile conditions (Howieson *et al.* 1995). To estimate the effectiveness of inoculants, nodulation was scored and the dry weights of plant shoots were measured and compared with similar data from uninoculated controls.

**Results** Two fast-growing isolates showed differing cross-inoculation patterns, each nodulating 3 species (Js, Kc and Nc; and Kc, Nc and Sf). All 13 slow-growing strains, and one fast-growing strain, displayed a third cross nodulation pattern, where symbioses formed on four species (Aa, Js, Kc and Nc). Four fast-growing strains of RNB failed to form nodules with any tested host. The effectiveness of symbioses was highly variable between strains and hosts. No strain was the most effective inoculant on all hosts. The most effective RNB strain overall was slow-growing and was the most effective strain on Aa, the most effective slow-growing strain on Nc and Js, and the third most effective slow-growing strain on Kc.

**Conclusions** The nodulation of slow-growing RNB showed uniformly wide host ranges and a promiscuous habit. In contrast, the fast-growing strains were more specific in the hosts they nodulated. The effectiveness of the RNB tested was variable between hosts and RNB strains, and ranking of these strains is possible to select useful inoculants. It is evident that particular native legumes, such as the *Swainsona* species tested here, could require specific inoculum and may not nodulate with broad-scale inoculum, a finding supported by Yates (2004). That several RNB were moderately effective on several species is encouraging. That result suggests that there is an opportunity for further selection on a wider range of RNB to develop broad-scale inoculum for native pasture species in Australia.

### References

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