

Wilhelm J. Botha · Jacomina F. Bloem · Ian J. Law

***Bradyrhizobium* sp. (*Lupinus*) in the winter rainfall region of South Africa**

Received: 28 January 2002 / Accepted: 5 August 2002 / Published online: 1 October 2002
© Springer-Verlag 2002

Abstract Widespread cultivation of lupin has resulted in the establishment of effective populations of *Bradyrhizobium* sp. (*Lupinus*) in the winter rainfall region of the Western Cape, South Africa. To determine whether inoculation increased yields of *Lupinus angustifolius* L., field trials were carried out at five sites in this region. Populations ranged from 380 rhizobia g⁻¹ in a moderately alkaline (pH 7.6) soil to >5,000 rhizobia g⁻¹ in four moderately acid (pH 5.5–5.8) soils. Soil isolates were generally similar to the inoculant strain WU425 in nitrogen-fixing effectiveness but several were significantly less effective. Average effectiveness of isolates from certain soils differed significantly. Although inoculation failed to appreciably increase nodule occupancy by WU425 in acid soils containing high populations of rhizobia, nodule occupancy was increased to 98% in the low population alkaline soil. The latter site was later abandoned because of disease. At the other sites, analysis of seed dry mass and protein content showed that yields were not significantly increased by either inoculation, nitrogen fertiliser (45 kg N ha⁻¹) or molybdenum applications. Analysis of genomic DNA by PCR fingerprinting showed that WU425 (isolated in Western Australia) and serologically related strains from other cultures clustered separately from the soil isolates. Isolates from the four acid soils were genomically diverse, whereas isolates from the alkaline soil formed a homogeneous cluster. Further investigation is required to determine the benefit of inoculation in alkaline soils of the winter rainfall region of the Western Cape.

Keywords *Bradyrhizobium* sp. (*Lupinus*) · *Lupinus angustifolius* · Inoculation · Genomic fingerprinting · Soil rhizobia