

An Assessment of Nodulation and Nitrogen Fixation of *Lessertia Frutescens* Plants Inoculated with Rhizobial Isolates from the Cape Fynbos

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Abstract : *Lessertia* (L.) *frutescens* (syn. *Sutherlandia frutescens*) is a leguminous medicinal plant indigenous to South Africa. Traditionally, *L. frutescens* has been used to treat cancer, diabetes, epilepsy, fever, HIV, stomach problems, wounds and other ailments. This legume is endemic to the Cape fynbos, with large populations occurring wild and cultivated in the Cape Florist Region. Its widespread distribution in the Western Cape, Northern Cape, Eastern Cape and Kwazulu-Natal is linked to its increased use as a phytomedicine in the treatment of various diseases by traditional healers. The frequent harvesting of field plants for use as a medicine has made it necessary to undertake studies towards the conservation of *Lessertia frutescens*. As a legume, this species can form root nodules and fix atmospheric N₂ when in symbiosis with soil bacteria called rhizobia. So far, however, few studies (if any) have been done on the efficacy and diversity of native bacterial symbionts nodulating *L. frutescens* in South Africa. The aim of this project was to isolate and characterize *L. frutescens*-nodulating bacteria from five different locations in the Western Cape Province. This was done by trapping soil rhizobia using rhizosphere soil suspension to inoculate *L. frutescens* seedlings growing in sterilized sand and receiving sterile N-free Hoagland nutrient solution under glasshouse conditions. At 60 days after planting, root nodules were harvested from *L. frutescens* plants, surface-sterilized, macerated, and streaked on yeast mannitol agar (YMA) plates and incubated at 28 °C for observation of bacterial growth. The majority of isolates were slow-growers that took 6-14 days to appear on YMA plates. However, seven isolates were fast-growers, taking 2-4 days to appear on YMA plates. Single-colony cultures of the isolates were assessed for their ability to nodulate *L. frutescens* as a homologous host under glasshouse conditions. Of the 92 bacterial isolates tested, 63 elicited nodule formation on *L. frutescens*. Symbiotic effectiveness varied markedly between and among test isolates. There were also significant ($p \leq 0.005$) differences in nodulation, shoot biomass, photosynthetic rates, leaf transpiration and stomatal conductance of *L. frutescens* plants inoculated with the test isolates, which is an indication of their functional diversity.

Keywords : *lessertia frutescens*, nodulating, rhizobia, symbiotic effectiveness

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