

Abstract

Inoculation experiments were conducted in Kenya on seven African *Acacia* species/subspecies (*Faidherbia albida*, *Acacia karroo*, *A. arenaria*, *A. nilotica* ssp. *kraussiana*, *A. tortilis* ssp. *spirocarpa*, *A. tortilis* ssp. *heteracantha*, *A. senegal*) in sterilised and untreated soil. The untreated soil contained 10^3 rhizobia g^{-1} . In six of seven species in untreated soil the multi-strain inoculated plants contained significantly more total nitrogen than control plants. The exception was *A. arenaria* in which significant increase in total nitrogen was achieved only with the single strain inoculum in sterile soil. In *A. tortilis* ssp. *spirocarpa* the single strain was better than the multi-strain inoculum. Significant increases over controls in dry weight ranged from 19 to 75% and in total nitrogen from 11 to 89%. Nitrogen derived from fixation (Ndff) was determined for three species/subspecies using the natural abundance ^{15}N method. Values for fixation for the best treatments in these species were *A. nilotica* 53%, *A. tortilis* ssp. *heteracantha* 45% and *A. tortilis* ssp. *spirocarpa* 44%. These are conservative values because of the relatively small $\delta^{15}N$ values (-2.85‰ for *A. nilotica* and -2.52‰ for both species of *A. tortilis*) determined as the 100% fixation values. We conclude that: inoculation can result in substantial gains in nitrogen fixation in African acacias; multi-strain inoculation is preferable to single strain inoculation in some circumstances; *A. nilotica* and *A. tortilis* have at least moderate nitrogen fixation potential and the wide genetic variation found suggests that substantial improvement may be obtained by selection for this character.