

Abstract

Nitrogen (N) fixation was estimated for three *Acacia senegal* (L.) (*A. senegal*) Willd. varieties (*A. senegal* var. *senegal*, *kerensis*, and *leiorhachis*) growing naturally in different sites in the dryland areas of Kenya. The quantities of N₂ fixed were estimated by the ¹⁵N natural abundance method, using leaves as the sampling material. *Balanites aegyptiaca* (*B. aegyptiaca*) was selected as the reference species growing in the same area. Soil samples were also collected under *A. senegal* trees for nodule assessment. Leaf ¹⁵N natural abundance values ($\delta^{15}\text{N}$) were significantly different between *A. senegal* and *B. aegyptiaca*. These values averaged 6.35, 4.67, and 3.03% for *A. senegal* var. *kerensis*, *leiorhachis*, and *senegal*, respectively, and were lower than those of the adjacent reference species. There were also significant differences in the amount of N₂ fixed (% Ndfa) among the varieties. *A. senegal* var. *senegal* showed the highest levels of N₂ fixation with a mean of 36% while *A. senegal* var. *kerensis* and *leiorhachis* had equal estimates of 25%. However, no nodules were observed in the collected soil samples. Leaf N values were significantly different among the varieties with a mean of 2.73, 2.46, and 4.03% for *A. senegal* var. *kerensis*, *leiorhachis*, and *senegal*, respectively. This study shows that the three varieties of *A. senegal* are able to fix N₂ in their natural ecosystems and the differences could probably be due to soil properties and nutrient availability under the different environments. The species can hence be utilized as plantations in agriculture and land rehabilitation programs.