

Abstract

Acacia senegal (L.) Willd is an African arid and semi arid zones, leguminous multipurpose tree species belonging to the subfamily *Mimosoideae*, family *Fabaceae* and subgenus *Aculeiferum*, highly valued for gum arabic production. Patterns of genetic diversity of this important species in Kenya have not been studied for efficiency of germplasm utilization, conservation and improvement. Four natural populations of *A. senegal* in Kenya (Bulla Sambul, Kutulo, Wamba and Meisori) were analyzed to estimate genetic variation among and within populations, by use of ISSR (Inter-simple sequence repeat) markers. Using five primers, 17 polymorphic loci were observed, ranging in size from 564 bp to 983 bp. A high mean total genetic diversity index for the species was observed ($H=0.27$). The principal coordinates analysis (PCoA) of the 95 samples from the four populations showed that about 40.75% of the total variation was described by the first two axes with much overlap among populations; hence populations were not defined on the basis of geographic distance. Much of the genetic variation resided within the populations based on the coefficient of gene differentiation ($G_{st}=0.0573$) and Analysis of Molecular Variance (AMOVA) (95%). It was therefore recommended that selection for the desired important economic traits for improvement and conservation should emphasize on individual trees within populations rather than among populations, and also ensure a comprehensive coverage of the entire ecological amplitude of the populations.