

Identifying Environmental Adaptive Genetic Loci in *Calotropis Procera* (Estabragh): Population Genetics and Landscape Genetic Analyses

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Abstract : *Calotropis procera* (Aiton) W.T.Aiton, (Apocynaceae), is an economically and medicinally important plant species which is an evergreen, perennial shrub growing in arid and semi-arid climates, and can tolerate very low annual rainfall (150 mm) and a dry season. The plant can also tolerate temperature ran off 20 to 30°C and is not frost tolerant. This plant species prefers free-draining sandy soils but can grow also in alkaline and saline soils. It is found at a range of altitudes from exposed coastal sites to medium elevations up to 1300 m. Due to morpho-physiological adaptations of *C. procera* and its ability to tolerate various abiotic stresses. This taxa can compete with desirable pasture species and forms dense thickets that interfere with stock management, particularly mustering activities. *Calotropis procera* grows only in southern part of Iran where it comprises a limited number of geographical populations. We used different population genetics and r landscape analysis to produce data on geographical populations of *C. procera* based on molecular genetic study using SCoT molecular markers. First, we used spatial principal components (sPCA), as it can analyze data in a reduced space and can be used for co-dominant markers as well as presence / absence data as is the case in SCoT molecular markers. This method also carries out Moran I and Mantel tests to reveal spatial autocorrelation and test for the occurrence of Isolation by distance (IBD). We also performed Random Forest analysis to identify the importance of spatial and geographical variables on genetic diversity. Moreover, we used both RDA (Redundancy analysis), and LFMM (Latent factor mixed model), to identify the genetic loci significantly associated with geographical variables. A niche modelling analysis was carried out to predict present potential area for distribution of these plants and also the area present by the year 2050. The results obtained will be discussed in this paper.

Keywords : population genetics, landscape genetic, *Calotreropis procera*, niche modeling, SCoT markers

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