Prunus africana--an evergreen tree found in Afromontane forests--is used in traditional medicine to cure benign prostate hyperplasia. Different bioactive constituents derived from bark extracts from 20 tree populations sampled throughout the species' natural range in Africa were studied by means of GC-MSD. The average concentration [mg/kgw/w] in increasing order was: lauric acid (18), myristic acid (22), n-docosanol (25), ferulic acid (49), β-sitostenone (198), β-sitosterol (490), and ursolic acid (743). The concentrations of many bark constituents were significantly correlated and concentration of n-docosanol was highly significantly correlated with all other analytes. Estimates of variance components revealed the highest variation among populations for ursolic acid (66%) and the lowest for β-sitosterol (20%). In general, environmental parameters recorded (temperature, precipitation, altitude) for the samples sites were not correlated with the concentration of most constituents; however, concentration of ferulic acid was significantly correlated with annual precipitation. Because the concentration of compounds in bark extracts may be affected by tree size, the diameter of sampled plants at 1.3m tree height (as proxy of age) was recorded. The only relationship with tree diameter was a negative correlation with ursolic acid. Under the assumption that genetically less variable populations have less variable concentrations of bark compounds, correlations between variation parameters of the concentration and the respective genetic composition based on chloroplast and nuclear DNA markers were assessed. Only variation of β-sitosterol concentration was significantly correlated with haplotypic diversity. The fixation index (F(IS)) was positively correlated with the variation in concentration of ferulic acid. Principal Components Analysis (PCA) indicated a weak geographic pattern. Mantel tests, however, revealed associations between the geographic patterns of bioactive constituents and the phylogenetic relationship among the populations sampled. This suggests an independent evolution of bark metabolism within different phylogeographical

lineages, and the molecular phylogeographic pattern is partly reflected in the variation in concentration of bark constituents. The results have important implications for the design of strategies for the sustainable use and conservation of this important African tree species.