For thousands of years, local communities have recognized the importance of African cherry – a tree found only within isolated mountain chains across Africa. In addition to providing fuelwood and building materials, it has been revered by local healers across the centuries for its medicinal properties. In the 1970s, the modern pharmaceutical industry discovered that the tree's bark contained a host of chemical compounds that could be used to treat prostate hyperplasia – an extremely common condition for men over 50. This not only increased the tree's value, it put its survival at risk.

Getting to the roots of a valuable tree's genetic heritage

Bioversity International’s study of African cherry (*Prunus africana*)

When genealogists conduct research on family trees, they often go back across many generations and even centuries to learn as much as possible about where that family originated. Along that same line, scientists at Bioversity International have been doing their own genealogical research for the last decade – only in their case, they are tracing the family tree of an actual tree – not just across centuries but across millennia, in order to support conservation actions. The goal of this search is to reconstruct the migratory path of a lofty evergreen known scientifically as *Prunus africana* and create a composite picture of how its genetic profile adapted as it migrated and settled in isolated spots – high-elevation locations scattered across African mountain ranges. The species occupied lower elevation locations during the last Ice Age, but later, an increase in temperature caused a retraction of montane species to higher elevation locations, where it is currently found. Today, African cherry is Africa's most important medicinal tree in terms of international trade, highly valued in pharmaceutical and herbal medicine for its bark, which is used in treatments for certain prostate conditions. But the tree is under threat. Often, the bark has not been harvested sustainably and many trees have died, putting *P. africana* in danger of extinction in some countries. Bioversity International is gathering phylogeographical data about the tree and its genetic diversity to understand the location of hotspots of useful diversity. These will be used to support both the conservation of its diversity and a transition from wild collection to cultivation of this medicinal tree so that overexploitation can be avoided, but local forest communities can still obtain income from harvesting the bark.

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With this discovery came a lucrative market for the bark, with exports from Cameroon alone reaching 1,800 tonnes per year between 2004 and 2006. To feed this market, bark harvesting became unsustainable, often killing trees through bark stripping that girdled them. It didn’t take long for some countries to lose most of their African cherry tree populations, for the tree to be listed by the ‘Convention on International Trade in Endangered Species’ as vulnerable to extinction, and for the European Union to ban its importation. While this was meant to protect the tree, it also meant the loss of an income opportunity. In Cameroon, the government has been issuing export licenses to entrepreneurs and farmers’ organizations, which allows at least 60,000 people who harvest and dry the bark to obtain income from it.
Tracing a tree’s ancestry, in order to protect it

For the past decade, Bioversity International has played a sleuthing and scientific role in efforts to learn more about African cherry’s genealogical heritage in order to improve its conservation and cultivation. Researchers have been working with a laboratory in Austria that has identified the molecular markers that reveal differences among populations of trees growing on different mountains across various countries. These markers have also enabled researchers to reconstruct its migratory and evolutionary pathways.

Through their study of 32 populations of the tree in nine countries, researchers found that the species seems to have entered the African continent through the Middle East and Ethiopia some 100,000 to 180,000 years ago. Populations in West Africa were divided from those in Eastern and Southern Africa by basins that were either too dry or too low for African cherry. The major climatic changes of the last Ice Age, which ended 10,000 years ago, modified the tree’s range, leading to the isolation of populations at high elevations on mountains, and resulting in differentiation in its genetic makeup and desirable traits, including the chemical composition of the bark.

Research results guide efforts for conservation and sustainable use

Bioversity International is now taking steps to translate the knowledge produced by this research into action, with efforts under way to combine the various pieces of evidence collected and improve the identification of the most valuable regions for the conservation of African cherry, and the best seed sources for planting. The first results of the diversity study, published in 2011, were correlated with data collected on the chemical compounds found in the bark extracted from individual trees. This information enables forestry researchers to identify which trees have the characteristics sought by the pharmaceutical industry. While it is common for pharmaceutical companies to make chemical models that recreate natural healing compounds, the African cherry’s ‘bark medicine’ is actually a cocktail of compounds, making it challenging to develop a synthetic version. The pharmaceutical companies need the natural product. Although practices to sustainably harvest bark are known, the focus is increasingly on cultivating trees on farms to provide a constant and accessible source of bark.

Thanks to this investigation, which involved the collaborative efforts of scientists across several countries, researchers know from the sites they studied where African cherry trees have the highest genetic diversity and are more likely to withstand different pressures, including climate change; what populations have a specific concentration of different compounds in the bark that the pharmaceutical industry wants; and which populations have adapted to marginal climatic conditions. This means that foresters can select the best sources of the high-quality reproductive materials needed to establish tree nurseries and support the cultivation of the trees. African cherry orchards are expected to alleviate the threat of extinction of these trees in the wild. It takes 12 to 15 years for an African cherry tree to reach the size at which the bark can be harvested, but in the interim, if farmers are careful to harvest the bark without girdling the tree, they can still obtain income from local wild trees without killing them while they wait for their orchards to grow up.

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