

Sorghum and biodiversity

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Credit: IRD / A. Barnaud

It is difficult to distinguish the human impact on the effects of natural factors on the evolution of crop plants. A Franco-Kenyan research team has managed to do just that for sorghum, one of the main cereals in Africa. The scientists demonstrated how three societies living on the slopes of Mount Kenya have shaped the geographic distribution and structure of the genetic diversity of local varieties. Because of their

practices for selecting and exchanging crop seeds for harvesting, the farmers in each ethnic group maintain varieties which are unique to them. These prove to be genetically and phenotypically differentiated, despite their close geographical proximity. This study sheds light on the debate on the ownership and redistribution of benefits from genetic resources.

Three societies, the same environment

Climate, environment and competition between species are well-known factors in the genetic evolution of plants. But crop plants are subject to an additional force: human action. Up to now, few studies have been able to distinguish the results of the domestication of the effects of natural constraints on crop diversity. To shed some light on this question, a Franco-Kenyan research team became interested in a particular territory: the eastern slopes of Mount Kenya. This territory offers both an ecologically homogeneous environment and brings together different [ethnic groups](#), the Chuka, Mbeere and Tharaka peoples, making it possible to compare the influence of their different agricultural practices and traditional knowledge on the diversity of sorghum, a very important cereal in this area.

Practices that shape each variety

Researchers from the IRD, Cirad and KARI in Kenya have carried out field surveys of each ethnic group to specify their social organisation, the traditional methods for selecting and exchanging seeds from one harvest to another, the importance of the market in such trading, etc. These investigations revealed that the Chuka, Mbeere and Tharaka peoples each grow a mixture of sorghum varieties that is unique to each group. Certain varieties dominate based on ethnic preferences and practices (cooking, etc.), or according to their agricultural strategies for

dealing with natural hazards (long or short crop cycle varieties). In addition, local seed varieties are traditionally transmitted in a very compartmentalised way within the same ethnic group. These practices limit the genetic and phenotypic standardisation of the varieties grown on the slopes of Mount Kenya. So, despite a common local market, sorghum populations are very different there.

Each ethnic group leaves its genetic "signature"

At the same time, the researchers inventoried and sampled the different varieties of sorghum grown by 130 Chuka, Mbeere and Tharaka households. DNA analysis of the 300 plants gathered has identified four genetic groups of sorghum. Two of them correspond to two introduced varieties. These are varieties that were genetically improved by NGOs or the national agricultural extension services. One of these [varieties](#), which was introduced almost 15 years ago, seems to be more genetically diverse among the Chuka than with the other ethnic groups. This suggests that the practices of the three communities leave their "signature" in the genomes of sorghum populations.

Using this multidisciplinary approach bringing together anthropologists, geneticists and agronomists, this work shows the role of human societies in the [geographic distribution](#) and evolution of the [genetic diversity](#) of [crop plants](#). Identifying the factors that shape biodiversity locally helps to preserve them better in the future. Furthermore, this confirms the influence of local practices and knowledge on the diversity of life, which is a central issue in the debate on the ownership and redistribution of benefits from the use of genetic resources.

More information: Labeyrie V., Deu M., Barnaud Adeline, Calatayud C., Buiron M., Wambugu P., Manel S., Glaszmann J. C., Leclerc C. "Influence of ethnolinguistic diversity on the sorghum genetic patterns in subsistence farming systems in Eastern Kenya." *Plos One*, 2014, 9 (3), p.

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