Agrobiodiversity of the shea nut tree

Tree biodiversity is particularly high in the agroforestry parklands of southern Burkina Faso, where large trees grow in association or rotation with such crops as yam and cereals. Along with the omnipresent shea nut tree (Vitellaria paradoxa), more than 100 other tree species are found in farmers' fields! This specific biodiversity has been maintained by the way the agro-ecosystems are managed, with fallow periods and successive cropping phases. In recent years, there has been a major influx of migrants from neighbouring countries and other parts of Burkina Faso. Fallowing is used less, and for shorter periods. Without the traditional ecosystems, tree biodiversity is in danger.

Research by INERA and CIRAD has shown that a new land use pattern is emerging in these areas. Newcomers settle on land where they grow cashew nut trees, sometimes in association with cereals, while native farmers continue to practice extensive fallowing on large areas. Nonetheless, both groups still depend on the agroforestry parklands, the indigenous farmers for fallowing (where this is still practiced), and the newcomers for maintaining permanent agroforestry parklands which no longer depend on fallow periods to regenerate.

A reduction in ecosystem and species biodiversity is inevitable in this fast-changing social situation, but the new practices ensure it is maintained to some extent. In the permanent parkland, several dozen tree species are commonly maintained in the fields; in the tree plots, trees are associated with crops, the densities varying according to whether the farmer gives priority to subsistence crops (cereals) or cash crops (fruit). As such, tree biodiversity helps to explain farm strategies. Although it is often said that fallowing is dying out, agroforestry areas are still being developed. Within a few years, a composite landscape with a high degree of ecosystem and species biodiversity should take the place of today's slash-and-burn farming. This is to be hoped for, rather than a change to cereal monocropping.

Analysis of shea nut biodiversity shows that its distribution and genetic variation within its natural range are probably due to the existence of refuge areas where populations of the tree were isolated during drought periods at the time of the glacial maximum in Europe, 20,000 years BP.

At the regional level, study of shea nut trees from several agroforestry parklands reveals greater genetic diversity within populations than between them. This can be explained by the considerable gene flow fostered by the agroforestry system and the low impact the semi-domestication process has had on the tree's adaptive and economically useful features.

Agroforestry practices foster the dynamics of genetic diversity within a local area. Thinning of the trees' crowns, the favourable impact of cultivation on fruiting, and higher density increase gene flows and gene mixing, developing and maintaining genetic diversity. Thus, to improve the shea nut tree, it is more effective to start with a large number of individuals from a few populations than from a few individuals from a large number of populations.