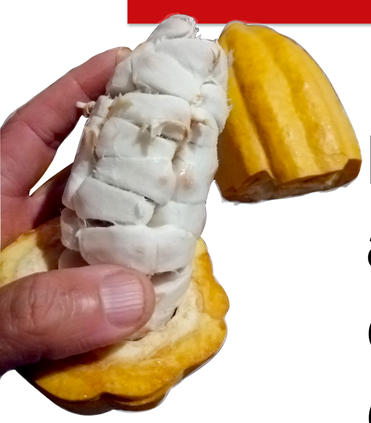

Brazilian cabruca: cacao agroforestry as a pathway to biodiversity conservation, climate change mitigation and development of sustainable farms

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Fermented cocoa beans are the raw material for fine chocolate products.

Introduction

Cabruca is a traditional cacao production system in the State of Bahia, Brazil, which has been contributing to preserve the Atlantic Forest, home to thousands of endemic species and one of the 25 world's biodiversity hotspots[1]. A perennial, dynamic and diverse farming system, cabruca is resilient to climate stressors and its conservation provides valuable ecosystem services, particularly carbon sequestration, climate stabilisation and water storage. Developing the cabruca cacao value chain is essential to climate mitigation, due to the large land areas covered with cacao agroforestry.

Cacao agroforestry

Cacao is a fruit native from the Amazon Basin, cultivated under the canopy of large trees, mostly endemic species, using agroforestry practices according to the principles of agroecology and syntropic agriculture. It benefits from natural plant succession, generating a positive energy balance through C accumulation in the agroecosystem and nutrient cycling[2]. As an alternative to conventional agriculture, the cabrucas avoid deforestation for growing eucalyptus monoculture and cattle breeding, widespread activities with intensive use of fertilisers, pesticides and other contaminants.

Carbon stocks in the cabrucas

It was estimated that traditional and intensified cacao agroforestry (cabrucas) hold 59% of the aboveground carbon stocks in tree dominated vegetation in southern Bahia, exceeding the C stocks in natural forests in the landscape by a considerable margin[3].

Means and range of aboveground carbon (C) stocks in trees over 10 cm diameter at breast height (dbh) and cocoa (Theobroma cacao) trees in agroforest (cabruca), forest and fallow vegetation in southern Bahia, Brazil

	Traditional cabruca (n=51)	Intensified cabruca (n=4)	Mature forest (n=6)	Disturbed forest (n=8)	Fallow or young secondary forest (n=7)
Plot-level C storage[1] (Mg ha^{-1})	87[1] a (17–182)	46[2] b (15–56)	183 c (98–258)	102 a (58–152)	33 b (16–69)
Area (ha)[3]	522,787 (37 %)	152,649 (11 %)	58,164 (4 %)	174,492 (12 %)	498,324 (35 %)
Landscape C storage (Tg)	45.3 (51 %)	7.0 (8 %)	10.6 (12 %)	17.7 (20 %)	8.1[4] (9 %)

Schroth, G. et al. (2015).

Theobroma cacao was described by Linnaeus in the XVIII century. Native from the Amazon Basin, the "forastero" variety was adapted to the Atlantic rainforest, being cultivated for centuries until the present.

Scenario development

Official data accounts for 69,000 cocoa farms in the state of Bahia[4], most of which owned by families producing cacao beans without proper infrastructure, and supplying to an industry dominated by a few transnational companies. However, a growing number of initiatives are being undertaken by local entrepreneurs to explore the extraordinary potential of the cabrucas for production of premium, high value-added products like organic cacao nuts and nibs, chocolate, cacao honey, cacao vinegar and cacao pulp.

The main challenge for those entrepreneurs is to improve post-harvest practices to produce high-quality cocoa beans and avoid commodification. As the most fine cacao flavours are obtained during fermentation, drying and roasting, it is crucial to ensure the basic infrastructure and technical knowledge for these activities, both through private investments and governmental assistance. The existing old processing structures are an asset, but only increasing financial rewards to farmers can boost adequate cocoa processing and quality.

A more efficient exploitation of a yet untapped and promising national market of sustainable fine cacao is an opportunity to increase the income of families, their food security and the local development. On the other hand, as Brazil remains a relevant player in the global cocoa sector, to overcome obstacles to certification of small farms and to facilitate their access to export markets will enhance revenues and stimulate better practices, hence protecting the biodiversity in the cabrucas and mitigating climate change.

(1) The traditional solar drying structure is a typical component of the cacao culture. (2) Cacao tree protecting a creek. (3) Pastures close to a preserved cabruca at Casa Torta Pirangi. (4) Cocoa agroforestry.

Challenges

Environmental agencies are currently implementing projects to revitalise the cabrucas, as a strategy to reconcile the conservation of threatened forest fragments in private cocoa farms with the social and economic well-being of rural families[5]. The generation of income opportunities is expected to make more effective the biodiversity conservation and restoration in the Atlantic Forest. Professionals and institutions dedicated to the cacao production chain have conducted studies to identify obstacles to the revitalisation of the cabrucas and the necessary measures to promote its sustainability[6], as follows:

- Strengthening of local associations
- Training and capacity-development of small farmers
- Restoration of existing post-harvest units and implementation of new processing technologies
- Utilisation and commercialisation of cacao by-products
- Creation of new marketing networks and channels
- Implementation of branding strategies
- Promotion of organic and forest certifications
- Creation of investment opportunities and partnerships with the private sector

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Photos: Thiago Rodrigues (Casa Torta Pirangi).

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