COFFEE AGROFO-RESTERY

BELCO
WHERE SOURCING MAKES SENSE

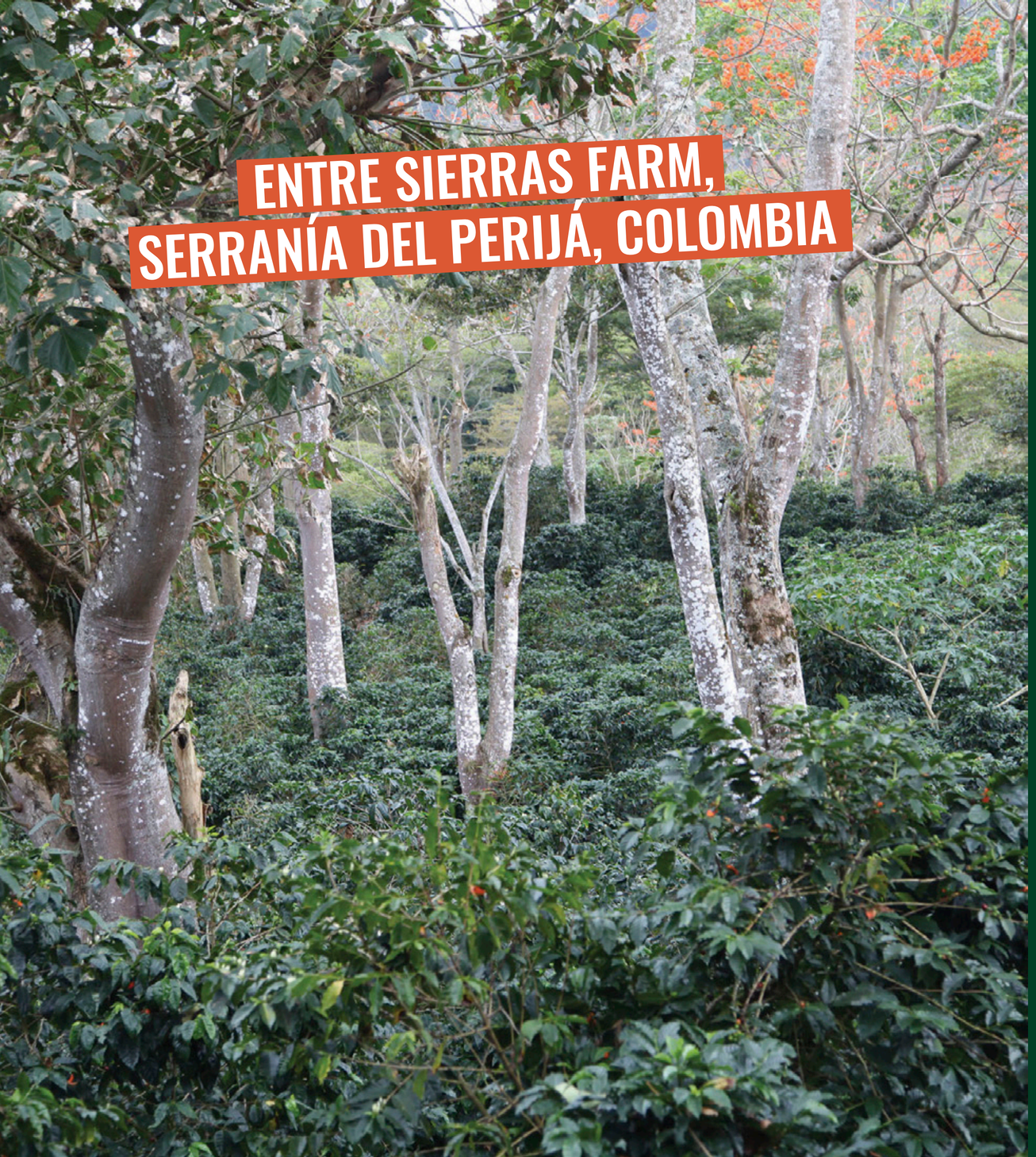
FOR 10 YEARS, BELCO HAS BEEN TAKING CONCRETE ACTION TO PROTECT FORESTS THROUGH ITS FOREST COFFEE BRAND

Forest coffees are ultra-high-quality coffees grown in well-preserved environments. Our Forest Coffee brand recognises the know-how of local farmers, and their deep knowledge of coffee agroforestry techniques.

To better communicate the enormous benefits of this agricultural practice, Belco has joined forces with the **French Agroforestry Association**. This booklet details the fruit of our joint efforts and illustrates the environmental, social and economic advantages of this model. Agroforestry is a means of developing a **more sustainable** form of agriculture. The rich ecosystems in which these coffee shrubs grow have many benefits for local populations.

BELCO

AGROFORESTERIE
association française



ENTRE SIERRAS FARM,
SERRANÍA DEL PERIJÁ, COLOMBIA

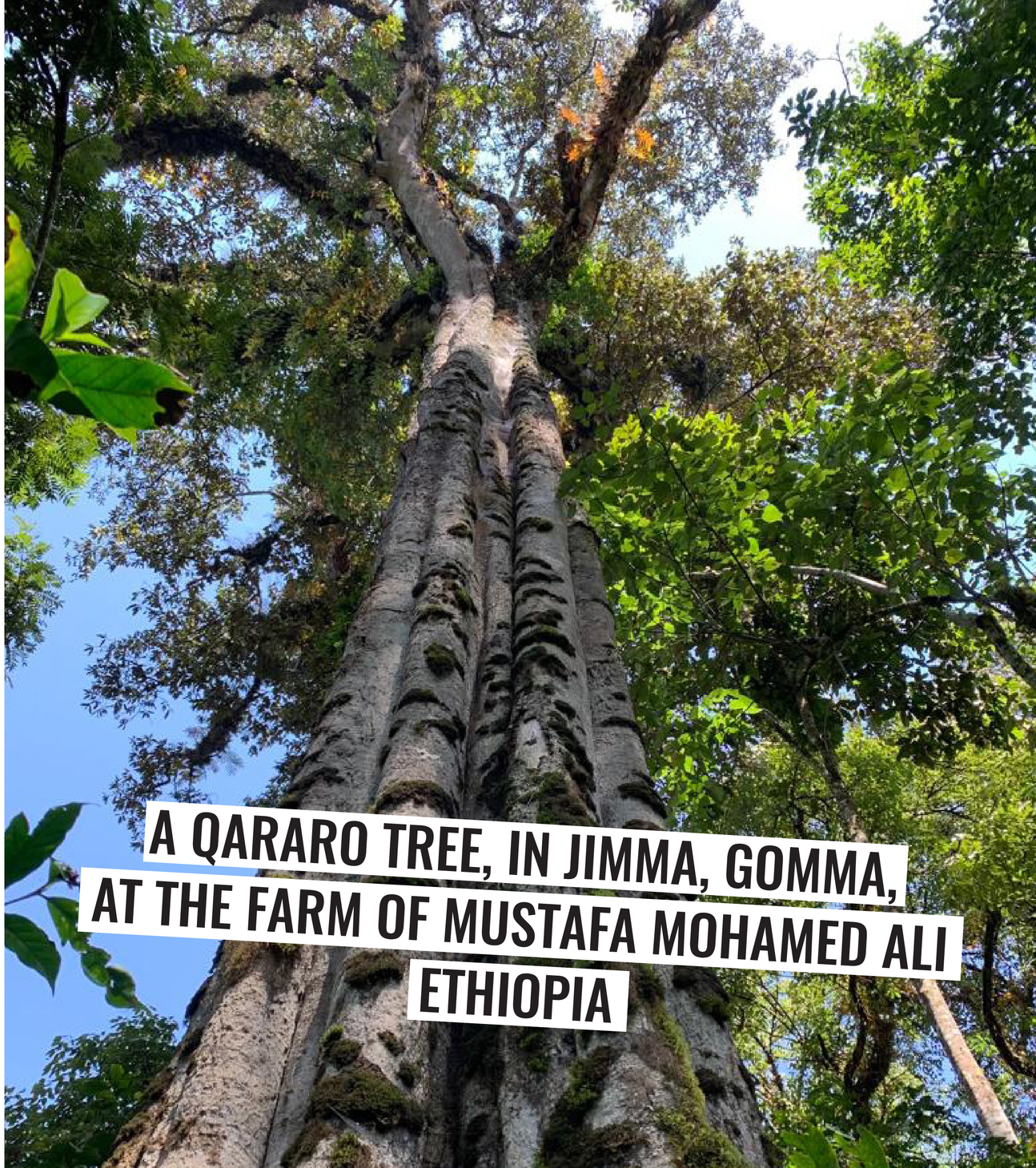
AGROFORESTRY

01

TREES & CROP PRODUCTION

WHAT IS AGROFORESTRY ?

The term agroforestry covers **all agricultural practices** where **trees** coexist with **crops and/or livestock** on the same plot. It is a **mutually beneficial system** that increases production, generates multiple sources of income, provides various services, and ensures effective management of natural resources: water, soil, biodiversity, etc.



TREES
THAT PROTECT

CLIMATE/AIR

1. Trees capture **CO2** and release **oxygen**
2. They serve as a **natural barrier**, offering **better protection** from the **wind and weather**
3. They help **keep temperatures down** in plots grown under shade

WATER

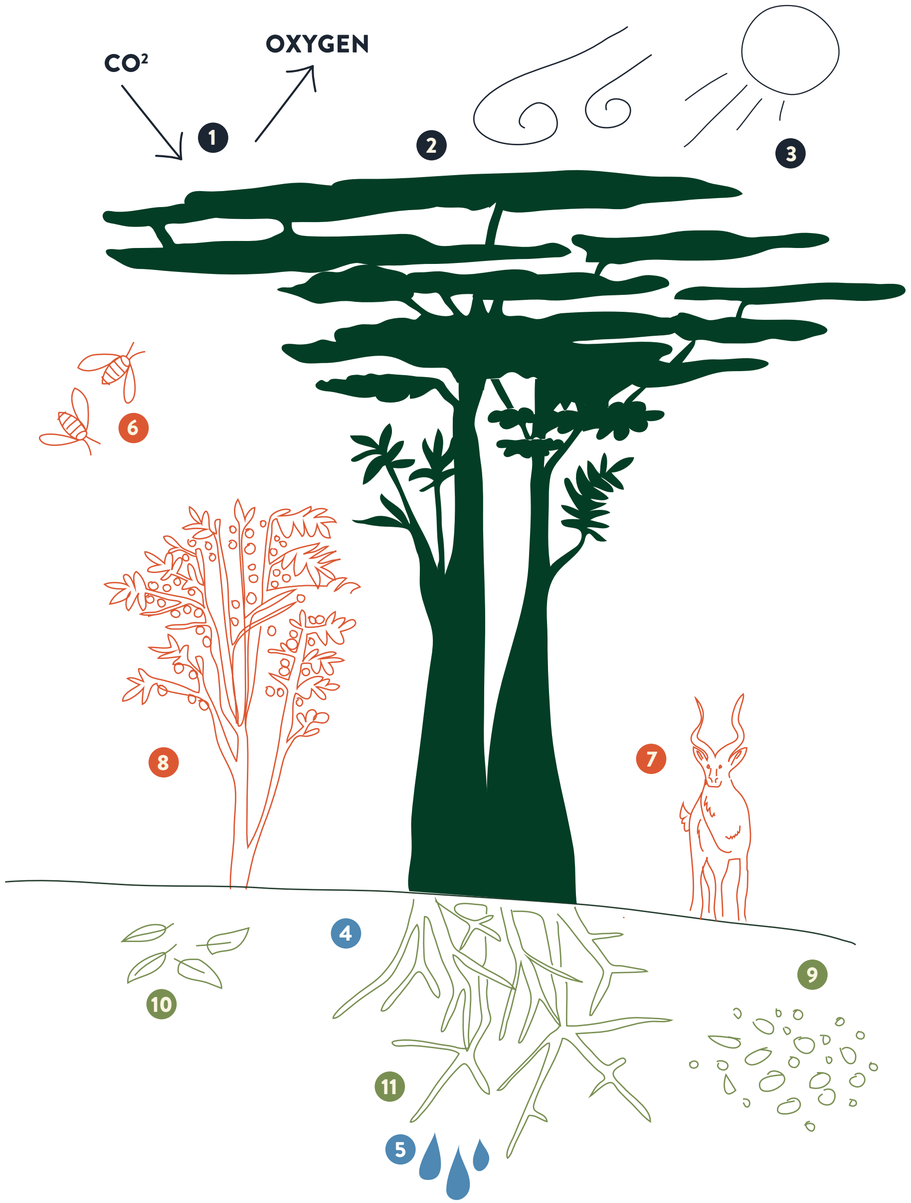
4. Trees store and drain water and **promote humidity**
5. They also help to **filter** water

BIODIVERSITY

1. Crop diversification and plant cover **enrich plant and animal biodiversity**, with for example insects, reptiles, amphibians and small mammals
2. The trees i**mprove animal welfare** by providing shade and fodder
3. Planting diverse crops creates staggered plant layers, thus **capturing more light, increasing photosynthesis** and generating the production of organic matter

SOIL

9. Crop diversity makes **soil fertile**
10. Leaves and debris **enrich soil** by releasing nitrogen
11. Multiple layers of roots facilitate exchange and transfer of matter, hence **improving soil** structure; it aerates the soil, retains it and limits erosion



TREE THAT PRODUCE

Trees provide **additional income** to that generated by the main agricultural crop.

A GUEREZA MONKEY SURROUNDED BY ETHIOPIAN BEEHIVES ABOVE COFFEE SHRUBS IN A FOREST ENVIRONMENT

DIVERSIFIED AGRICULTURAL AND FORESTRY PRODUCTION

Agroforestry is a means for farmers to **diversify their income** (agricultural production, timber and firewood, fodder, fruit, honey, etc.).
This makes them **less vulnerable, less dependent on a single crop**.

STRONGER SOCIAL TIES

In some parts of the world, trees have enormous cultural, medicinal, religious and/or **symbolic value**. Mutual aid and farm work play an **important part** in consolidating social ties within these complex systems.

AGROFORESTRY GENERATES ECONOMIC, SOCIAL AND ENVIRONMENTAL BENEFITS FOR A MORE SUSTAINABLE AGRICULTURE!

AGROFORESTRY AND ECOSYSTEM SERVICES

THE CASE OF COSTA RICA

CIRAD has carried out a study at the Aquiares Farm in Costa Rica that gives a comprehensive picture of the type of ecosystem services provided by coffee agroforestry systems.

The research was carried out by **multidisciplinary teams** to cover as many fields of study as possible: water, soil, trees, yields, etc.

The study took place over **eight years**. The team used **precise methodologies** and did **rigorous field surveys**, which are detailed in the following article:

Roupsard, Allinne et al., 2019, Suivi des services écosystémiques dans un observatoire de caféiers agroforestiers. Application pour la filière u café – Agroforesterie et services écosystémiques en zone tropicale: Recherche de compromis entre services d'approvisionnement et autres services. Quae, 37-52pp.

DID YOU KNOW?

WHAT ARE ECOSYSTEM SERVICES ?

"Ecosystem services make human life possible by, for example, providing nutritious food and clean water, regulating disease and climate, supporting the pollination of crops and soil formation, and providing recreational, cultural and spiritual benefits"
FAO

AT THE AQUIARES FARM, COFFEE TREES GROW UNDER THE SHELTER OF LARGE ERYTHRINA POEPPIGIANA TREES, WHICH CAN REACH OVER 20 METRES IN HEIGHT.

THE BENEFITS OF AN AGROFORESTRY SYSTEM

This study of the farm's agroforestry systems revealed numerous benefits, shown here as a non-exhaustive list.

EROSION Shade significantly reduces runoff and soil erosion compared to plots exposed to full sunshine.

FERTILISATION/NITROGEN The residues from tree pruning diffuse nitrogen into the soil, which then benefits the coffee shrubs.

YIELD Under shade, coffee yields remained virtually the same for five years, even without fertiliser.

IMPORTANCE OF LOCAL EXPERTISE These study results open up interesting possibilities in other contexts, provided that consideration is always given to local factors to arrive at appropriate and viable solutions.

AGROFORESTRY IS AN INTERESTING WAY OF MITIGATING THE EFFECTS OF RISING TEMPERATURES ON COFFEE QUALITY

CARBON FOOTPRINT The study made it possible to calculate the farm's carbon footprint. Under the carbon footprint calculation criteria established by the IPCC, coffee trees cannot be considered equivalent to growing shade and forest trees in terms of CO2 capture. If they were, this farm would achieve carbon neutrality by itself with no need for offsets.

DISEASE REDUCTION Shade reduces the incidence of leaf diseases (leaf spots caused by fungi or bacteria) by 10-20%.

CLIMATE CHANGE ADAPTATION These study results open up interesting possibilities in other contexts, provided that consideration is always given to local factors to arrive at appropriate and viable solutions.

02

COFFEE AGROFRESTRY

LA PRADERA FARM, ARATOCA, COLOMBIA

COFFEE
AGROFORESTRY

COFFEE IS FIRST AND FOREMOST A PLANT THAT GROWS IN FORESTS.

In Ethiopia, its land of origin, there are still some ine examples of wild coffee forest in the south and west of the country. Although the original model is becoming increasingly rare, producers have often imitated it when setting up coffee farms. This is why **Ethiopian farmers still grow a lot of their coffee under forest**.

Other countries, such as **Colombia and Mexico**, also use the agroforestry coffee production model, albeit in a more scattered manner.

FOREST COFFEES GROWING IN THE REGION OF GUJI, AT MÉTAD

But such systems remain marginal and vulnerable. The growth in coffee production worldwide has had the effect of **simplifying agricultural systems**, and farmers now produce much of their coffee in **monoculture**, in other words in **full sunshine**.

Now more than ever, it is important that we recognise the **unique** and **complex** nature of these agroforestry models to ensure their continued existence. Producing coffee in forests calls for **numerous technical skills and an expertise that must be continually reinvented** to strike the right balance between tradition and modernity. Successfully combining tree species, beneficial for the soil, with coffee shrubs demands **regional know-how**.

Producers must **control the shade**, and regularly prune and trim trees to maintain the **ventilated and luminous system** necessary for good coffee flowering and fruiting.

MANAGEMENT OF THESE AGROFORESTS INVOLVES MAINTAINING A BALANCE, TO ENSURE A PRODUCTIVE AND SUSTAINABLE SYSTEM.

TODAY'S COFFEE AGROFORESTS ARE CREATED:

→ either by integrating coffee trees **at the heart of old-growth forests**
→ or by planting a **tree canopy** over existing coffee shrubs

AT BELCO, WE DISTINGUISH BETWEEN THREE TYPES OF AGROFORESTRY COFFEE:

	AGROFORESTRY COFFEES	SUPERIOR AGROFORESTRY COFFEES	FOREST COFFEES
NUMBER OF SHADE SPECIES	Between **3 and 5** different species	Between **5 and 10** different species	Over **10** different species
TYPES OF SHADE SPECIES GROWING ON THE PLOT	More than **50%** introduced exotic species	At least **50%** native species and between **30% and 50%** introduced exotic species	At least **70%** native species and less than **30%** introduced exotic species
NUMBER OF TREE STRATA	**Single stratum**	Multi-strata, **minimum of 2**	Multi-strata, **minimum of 3**

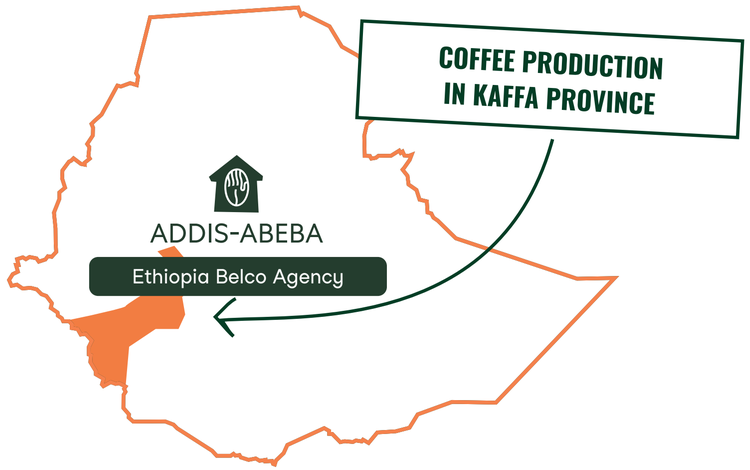
THE FOREST AT ZINABU ABAMECHA'S TULA FARM, KAFFA, ETHIOPIA

AGROFORESTRY

03

AGROFO-RESTRY AND COFFEE IN THE FIELD

IN ETHIOPIA



→ This region in southwest Ethiopia is recognised **as the birthplace of coffee.** Its high plateaus rise to around 1,500 metres in altitude and it offers a very fertile volcanic soil, home to a variety of agricultural crops. Here, **coffee has a prominent place** as the region's main export crop, and by far. Most coffee trees still grow under tree cover, although monoculture is slowly taking hold in the landscape. The **challenge** lies in encouraging use of coffee agroforests if they are to survive in the region of Kaffa, as elsewhere in Ethiopia.

IMMERSION IN TULA FARM AND ITS COFFEE AGROFOREST

Tula Farm sits at the heart of one of the country's **oldest coffee regions**, 32 kilometres from the main town of Bonga. The coffee shrubs grow in forests at an altitude of over 1,800 metres. The farm, established some fifteen years ago, **covers 92 hectares** (80 of which are cultivated) and has 15 permanent employees. It produces 10.8 tonnes of green coffee annually. In addition to coffee, farmers can harvest spices and honey in this dense forest and sell them on the local market.

Coffee is produced under an ancient forest with four different tree strata, boasting **a remarkable diversity of flora and fauna** (monkeys, deer, birds). The forest also has some old wild coffee trees, but for the moment only the local 74 110 variety is available for export.

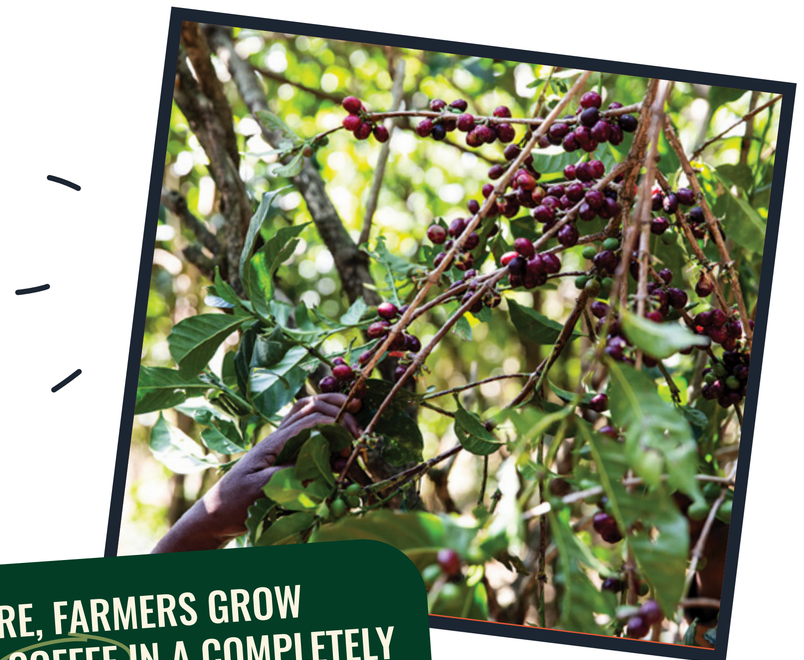
Its canopy consists of over a dozen varieties of trees that grow up to 40 metres in height, **offering good shade for slow cherry ripening.**

The **homi** and **qararo** species also exist here, both of which can grow very tall. These trees are increasingly rare in Ethiopia, where they serve commonly as construction timber, particularly for furniture. Farmers find them extremely useful for shading coffee shrubs, which will secure their future in Kaffa agroforests. Tula Farm is also home to the **wadeza**, whose deep root system limits erosion, and to the birbirsa, which grows to an intermediate height, making it a good additional source of shade for coffee shrubs.

The coffee plants are **between one and 13 years old.** After spending eight months in the nursery, farmers plant their seedlings, grown from seeds purchased at the Jimma research centre, in the forest.

They use no irrigation or phytosanitary products, but instead let leaves fall to the ground and allow roots to decompose for fertilisation. Farmers carry out all maintenance operations manually. They prune coffee trees to a height of 2 to 2.5 metres to facilitate harvesting, which takes place from October to January.

They remove any branches that present health risks, and may carry out some thinning operations if they consider the shade too important for good coffee bush development. **No severe diseases have been recorded** here since the farm's beginnings, thus demonstrating this chemical-free agroforestry system's ability to yield positive results and high-quality coffee in a **completely organic manner.**



OTHER CROPS AND SERVICES

The Tula coffee forest is home to many different species, providing additional means of income for its producer. Of course, coffee remains the dominant crop and the only one to have its place on the export market, but the forest also provides **additional produce**.

The gatame and the wadeza produce flowers for **honey production**, and there are 40 beehives currently set up in the forest. This combined with the cardamom harvest brings in additional income. Locals use ambabesa leaves in traditional medicine.

In terms of forest management, the farmers **cut trees down for timber and firewood** in moderation to keep the forest healthy. Zinabu Abamecha – who runs Tula – has also begun building an ecolodge at the farm, to share the beauty of this rare, protected environment with others.

ZINABU ABAMECHA

Born to a coffee trader, Zinabu Abamecha bought Tula Farm in 2005 with the aim of **preserving its biodiversity and producing quality coffee.**

Zinabu means rain in Amharic, which is Ethiopia's official language. It signifies hope and prosperity in the highlands, where the rainy season's arrival influences the entire year's harvests. Zinabu gives training on coffee tree management and harvesting to other farmers in his district.

IN COLOMBIA

COFFEE PRODUCTION IN THE SERRANÍA DEL PERIJÁ

REGIONAL CHARACTERISTICS

The Serranía del Perijá is a mountain range located in the northeast of the country. It forms the border between Colombia and Venezuela. The region's "sub-Andean" climate is characteristic of a high-altitude **tropical rainforest.** Its landscape is characterised by slopes at altitudes of between 1,000 and 2,000 metres. The area is known for its **coffee crops** and as a **refuge for local flora and fauna**.

IMMERSION IN THE ENTRE SIERRAS ASSOCIATION AND ITS COFFEE AGROFORESTRY SYSTEM

Entre Sierras is an association that brings together **17 coffee producers.** In total, these farmers cultivate 385 hectares of land, consisting mainly of **forests in which the coffee trees grow.** These farms are located in the village of Augustin Codazzi, at an altitude of over 1,300 metres. The main cash crop here is coffee, combined sometimes with cocoa, but farmers also use these plots to grow food crops, including cassava, potatoes, plantains, beans and onions, mainly for personal consumption.

Four varieties of Arabica coffee are grown on the slopes of these mountains: Tabi, Colombia, Caturra and Castillo.

Here, the coffee shrubs are integrated into old-growth forests, consisting on average of 5 to 10 different tree species.

This agroforestry model is unique in the region, as government authorities have long recommended reducing shade in coffee plantations on the pretext that it encourages diseases such as rust. The producers have gone against these institutional recommendations and **maintained these forest areas**, which one farmer still describes as a “diamond” that must be preserved. It is because of this unique history that the coffee-growing areas in Entre Sierras now enjoy such a rich **biodiversity**.

The guamo (Inga species) is typical of the type of tree found at these coffee farms. Coffee bushes thrive in its shade. It also releases nitrogen, which fertilises the soil.

Its edible fruit is sold at local markets, and its leaves are used to feed farm livestock. **A wide diversity of trees** grow in these forests, which helps to combat soil erosion on slopes and retain humidity, beneficial for farming. They also serve as fertilisation and **protect coffee bushes from the elements** (rain, wind and bad weather). The forests are conservations areas for **many birds** (tanagers, hummingbirds, wild doves, etc.), insects and mammals (foxes, opossums, chipmunks).

PLOT MANAGEMENT

The coffee trees here originate from a local nursery. They are between three and seven years old and are planted at distances of 1.5 metres. The plantations are managed **manually**, with no irrigation and using organic farming techniques.

Soil fertility is maintained by forest tree and legume growth, combined with use of natural minerals and biofertilisers. Producers prune the coffee trees to a height of two metres to ensure they remain productive.

Thanks to the forest, the family farms at Entre Sierras benefit also from **some additional services**, useful to the members of their households.

Avocado trees produce fruit which they consume directly and occasionally sell at markets. The families and workers living on site can use the available wood as **firewood** and for cooking. Eucalyptus, an exotic species that grows rapidly and produces highly flammable wood, is particularly useful for this purpose. If necessary, they can also harvest and sell some of the **spices and flowers**. These are of course marginal sources of income, the farms rely on their **agroforestry coffee exports** to survive.

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