



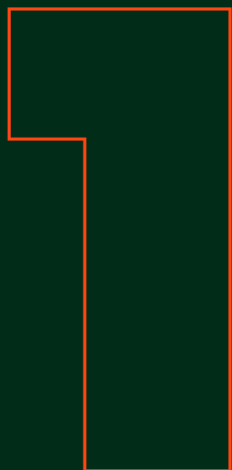
Everything you need to know about

AGROFORESTRY LEVELS AT BELCO



AGROFORESTRY LEVELS AT BELCO

1. Purpose of the tool
2. Coffee, a forest plant
3. Why agroforestry?
4. Belco's approach
5. The 3 levels
6. The 10 criteria – understanding them one by one
7. Field evaluation methodology
8. What it changes in your cup



Purpose of the tool



For **the consumer**: understanding what the agroforestry level displayed on his coffee means in concrete terms



For **the roaster**: having reliable field data



For **the producer**: a framework for improving and enhancing his practice



For **the field team**: a measurement and monitoring tool



2

Coffee, a forest plant

The Arabica coffee plant (*Coffea arabica*) is a species native to the montane forests of East Africa, mainly Ethiopia and South Sudan.

→ It grows naturally under tree cover between 1400 and 2400 m above sea level.

→ Grown in the undergrowth, under shade, in soils rich in organic matter and in a humid and stable microclimate: it is in these conditions that the species expresses its full potential.



3

Why agroforestry?



Regulated microclimate: shade trees maintain a temperature up to 5°C cooler than in full sun for an optimum of 18-23°C.



Living soils: diversified litter, active macrofauna, natural fertilization.



Biodiversity preserved: complex agroforestry systems are home to 60% more animal species than a monoculture system.

4

The Belco approach



2015

Creation of the specifications with the French Association of Agroforestry

Terrain

10 criteria measured directly in the field

Evolution

Thresholds adjusted by field resources, updated every 3 to 5 years

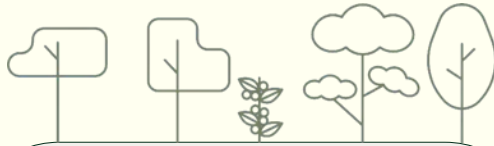
Transparency

Visible result on the technical sheet of each coffee on belco.fr

5

The 3 levels

Not all coffees sourced by Belco have the same degree of agroforestry:



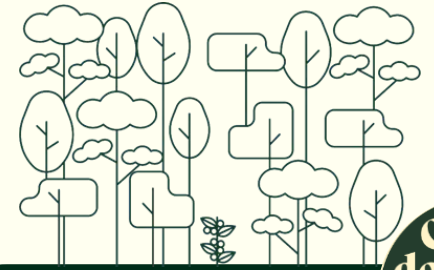
Simple agroforestry

First shade trees, limited diversity, beginning of transition to a more complex system. Between 3 and 5 species, 1 to 2 strata, sustainable management.



Complex agroforestry

Structured system, several layers, mix of native and introduced species. Between 5 and 10 species, at least 2 strata, agroecological practices.



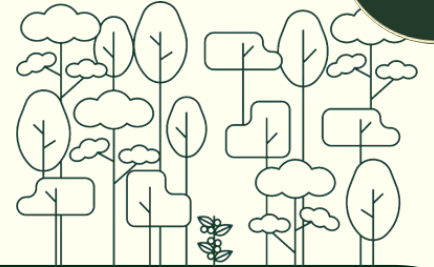
Forest Coffee

The most demanding level. System close to the original forest ecosystem, majority of native species, dense canopy, no pesticides, active natural regeneration. More than 10 species, 3 strata minimum, 4 mandatory criteria.



5

Focus on forest coffee



Forest coffee is the most demanding level of the Belco standard. It refers to systems where the coffee plant evolves in an environment close to an original forest environment: majority of native species, no pesticides, active natural regeneration, dense canopy.

The 4 mandatory criteria:



10+ shade species

Of which a majority are native species



Minimum 3 tree strata

A vertical structure that reproduces the complexity of a forest



No pesticides

Zero chemical inputs for at least 3 years



Active natural regeneration

+ 30% of the species in the lower strata are indigenous



6

The list of the 10 indicators evaluated

10 indicators measured in the field to characterize each agroforestry system

1. Number of shade species
2. Number of tree strata
3. Native species presence index
4. Total basal area of stand
5. Canopy opening rate
6. Shading Management
7. Pesticide use
8. Macrofauna management
9. Type of fertilizer used
10. Regeneration of the upper stratum





Understanding them one by one

CRITERION 1: Number of shade species

Simple agroforestry	Complex agroforestry	Forest Coffee
Between 3 and 5 species	Between 5 and 10 species	10+ species

** required*

Each tree species creates a distinct ecological niche: type of litter, depth of rooting, habitat of fauna.

→ The higher the diversity, the more resilient the system is to diseases and climatic hazards?



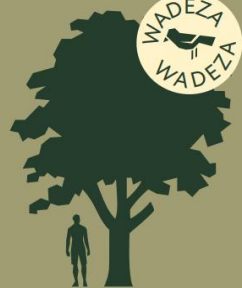
Examples of native trees and their functions

Wadeza

Scientific name: *Cordia
Abyssinica/ africana*
Family : Boraginaceae

→ Very present in shade forests,
offers good shade and many
advantages: construction wood,
firewood, erosion control,
flowers/bees/honey

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Ambabesa

Scientific name: *Albizia
Schimperiana*
Family : Fabaceae

→ grows at altitude, between 1400
and 2000m. Its roots, known to fix
nitrogen, make Ambabesa very
effective for soil conservation

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Badessa

Scientific name: *Syzygium
Guineense*
Family : Myrtaceae

→ very widespread species in coffee-
growing areas. From 10 to 15 m it
provides good shade for the coffee
plants.
→ soil enrichment, medicinal use or
firewood

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Understanding them one by one

CRITERION 2: Number of tree strata

Simple agroforestry	Complex agroforestry	Forest Coffee
1 strata	2 to 3 strata	3+ strata



The **vertical structure** of a forest is as important as its diversity. Each stratum fulfills a different function: thermal regulation, soil protection, wildlife habitat, carbon storage. A multi-layered system is similar to the structure of an agroforestry ecosystem



Understanding them one by one

CRITERION 3: Native Species Presence Index

Simple agroforestry	Complex agroforestry	Forest Coffee
Index 0.5 or 1	Index 1 or 1.5	Index ≥ 2

** Mandatory*

The index combines two measures: the proportion of native individuals and the proportion of native species on the plot. The higher the index, the more the system is dominated by local species. An index of 2.5 means that less than 25% of the alien in individuals AND species the system is ecologically rooted in its environment.



Native species have co-evolved with local organisms: pollinators, migratory birds, fungi. They create **networks of interactions** that are impossible to reproduce with exotic species. They can also serve as an ecological corridor.

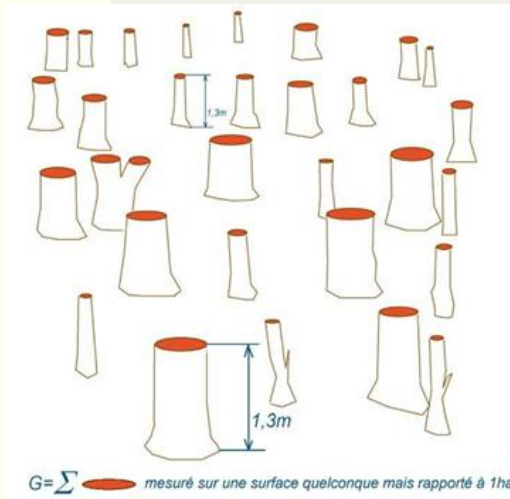


Understanding them one by one

CRITERION 4: total basal area of the stand



Simple agroforestry	Complex agroforestry	Forest Coffee
15 to 20 m ² /ha – sparsely populated	20 to 25 m ² /ha - dense	+ 25 m ² /ha dense to very dense



The basal area measures the tree **density of a plot**: it is the sum of the cross-sections of all the trunks measured at 1.30 m from the ground, expressed in m² per hectare. The higher it is, the more space the trees occupy and the more the soil benefits from dense shade, abundant litter and significant carbon storage.





Understanding them one by one

CRITERION 5: Canopy Opening Rate

Simple agroforestry	Complex agroforestry	Forest Coffee
+ 75% opening	Between 50 and 70% opening	Less than 50% open



It is the most direct indicator of the **microclimate**. A low opening rate means that there is dense shade and therefore cooler temperatures, better humidity, and reduced water stress.



Understanding them one by one

CRITERION 6: Shading Management



Simple agroforestry	Complex agroforestry	Forest Coffee
Size Seriously Reduces Size (>50% Off)	Size moderately reduces shading (25-20%)	Size slightly reduces shading (<25%)



Pruning that is too severe can destroy a microclimate built over several years in a few days. This criterion evaluates whether annual pruning practices **preserve the cover**. Pruning too much also increases the rate of canopy opening and therefore increases the temperature and disease pressure and decreases humidity.



Understanding them one by one

CRITERION 7: Use of pesticides

Simple agroforestry	Complex agroforestry	Forest Coffee
Non-label or green label use in reasoned application	Green label in reasoned application	No pesticides

** Mandatory*

Pesticides have a direct impact on pollinators, macrofauna and the biological balances that naturally regulate pests.

In a complex agroforestry system, **biodiversity replaces inputs.**





Understanding them one by one

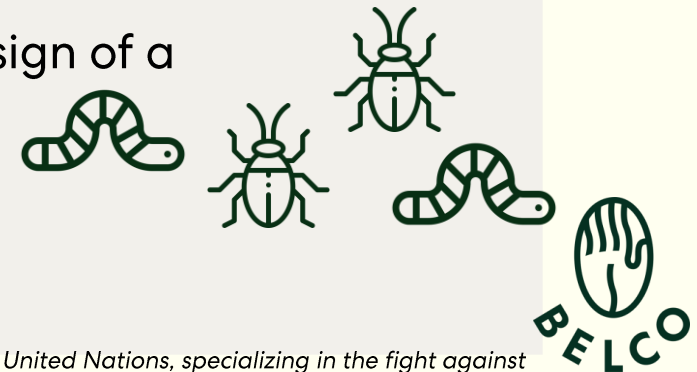
CRITERION 8: Macrofauna management

Simple agroforestry	Complex agroforestry	Forest Coffee
not	Yes	Yes



Earthworms, ants and beetles are **key indicators of soil health** by the FAO. They break down the litter, aerate the soil, and ensure nutrient cycling.

→ The presence of macrofauna is a sign of a living, fertile and well-structured soil



FAO (Food and Agriculture Organization) is the Food and Agriculture Organization of the United Nations, specializing in the fight against hunger and the promotion of global food security.



Understanding them one by one

CRITERION 9: Type of fertilizer used

Simple agroforestry	Complex agroforestry	Forest Coffee
Synthetic or organic fertilizer not produced on the farm	Organic fertilizer not produced on the farm	Organic fertilizer produced on the farm

**required*



In an agroforestry system: tree litter and crop residues return the **nutrients that crops need** to the soil.

The organic fertilizers produced on the farm show an **autonomous system**, without dependence on external inputs.



Understanding them one by one

CRITERION 10: Regeneration of the upper stratum

Simple agroforestry	Complex agroforestry	Forest Coffee
No native saplings	- 30% of the species in the lower strata are indigenous	+ 30% of the species in the lower strata are indigenous

** required*



A system that does not regenerate is doomed to disappear in the long term. The presence of native saplings in the lower strata shows an **ecosystem functioning autonomously**. The seeds fall, germinate, and develop without human intervention.

7

Field evaluation methodology



Update:

The thresholds are revised every 3 to 5 years according to feedback from the field and the evolution of scientific knowledge.



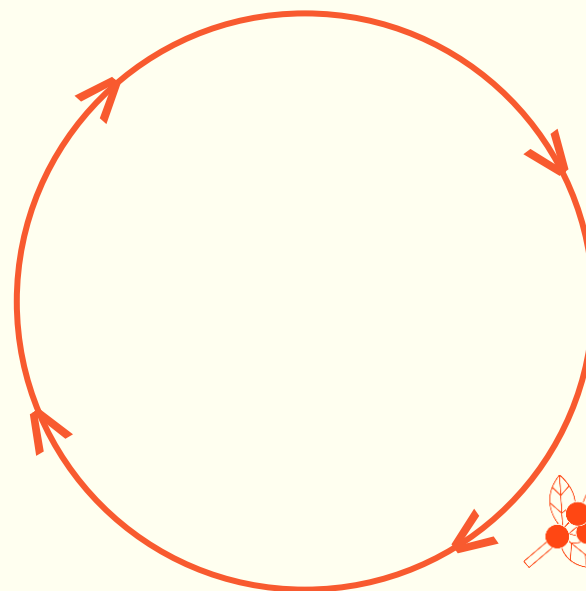
Measures taken:

Floristic survey, basal area measurement with a relascope, canopy opening rate with a spherical density meter, identification of native and exotic species.



Sampling:

The producers to visit are randomly chosen from an exhaustive list. The calculated sample size has an 85% confidence level for a 10% margin of error.



Plot of land:

The surveys are carried out on plots of 625m². There are 10 to 20 trees per plot and 1 to 5 plots per farm.

8

What it changes in your cup



- **Slow ripening:** under shade, cherries ripen more slowly, concentrating more sugars and aromas.
- **Marked terroir:** lively and diversified soils transmit a unique sensory profile to the grain, linked to its environment.
- **Consistency and resilience:** a stable microclimate produces more consistent coffees from year to year, even in the face of climatic hazards



That's it, you know everything about our method of assessing agroforestry levels at Belco.

Have questions? We would be happy to answer them, write to us on
impact@belco.fr