

University of Stuttgart

Institute for Sanitary Engineering, Water Quality and
Solid Waste Management

Chair of Waste Management and Emissions



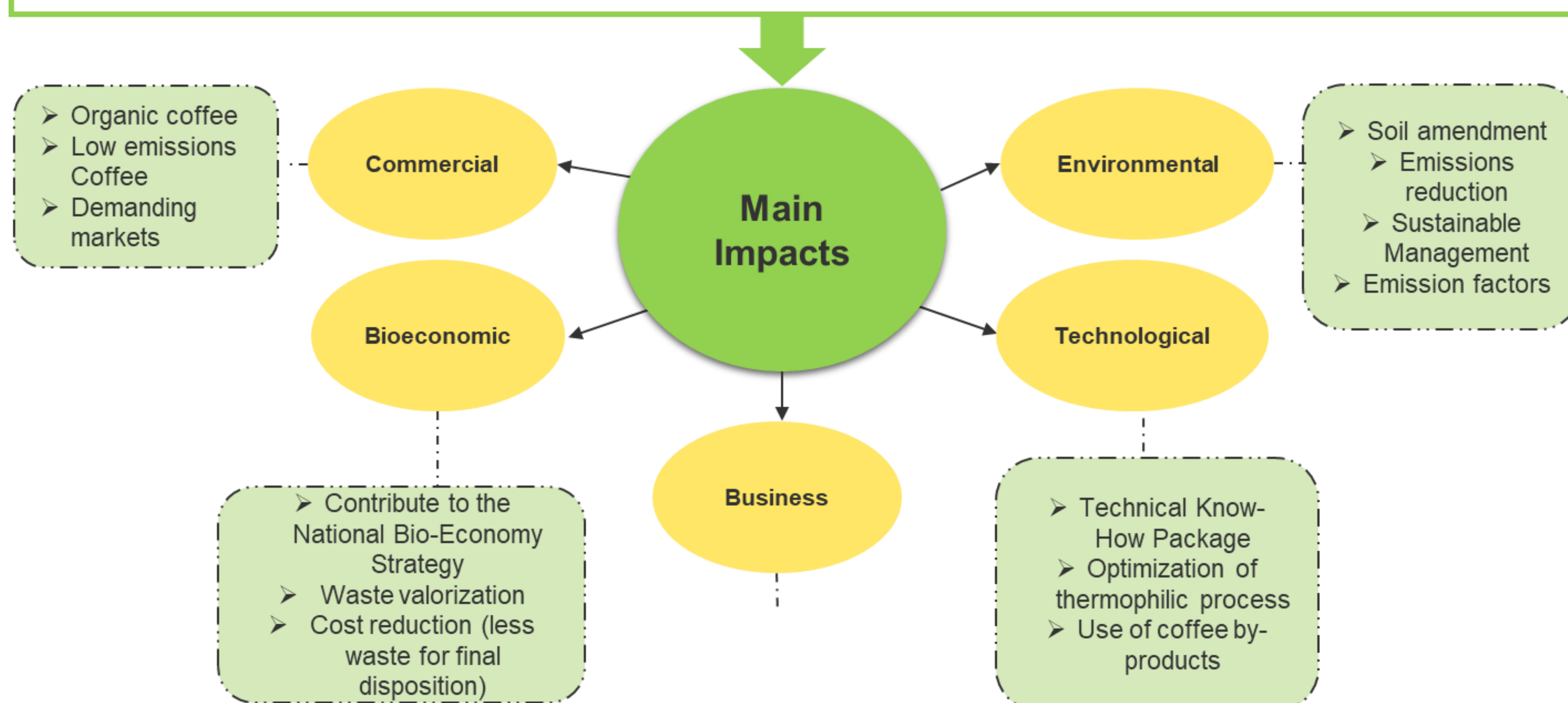
Sustainable management of coffee by-products and determination of emission factors

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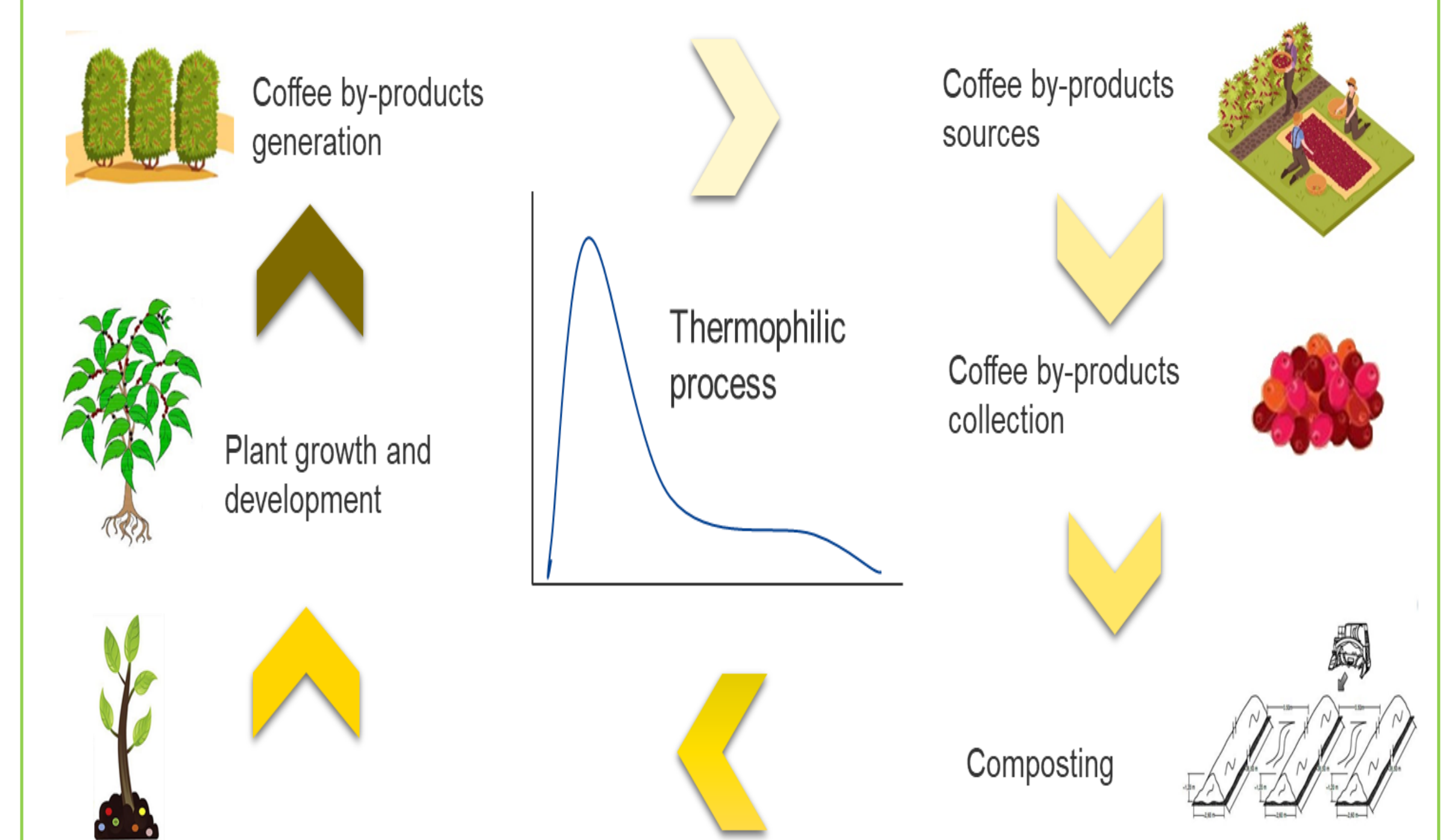
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Overview

Main Objective: Enhance the opportunity of an improved compost production from coffee by-products, promoting a circular economy in the coffee industry that incorporates the objectives of the bio-waste strategy and the principles of sustainable agriculture and the reduction of methane emissions



Coffee by-products- a concept towards circular economy



Composting process

Before (12 weeks treatment)



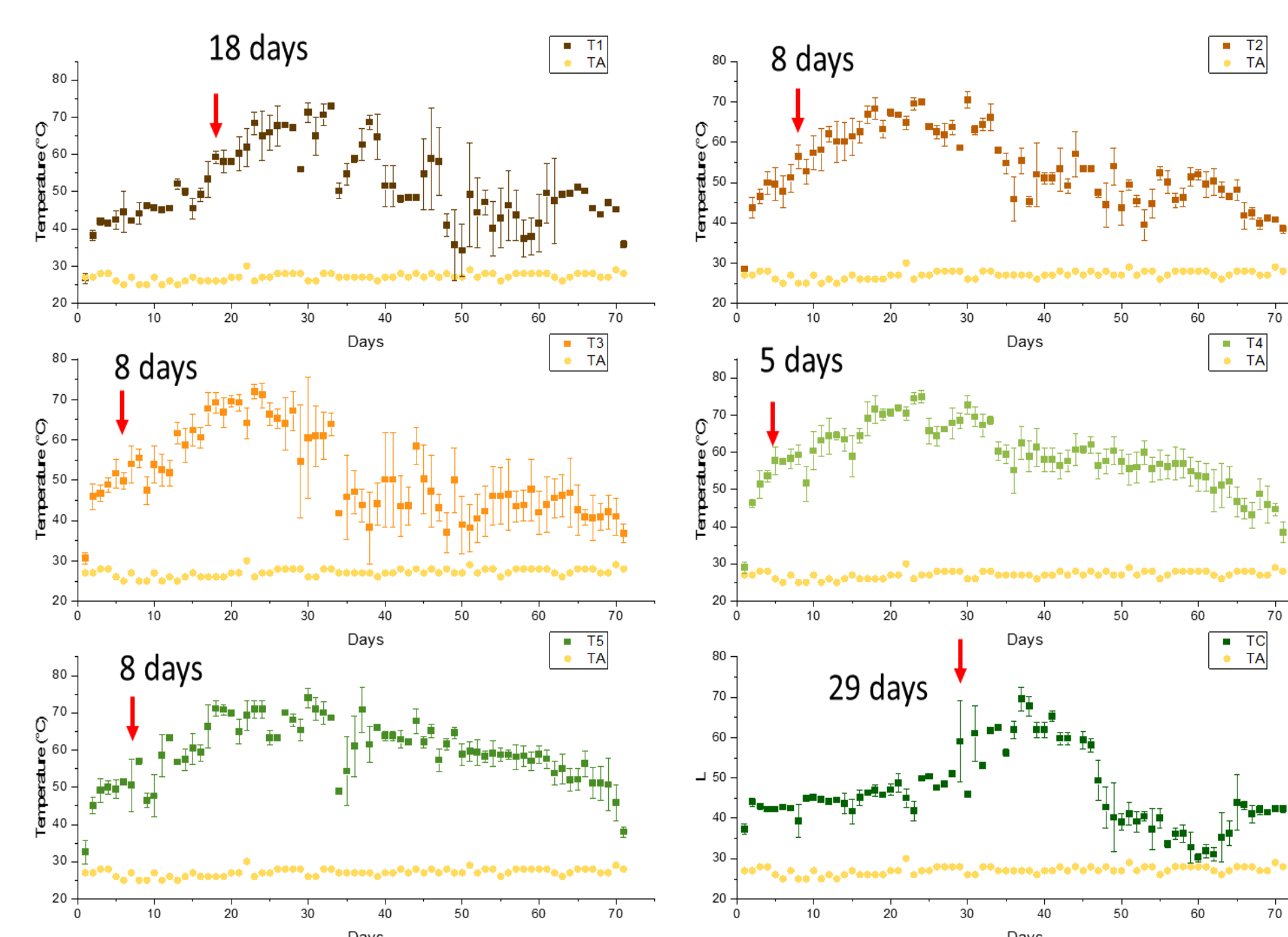
Implemented (8 weeks weeks treatment)



Parameters	Before	Implemented
Input	Coffee pulp + Husk	Coffee pulp + Green waste
Turning	Daily	Weekly
Pathogens	High	Low
Fumigation	Weekly	None
Odor	High	Low
Input materials: 530 tons of coffee pulp and 110 tons of green waste		

Methane emission factors

Temperature profiles

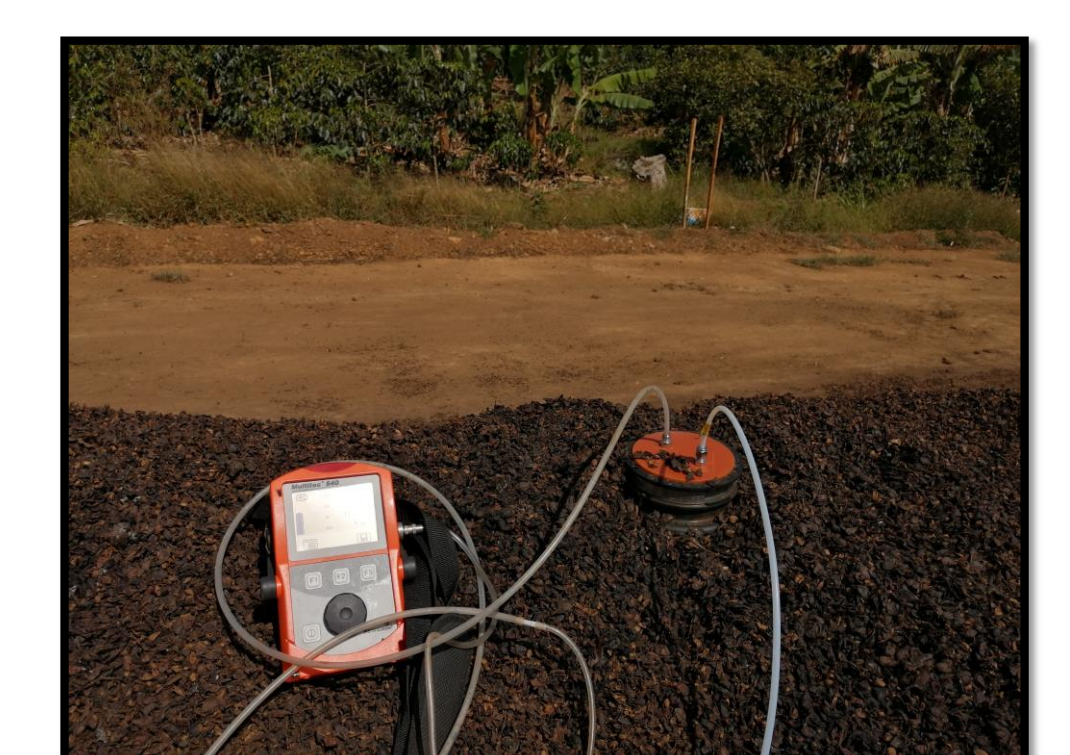


Thermal Improvement

T1: 38%
T2,T3,T5: 72%
T4: 83%



Emission factors		
Treatments		g CH ₄ kg ⁻¹ Pulp
T1	80% Pulp - 20% Green waste	43.9 ± 0.23
T2	75% Pulp - 25% Green waste	14.4 ± 0.17
T3	70% Pulp - 30% Green waste	20.0 ± 0.23
T4	60% Pulp - 40% Green waste	23.4 ± 0.24
T5	50% Pulp - 50% Green waste	11.6 ± 0.14
TC	Control (100% pulp)	129 ± 2.96



Passive area emission sources

Highlights and Conclusions

- ✓ Waste valorization within the process.
- ✓ Coffee pulp is suitable for composting if green waste is added
- ✓ Low-emission and resilient production practices have been successfully implemented and scaled up in the coffee sector.
- ✓ These types of initiatives enhance a sustainable development and at the same time provide a paradigm shift in high impact productive sectors, in the coffee sector and the reduction of its emissions.

