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Agro-climatic constraints to Integrated Coffee Berry Borer Management

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Introduction

The phenology of *arabica* coffee trees manifests itself differently in tropical regions where two seasons, dry and wet, are opposed and in equatorial regions where the climate is relatively homogeneous throughout the year.

- **Tropical climate**: the single major harvest alternates with a period of little or no production during which the coffee berry borer (CBB), *Hypothenemus hampei* (Ferr.), survives inside residual berries and colonizes scattered berries from early bloom.
- **Equatorial climate**: the staggering of the main harvest periods due to multiple fruiting periods contributes to the quasi-permanent development of CBB populations. Migration from pulping and drying areas favors reinfestation.

CBB control must therefore be adapted to different infestation dynamics in order to optimize its efficiency. Based on results obtained during several years of experimentation, we have developed two different IPM strategies, one in Central America (tropical conditions), the other in North Sumatra (equatorial conditions).

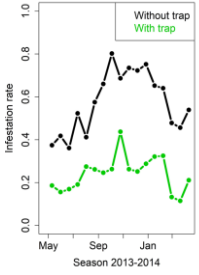

Fig. 1. Effect of CBB trapping in North Sumatra

Multiple fruiting bodies, in equatorial climate

Residual berries, after harvesting, in tropical climate

Results

America central

IPM components	Efficiency (%)*	Reference
Trapping (post-harvest period)	> 50	Dufour *et al.*, 2004
R b** + Trapping + P**	> 70	Dufour, unpublished
R b + Trapping + P + M**	> 90	Dufour *et al.*, 2007

North Sumatra

IPM components	Efficiency (%)	Reference
C pds [5]	≈ 10	Fig. 2
T [6] + P [3] + M [4]	≈ 50	Fig. 1
T [6] + P [3] + M [4] + C pds [5] + SHb [2] + SHg [7]	To be validated	Fig. 2

** Efficiency = rate of decrease in the number of infested berries compared to the control. [1] = Trapping in post-harvest period (18 Brocap© traps/ha); [2] = Sanitation harvesting on branches; [3] = Pruning; [4] = Plot maintenance; [5] = Control with traps at pulping and drying sites; [6] = Permanent trapping (25 Brocap© traps/ha); [7] = Sanitation harvesting on ground.*

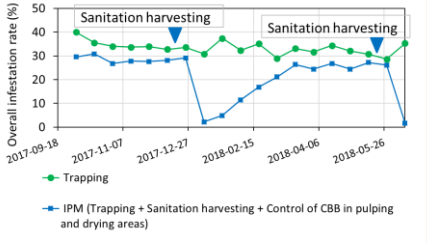

Fig. 2. Two CBB control strategies in North Sumatra

Recommendations

Tropical climate - **post-harvest interventions** to target surviving CBB populations.
- Single sanitation harvesting to eliminate residual berries on branches,
- Temporary trapping (4 months) to capture CBB emerging from residual berries on the ground,
- Trapping in coffee processing plants to avoid local reinfestation,
- Picking of infested berries from early fruiting stages.

Equatorial climate - **year-round interventions** to control all CBB populations.
- Multiple sanitation harvestings to remove infested berries from branches,
- Permanent trapping to capture CBB emerging from residual berries on the ground,
- Trapping near pulping and drying sites to avoid widespread reinfestation.

Other interventions, common to both areas:
- Maintenance of plots to facilitate interventions,
- Pruning to modify coffee tree architecture, in support of IPM (Dufour *et al.*, 2019),
- Use of control agents such as *Beauveria bassiana* to complement other forms of control.

Conclusion/Perspectives

IPM for CBB control in Central America and North Sumatra relies on separate applications of control components that have been tested for efficacy. This diversity of IPM is dictated by agro-ecological diversity itself.
In all cases, control can be enhanced by biological methods (*Beauveria bassiana*). The use of parasitoids can also be considered, especially in Africa where they already constitute a natural control potential.

References

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