Experimental approaches for agro-ecological management of BLSD in dry and humid tropical conditions

C. Guillermet
R. Le Guen
T. Lescot
M. Dorel
L. de Lapeyre de Bellaire
Needs for sustainable control of BLSD

Fungicide use more and more difficult...especially BLSD in the FWI
- High social pressure
- Restrictive legislation
- Lack of technical options
- First shift in sensibility

➔ Need for alternative management, with less / NO chemical control

With no massive reduction of yield / With fruit able to be exported
Designing new cropping systems

> Means using combinations of several practices
  = Integrated managment of BLSD
  → Design of a first innovative CS with NO chemical control

Practices to limit pathogen development
- Leaf pruning: 1-2 / week

✓ Lower quantity of inoculum in field
✓ Lower ascospores production / only conidias → lower ability to dispersion

Practices to limit impact on plant physiology
- Optimize growth conditions
- Strict leaf pruning

✓ Maintain high LER during vegetative growth → compenses leaf area reduction
✓ Eliminate necrosis during fruit filling → limits disease effect on fruit

Compared to Reference with regular Fungicides Applications

(Crimet et al., 2013)
Evaluating new cropping systems

- In contrasting conditions, over 3 cropping cycles

<table>
<thead>
<tr>
<th>Dominican Republic</th>
<th>Martinique</th>
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<tbody>
<tr>
<td><strong>DRY TROP. CONDITIONS</strong> ≈ 7 ap/y</td>
<td><strong>HUMID TROP. CONDITIONS</strong> ≈ 10 ap/y</td>
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<td>2 ha, June 2011 to June 2013</td>
<td>0,6 ha, June 2014 to June 2016</td>
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Evolution of Foliar Area w/o applications


Poor differences of dynamics in FA reduction

Martinique

Increasing differences in FA after flower emergence
3 harvests very reduced FA in Prototype

High effect of fungicides treatments
Compensations before flower emergence
Evolution of Number of Leaves between Flowering and Harvest – 3rd Cycle

- **REFERENCE**
- **PROTOTYPE**

The graph shows the number of leaves over time, with markers indicating specific dates and corresponding leaf counts for the reference and prototype.
Evolution of Number of Leaves between Flowering and Harvest – 3rd Cycle
Evolution of Bunch Weight in wet tropics conditions

- Low differences in Bunch Weight and Bunches/Box (1/1,4/1,4)
- Low correlation with Foliar Area: Acceptable bunches even with few leaves at Harvest

Progressive defoliation does not impact critically bunch weight
leftrightarrow Progressive reduction of Sources
leftrightarrow Other compensation phenomena
Evolution of Greenlife in wet tropics conditions

- Low reduction of Greenlife Compatible with export
- Poor relation with number of leaves at harvest

Greenlife is not critically impacted by foliar reduction IF
Regular deleafing x Harvest at optimum physiological age
⇔ Necrosis are mainly responsible of GL reduction
⇔ Still an effect to understand...

R²=0.38
Conclusions

In the conditions of our 2 trials, with no chemical control of BLSD, under specific crop management

- Importance of 2 major periods in the cropping cycle
  - VEGETATIVE PHASE
    - Growth
      - Optimized growth to build sufficient nutrient reserves in plant and sufficient stock of leaves for bunch filling
  - REPRODUCTIVE PHASE
    - Deleafing
      - Eliminate all necrotic parts of leaves to avoid ripening risks

- Impact on yield can be limited and compatible with export

- Number of leaves is not the adequate criteria for fruit export → No leaves better than many infected leaves!
Futur prospects

- Precise impact of foliar area reduction on Yield: understand phenomenon of compensation and remobilisation of nutrients → how to optimize sources/sinks ratio = adapt practices of hands removal, desuckering...?

- Precise impact of disease on Greenlife: Timing? Intensity? → how to optimize practices of deleafing?

Evaluate potential for introduction of new practices in the cropping system: biocontrol, introduction of biodiversity, tolerant varieties...

= Complete toolbox to design systems adapted to various conditions
Thanks for your attention