

Effect of temperature on the Cacao swollen shoot virus (CSSV, Badnavirus) vection by the mealybug *Planococcus citri* to cocoa seedlings in the laboratory

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Cacao swollen shoot virus (CSSV) disease is transmitted by mealybugs (Hemiptera: Pseudococcidae). Vection ecology is not well documented, especially the impact of climate on virus transmission. The present study aims at characterizing the impact of temperature on CSSV vection by mealybugs.

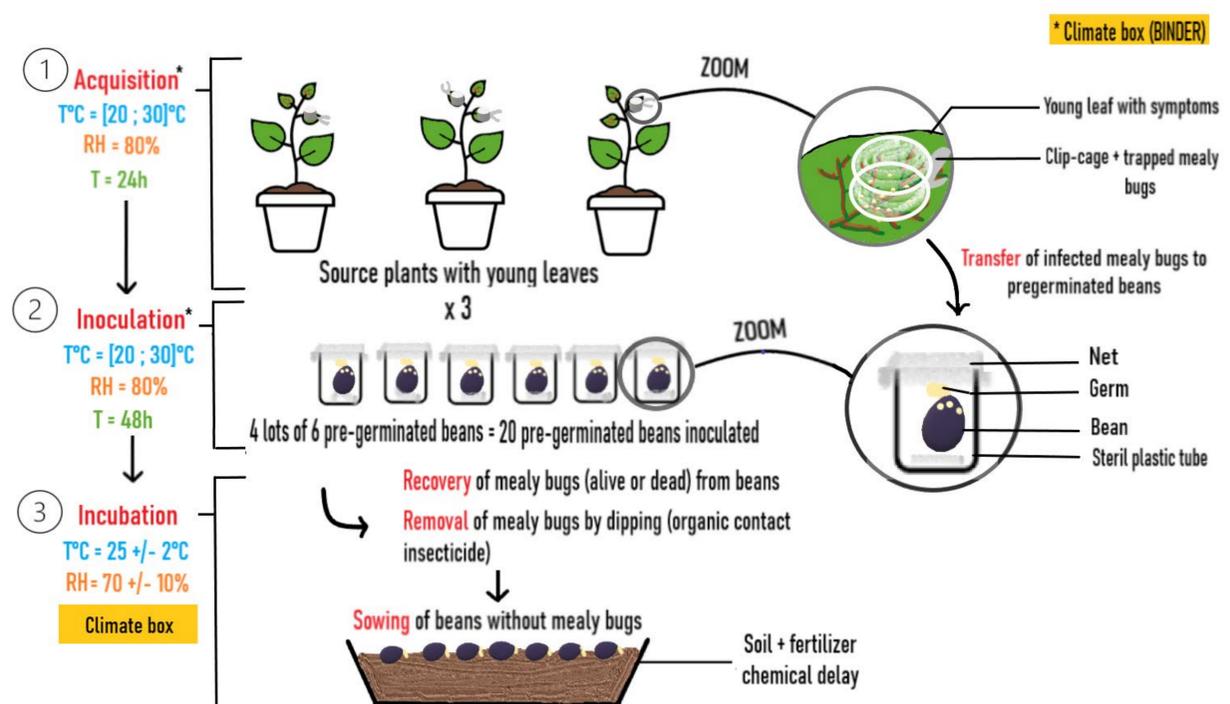
Régis Babin^{1,4*}, Chloé Cailleaud^{2,4}, Bernard Dufour^{2,4}, Frédéric Dedieu^{2,4}, Nicolas Sauvion^{3,4}, Fabienne Ribeyre^{2,4} and Emmanuelle Muller^{5,6}

1- CIRAD, UMR PHIM, Abidjan, Côte d'Ivoire
 2- CIRAD, UMR PHIM, Montpellier, France
 3- INRAE, UMR PHIM, Montpellier, France
 4- PHIM Plant Health Institute, Univ Montpellier, CIRAD, INRAE, Institut Agro, IRD, Montpellier, France
 5- CIRAD, UMR AGAP Institut, Montpellier, France
 6- UMR AGAP Institut, Univ Montpellier, CIRAD, INRAE, Institut Agro, Montpellier, France

* Corresponding author: regis.babin@cirad.fr

Materials and methods

The method included three steps: 1) an acquisition period at 6 different constant temperatures, during which first instars of the mealybug *Planococcus citri* were enclosed in clip-cages on young symptomatic leaves of cocoa seedlings previously artificially infected with a recombinant *Agrobacterium tumefaciens* bacteria containing the cloned sequence of Agou 1 isolate of CSSTBV species; 2) an inoculation period under the same temperatures, where the young infective mealybug instars were transferred to sprouting cocoa beans and allowed to feed for 48 h; 3) an incubation period at 25°C, where the cocoa beans were cleared of mealybugs and planted in a tray with potting soil, where they grew until swollen shoot symptom onset, which was recorded. Molecular analyses by PCR, with specific primers of Agou 1 isolate, were performed 180 days after inoculation period to detect the presence of the virus in cocoa seedlings.



Results

Preliminary results show that temperature has an effect on CSSV vection by mealybugs (Figure). 180 days after inoculation, transmission rate gradually increased from 36.4% at 20°C to reach 90% at 24°C and 95.5% at 26°C. Then transmission rate remained relatively stable for upper temperatures of 28 and 30°C. Observations on mealybug behavior suggested that the relationships between transmission and temperature could be explained by mealybug activity, which was stronger as temperature increased.

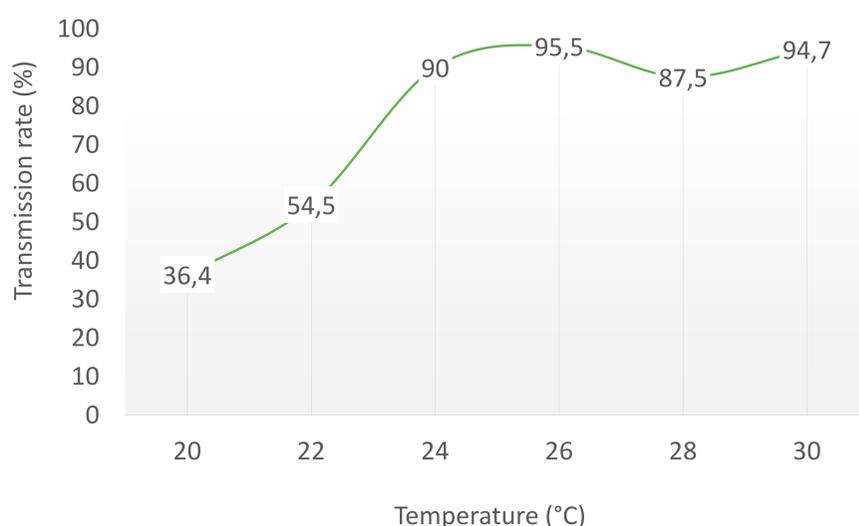


Figure:
Impact of temperature on CSSV transmission rate by *Planococcus citri* to cocoa seedlings

Conclusion and perspectives

- ✓ The method we developed in the laboratory allows the study of the biology of CSSV vection by mealybugs
- ✓ Temperature has an effect on CSSV vection by *Planococcus citri* that may be due to more active mealybugs as temperature increases
- ✓ These preliminary results will help develop models to better understand and predict the impact of microclimate on CSSV epidemics in cocoa plantations