

# 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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Régis Babin<sup>1,4\*</sup>, Chloé Cailleaud<sup>2,4</sup>, Bernard Dufour<sup>2,4</sup>, Frédéric Dedieu<sup>2,4</sup>, Nicolas Sauvion<sup>3,4</sup>, Fabienne Ribeyre<sup>2,4</sup> and Emmanuelle Muller<sup>5,6</sup>

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

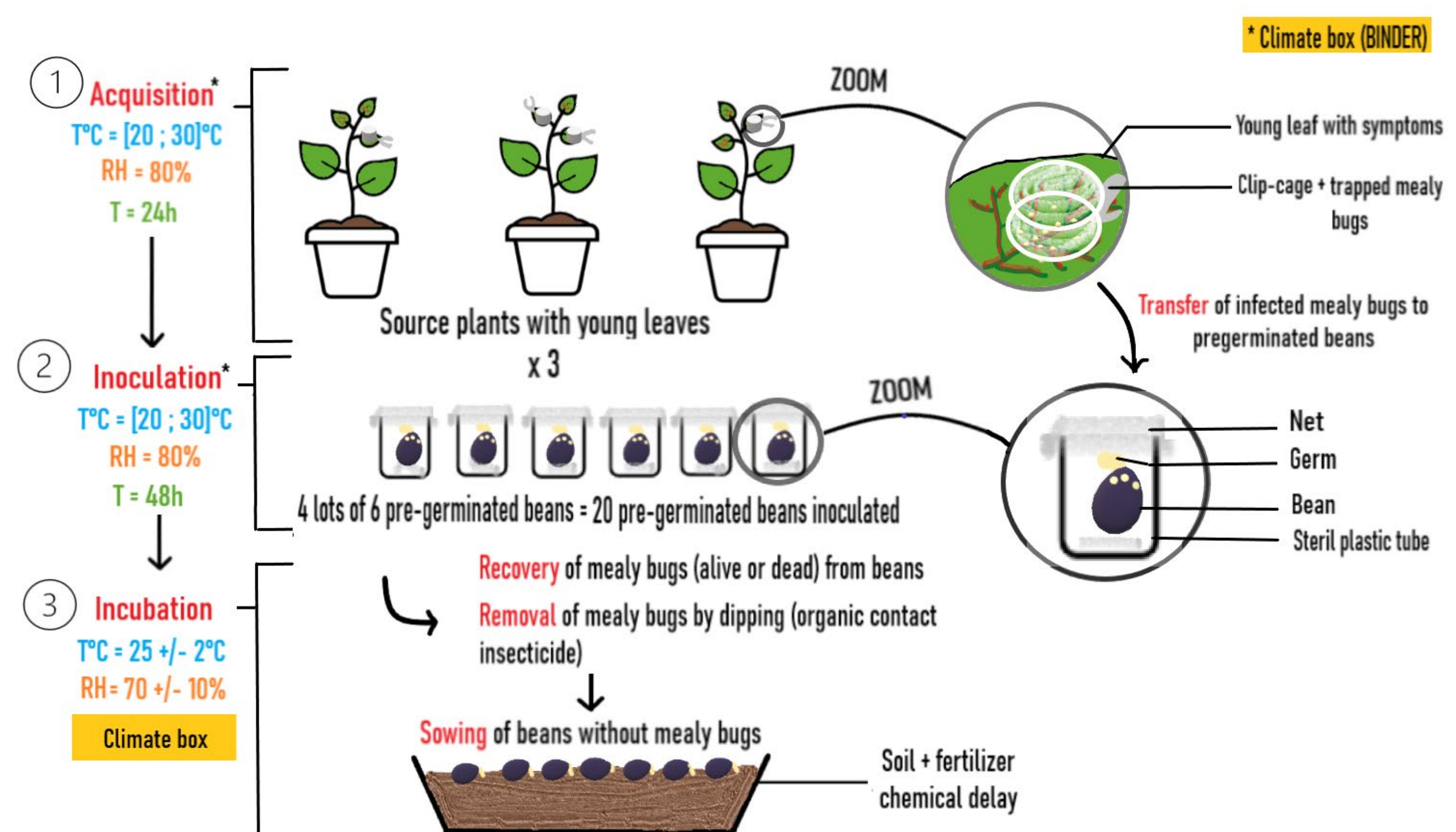
6- UMR AGAP Institut, Univ Montpellier, CIRAD, INRAE, Institut Agro, Montpellier, France

\* Corresponding author: regis.babin@cirad.fr

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.

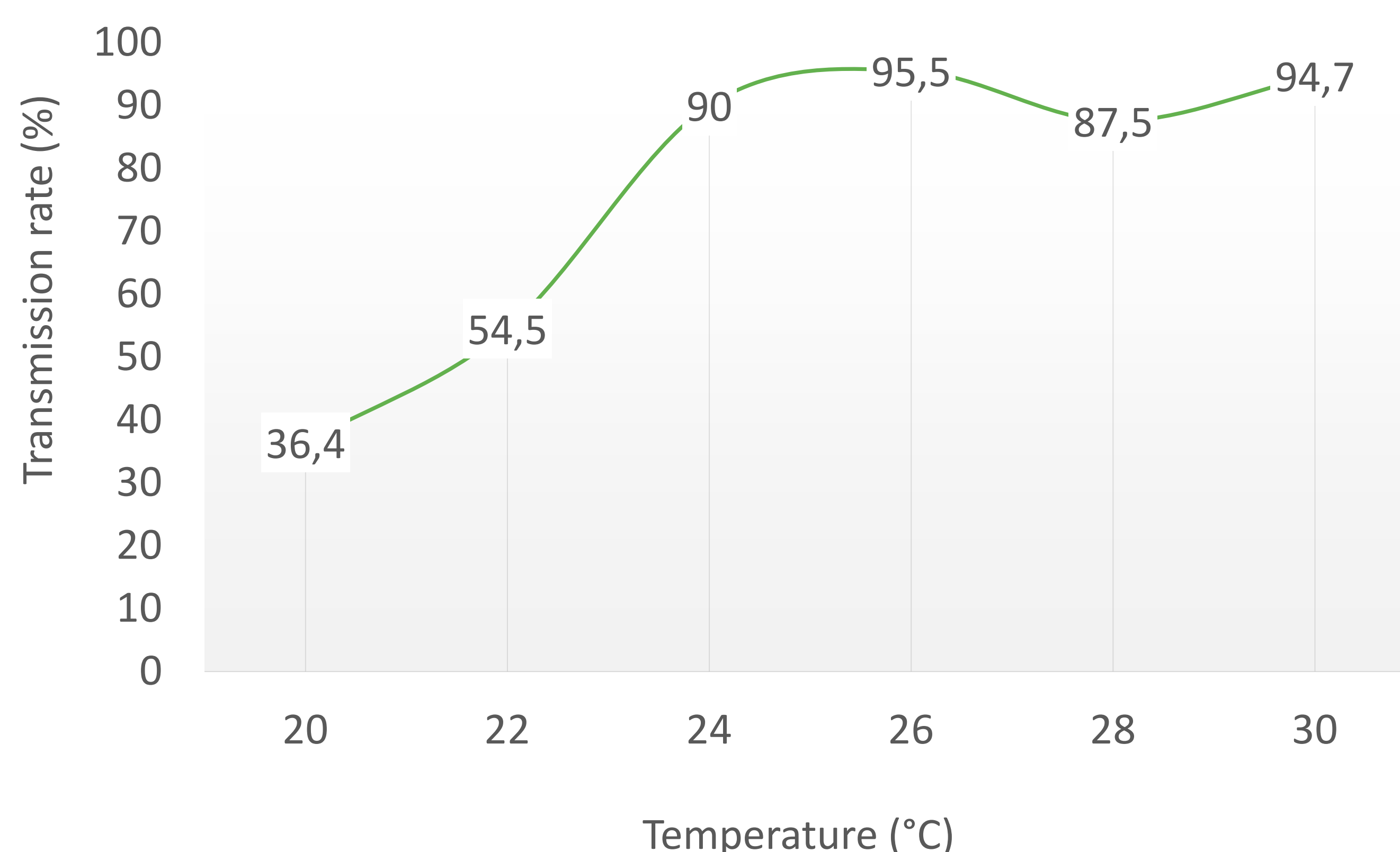
## Materials and methods

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.



## 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**