Molecular chaperone modulation in cocoa leads to plant resistance to *Moniliophthora perniciosa*

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INTRODUCTION

Moniliop ra perciciosa, the causal agent of witches' broom disease, is one of the main pathogens that affect cocoa cultivation in America. The hogen is usually carried out by the use of resistant by phytosanitary pruning and the identification lant's defense mechanism. Biding Protein (*BiP*) is that plays an important role in the regulation of lasmic Reticulum (ER) and cellular protection abundant protein under all growth conditions, but dly induced in conditions that lead to the d polypeptides in the ER, such as when plants hogens. In this work, we overexpressed the BiP gene in tomato plants and investigated its functionality in tolerance to *M. pernic*

METHODOLOGY

Genetic transformation

Molecular analysis of transgenic plants

PCR Analysis

Western blot Analysis

Inoculation of *M. perniciosa* in plants of tomato

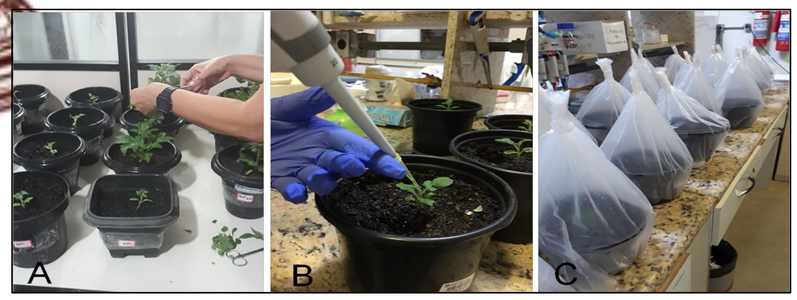


Figure 1. Inoculation procedures. **A:** Section of leaves at 50% of the size; **B:** drop deposition with basidiospore suspension; **C:** packaging of plants in plastic bags with water.

RESULTS

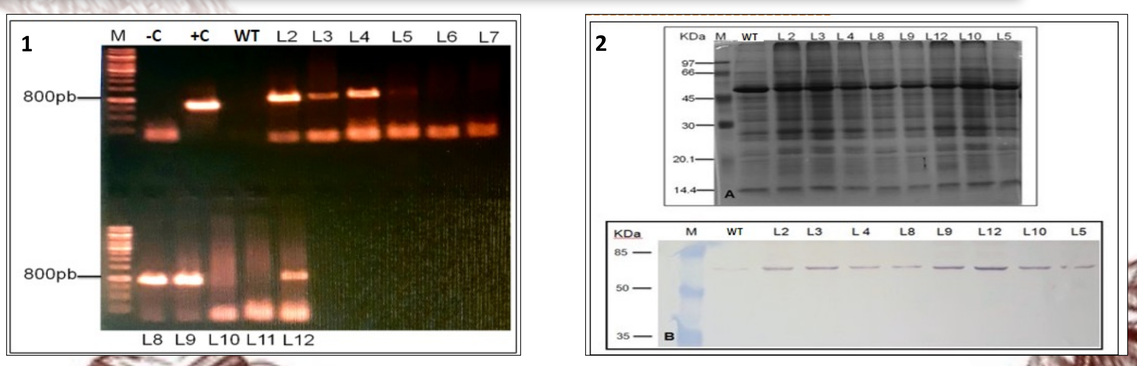
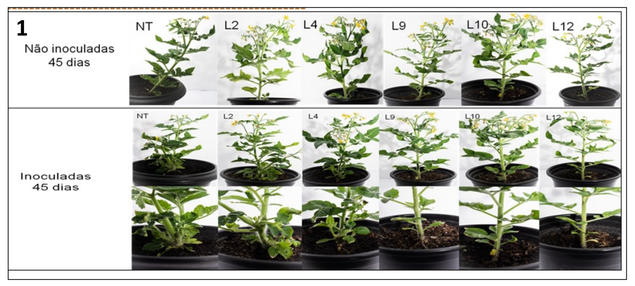


Figure 2. 1-Molecular diagnosis of *S. lycopersicum* plants expressing SoyBiP. Genomic DNA subjected to PCR reaction using primers for nptII (Neomycin Phosphotransferase). 2- Protein analysis of transgenic plants, Western Blot analysis. (M) 1 Kb marker **(-C)** Negative control**, (+C)** Positive control, **(WT)** Non-transformed plant, **(L2 to L12)** in vitro regenerated lines .



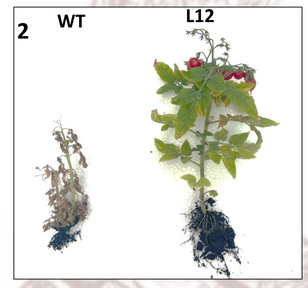


Figure 3- (1) Evaluation 45 days- *S. lycopersicum* without inoculation and inoculated with *M. perniciosa*. Visualization of symptoms (stem swelling and overbudding). **2- Evaluation 60 days- S.lycopersicum inoculated with *M.perniciosa*.** Untransformed plant **(WT),** lines overexpressing BiP **(L2 to L12)**.

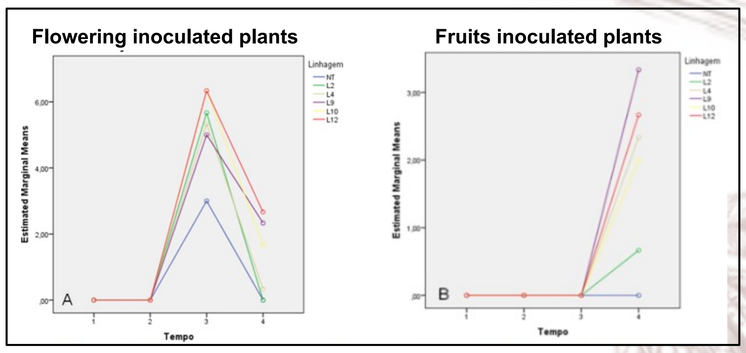


Figure 4. Flowering and number of fruits at 15, 20, 30 and 45 days in plants inoculated with *M. perniciosa*. (A) Amount of flowers **(B)** Amount of fruits: **Friedman test.** Non-transformed plant **(NT),** Lines overexpressing BiP **(L2 to L12).**

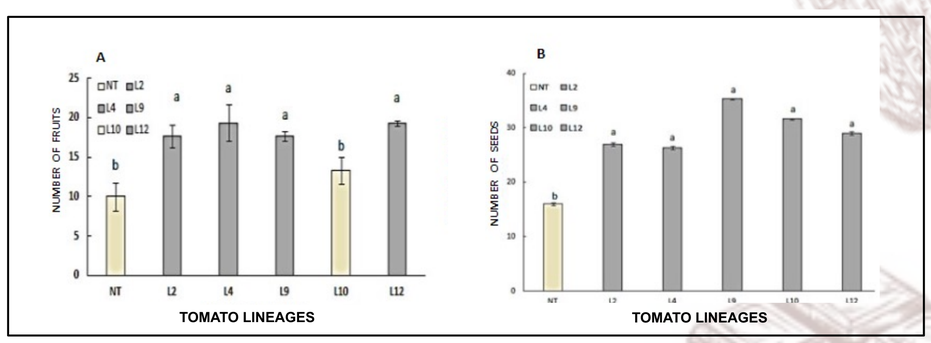


Figure 5. A) Number of fruits collected (B) Number of seeds collected: Non-inoculated plants . Means followed by the same letters do not differ statistically from each other by the Tukey test ($p \leq 0.05$). The bars correspond to the standard errors of the means**.** Non-transformed plant **(NT),** Lines overexpressing BiP **(L2 to L12).**

DISCUSSION

Our results suggest that BiP overexpression may have a protective role against pathogen attack. Indeed we observed a positive correlation between BiP accumulation and plant tolerance to *M. perniciosa*. It is possible that under the accumulation of BiP in the lumen of the ER, secretory proteins, such as PRs, are more readily assembled giving the plant a molecular advance in the response to the pathogen infection.

CONCLUSION

More research needs to be carried out to better understand the molecular basis of resistance induced by overexpression of BiP in 's. However, our results bring the notion that it may be le to develop new strategies to control the pathogen based on ction of endogenous expression of cocoa BiP.

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