

Introduction

Pineapple monoculture and the use of pesticides reduced the biodiversity in the agrosystems and increased the imbalance between pathogenic and beneficial organisms. Non specific natural defenses induced by chemical elicitors or non pathogenic micro-organisms, may contribute to ecologically based IPM as an alternative to pesticides ([Vallad and Goodman, 2004](#)).

We showed that pineapple plants (MD-2 and Smooth cayenne) can produce a systemic resistance against nematodes after elicitor application. We measured *Rotylenchulus reniformis* populations and the evolution of enzymatic activities linked to plant defenses (oxidative enzymes, and LOX and PAL as key enzymes for signaling molecules, Methyl-jasmonate, 'Met-jasm', and Salicylic acid, 'SA'). These enzymatic activities were tested as potential markers of physiological changes after 3 elicitors treatment.

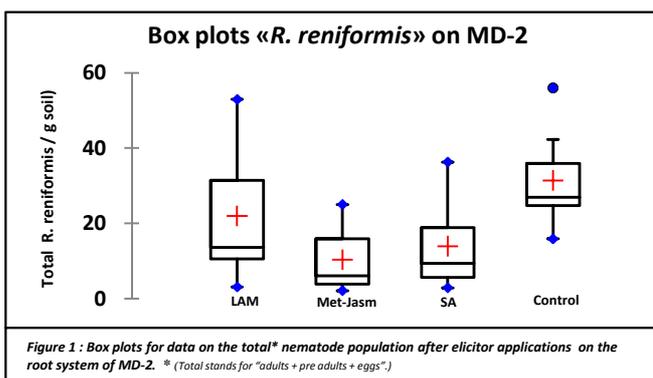
Material and Methods

Varieties: Smooth Cayenne (SC) and MD-2 in 1L pot, age: 2 months. **Elicitor treatment:** soil applications of 50mL Met-jasm, 10^{-4} M, or SA, 10^{-3} M, or LAM (β 1,3 Glucans), 37 g/L, 3 times at one week interval. Plant weight at treatment was 201.6 ± 42.7 g. **Nematodes inoculation:** *R. reniformis* (5000/pot), one week after the last elicitor application. **Nematode populations development:** evaluated 45 days after inoculation. **Enzymatic activities:** Catalase (CAT), Superoxide dismutase (SOD), Phenylalanine ammonia lyase (PAL) and Lipoxigenase (LOX) on non inoculated plants.



Fig 2 : Oxidative enzymes controlling toxic reactive oxygen species

Results



1- Nematode populations (Fig 1)

MD-2, a pineapple variety more tolerant to nematodes than SC ([Soler et al., 2009](#)), set up efficient defenses against nematodes, SC did not.

The Nematode population growth was slowed down by Met-jasm (10^{-4} M) and SA (10^{-3} M), *p* values were 0.003, 0.021 and 0.111 respectively for Met-jasm, SA and LAM. Most of the decreases ranged 30 to 70%. Fecundity was particularly affected with reduced egg numbers (*data not shown*).

Discussion

Pineapple has been able to set up efficient defenses against nematodes after elicitor treatments reducing both nematodes number and fecundity, but tolerant and sensitive varieties did not react equally. Is the MD-2 response a Systemic Resistance? Similar experiments using a split-root system tend to confirm this (*data to be published*).

The enzymatic activities measured here can characterize physiological changes in the plant but these are similar in both varieties. LOXs control the Met-jasm pathway, meanwhile PAL controls the SA and phenylpropanoids pathways. The LOX activity increase may reflect an enhanced biosynthesis of the signal molecule Met-jasm, characterizing an Induced Systemic Resistance set up. The decrease of PAL activity is less clear as it means less phenylpropanoids involved in plant defense. It may also reflect a necessary balance between SA and Met-jasm pathways ([Beckers and Spoel, 2006](#)).

Concluding remark : Based on bibliography, we can assume that non-pathogenic endophytes (*Rhizobacteria* and *fungi*) would have induced plant natural defenses in pineapple more efficiently (long lasting effect and maybe stronger) than chemical elicitors used here. It is our further objective to investigate this research area.

[Vallad and Goodman, 2004, Crop Science 44: 1920-1934](#) ; [Soler et al., 2009, ISHS, Act. Horticulturae 822: 191-198](#); [Beckers and Spoel, 2006, Plant Biology 8: 1-10](#).

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Fig 3: Enzymes controlling the Signaling molecules pathways

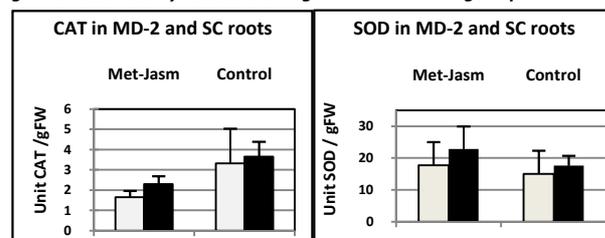
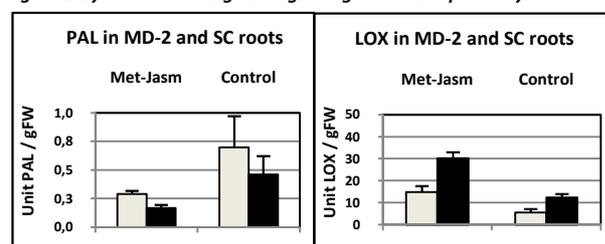


Fig 3: Enzymes controlling the Signaling molecules pathways



2- Biochemical markers

Met-jasm and LAM induced similar and significant enzymatic activities variations; SA treatment did not. Most remarkable were the decreases of Catalase (CAT) activities and PAL. Meanwhile LOX activity increased significantly, specially in MD-2, and a slight increase in SOD was also observed.