

Are there any *Pinus pinaster* trees resistant to *Bursaphelenchus xylophilus*? Studies implemented in Portugal to address this question

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The Problem

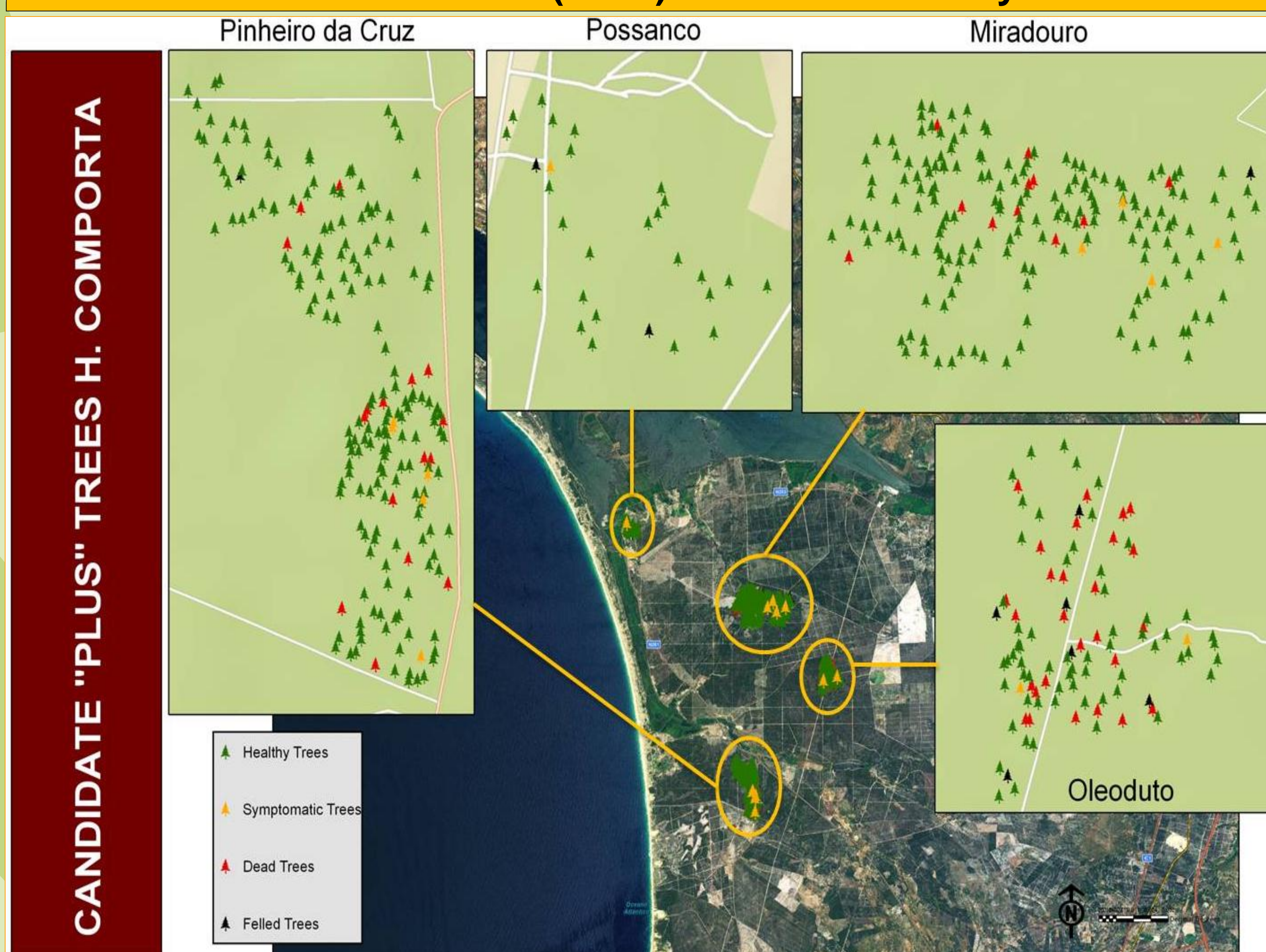
The Pinewood nematode *Bursaphelenchus xylophilus* (Bx) was found to be responsible for maritime pine (*Pinus pinaster*) death for the first time in Europe in 1999, in a Portuguese stand in the South of Lisbon. It is the causal agent of the Pine Wilt Disease (PWD) and a quarantine organism in the European Union with approximately €80 million spent from 1999 – 2009 for attempting its eradication related with the control of the insect vector *Monochamus galloprovincialis*.

The Approach

Although PWN can cause devastating tree mortality, there is also evidence that some tree species such as *P. pinea* or individual trees within a species, are either tolerant (i.e. support the nematode, but are not killed immediately) or resistant to the nematodes. In order to investigate the susceptibility of *Pinus pinaster* to Bx, and as a first step for the establishment of methodologies for the improvement of its resistance, a research program was implemented recently in Portugal for this species, combining both genomic, transcriptomic and quantitative genetics approaches.

Results – Current stage of research

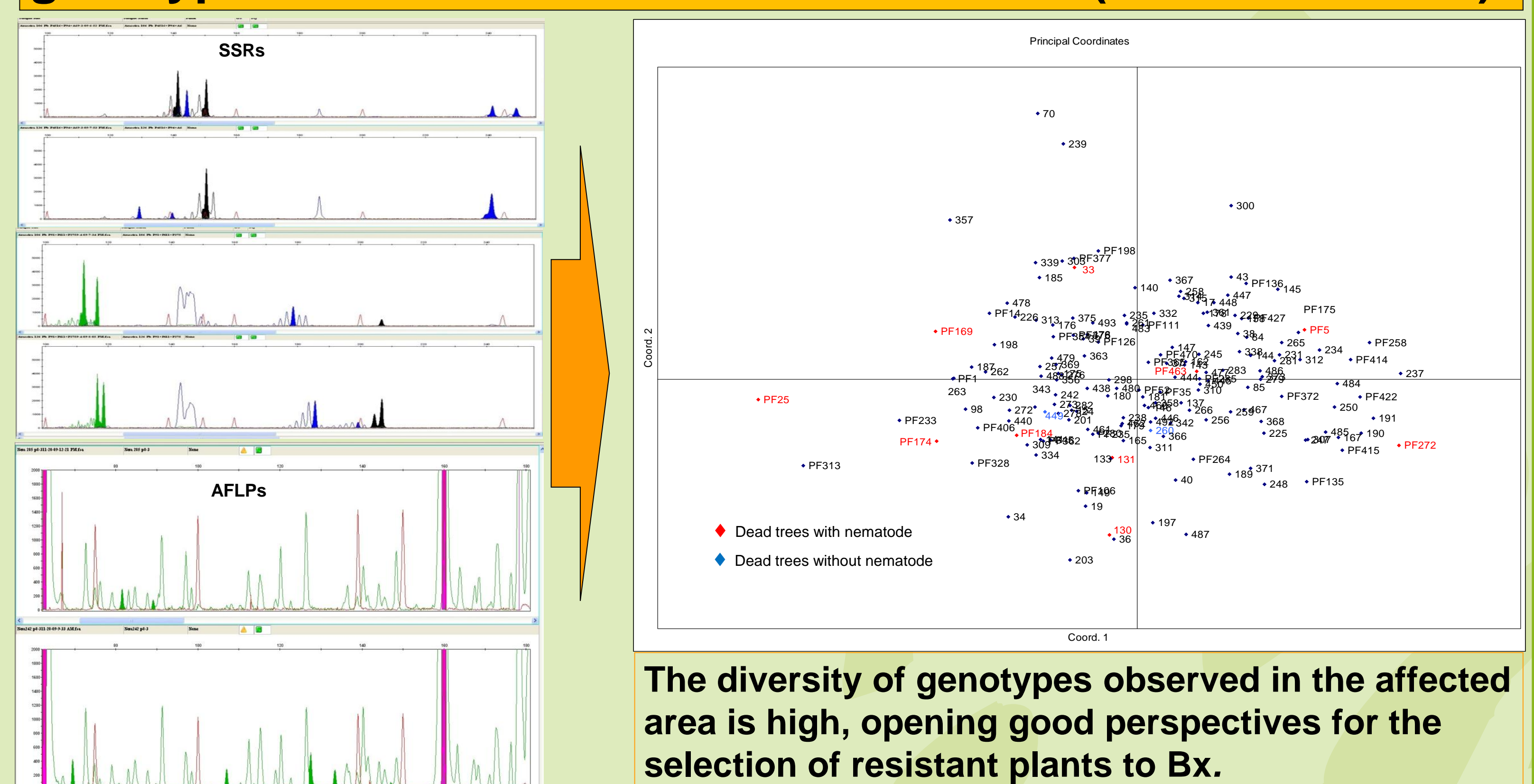
Selection strategy: About 500 trees were selected in highly infested areas with Pine Wilt Disease (PWD) for more than 10 years



Progenies tests were established from 135 candidate trees and inoculation tests with Bx will be performed

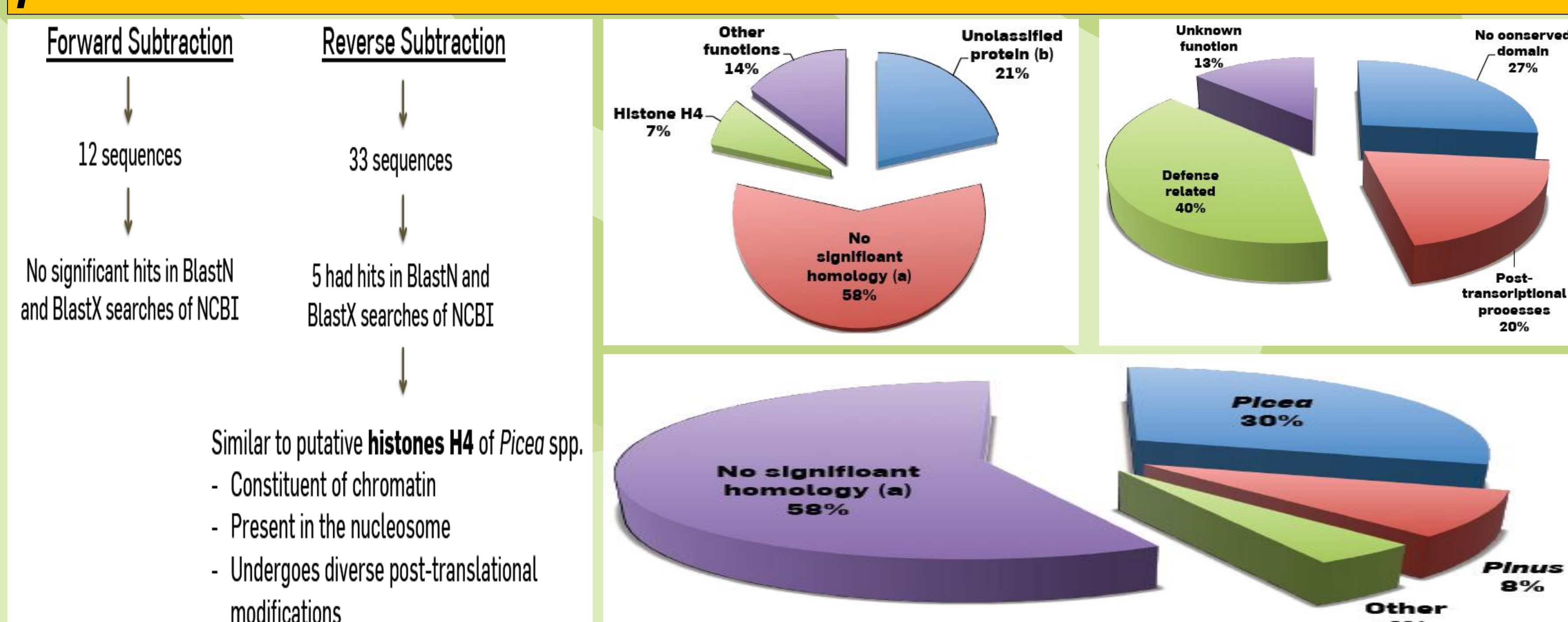


Genotyping: A sample of 175 of the selected trees were genotyped with 6 SSRs markers and AFLPs (3 combinations)



The diversity of genotypes observed in the affected area is high, opening good perspectives for the selection of resistant plants to Bx.

Transcriptomics: Suppression subtractive hybridization (SSH) detected differentially expressed genes between *P. pinea* and *P. pinaster*



- 58% of the isolated sequences didn't have a significant homology in the NCBI database;
- 40% of the expressed genes were related to defense mechanisms;
- Oxidative stress was found to be a very important defense mechanism triggered by the infection;
- Histone H4 was the differentially expressed gene by *P. pinea*, which might contribute to its apparent resistance to the disease;
- Pyrosequencing will allow further interpretation of data and generated novel sequences.

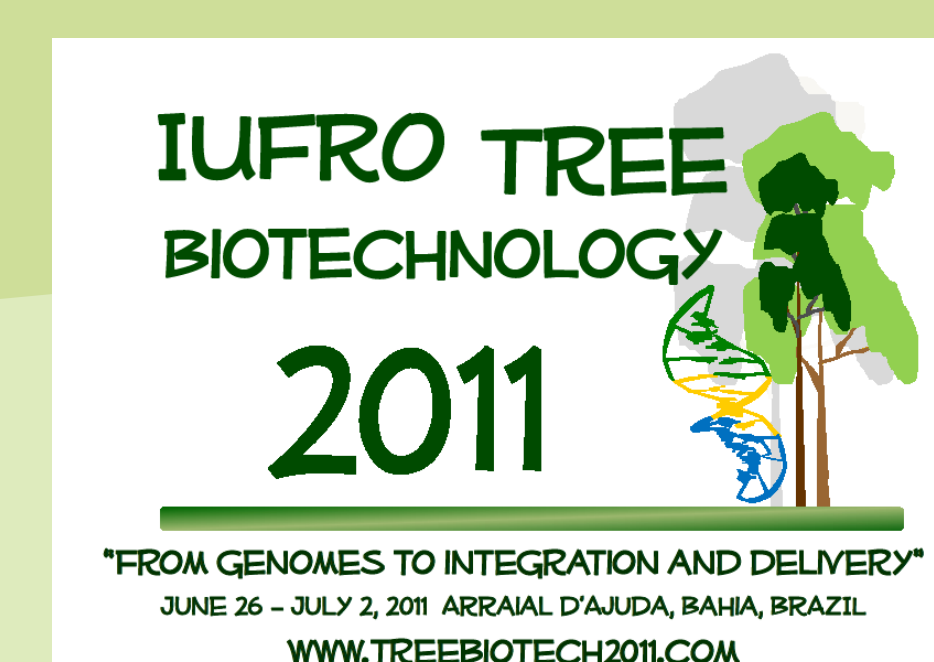


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