An investigation of plant defence against the fungal pathogen *Botrytis cinerea*

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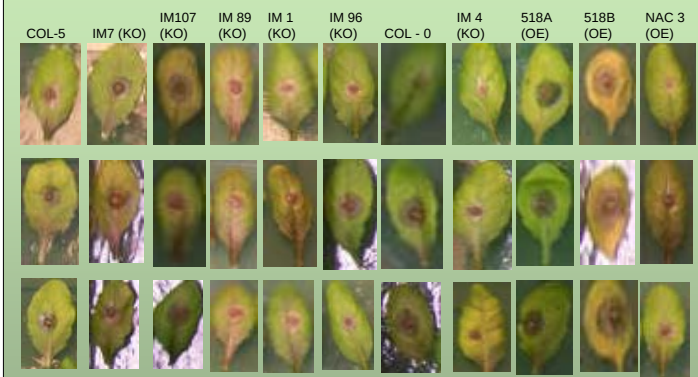
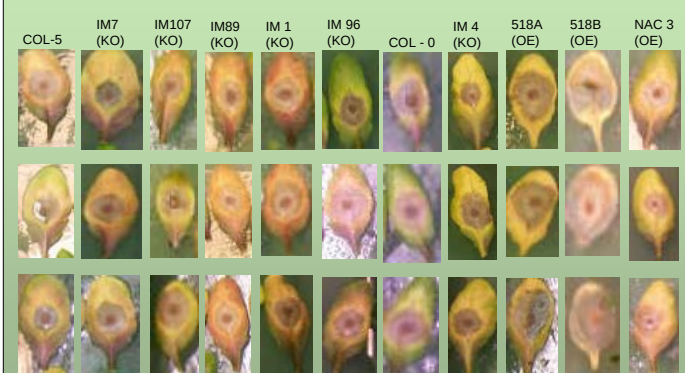
1. Introduction

The fungal pathogen *Botrytis cinerea* infects a wide range of fruit and vegetable crops and is responsible for losses both before and after harvest. The model plant *Arabidopsis thaliana* was used to identify defence mechanisms activated in response to *B. cinerea* infection, and determine which mechanisms are influencing the outcome of the plant-pathogen interaction. A large number of genes whose expression increases significantly after infection with *B. cinerea* had already been identified before I started the project. Transgenic plants silenced for individual genes (using RNAi) had been generated to assess the importance of a gene to defence. For example, a line with a key defence gene silenced will show increased susceptibility to the pathogen. Several transgenic lines overexpressing transcription factors that are upregulated after *B. cinerea* infection were available and these were tested to determine whether they altered susceptibility.

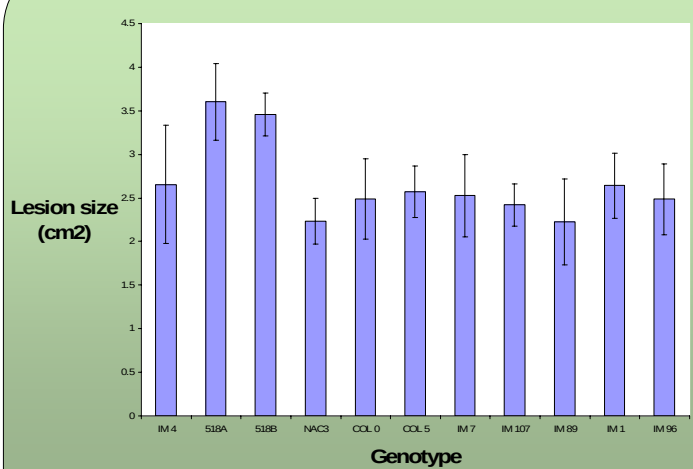
2. Infection at 48 hours



3. Infection at 72 hours



4. Comparing lesion sizes at 72 hours



The bars represent the average lesion size for each genotype, and the Y-bar errors represent the standard deviation for each genotype

5. Microarray Data

Overexpression of a transcription factor can help identify downstream targets of that gene.

	518A		518B		NAC3	
	Down-regulated	Up-regulated	Down-regulated	Up-regulated	Down-regulated	Up-regulated
No. of genes	15	63	24	69	10	91

These genes can be used to find promoter elements here: www.arabidopsis.org/tools/bulk/motiffinder/index.jsp

In conclusion, the groups are still too broad and future methods should narrow these groups further, such as inducible overexpressors

6. Findings

The transcription factor overexpressors, NAC3, 518A and 518B, had increased susceptibility to the fungal pathogen *Botrytis* compared to the wild type (Col – 0). When observing the plants, it could also be seen that these lines showed early senescence (see Figure 1), where proteins within the leaves break down, as well as chlorophyll, which causes the leaves to lose their green colour. Being as *Botrytis* breaks down the plant material to use as an energy source, the fungus has a head-start with the plants undergoing early senescence.

FIGURE 1: 518B *Arabidopsis* plants (left) showing early senescence, compared to wild type COL- 0 *Arabidopsis* plants (right)