Screening an almond genotype collection for resistance to *Xylella fastidiosa* and identifying DNA markers associated with this trait

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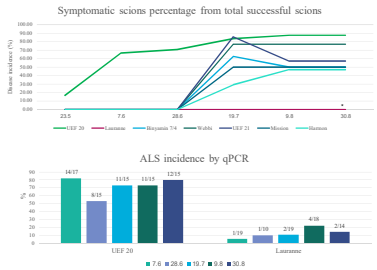
ALS disease in Israel

Xylella fastidiosa causes almond leaf scorch (ALS) disease in North America, the EU and the Mediterranean, In Israel was first reported in 2017. Controlling the disease once trees have been infected is practically impossible, and therefore **finding resistant genotypes** can be an elegant solution to reduce ALS damage.

Resistant genotype of almond

We have recently identified a resistant almond genotype by conducting a small-scale screening of our almond genotype collection. In the Second year of the experiment, the resistant genotype displayed no symptoms and low disease incidence compared to the commercially susceptible one.



Resistant genotype
'Lauranne'

Susceptible genotype
'Um El-Fachem'

methodology

Screening Almond Genotypes

Fifty different genotypes were studied, including both commercial and wild cultivars. From each genotype, eight seedlings were generated through grafting genotype scions onto GF677 rootstocks. Inoculation was performed using the pin-prick method in May and June. The evaluation included the assessment of disease incidence, severity, and X. fastidiosa colonization during the summer.

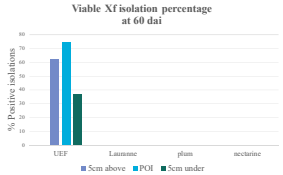
Self-pollination population of the resistant cultivar

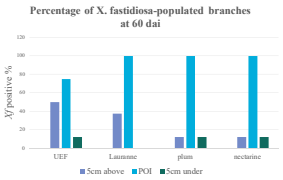
The Unit of Fruit Tree Sciences in Newe Yaar has established a map of ~5000 SNP markers, evenly spread across the genome of these almond genotypes. Using this map, we will lead the research to link *X. fastidiosa* resistance to specific DNA markers, which represent a region of approximately 40 Kbp.

The population includes 150 seedlings, inoculated in May and June using pin prick method. Evaluations began in the summer.

Relevant experiments- Comparison between resistant, susceptible and non-host

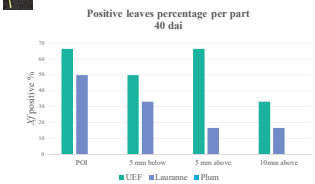
Macro scale
Movement, reproduce and survival within the tree

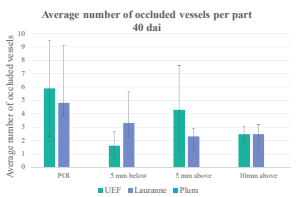




The first sample taken at 60 days after inoculation (dai) presented the resistant genotype with a low X. fastidiosa population and no symptoms.

Micro scale
Movement and vessels occlusion within the leaf



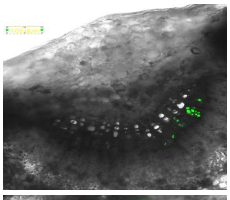


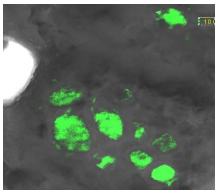
The first sample taken at 40 days after inoculation (dai) presented the resistant genotype as

GFP-labeled bacteria

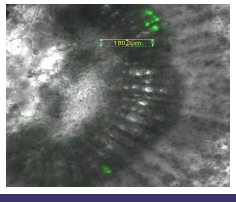
40 dai
Xylem vessels occlusion under the confocal microscope

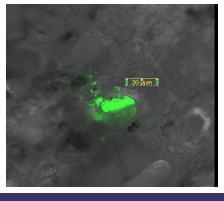
Susceptible genotype





Resistant genotype





Future plans

Sequencing using the genetic markers, genotyping for the trait and RNA seq.
Results from these experiments are expected to advance breeding efforts to generate *X. fastidiosa* resistant almond cultivars and to help understand the genetic basis of resistance to ALS.