

Functional genomics analysis of virus resistance expression in potato

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Introduction

The technique

- This is an example of the “traditional” use of microarrays in gene expression analysis.

Background for the experiment

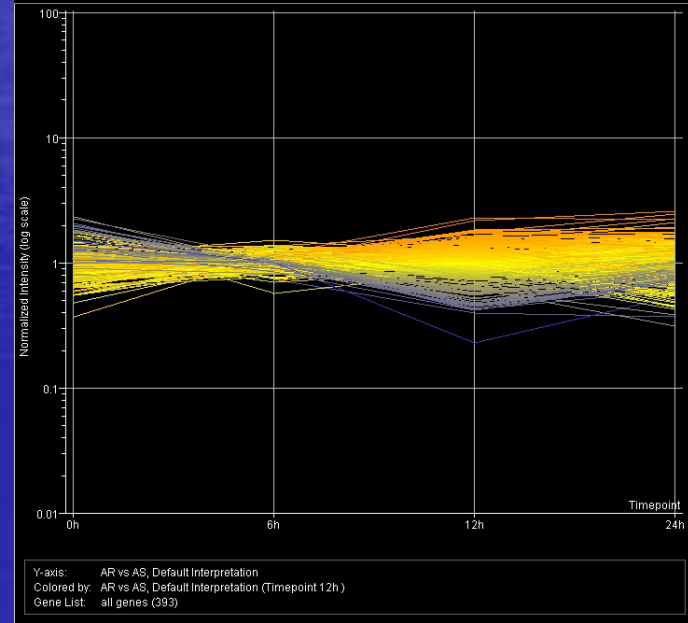
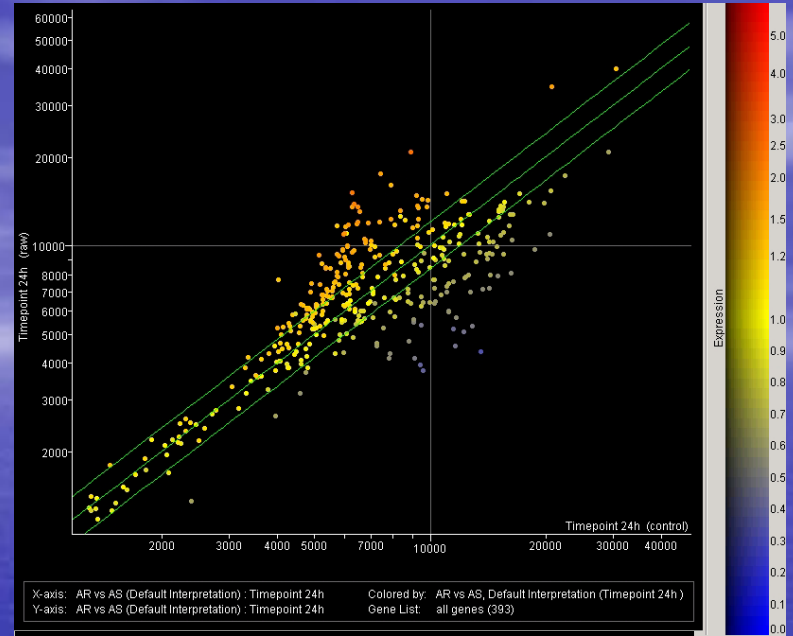
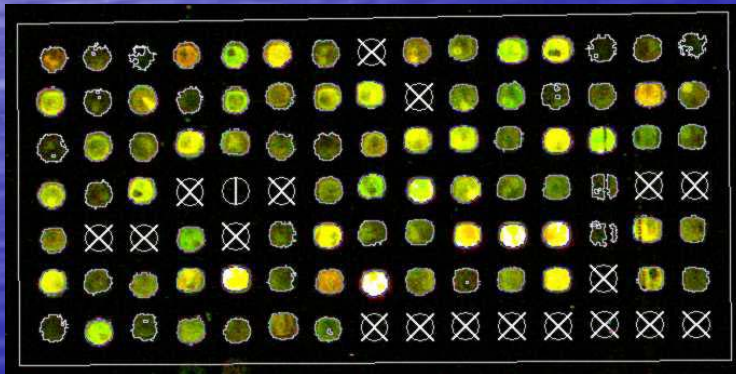
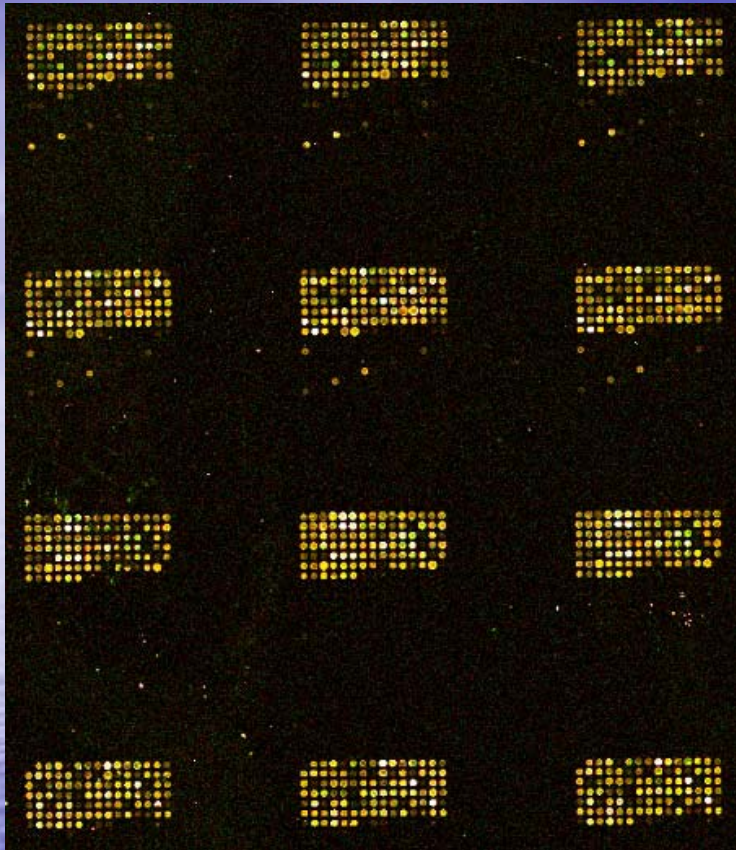
- The only effective way to protect potato from viruses is resistant cultivars.
- The aphid-transmitted *Potato virus A* (PVA) and *Potato virus Y* (PVY) are the most harmful potato viruses in the Northern Hemisphere.

Materials

- A cDNA library was made of genes that were expressed more in a PVA resistant genotype 24h post inoculation by subtracting out the cDNA of a susceptible genotype.
- We compared the gene expression of the resistant potato genotype to the susceptible one 0h, 6h, 9h, 12h and 24h after inoculation to see which genes are involved in the resistance reaction. This was done on microarrays.

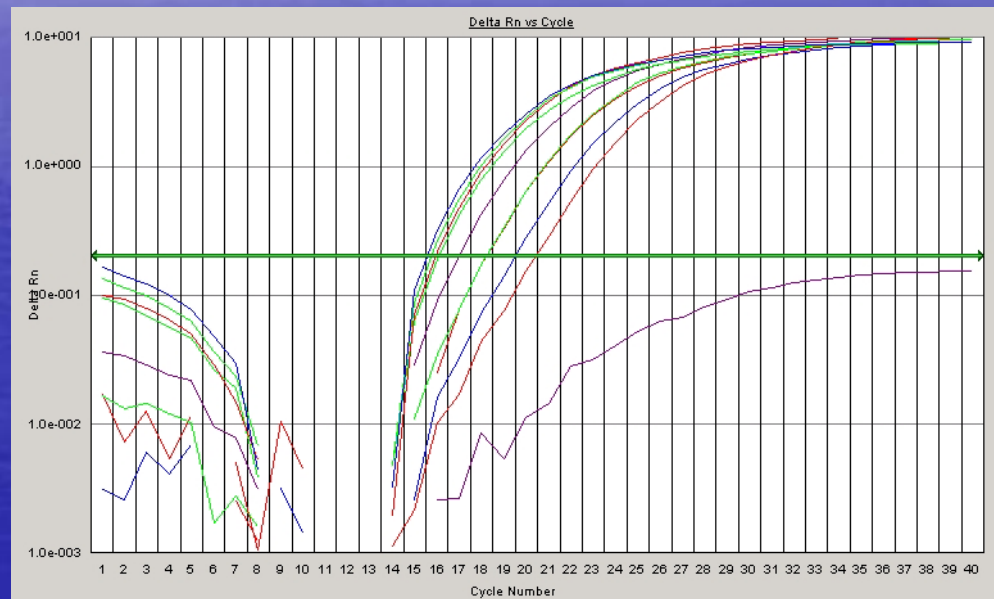
Microarray techniques used

- 384 randomly picked cDNAs from the subtraction library were printed on Poly-L-lysine coated microarray slides.
- The gene expression of these genes was compared in resistant, susceptible and water-inoculated plants and all the different timepoints by hybridizing their RNA on the slides.
- We used the Ambion Amino Allyl MessageAmp™ aRNA Kit to amplify and to label the RNA.



Confirming the results

- The microarray results are being confirmed by Real Time PCR.
- We have also used northern blots to confirm the subtraction results.



Conclusion

- Our results indicate many active responses associated with the resistance that blocks the phloem-dependent movement of PVA in the resistant potato genotypes.
- We have used four different methods (suppression subtractive hybridization, microarrays, northern blots and Real Time PCR) to characterize the gene expression in PVA infected potato leaves.

Acknowledgements

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- The work is done in collaboration with MSc Elin Gammelgård and PhD Maradumane Mohan (Swedish University of Agricultural Sciences).

Governmental institutions active in microarray usage in Finland

University of Oulu

University of Tampere
- Institute of Medical Technology

University of Turku
- Finnish DNA Microarray Centre



University of Kuopio

University of Joensuu

CSC, The Finnish IT Center for Science

University of Helsinki
- Institute of Biotechnology
- Biomedicum
- Faculty of Agriculture and Forestry