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York research spotlight: Dr Andrea Harper

By [Nathan Castro Pacheco](#), Science Editor (2017/18)

Tuesday 21 November 2017



Department: Biology

Current project: Establishing an Associative Transcriptomics platform for the development of resilient ash in the UK

Advice to aspiring scientists: “If you research something you really love, it will never feel like you’re actually doing work”

Selected publication: (2017) Genome sequence and genetic diversity of European ash trees. *Nature* 541: 2012-2016

In the first of a new regular feature, Nathan Castro meets with Biology’s Dr Andrea Harper to discuss her latest research project. This Edition, Dr Andrea Harper, a statistical geneticist in the Centre for Novel Agricultural Products (CNAP), shares her research with *Nouse*.

Dr Harper studied at the University of Manchester where she completed her BSc and MSc in Biological Sciences before moving to Birmingham to complete her PhD in population and evolutionary genetics. She took a role at the John Innes Centre in Norwich where she began research into a highly publicised issue that has been killing off between 70 and 90 per cent of the native ash trees across Europe.

Dr Harper has been here at York, since 2014 where she works at CNAP, a centre in the Biology department that uses cutting edge techniques in the fields of biotechnology and microbial science. They aim to improve sustainability of food supplies, energy and yields of crops.

Dr Harper’s work has led to the identification of genetic markers present in the few trees which are able to survive exposure to the disease. While these trees are affected by the disease, studying their traits of resistance is the leading way in which further loss of European ash trees can be prevented. This approach of studying complex genomes in order to recognise the genes that code for certain physical traits has been referred to as ‘associative transcriptomics’ by Dr Harper since 2012.

In the future, this research could be applied to help predict the levels of disease-tolerance of any European ash tree, as well as to identify disease tolerant trees that could be used for future breeding programs.

While geneticists are able to determine which genes are linked to certain traits in different organisms, crops are unusual in that they can have multiple copies of each chromosome within every nucleus. This makes the process of identifying linkage between genes and traits significantly more difficult. Thus Dr Harper, and others, pioneered the new technique of associative transcriptomics and have since used it to study multiple plant species.

Harper arrived at the University of York to work at the Centre for Novel Agricultural Products, Dr Harper continued to apply these techniques while working as part of the Bancroft lab. The team which Harper was part of identified the genes responsible for quality variations of rapeseed. As the third-largest source of vegetable oil in the world, research into rapeseed is an effort to increase the yield of crops responsible for feeding a large part of the increasing world population.

Dr Harper now manages her own lab where she continues to study the genetic factors responsible for certain traits in European ash trees, bread wheat, and rapeseed. This approach to agriculture eliminates the guesswork that botanists have been forced to do for centuries, thus allowing scientists to grow crops resistant to environmental conditions.

Funded by organisations such as the Department for Environment, Food and Rural Affairs and the Biotechnology and Biological Sciences Research Council (BBSRC) Dr Harper's work is part of the global scientific effort to better understand the genetic makeup of plants. Dr Harper hopes to go on to research lessstudied crops in Subsaharan Africa and India.



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