

Post Seminar challenge Questions

1. The scientific research team developed understanding of the role of Auxin Binding Protein 1 (ABP1) in auxin action using two key biotechnologies:

- Transgenic plants
- Polymerase Chain Reaction

By creating a transgenic plant where a gene could be turned on or off, the scientific team worked out what that ABP1 gene did in the cell and therefore the plant.

- Explain how a transgenic plant is created and what biotechnologies are required to do this.
- Describe what mechanism the team used to turn the gene on and off
- Explain how PCR technologies are used to measure whether the gene is turned on or off
- Why did they also need to make observations of the plant using microscopes and simple measurements of leaves and roots?



Using PCR Technologies

PCR—the polymerase chain reaction, amplifies DNA and is used in multiple ways. In gene expression studies PCR is used to amplify specific fragments of a gene to find out whether that gene is being expressed in the tissue being studied.

RNA is extracted from the cells



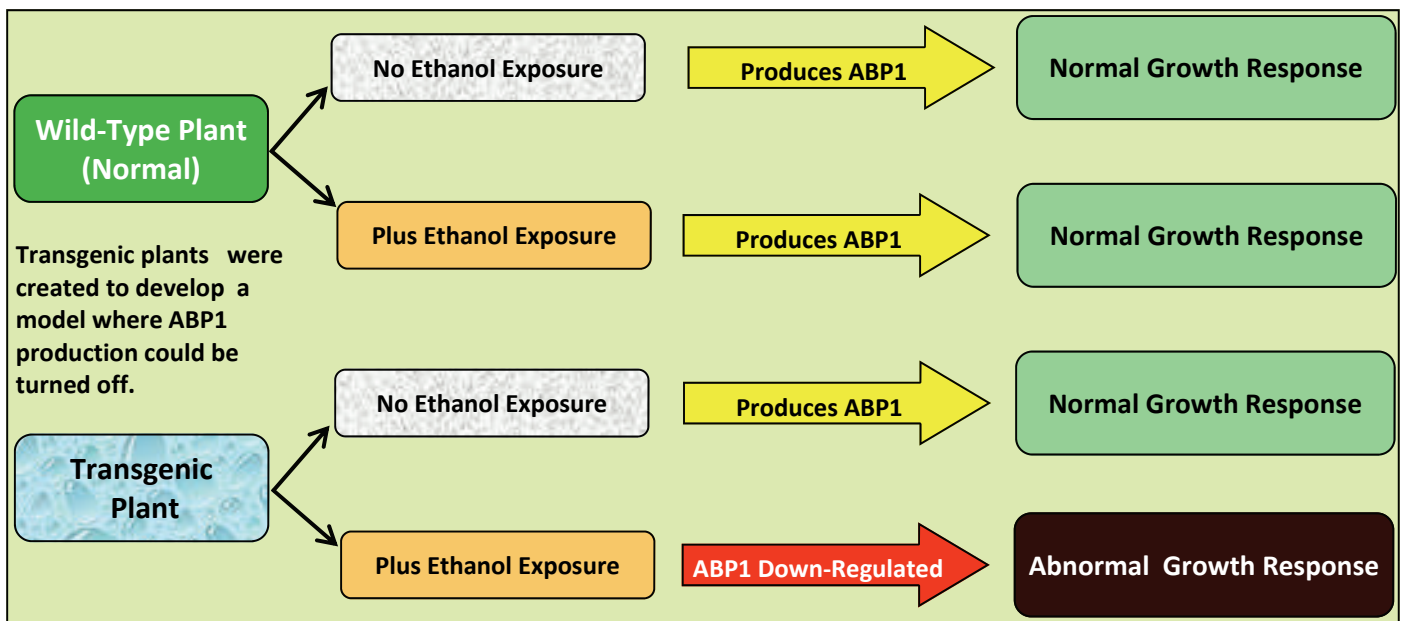
Reverse Transcriptase reaction produces cDNA from the RNA



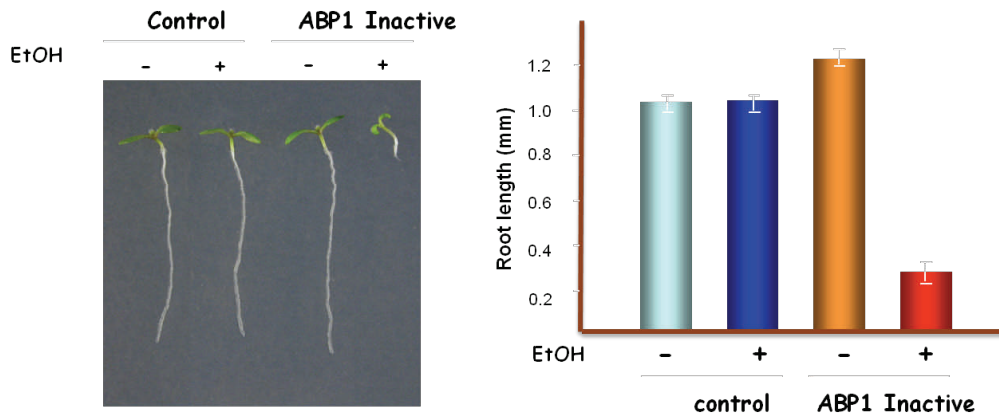
The Polymerase Chain Reaction (PCR) using specific primers produces multiple copies of the target DNA



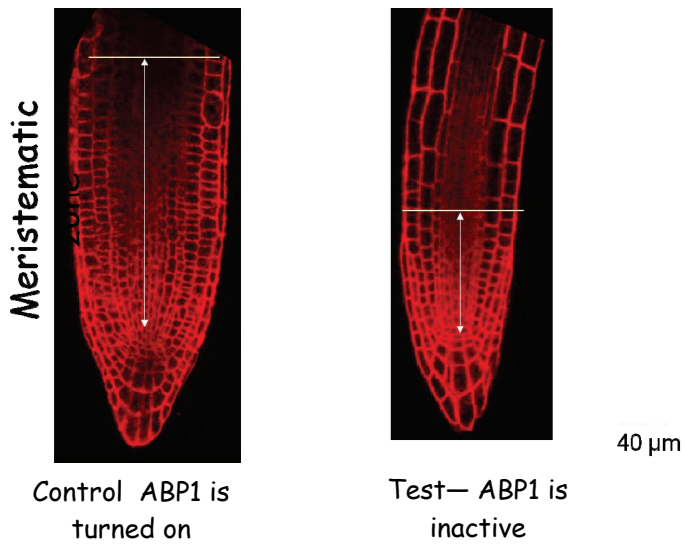
The target DNA is analysed using Gel Electrophoresis. A variation on PCR called REAL TIME PCR uses fluorescent labels and provides a quantitative analysis of the PCR product.



2. The scientific team found that as well as affecting shoots and leaves, inhibiting Auxin Binding Protein affected the growth of roots. As with the shoots they ran tests with and without ethylene to check that the gene was being turned off.



The photomicrographs below show what the cells looked like in the roots. The white arrows show how extensive the meristematic tissue was in the roots. Meristematic tissue is the tissue in plants that can still divide—it is undifferentiated.



We know that when ABP1 was inactive the roots did not grow.

What does the information in the micrographs above tell us about the role of ABP1 in root growth?

Why did having ABP1 turned off stop the roots from growing?