Initiation of meiotic double strand breaks in Arabidopsis depends on two different SPO11 proteins

Thorben Sprink[1] and Frank Hartung[1]
[1] Julius Kühn-Institut, Institute for Biosafety in Plant Biotechnology
Email of corresponding author: thorben.sprink@jki.bund.de

Pairing and balanced distribution of allelic chromosomes during meiosis depends in most organisms on the initiation of double strand breaks (DSBs) by the protein SPO11. SPO11 is an evolutionary conserved meiotic transesterase, which introduces DSBs to the DNA during early prophase I of meiosis. Whereas in animals and fungi only one single SPO11 is present, plants have at least two meiotic active SPO11 proteins (SPO11-1 and SPO11-2) which are essential for proper chromosome distribution and recombination processes. Single knock out mutants of SPO11-1 as well as SPO11-2 are nearly sterile due to random chromosome segregation during meiosis.

In all so far sequenced land plants orthologous genes to *Arabidopsis* SPO11-1 and SPO11-2 can be found. Our aim is to investigate whether the function of SPO11-1 and -2 is species specific or interchangeable between different near or far related species.
We were able to show that it is, in some cases, possible to interchange SPO11-1 as well as SPO11-2 between *Arabidopsis* and a different species.

Furthermore we were able to identify a species specific splicing pattern of SPO11-1 and SPO11-2. We will present results on heterologous complementation approach as well as splicing patterns of different plants SPO11-1 and -2 genes, as well as patterns from *Arabidopsis* plants carrying SPO11 from a different species. Additionally we investigate if the function of SPO11-1 and -2 is sequence specific and if they work together. For this purpose we interchanged regions between SPO11-1 and -2. We will present results on these swapped gene approach.

Additionally we designed and produced antibodies against *Arabidopsis* SPO11-1 and -2 for use in immunofluorescence-microscopy to get a closer look on the behavior and the distribution of SPO11-1 and -2 during meiosis. We will show images using these and other antibodies on different *Arabidopsis* mutant lines from the complementation approaches.

By analyzing the results of these experiments we should be able to answer the question if there is an sequence and/or species specific function of SPO11-1 and -2 and if the specific splicing pattern has influence on the function if SPO11. With the new antibodies we should also be able to get a closer look on the behavior of SPO11-1 and -2 during meiosis.