SPO11 dependent initiation of meiotic double strand breaks in *Arabidopsis thaliana*

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Meiosis plays a key role in sexual reproduction in plants as well as in animals and fungi, by dividing the chromosome set in half and forming gametes. One of the major steps in meiosis is the prophase, during this stage meiotic recombination occurs leading to the physical connection of homologous chromosomes and exchange of genetic material between them.

This process eventually leads to faithful segregation of the allelic chromosomes and depends in nearly all analyzed eukaryotic organisms on the initiation of double strand breaks (DSBs). SPO11, a meiosis specific transesterase, is one of the main enzymes introducing DSBs during prophase. Whereas in animals and fungi only a single SPO11 for the initiation of DSBs is present, plants have at least two meiotic active SPO11 proteins (SPO11-1 and SPO11-2). Both are essential for the initiation of meiotic DSBs in *Arabidopsis thaliana* (Ath). Single knockout mutants of Ath_SPO11-1 as well as Ath_SPO11-2 are nearly sterile because random chromosome segregation during meiosis occurs.

In all so far sequenced plants genes homologous to Arabidopsis SPO11-1 and -2 exist. Our aim is to investigate whether the function of these two SPO11 proteins is species and/or sequence specific. To analyze this we use orthologous genes from different land plants (*Carica papaya*, *Oryza sativa* and *Physcomitrella patens*) as well as cDNAs from lesser related organisms such as *Chlamydomonas reinhardtii* and *Mus musculus* for heterologous complementation of SPO11 mutants from Arabidopsis.

We will also swap gene regions between the two SPO11 in Arabidopsis to figure out by homologous complementation if the function is sequence specific.

With this information we should be able to answer the questions if there are sequence and/or species specific functions of each SPO11 and which region(s) of the proteins are essential for the initiation of meiotic double strand breaks.