P009 Analysis of whether the *Papaver rhoeas* (poppy) S-determinants are functional in *Hordeum vulgare* (barley) to make it self-incompatible

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As most flowering plants are hermaphrodites, increasing genetic diversity by preventing self-pollination remains a major challenge. Self-incompatibility (SI) is a major genetic mechanism utilised to encourage outbreeding and involves rejection of "self" pollen. In *Papaver rhoeas* (poppy) SI is controlled by a single locus with multiple haplotypes, each haplotype encodes both male (PrpS) and female (PrsS) determinants (*S*-determinants). Self PrpS-PrsS interaction triggers signalling to the actin cytoskeleton, culminating in programmed cell death.

We have recently introduced PrpS into self-compatible *A. thaliana* and demonstrated that *Papaver PrpS* is functional. Transgenic pollen expressing *PrpS*, when grown "*in vitro*" with recombinant PrsS protein, elicits a remarkably similar response to that triggered in incompatible *Papaver* pollen (de Graaf et.al., 2012). Existing strategies to make F1 hybrids are expensive and time consuming, and SI may provide a way to reduce production costs. We are investigating whether it is possible to transfer functional SI to self-compatible barley. Barley has been transformed with PrpS-GFP and PrsS and these are being analysed. Preliminary experiments are testing if transgenic barley pollen expressing *PrpS*, when grown "*in vitro*" with recombinant PrsS protein, elicits actin alterations like the incompatible in *Papaver*. Preliminary data suggests that PrpS is functional in barley pollen, as F-actin foci were detected. Ultimately, pollinations with PrsS- and PrpS-expressing transgenic plants will allow us to examine if we can obtain functional SI *in vivo* in barley.