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Poster Abstract – D.52

APOMIXIS IN ST. JOHN'S WORT (*HYPERICUM PERFORATUM* L.): AN OVERVIEW ON RECENT FINDINGS

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In angiosperms, sexual reproduction is characterized by an alteration between clearly defined sporophytic and gametophytic generations. Differently from the common sexual behaviour, apomixis defines alternative reproductive strategies in which seeds are generated asexually without either meiotic reduction and fertilization in ovules. Apospory belongs the apomictic reproductive strategies and it is characterized by the development of one or more functional embryo sacs from somatic nucellar cells, known as the aposporous initial cells. In such a reproductive system, the unreduced egg cell develops parthenogenetically into an embryo and the endosperm can develop either autonomously or by fertilization dependent way (pseudogamy).

Recent studies suggest the adoption of *Hypericum perforatum* L. as a model species for this variant of gametophytic apomixis.

Great strengths aimed at elucidating the cytological and molecular basis of plant sporogenesis and gametogenesis have been performed and a number of mutants lacking various components of the embryo sac development have been identified in different model sexual species (*e.g.*, Arabidopsis and corn). Even so, a few data are available for the aposporous development in model apomicts, including *Hypericum perforatum*. Advances towards the comprehension of the aposporous apomictic pathway have been recently obtained following a two-steps approach: i) definition of the developmental window in which megasporogenesis and megagametogenesis occur as well as the aposporic initials take place into ovules; ii) cloning and studying the expression patterns of key genes, candidate to be part of the aposporic molecular machinery, during different developmental stages of ovules.

With respect to the cytohistological analyses, flowers from plants of known sexual and aposporic behaviour were harvested at different developmental stages and both sporogenesis and gametogenesis investigated by means of ovule whole mount microscopical observations. Sexual development pathways were studied and major recognisable steps related to morphological traits of flowers. The illegitimate reproductive pathway represented by Aposporous initials (AI) establishment and development were characterized and integrated within the reproductive model.

Concerning the molecular approach, three different genes: HpEMB2733-like, HpARIADNE and HpAPOSTART, were selected as candidates, cloned and the expression patterns assayed in reproductive organs. More in detail, EMB2733-like as well as APOSTART were previously found to be differentially expressed between aposporic and meiotic reproductive organs of *H. perforatum* and *Poa pratensis*, respectively. Similarly, a CAPS marker designed on a RING-finger gene (*i.e.*, HpARIADNE), was previously found to be in strong Linkage Disequilibrium with the apomixis trait and therefore selected for further investigations.

Overall results of ovule cytohistological investigations along with gene expression analyses are presented and critically discussed.