

DISSECTING THE ROLE OF PROLINE IN POLLEN DEVELOPMENT AND FERTILITY

MATTIOLI R.*, EL SHALL A.*, COSTANTINO P.*, FUNCK D.***, TROVATO M.*

*) Department of of Biology and Biotechnology, Sapienza University, P.le A. Moro 5, 00185 Rome (Italy)

**) Department. of Biology, University of Konstanz, Universitätsstraße 10, 78464 Konstanz (Germany)

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In addition to its well-established functions in protein synthesis and stress response, proline has been involved in several developmental processes in plants, such as flowering time, embryo development, fertilization and root growth. We recently showed that proline is required for pollen development and fertility in Arabidopsis, although the precise function of this amino acid is yet to be fully understood. As revealed by histological GUS analysis, *P5CS1* and *P5CS2*, the paralog genes encoding the most important enzyme for proline synthesis in plants, exhibit a strong expression in developing microspores and pollen grains but no consistent expression in surrounding sporophytic tissues, suggesting a primary role of proline synthesis in developing pollen grains. To validate these data we introgressed in a *p5cs1/p5cs1 p5cs2/P5CS2* background a wild type *P5CS2* gene under the control of either a pollen- or a tapetum-specific promoter to analyze the effect of proline synthesis in sporophytic and gametophytic tissues of the anther. Another developmental process proline is involved in is root growth, which we recently found to be modulated by proline through control of root meristem size and cell division in a hormone-independent manner. We are currently investigating the molecular and genetic mechanisms through which proline exert its effects on root meristem size as well as its metabolic implications with other developmental processes and bioactive molecules. In this communication we shall present preliminary data on the current state-of-the-art of proline biology, with particular attention the role of proline synthesis in pollen fertility and in root growth, and will discuss future perspectives.