Proceedings of the Joint Meeting AGI-SIBV-SIGA
Assisi, Italy – 19/22 September, 2011
ISBN **978-88-904570-2-9**

Poster Communication Abstract – 7.20

THE EXPRESSION OF A FUNGAL POLYGALACTURONASE CAUSES CELL WALL PECTIN MODIFICATION AND ALTERS PLANT GROWTH IN WHEAT

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Cell wall, homogalacturonan, Polygalacturonase, wheat development

Pectin is a major constituent of the primary cell wall of dicotyledonous plants and is composed mainly of homogalacturonan (HGA). This pectic polysaccharide consists of a linear homopolymer of 1,4-linked α-D-galacturonic acid (GalA) with a degree of polymerization of about 100 residues. Pectin is synthesized in the Golgi apparatus, secreted into the cell wall in a highly methyl esterified form and here de-esterified to varying degree in a spatial regulated manner by the activity of pectin methyl esterase (PME) under control of its inhibitor (PMEI). Differently from dicotyledonous plants, grass species contain a low level of pectin in their cell wall, however, recent evidences and the presence of a large number of genes encoding PME and PMEI in the model species *Oryza sativa* and *Brachypodium distachyon* suggests that pectin structure could play a relevant role in plant development and defense also in grass species.

In order to gain information on the role of pectin, and in particular of HGA, in wheat grow and development, we have specifically modified HGA in wheat transgenic plants by expressing the endopolygalacturonase II of *Aspergillus niger* (AnPGII). We obtained a limited number of transgenic wheat plants (*Triticum aestivum* cv Bobwhite and *T. durum* cv Svevo) and some of them showed a dwarf phenotype that was associated to AnPGII activity. The pollen grains of these plants showed an altered morphology and a reduced vitality. Immunodot analysis on cell wall pectin of the transgenic and control plants using monoclonal antibodies that recognize pectin epitopes with different methyl ester distribution revealed a lower level of PAM1-binding epitope on transgenic lines compared to WT, indicating a reduced level of long stretches of de-esterified pectin in the transgenic lines. A reduced level of LM19 binding epitopes was also detected on transgenic lines compared to the WT, indicating a low level of short contiguous unesterified GalA residues in the transgenic lines. These observations indicates that the de-esterified HGA is a crytical component in wheat growth.