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

Poster Communication Abstract – 7.19

ISOLATION AND CHARACTERIZATION OF XYLANASE INHIBITORS FROM CHROMOSOME GROUP 5 OF WHEAT

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Xylanase inhibitor protein, xylanases, wheat, transgenic plants, defence response

Cereals contain xylanase inhibitor proteins (XIs) which inhibit microbial xylanases from glycoside hydrolase families 10 and 11. In wheat, three types of XIs have been identified: *Triticum aestivum* XI (TAXI), xylanase inhibitor protein (XIP) and thaumatin-like XI (TLXI), and each of them is represented by a multiple number of genes. Several observations suggest that these inhibitors are important plant defence components. For example, XIs are effective against xylanases of microbial origin and not against plant xylanases. XIs share a significant sequence similarity with pathogenesis-related proteins (PR), are localized in the apoplastic region and are induced by wounding, jasmonic acid and pathogen infection. Moreover, the importance of xylaneses during pathogenesis has been demonstrated for the fungal pathogens *Botrytis cinerea* and *Septoria tritici*. Here we report the isolation and localization on chromosome group 5 of some XI genes. Moreover, to verify *in planta* the role of these XIs in wheat defence, we produced a number of transgenic plants over-expressing XipI, XipIII and TaxiIII. We are also attempting to silence TaxiIII and XipIII and a number of regenerated wheat plants have been obtained. The over-expression of XIs under control of the maize *Ubi-1* promoter endows wheat with the capacity to produce these inhibitor constitutively and through *in vitro* inhibition assays using total protein extract from transgenic tissue we demonstrated the capacity of the transgenic XI to retain the inhibition properties against fungal xylanases. The transgenic wheat plants are under investigation to verify their response to the fungal pathogens *Bipolaris sorokiniana* and *Fusarium graminearum*.