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

**Poster Communication Abstract – 5C.11**

# RHIZOSECRETION OF CELLULASES FOR BIOETHANOL PRODUCTION

MAGGIO C., BARTOLUCCI A., DORIA E., LONGONI P., CONCIA L., PANTALEONI L., CELLA R.

Department of Genetics and Microbiology "A. Buzzati Traverso", University of Pavia,
Via Ferrata 1, 27100 Pavia (Italy)

*Bioethanol, cellulases, rhizosecretion, hydroponic colture, Nicotiana tabacum*

The most common renewable fuel today is ethanol derived from corn grain (starch) and sugar cane (sucrose). It is expected that there will be limits to the supply of these raw materials in the near future, therefore lignocellulosic biomass is seen as an attractive feedstock for future supplies of ethanol. However cellulose is highly crystalline and compact making it very resistant to biological attack and much more difficult than starch to enzymatically degrade to fermentable sugars. Moreover the presence of non-glucose sugars in the feedstock complicates the fermentation process because conversion of pentose sugars into ethanol is less efficient than conversion of the hexose sugars. Consequently the cost of producing ethanol from biomass is higher than production from starch. In order to optimise the process the enzymes used for biomass hydrolysis must become more efficient and far less expensive.

Plants have been shown to be suitable for production of many recombinant proteins. Indeed, numerous recombinant proteins have been produced in various plant tissues and targeted to different subcellular compartments, such as cytoplasm, endoplasmic reticulum (ER), or apoplastic space. However, the extraction and purification of proteins from biochemically complex plant tissues is a laborious and expensive process and a major obstacle to large-scale protein manufacturing in plants. Root secretion can be successfully exploited for the continuous production of recombinant proteins in hydroponic coltures, in a process named "rhizosecretion."

Here we show the results obtained using tobacco plants transformed with genes encoding bacterial or fungal cellulases secreting enzymes in the apoplast and in the rhizosphere.