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

Poster Communication Abstract – 7.33

CHITOSAN-INDUCED CELL DEATH IN SYCAMORE CULTURED CELLS

CERANA R.*, CROSTI P.**, MALERBA M.**

*) Department of Environmental Sciences, University of Milano-Bicocca, Piazza della Scienza 1, 20126 Milano (Italy)
**) Department of Biotechnology and Biosciences, University of Milano-Bicocca, Piazza della Scienza 2, 20126 Milano (Italy)

Chitosan, programmed cell death, oxidative stress, Acer pseudoplatanus

Programmed cell death (PCD) plays a pivotal role in many developmental plant processes and in defense mechanisms against biotic and abiotic stresses. At least three different forms of PCD have been reported in plants: a "nuclear" (apoptotic-like) form, a "chloroplastic" form and a "vacuolar" form[1]. In plant cell cultures different stress conditions induce cell death that only in a fraction of the dead cells presents the typical morphological hallmarks of apoptosis, i.e. cell shrinkage, chromatin condensation, DNA fragmentation[2,3]. Recently, our attention has been focused on chitosan (CHT). CHT is a natural, non-toxic and inexpensive compound obtained by partial alkaline deacetylation of chitin, the main component of the exoskeleton of crustaceans and other arthropods as well as of the cell wall of many fungi[4]. Although the exact mode of action of CHT is still unknown, in agriculture it has been shown to be a versatile compound that controls numerous pre and postharvest diseases of various horticultural commodities[5]. In sycamore (*Acer pseudoplatanus* L.) cultured cells CHT rapidly induces a set of defense/stress responses that include accumulation of dead cells and of cells with fragmented DNA accompanied by release of cytochrome *c* from the mitochondrion[6]. In this work we further investigated the cell death process induced by CHT. In particular, we tested the capability of CHT to induce oxidative stress (superoxide anion and malondialdehyde production) and to increase the activity of caspase3-like proteases.

REFERENCES

1) Lam E (2004) Controlled cell death, plant survival and development. Nat Rev Mol Cell Biol 5:305–315.

2) Malerba M, Cerana R, Crosti P (2004) Comparison between the effects of fusicoccin, Tunicamycin, and Brefeldin A on programmed cell death of cultured sycamore (*Acer pseudoplatanus* L.) cells. Protoplasma 224:61–70.

3) Malerba M, Crosti P, Cerana R (2010) Effect of heat stress on actin cytoskeleton and endoplasmic reticulum of tobacco BY-2 cultured cells and its inhibition by Co^{2+}. Protoplasma 239:23–30.

4) Kurita K (2006) Chitin and chitosan: functional biopolymers from marine crustaceans. Mar Biotechnol 8:203–226.

5) Bautista-Baños S, Hernández-Lauzardo AN, Velázquez-del Valle MG, Hernández-López M, Ait Barka E, Bosquez-Molina E, Wilson CL (2006) Chitosan as a potential natural compound to control pre and postharvest diseases of horticultural commodities. Crop Prot 25: 105–118.

6) Malerba M, Crosti P, Cerana R (2011) Defense/stress responses activated by chitosan in sycamore cultured cells. Protoplasma DOI 10.1007/s00709-011-0264-7.