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Poster Abstract – C.08

ARE BIOLOGICAL CLOCK AND PHOTORECEPTORS INVOLVED IN THE REGULATION OF PEAR PATHOGEN RELATED GENES?

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Plants, fungi, animals and some bacteria have internal 24-hours clock. These "Circadian" rhythms regulate organism lives in many ways. Tòth et al. (2001) demonstrated that the circadian clock regulates promoter activity and/or mRNA accumulation of *PHYs* and *CRYs* genes, although in the meantime they play also an important role in the synchronisation of internal clock, working as zeitgeber molecules. Among the plethora of processes and pathways regulated by internal clock and photoreceptors Karpinski and collaborators (2003) has found that the salicylic acid (SA), which up-regulates the pathogen-related gene expression and accumulation of related protein is under control of light. In *A. thaliana phys* nil mutants have been confirmed that PR1 gene is under the control of photoreceptors (Genaud *et al.*, 2002), and recently, these regulation has been confirmed by the Yanovsky group (2006). Overexpressing *phyA* cherry plants showed an increase resistance to *Pseudomonas syringae* pv. mors-prunorum, suggesting a putative role of PHYA in the regulation of PRs genes (Cirvilleri *et al.* 2007).

The objectives of this research are to understand how the circadian clock and light quality, and related photoreceptors, affect the regulative system of pathogen-related gene expression. To evaluate if the internal clock autonomously regulates the abundance of PR1 and PR10 transcripts, an *in vitro*-cultured plantlets system of *Pyrus communis* L. cv Dar Gazi was used. Plantlets of three different lines: Dar Gazi-wt, Dar Gazi-*phyB* (transgenic plant overexpressing *phyB*) and Dar Gazi-*cryI* (transgenic plant overexpressing *cryI*) were submitted to different circadian experimental conditions, and continuous Blue-, Red- and Far-Red- light conditions. Fluorescent white light was used as a control.

Results show that PR10 is under circadian control, being highly expressed during dark period, while PR1 is expressed at low level ratio irrespective of dark/light period without clear evidence of circadian regulation. Under the same conditions the two photoreceptors play different but important roles. A complex regulation system is indicated in which there is a specific role for each photoreceptor under the relevant light quality. In this regulation framework the active form of phytochrome seems to play a clear promotive role in the expression of PR1, that is induced to be expressed at very high (from 5 to 15 times more) levels. An ultradian rhythm has been observed under photoperiodic condition indicating CRYI as possible zeitgeber. The overexpression of the photoreceptors drastically reduces the expression ratio of the PR 10 gene.

This work confirms that PR1 is photoregulated in pear tree and indicates a role for PHYB and CRYI. For the first time, the relationship between PR10, biological clock and photoreceptor has been studied and differentiated. Moreover, for the first time the relationship between PR1 and PR10

genes and light quality in woody fruit crop plants has been studied. Results will be discussed in relation to the expression of photoreceptors during photoperiodic conditions.