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“*Osmyb4*: a tool to improve biotic and abiotic stress tolerance in crops”

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ABSTRACT

The rice *Osmyb4* gene encode a R2/R3 Myb transcription factor involved in stress tolerance. Its expression in rice is induced by cold through the ABA independent pathway and by pathogens, through the salicylic and the jasmonic acid pathways. Its constitutive expression in transgenic Arabidopsis plants results, in the activation of more than 250 genes, many of them involved in both biotic and abiotic stress tolerance. Transgenic plants accumulate several metabolites known to be essential in stress responses (i.e. proline, sugars, alanine, glycine betaine, aromatic compounds) at higher concentration and at higher rate with respect to the WT. According to the molecular and biochemical results, we found that *Osmyb4* transgenic plants exhibit higher level of tolerance (compared to the wild type) to pathogen (virus, bacteria and fungi) and to abiotic stresses (cold, freezing, drought, salt, UV, ozone). Our data indicate the *Osmyb4* involvement as a major upstream factor in the coordination of the response to biotic and abiotic stresses (Vannini et al. 2004, Plant J., 37, 115-127; Vannini et al, in preparation).

The ability of the rice *Osmyb4* gene to confer a coherent phenotype in Arabidopsis, suggests that its action would be evolutionary conserved. This idea is supported by

our recent results in several crops, belonging to different families, namely maize, tomato, apple and *Osteospermum*.

We over expressed *Osmyb4* in rice, the original species, as well.

Preliminary data suggest that *Osmyb4* activate the stress response pathways also in crops, though the specificity of action seems to depend on the guest plant. For example, Myb4 ectopic expression differentially affects the level of several metabolites in the different crops. Moreover, high level of *Osmyb4* expression seems to be lethal in some of them. Nevertheless, it is of great interest (both theoretical and applicative) the Myb4-driven improvement in stress tolerance in all assayed species. Keywords: *Osmyb4*, transgenic plants, stress tolerance, crops