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BIOCHEMICAL AND PHYSIOLOGICAL EFFECTS OF *PSBS* GENE SILENCING BY RNAi IN *SOLANUM LYCOPERSICUM*

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Photosynthetic organisms convert light energy into chemical energy used in order to produce biomass. This special feature has been widely exploited by human beings for edible purposes, harvesting leaf tissues, seeds or fruits of several species, now intensively cultivated. Photosynthesis, however, brings as a side product the production of Reactive Oxygen Species (ROS) that can damage cell membranes (photoinhibition), especially when the light energy available is in excess, saturating the photosynthetic machinery. One of the major mechanisms developed by higher plants in order to reduce photoinhibition is the thermal dissipation of light energy absorbed by chlorophylls preventing energy transfer to oxygen and thus ROS formation. This mechanism, named Non-Photochemical Quenching (NPQ), in higher plants is strictly dependent on the presence of a Lhc (Light Harvesting Complex) -like protein, PsbS, which differently from other Lhc proteins does not bind pigments, but stimulates NPQ interacting with Photosystem II antenna proteins. This mechanism is very efficient, inducing thermal dissipation up to 80% of absorbed light even at moderate irradiance, suggesting that evolution lead higher plants to fully protect themselves at the expense of partial a loss of light energy conversion efficiency. Preliminary analysis conducted on an *Arabidopsis thaliana* mutant missing PsbS protein (npq4 mutant) indeed showed an increased growth at low light as compared to WT, suggesting that the deletion of this photoprotective mechanism might have an industrial application for plants cultivated in control conditions as in greenhouses, where the light can be artificially modulated. For example, the npq4 phenotype could be used to reduce the light energy needed for obtaining the same amount of biomass for tomato plants grown in greenhouses in northern countries, thus reducing the cost of cultivation. In this work, we produced different lines of *Solanum lycopersicum* transformed with a construct for RNA interference (RNAi) against the *psbS* gene. Here we report the physiological and biochemical characterization of two of these lines, one with complete absence of PsbS proteins, and one with a 30% protein left. Possibilities of industrial application of this mutation are discussed.