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A PALE GREEN BARLEY MUTANT TO INCREASE THE ALBEDO OF CULTIVATED AREAS AND AGRICULTURE SUSTAINABILITY

ROTASPERTI L.*, PERSELLO A.*, TORRICELLA V.*, TADINI L.*, ROSIGNOLI S.**, ROSSINI L.***, SALVI S.**, HORNER D. S.*, PESARESI P.*

*) Department of Biosciences, University of Milano, I-20133, Milano, Italy
**) Department. of Agricultural and Food Sciences, University of Bologna, I-40127 Bologna, Italy
***) Department of Agricultural and Environmental Sciences - Production, Landscape, Agroenergy, University of Milano, I-20133 Milan, Italy

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Photosynthesis is one of the most promising target to improve plant yield. The reduced antenna size of photosystems and the consequent reduction of leaf chlorophyll content (pale green phenotype), allow plants to perform better under different environmental conditions such as high-density cultivation and high light exposure. Furthermore, the increased albedo capacity reduces the temperature at canopy level, allowing a better water use efficiency and representing a possible solution to counteract global warming. The possibility to exploit the pale green trait to increase the efficiency of bifacial Agriphotovoltaic plants can be also taken into consideration.

Here, we report on the preliminary characterization of the pale green and highly photosynthetic efficient barley mutant TM-2490, isolated from the chemical mutagenized population TILLMore. Pigment analysis shows a significant reduction in chlorophyll-b and carotenoid content in TM-2490 leaves compared to the wild-type Morex variety, while immunoblot analyses show the reduction of specific antenna proteins of both photosystems.

An RNA-seq based strategy has been used to identify the causal mutation responsible for the pale green phenotype. Preliminary data on differential expressed genes and on candidate genes, whose mutations might be responsible for the reduced content of leaf chlorophyll, are provided,

together with a detailed biochemical and physiological characterization.

We are confident that our data will provide a contribution to the definition of a new generation of pale green crops that can increase the albedo of cultivated areas without any deleterious effect on yield, while maximizing the use of resources and the efficiency of the Agriphotovoltaic technology.