High photosynthesis efficiency can be achieved in chlorophyll *b*-less barley mutant *chlorina* 3613

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The ability of chlorophyll *b*-less barley mutant *chlorina* 3613 to adjust effectively to long-term low solar radiation was studied by shading plants to 800 μmol m^{-2} s^{-1} (40% from 2000-2500 μmol m^{-2} s^{-1} PAR measured at noon) for a week, followed by the restoration of natural radiation regime. The experiment started when plants were just after the beginning of tillering. Plants were grown in the field. Under the shading cover, the yellow-pale *chlorina* experimental plants turned bright-green while their chloroplast thylakoids, leaf and stem dimensions, vegetative and seed production changed significantly. By the 7th day after removal of the cover, the 2-fold increase of chlorophyll *a* content was accompanied by the 3-fold increase in CO_2 absorption (measured at saturating light) as compared to control plants, while no restoration of chlorophyll *b* synthesis occurred. This high efficiency of photosynthesis acquired in course of shading persisted in these plants until the end of vegetation. The experiment was carried out in 2006 and successfully reproduced in 2007 but failed to reproduce in cold and cloudy summer in 2008 showing that the results can be achieved only in a narrow range of light and temperature conditions. The conclusion is made that, upon such conditions, chlorophyll *b*-less plants can achieve the efficiency of photosynthesis similar to that in wild-type plants.

Typical for C_3 higher plant the photosynthesis efficiency can be achieved without chlorophyll *b* content (the experiment with barley mutant *chlorina* 3613)