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AGROBACTERIUM RHIZOGENES ROLB GENE IMPROVES PHOTOSYNTHESIS AND PHOTOPROTECTION UNDER FAR-RED LIGHT IN TRANSGENIC TOMATO PLANTS

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Previous work showed in tomato plants harbouring the *Agrobacterium rhizogenes rolB* gene overexpression of genes involved in chloroplast function and stress response, significant increase in non-photochemical quenching and chlorophyll *a* and *b* content, and reduced chlorophyll *a/b* ratio. The latter condition being typical of plant shade, where far-red is dominant, suggested a role for *rolB* in improving photosynthesis in such condition. To gain a better insight into these results, we evaluated the photosynthetic performance of transgenic and control plants after 6 days-exposure to a far-red-enriched light source by chlorophyll *a* fluorescence kinetics. Photosynthetic parameters were determined, as well as chlorophyll *a* and *b* content. Real-time PCR was also performed to quantify the expression level of some of the chloroplast-related genes already shown to be overexpressed in *rolB* plants.

Results showed in transgenic plants improved photochemical efficiency under far-red-enriched light regimen with respect to control plants. Photoprotection capability on the other hand was higher in r*olB* plants in both light conditions, but in far-red-enriched condition differences were prominent. Chlorophyll *a/b* ratio was decreased in transgenic plants under far-red-enriched light with respect to white light. Finally, qPCR showed that the expression of genes encoding chloroplast small heat shock protein, chlorophyll *a/b* binding protein and carbonic anhydrase was significantly induced by far-red-enriched condition.

Taken together, these data suggest the involvement of *rolB* in photosynthesis modulation under far-red-rich light in tomato, an adaptive behaviour similar to that of sciaphilous plants.