Heterologous Expression of Arabidopsis *rty* Enhances Drought Tolerance in Strawberry (*Fragaria × ananassa* Duch.)

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Abstract

Strawberry (*Fragaria × ananassa* Duch.) is an important fruit crop worldwide. Mutation of Arabidopsis thaliana *ROOTY* (*RTY*) results in increased endogenous auxin levels and root and shoot growth, but the effects of this gene in strawberry remain unclear. Here, we heterologously expressed Arabidopsis rty in strawberry plants and examined the effects of *rty* expression on the hormonal and physiological properties of the plants. Heterologous expression of rty induced IAA accumulation and increased the production of adventitious roots as well as trichomes on the abaxial leaf surface of the transgenic plants. Furthermore, the transgenic strawberry plants had increased ABA accumulation and stomatal closure. The transgenic strawberry plants exhibited enhanced water use efficiency and a reduced water loss rate. Additionally, peroxidase and catalase activities were significantly higher in the transgenic plants than in the untransformed controls, and the transgenic plants were more drought tolerant than the wild-type plants. Our results suggest that transgenic approaches can be used to overcome the inherent trade-off between plant growth and drought tolerance by enhancing water use efficiency and reducing water loss rate under water shortage conditions. This study provides the basis for future genetic modifications of strawberry to improve drought tolerance.

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