**Vacuolar Phosphate Transporter1 (VPT1) may transport sugar in response to soluble sugar status in different types of fruits**

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**Abstract**

Vacuolar Phosphate Transporter1 (VPT1)-mediated phosphate uptake in the vacuoles is essential to plant development and fruit ripening. Interestingly, here we find that the VPT1 may transport sugar in response to soluble sugar status of fruits.

The VvVPT1 protein isolated from grape (*Vitis vinifera*) berries was tonoplast-localized and contains SPX (Syg1/Pho81/XPR1) and MFS (major facilitator superfamily) domains. Its mRNA expression was significantly increased during fruit ripening and induced by sucrose. Functional analyses based on transient transgenic systems in grape berry showed that VvVPT1 positively regulated berry ripening and significantly affected hexose contents, fruit firmness, and ripening-related gene expression.

The VPT1 proteins (grape VvVPT1, strawberry FaVPT1, and Arabidopsis AtVPT1) all showed low affinity for phosphate verified in yeast system, while they appear different in sugar transport capacity, consistent with fruit sugar status. Recently, we found that the sugar transport capacity of VvVPT1 and FaVPT1 depended on the SPX domain and Glu 522 in MFS domain.

Thus, our findings reveal a role for VPT1 in fruit ripening, associated to its SPX and MFS

domains in direct transport of soluble sugar available into the vacuole, and open potential avenues for genetic improvement in fleshy fruit.