How do phytohormones regulate nitrate transport in apple?

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Apple (Malus domestica) is an economically important fruit tree that is extensively planted worldwide. Nitrogen is the most important nutrient for crop productivity; effective nitrogen utilization is the key to high

plant yields in agricultural production, but full absorption of soil nitrogen by plants can be a challenge. Nutrient absorption and utilization are very important for apple growth, and a lack of sufficient nitrogen can affect flowering time, yield, and fruit quality. Therefore, research aimed at increasing nitrogen absorption efficiency is important for apple quality improvement.

Various hormonal signals affect plant nitrate content. Abscisic acid (ABA) has been shown to participate in nitrate signaling in Arabidopsis, and other findings have demonstrated that there is some correlation between ABA and nitrate. Nonetheless, the underlying mechanism that links ABA and nitrate transport in apple remains largely unknown.

Recently, a group of plant scientists discovered a new mechanism by which ABA inhibits the transport of nitrate from roots to shoots in apple. The transcription of the nitrate transporter MdNRT1.5/MdNPF7.3 was markedly reduced at the transcriptional level by ABA, thereby inhibiting the transport of nitrate from roots to shoots. The ABA-responsive transcription factor MdABI5 was found to bind directly to the ABRE recognition site in the MdNRT1.5 promoter, suppressing its expression. By treating MdABI5-overexpressing Arabidopsis seedlings and apple seedlings with and without ABA, the research team found that MdABI5 overexpression inhibited the ABA-mediated transport of nitrate from roots to shoots. This research was published in *Horticulture Research*, and all authors are from Shandong Agricultural University in China.

"In brief, these results indicate that MdABI5 regulates root-to-shoot transport of nitrate by modulating the expression of MdNRT1.5, illuminating the molecular mechanism by which ABA regulates nitrate transport in apples," said Xiaofei Wang, who is an Assistant Professor at the State Key Laboratory of Crop Biology. "Our findings provide new insight into the molecular mechanism by which ABA regulates nitrate transport in apple." More broadly, these results will help us to further

understand and integrate N partitioning processes with source and sink physiology and select the most promising candidates for optimized productivity and efficient nitrate usage.

More information: Ya-Jing Liu et al, The MdABI5 transcription factor interacts with the MdNRT1.5/MdNPF7.3 promoter to fine-tune nitrate transport from roots to shoots in apple, *Horticulture Research* (2021). DOI: 10.1038/s41438-021-00667-z

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