Additional amphivasal bundles in pedicel pith exacerbate central fruit dominance and induce self-thinning of lateral fruitlets in apple

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Résumé en anglais	Apple (Malus x domestica) trees naturally produce an excess of fruitlets that negatively affect the commercial value of fruits brought to maturity, and impact their capacity to develop flower buds the following season. Therefore, chemical thinning has become an important cultural practice allowing the selective removal of unwanted fruitlets. As the public pressure to limit the use of chemical agents increases, the control of thinning becomes a major issue. Here, we characterized the self-thinning capacity of an apple hybrid-genotype, from a tree scale to a molecular level. Additional amphivasal vascular bundles were identified in the pith of pedicels supporting the fruitlets with the lowest abscission potential (central fruitlet), indicating that these bundles might have a role in the acquisition of dominance over lateral fruitlets. Sugar content analysis revealed that central fruitlets were better supplied in sorbitol than laterals'. Transcriptomic profiles allowed us to identify genes potentially involved in the over-production of vascular tissues in central pedicels. In addition, histological and transcriptomic data permitted a detailed characterization of abscission zone (AZ) development and the identification of key genes involved in this process. Our data confirm the major role of ethylene, auxin, and cell wall remodeling enzymes in AZ formation. The shedding process in this hybrid appears to be triggered by a naturally exacerbated dominance of central fruitlets over lateral ones, brought about by an increased supply of sugars, possibly through additional amphivasal vascular bundles. The characterization of this genotype opens new perspectives for the selection of elite apple cultivars.
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