

Gibberellins are essential for cucumber female flower development

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Gibberellins (GAs) are hormones that play a central role for plant growth and development. The contribution of GAs for male and bisexual flower development is well studied. The stamen is the main source of bioactive GAs necessary for the development of the floral organs. However, little is known about the contribution of GAs for female flower development. Detailed analysis of endogenous GAs and transcript levels of GA signalling genes revealed that GAs are highly regulated during cucumber female flower development. But, unlike male flowers, our results suggest that cucumber female flowers produce mainly the biological inactive precursor GA₉ in ovaries that moves to petals and sepals where it is further converted to bioactive GA₄. To verify our hypothesis, deuterated GAs were injected into ovaries. Deuterated GA₉ is translocated from ovaries to petal/sepal tissues. To confirm the importance of ovary derived GA₉ for flower development, a catabolic GA 2-oxidase from pumpkin (CmGA2ox1) was expressed transiently in cucumber ovaries. This approach reduced the levels of precursor GA₉ and bioactive GA₄ significantly and flower development was arrested completely but could be restored by application of deuterated GA₉ to the petals. Altogether, our results suggest that ovary derived GA₉ is sufficient for cucumber female flower development. Since bioactive GAs can promote sex reversion of female flowers is now tempting to speculate that movement of a biological inactive precursor, instead of the hormone itself, might help female sex maintenance.