

## Interplay between cytokinin signaling and autophagy in regulating plant development

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### Abstract:

Plants respond to biotic and abiotic changes in their environment through several cellular processes, most of which are regulated by phytohormones. One such process is autophagy, the starvation-induced, vacuolar degradation of cytoplasmic components and organelles. Through a combination of genetic, *in vivo* imaging and immunoblot assays, we show that plants regulate their growth and development by integrating cytokinin signaling with autophagy, and propose that the mechanism for this integration proceeds through the degradation of *type-A Response Regulators* (ARRs), a negative regulator of CK response. Specifically, members of the EXOCYST SUBUNIT EXO70 (EXO70D) protein family interact with ARR in a phospho-Aspartate dependent manner. Consequently, the EXO70D-ARR interaction targets the ARR to the autophagy pathway via the interaction of EXO70D with ATG8, a ubiquitin-like protein directing autophagic vesicle formation. Accordingly, trafficking of ARR into autophagic vesicles is compromised in *exo70D* triple mutants, resulting in the accumulation of ARR proteins, and a corresponding decrease in cytokinin response. Furthermore, plants disrupted in ARR are compromised in their ability to undergo autophagy during carbon starvation. Thus, we propose a model where autophagy regulates cytokinin-mediated plant processes through the EXO70D-dependent turnover of ARRs, which in turn, enhances autophagy during nutrient starvation.