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CYTOKININ-MEDIATED LEAF LONGEVITY CONTROL BY PHOSPHORELAY OF AHK3 TO ARR2 IN *ARABIDOPSIS*

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The longevity of plant organs is limited by senescence. Cytokinins have long been known as anti-senescence plant hormones.However, molecular mechanisms underlying cytokinin-mediated leaf longevity control are largely unknown. Here we identified an *Arabidopsis* mutant, *ore12-1*, that has increased leaf longevity due to a gain-of-function mutation in AHK3, a histidine kinase cytokinin receptor. A loss-of-function mutant had a reduced sensitivity to cytokinin in delaying leaf senescence. We further found that, among three *Arabidopsis*cytokinin receptors, AHK3 plays a major role in leaf longevity control. In mature leaf cells, AHK3 led phosphorylation on a conserved Asp residue of ARR2, a response regulator, in a cytokinin-dependent manner. Furthermore, wild type but not an unphosphorylatable mutant ARR2 led to increased leaf longevity in transgenic plants. Thus, the phosphorelay cascade from AHK3 to ARR2 positively controls cytokinin-mediated leaf longevity.