Title Changes in ultrastructure, protease and caspase-like activities during flower senescence in *Lilium longiflorum*

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Abstract

The last phase of flower development is senescence during which nutrients are recycled to developing tissues. The ultimate fate of petal cells is cell death. In this study we used the ethylene-insensitive *Lilium longiflorum* as a model system to characterize Lily flower senescence from the physiological, biochemical and ultrastructural point of view. Lily flower senescence is highly predictable: it starts three days after flower opening, before visible signs of wilting, and ends with the complete wilting of the corolla within 10 days. The earliest events in *L. longiflorum*senescence include a fall in fresh and dry weight, fragmentation of nuclear DNA and cellular disruption. Mesophyll cell degradation is associated with vacuole permeabilization and rupture. Protein degradation starts later, coincident with the first visible signs of tepal senescence. A fall in total protein is accompanied by a rise in total proteases, and also by a rise of three classes of caspase-like activity with activities against YVAD, DEVD and VEID. The timing of the appearance of these caspase-like activities argues against their involvement in the regulation of the early stages of senescence, but their possible role in the regulation of the final stages of senescence and cell death is discussed.