

Kanjana Kirasak 2010: Programmed Cell Death of **Dendrobium** Orchid Flowers Induced by Ethylene during Senescence. Doctor of Philosophy (Postharvest Technology), Major Field: Postharvest Technology, Interdisciplinary Graduate Program. Thesis Advisor: Professor Saichol Ketsa, Ph.D. 155 pages.

Flowers of **Dendrobium** cvs. Lucky Duan, Red Bomjo, Missteen, Sakura, Tuptim and Sanan White were treated with 0.1-1.0 $\mu\text{L/L}$ ethylene for 24 hours at 25 °C (80% RH). It was found that flower cv. Lucky Duan was more sensitive to ethylene than flower cv. Red Bomjo. However, 1-MCP (1-methylcyclopropene) completely inhibited senescence of 'Lucky Daun' flowers induced by ethylene treatment. 'Lucky Duan' flowers started to show mesophyll layers of petals collapsed. However, epidermal layers of ethylene-treated flowers still showed a normal shape after ethylene treatment investigated under LM and this was confirmed by SEM study. Under TEM study showed that ethylene treatment resulted in thin cell walls and cell membrane separated from cell wall after ethylene treatment. Ethylene treatment also resulted in enlarged vacuoles and disorganized mitochondria followed by disappearance of ribosomes and endoplasmic reticulum. Nucleus showed chromatin condensed and nuclear envelope collapsed. There were more multivesicular bodies and myelin bodies. In addition, mitochondria had swollen and some of which showed internal degeneration. These granules were used as an indicator of still later stages of mitochondrial development in these cells. The apparent final stage of mitochondrial degeneration was a single-membrane-bound vesicle, resembling a vacuole. Some of these mitochondria showed high electron-density. While that plastids engulfed portions of the cytoplasm. Initial evidence rather suggested the formation of vacuoles from plastids. Taken together, the data strongly indicated that plastids can act both as autophagosomes and autolysosomes. DNase activity increased after ethylene treatment and increased again on the last day, DNA fragmentation of the ethylene-treated appeared smear after treatment and decreased to the most on last day.

Student's signature

Thesis Advisor's signature