Indentification of Native *Phalaenopsis* Photosynthetic Characteristics

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Abstract

With regards to *phalaenopsis Aphrodite* subsp. Formosana., its seeding, medium, and adult are obligate CAM plants. Its bottle seedlings are C_3-CAM plants.The stomatal distribution of the adaxial epidermis and of the abaxial epidermis are obviously different. The stomatal density of the former is 2.8±0.9/mm^2 , and the stomatal density of the latter is 26.2± 3.6 mm^{-2}. The stomatal frequency on both side differ about one to ten. The stoma opening of *Aphrodite* subsp. Formosana. is different from general C_3 and C_4 plants, it is open in night. The stomata are closed from 10 am to 6 pm and keep opened to10 o'clock in the next morning. The stomata of the adaxial epidermis are 100% opened at 2 am, and the pore size is about 3.87 μm. The stomata of the abaxial epidermis are 100% opened at 8pm and 4am. The pore size of the lower epidermis opening at 8pm. is 4.06 μm, and pore size of the ones opening at 2am is 4.59 μm The stomata open to stabilize CO_2 at night and close to photosynthesize in the morning.

The photosynthetic light saturation point of the five-years old of *Aphrodite* subsp. Formosana. is 400 μmolm^{-2}s^{-1}. The CO_2 fixation diel rate is 0.16 μmo1m^{-2}s^{-1}. The photosynthesis of *Aphrodite* subsp. Formosana，has typical alteration of diurnal rhythm. The dark period begins from 6 pm to 6 am the next day, and it is the main period for CO_2 fixation. At 2 am, the CO_2 assimilation reaches 3.2 μmolm^{-2}s^{-1} ，and stomatal conductance keep at 0.54~0.56 mmolm^{-2}s^{-1}. At 6 am,the CO_2 assimilation decrease to-0.03 μmo1^{-2}s^{-1},and the stomatal conductance reaches its highest, 0.88 μmolm^{-2}s^{-1}, About the bottle seedlings of phalaenopsis, their $\delta^{13}C$ is-19.5‰~21.4‰ and is belong to C_3-CAM plants. PEPC is enzyme activity 0.118 μmolhr^{-1}mg^{-1} protein in daytime and 0.018 μmo1·hr^{-1}mg^{-1} protein at nighttime. However, the activity of Rubisco is 0.033 μmolhr^{-1}mg^{-1} protein in nighttime and is

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higher than daytime 0.014 μmolhr^{-1}mg^{-1}. The δ^{13}C of the small, medium, and large seedlings is-13.2‰,and -12.4‰, respectively.They belong to CAM type, whose PEPC enzyme activity is high at night.The δ^{13}C of petals of *Aphrodite* subsp. Formosana is-13.5‰ ,belongs to CAM type, too.

Key words: Native phalaenopsis, Carbon metabolism, stomatal movement PEPcarboxylase, Rubisco,Tatal acid content,Crassulaecean Acid Matabolism.