Growth and Flowering Responses in Kalanchoe blossfeldiana under Different CO$_2$ Concentration and Daylength

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Kalanchoe is short-day flowering plant and most performed CAM photosynthesis that absorbs CO$_2$ at nighttime. Increasing atmospheric CO$_2$ concentration at nighttime can enhanced leaf growth and flowering quality in CAM patterned flowering plants. Our objective was to identify leaf growth and flowering in *Kalanchoe blossfeldiana* 'Lion' and 'Calanday Rudak 'Fikalrudak' under 400 and 800 µmol·mol$^{-1}$ CO$_2$ with different daylength; 8 h (08:00‒16:00 HR), 12 h (06:00‒18:00 HR), 16 h (04:00‒20:00 HR). At 55 days after treatment, the number of nodes increased under 800 µmol·mol$^{-1}$ CO$_2$ than those under 400 µmol·mol$^{-1}$ CO$_2$ in both *K. 'Lion'* and 'Fikalrudak', regardless of daylength. Length and width of immature leaf under 800 µmol·mol$^{-1}$ CO$_2$ with 12 h was the largest among the treatments in *K. 'Lion*', however, it was not significantly affected by CO$_2$ concentration and daylength in *K. 'Fikalrudak'*. Flowering was fastened in the plants with 12 h than those with 8 h and 16 h, regardless of CO$_2$ concentrations in *K. 'Lion'*. By comparing CO$_2$ concentrations, flowering in the plants with 12 h fastened more under 400 µmol·mol$^{-1}$ CO$_2$ than those under 800 µmol·mol$^{-1}$ CO$_2$. In *K. 'Fikalrudak'*, flowering only appeared in the plants with 8 h in both 400 and 800 µmol·mol$^{-1}$ CO$_2$ and time to flower was not significantly different between 400 and 800 µmol·mol$^{-1}$ CO$_2$. In *K. 'Lion'* the time was not significantly different by CO$_2$ concentration and daylength, however, it was decreased under 800 µmol·mol$^{-1}$ CO$_2$ than those under 400 µmol·mol$^{-1}$ CO$_2$. Elevated CO$_2$ of 800 µmol·mol$^{-1}$ CO$_2$ enhanced respiratory growth in *K. blossfeldiana* cultivars, however, flowering delayed and quality decreased under elevated CO$_2$. If we use CO$_2$ enrichment in *Kalanchoe blossfeldiana* cultivar to reduce CO$_2$ emitted by burning in the nighttime, appropriate CO$_2$ concentration and enriched duration should be considered. (This work was carried out with a grant (NRF-2018R1A2B6007834) from National Research Foundation of Korea.)

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