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## Morpho-physiological Response of Common Buckwheat (*Fagopyrum esculentum*) to Flooding Stress at Early Growth Stage

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### [Introduction]

Buckwheat is the 12<sup>th</sup> largest producer of major food crops, including maize, rice wheat, and barley. Regarding global warming, the types of precipitation are fluctuating, and much of the precipitation is expected to fall in the form of heavy rain. Flooding is one of the major abiotic stress which account for considerable growth damage of upland crop. The purpose of this study to find out the suitable growth stage caused by the flooding stress in Buckwheat.

### [Materials and Methods]

The common buckwheat (*Fagopyrum esculentum* cv. Harunoibuki) used in this study were collected from the Laboratory of Tropical Science at Kagoshima University in Japan. The seeds were grown in controlled conditions (25°C, 12 h day/12 h night, and 100-200  $\mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$  light intensity). The seedlings were exposed to flooding stress with 5 cm of water depth for 1-day, 3-days, 5-days and 7days at early growth stage. The samples were collected from control, after 1-day, 3-days, 5-days, 7-days and 4-days of recovery. The plant height, SPAD, chlorophyll fluorescence, photosynthetic, aerenchyma were measured.

### [Results and Discussion]

SPAD value, chlorophyll fluorescence, photosynthesis rate, conductance, intercellular CO<sub>2</sub> concentration and transpiration rate were significantly ( $p < 0.01$ ) affected at after 3-days under flooding stress. The most significant reduction in photosynthetic after 7-day of flooding stress at early growth stage followed by 5.01  $\mu\text{mol CO}_2\text{m}^{-2}\text{s}^{-1}$ , 0.06  $\text{mol H}_2\text{O m}^{-2}\text{s}^{-1}$ , 104.17  $\mu\text{mol CO}_2\text{mol}^{-1}$ , and 1.18  $\text{mmol H}_2\text{O m}^{-2}\text{s}^{-1}$  of photosynthesis rate, conductance, intercellular CO<sub>2</sub> concentration and transpiration rate. Also, the most significant reduction in SPAD value was observed after 7-days of flooding stress at early growth stage followed by 19.06 respectively. However, chlorophyll fluorescence showed the significant changes i.e. 0.57 Fv/Fm after 7-days under flooding stress at early growth stage. Furthermore, no aerenchyma was observed under flooding stress in Buckwheat. Taken together, the findings concluded that early growth stage was more sensitive regarding physiological characteristics after 7-days under flooding stress in Harunoibuki of Buckwheat.

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