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Morpho-physiological Response of Common Buckwheat (*Fagopyrum esculentum*) to Flooding Stress

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[Introduction]

Flooding is one of the major abiotic stresses which account for considerable damage to plant growth and development. Flooding induces several morphological and physiological changes in many plants, including common buckwheat which sensitive to flooding. This study aimed to investigate the effects of flooding stress during various developmental stages of common buckwheat (*Fagopyrum esculentum* cv. Harunoibuki).

[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 germinated in controlled conditions (25 °C, 12 h day/12 h night, and 150 $\mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$ light intensity). The seedlings were exposed to flooding stress with 5 cm of water depth for 3-days at early growth stage (ES), maximum vegetative stage (MS), and flowering stage (FS). The samples were collected from control, after 1-day, 2-days, 3-days and 4-days of recovery. The plant height, SPAD, chlorophyll fluorescence, root traits (length, surface area and volume), aerenchyma and dry weight were measured.

[Results and Discussion]

In the present study, flooding caused dramatic changes in the plant height, chlorophyll content and root morphology. SPAD value and chlorophyll fluorescence of both were significantly ($p<0.01$) affected at ES, MS, FS under flooding stress. The most significant reduction in SPAD value at ES followed by 40.7 and 41.5 at MS and FS respectively. In chlorophyll fluorescence showed the significant changes i.e. 0.73 Fv/Fm in ES followed by 0.80 Fv/Fm in MS and FS under flooding stress. Also, parameters of the root were significantly ($p<0.01$) affected at ES, MS, FS under flooding stress. Flooding affected root length, surface area and volume after 2-days in ES under flooding stress. Root (length, surface area, volume) caused serious damage under flooding stress. No aerenchyma was found in Buckwheat, however, flooding stress enhanced adventitious roots substantially. The findings concluded that early growth stage was more sensitive regarding physiological characteristics under flooding stress in Harunoibuki of Buckwheat.

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