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A Survey of Woody Tropical Species for Boron Retranslocation

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Abstract: The mobility in phloem of boron (B) has been reported to vary among plant species. Boron is phloem immobile in many species and completely mobile in others. Recent reports regarding phloem B mobility or immobility only considered temperate plants, and there is no information on tropical species. Information of phloem B mobility is useful for improving the diagnosis of B deficiency and management of B status in crop production. This study aimed to survey tropical species for their B mobility. Leaf samples of 17 species, including cashew (*Anacardium occidentale* L.), mango (*Mangifera indica* L.), custard apple (*Annona squamosa* L.), papaya (*Carica papaya* L.), cassava (*Manihot esculenta* Crantz.), Indian walnut (*Samanea samen* (Jacq.) Marrill.), cork wood tree (*Sesbania grandiflora* (L.) Pers.), tamarind (*Tamarindus indica* L.), jackfruit (*Artocarpus heterophyllus* Lamk.), guava (*Psidium guajava* L.), star fruit (*Averrhoa carambola* L.), passion fruit (*Passiflora edulis* Sims.), coffee (*Coffea arabica* L.), lime (*Citrus aurantifolia* Swingle.), longan (*Euphoria longana* Lam.), lychee (*Lychi chinensis* Sonn.) and teak (*Tectona grandis* L.) were collected in the position of the youngest fully expanded leaf (YFEL), the middle leaf age of a branch (ML) and the oldest leaf (OL). Based on a premise that the nutrient concentration gradient between young and old leaves will be steeper in those species in which B is immobile, B concentration in the different leaf positions was examined in comparison with calcium (Ca is phloem immobile) and potassium (K is phloem mobile). Concentrations of K in all leaf types were not significantly different or decreased with leaf age, while Ca concentrations were always higher in the older leaves. Three species; tamarind, guava and teak, showed concentration gradients of B that were

similar to K. The results suggested that B may be retranslocated from older to younger leaves of these species, hence indicating that B may be phloem mobile in these species. However, this hypothesis needs confirmation through studies examining retranslocation of B using ^{10}B isotope or identification of B-complexing molecules in the phloem, e.g. sugar alcohols.

Keywords: Boron, Phloem mobility, Retranslocation, Tropical species

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