

Maize benzoxazinoid exudation in soil follows a diurnal rhythm

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Abstract:

Root exudation of specialized metabolites is a dynamic process that shapes soil properties, plant nutrition, and plant interactions with soil organisms and other plants. While the pivotal roles of root exudates are increasingly acknowledged, the factors that modulate their release remain poorly understood. Here, we characterized the diurnal exudation of the maize specialized metabolites, benzoxazinoids (BXs). BX exudation increased over daytime and decreased during nighttime. The release of DIMBOA-Glc and of DIM₂BOA-Glc respectively reached at 6.2 and 2 ug/cm 14 hours after sunrise and decreased to levels below 1.2 ug/cm at night. HDMBOA-Glc exudation rapidly increased to 1.5 ug/cm after sunrise and remained rather constant over daytime, before dropping 15-fold at night. To investigate whether these patterns were modulated by light or by the plant circadian rhythm, we exposed the plants to extended darkness for 12 hours. Preliminary data suggest that BX exudation is mostly modulated by light but should be further confirmed. Understanding exudate patterns and their regulation is critical to better grasp plant-environment interactions at the root-soil interface.