

Fecal contamination of food: benefits to the herbivore?

Abstract:

Maize, a major crop worldwide, incurs 32% loss in production due to insect pests and pathogens. Among these insect pests, fall armyworm (FAW, *Spodoptera frugiperda*) is a major threat in the United States and Latin America. Feeding by caterpillars is known to induce plant defenses in maize and other species. We examined plant defense gene expression in response to another behavior of caterpillars on plants, their defecation. FAW are voracious eaters and their frass is composed of molecules derived from the host plant, the insect itself and associated microbes. FAW feeds in enclosed maize whorl where it deposits frass on the feeding sites, contaminating its food. Elicitors of plant defense in frass could trigger defenses even after caterpillars pupate and emerge as moths. We observed that FAW frass application to maize leaves initially induced expression of caterpillar defense genes; however, pathogenesis-related (*pr*) defense genes were induced as the time after application increased. Some insects are known to suppress herbivore defenses by increasing the expression of *pr* genes thereby increasing herbivore fitness on the plant. Preliminary experiments strongly suggest that frass contains proteinaceous effectors that can modify plant defenses. The goal of this study is to identify and characterize these proteins.