

Insect-produced Elicitors, Fatty Acid Amino Acid Conjugates: Insights from Physiological Point of View

Naoki Mori and Naoko Yoshinaga

Applied Life Sciences, Graduate School of Agriculture, Kyoto University, Sakyo, Kyoto
606-8502, Japan

Fatty acid-amino acid conjugates (FACs), first identified from beet armyworm *Spodoptera exigua* larvae (Alborn et al., 1997), have been found in noctuid as well as sphingid caterpillar oral secretions and especially volicitin [*N*-(17-hydroxy-linolenoyl)-L-glutamine, 17OH-volicitin] and its biochemical precursor, *N*-linolenoyl-L-glutamine, are known elicitors of induced volatile emissions in corn plants. We conducted FAC screening of 29 lepidopteran species and found FACs in 19 of these species (Yoshinaga & Mori et al., 2010). Thus, FACs are quite commonly synthesized through a broad range of lepidopteran caterpillars. From an evolutionary perspective, it is presumed that volicitin and the other FACs, although consequently unfavorable to the insect in the plant-herbivore interactions, are produced because they are essential part of the primary metabolism of the insects. In this context, we suggested that FACs in *Spodoptera litura* play an active role in nitrogen assimilation by regulating the amount of glutamine in the larval midgut (Yoshinaga & Mori et al., 2008). The benefits of the physiological function of FACs for the herbivores need to outweigh the costs caused by induction of plant defense

Key words: Fatty acid-amino acid conjugates, *Spodoptera exigua*, volicitin, nitrogen assimilation

Fungal Interaction with Insects

Young Woon Lim

School of Biological Sciences, Seoul National University

Fungi are characterized by eukaryotic microorganisms, growth with hyphal or yeast form, cell wall containing chitin, and both sexual and asexual reproduction. Many of fungi are associated with insects through the two ways: good or bad things. Good thing may include insect vector for fungal propagation and bad thing include entomophagous fungi to stink bug. Many specific examples of coevolution between fungi and insects have been recorded. Fungi provide the nutrients to insects while insects may vector them. Bark beetles are known as fungal vector as they bore through the tree bark to lay their eggs. Good example is the blue stain fungus *Ophiostoma novo-ulmi* causing the Dutch Elm disease, which is spread by Elm bark beetles (*Scolytus* spp.). Several bark beetles associated with coniferous forests also vector pathogenic fungi and decay fungi as well. In case study of the mountain pine beetle (MPB, *Dendroctonus ponderosae* Hopkins) that is a serious threat for mature lodgepole, we showed diversity of fungi associated on their body surface. Based on cultural morphology and sequence analysis of the internal transcribed spacer (ITS) and large subunit ribosomal DNA (LSU rDNA) region, 7 ascomycetes and 2 basidiomycetes were detected on the body surface. 14 ascomycetes and 1 basidiomycetes were represented in the ITS clone libraries. Recently NGS based Amplicon pyrosequencing discovered that much higher fungal diversity (191 OTU with 97% similarity) from MBP exterior.

Key words: bark beetle, coevolution, fungal interaction, fungal propagation, pyrosequencing