Metabolomics: Identification of inducible bioactive plant metabolites

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Hypothesis:
Metabolites that are strongly induced during plant defense are probably important.
GC/MS-based metabolic profiling reveals unknown terpenoids in maize afflicted with insects and/or pathogens.

Acidic diterpenoids

Acidic sesquiterpenoids

Ostrinia nubialis

Fusarium oxysporum

steric acid
An unknown phloem amino acid is induced by aphid feeding on Arabidopsis

Red = uninduced
Black = induced

HPLC-MS, NMR, and \textit{de novo} synthesis show:

$N^\delta$-acetylornithine

Adio et al, 2011, Plant Cell
nata1 mutant completely lacks $N^\delta$-acyetylornithine

N$^\delta$-acyetylornithine after elicitation

<table>
<thead>
<tr>
<th>nmol/mg fresh leaves</th>
<th>wildtype</th>
<th>nata1 mutant</th>
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NATA1: GCN5-related N-acetyltransferase

*P < 0.05, t-test

Adio et al, 2011, Plant Cell
Transient \textit{NATA1} expression in tobacco reduces aphid reproduction

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure.png}
\caption{\textit{NATA1} transient expression on \textit{Myzus persicae} on tobacco.}
\end{figure}

\*P < 0.05, t-test mean +/- s.e.

Adio et al, 2011, Plant Cell
Maize has insect-inducible non-protein amino acids

What is this?

BLACK: amino acid standards
BLUE: B73 control
GREEN: B73 elicited

Jian Yan
People who are doing the work

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