

 Screening for mutant lines 	
	Two independent transposon insertion lines
	(UFMu-11424 and UFMu-02640) generated
UFMU-11414	UFMU-02640
5'	IAA-Amidosynthase Gene 3
 Global metabolomics analysis 	
lacksquare	Three Spodoptera exigua were placed on the
	3rd leaf of IAA-amidosynthase knockdown and
	WT plants and allowed to feed for 5h
lacksquare	Herbivore induced leaves were collected in
	liquid nitrogen
ullet	Metabolites were extracted using 1:2:1
	chloroform:methanol:water
	LC-MS-based metabolomic analysis
• Caterpillar Performance	
•	Five-day old, size matched neonates of <i>S. exigua</i>
	were placed on 3wk-old W22 and mutant plants
	and allowed to feed for 5 days (1/plant)
ullet	Larvae were recovered and weighed

Metabolomics Induction

Caterpillar Performance

Ghorbel, M., Brini, F., Sharma, A. et al. Role of jasmonic acid in plants: the molecular point of view. Plant Cell Rep (2021). https://doi.org/10.1007/s00299-021-02687-4

Woldemariam MG, Onkokesung N, Baldwin IT, Galis I. Jasmonoyl-L-isoleucine hydrolase 1 (JIH1) regulates jasmonoyl-L-isoleucine levels and attenuates plant defenses against herbivores. Plant J. 2012 Dec;72(5):758-67. doi: 10.1111/j.1365-313X.2012.05117.x. Epub 2012 Oct 15. PMID: 22860609.



Metabolomic changes due to herbivory were greater for the wildtype (W22) and the UFMU-11424 insertion line than for the UFMU-02640 insertion line (Figure 1).

> Likely indicative of knockdown in defense pathway, as the UFMU-02640 insertion line did not react as greatly to herbivory as the other two lines.

BOYCE

THOMPSON

UFMU-11424 showed some inducibility but is still different from the W22 herbivory condition.

W22 shows inducibility by *S. exigua*. While insertion lines show inducibility, their general metabolomic differences are still very different from the W22 herbivory condition (Figure

Heatmap correctly differentiated W22 groups across herbivore conditions but could not for the insertion lines (Figure 3).

Heatmap shows that some genes were upregulated in the wildtype (W22) in response to herbivory that were not upregulated in insertion lines (UFMU-11424 and UFMU-02640) (Figure 3).

Shows that proteins normally upregulated significantly in defense are incapable of such upregulation without IAA-amidosynthase.

No significant difference was observed in caterpillar performance trials (Figure 4).

Specialist herbivores may not be affected by small changes in defense metabolomics.

Conclusion/Future Direction

Conclusion

The IAA-amidosynthase enzyme is involved in the Z. mays defense responses. However, its exact role needs to be investigated further.

Future direction

- Caterpillar performance with a generalist herbivore
- Phytohormone analysis of to measure JA/IAA compounds
- Transcriptomic analysis to measure differences in RNA between wildtype and insertion lines in response to herbivory
- In vitro testing of IAA-amidosynthase function

Acknowledgements

We would like to acknowledge the NSF and USDA/NIFA for funding

and

The College of New Jersey's Department of Biology and the Boyce Thompson Institute for support in our research.