Differential transcription of digestive serine proteases in the larval midgut of *Spodoptera frugiperda* in response to a plant protease inhibitor

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INTRODUCTION: Plant protease inhibitors (PIs) are a common defense mechanism induced in response to herbivory. The PIs impair the efficiency of insect digestive system by inhibiting gut proteases; in turn insects can adapt to PIs-feeding increasing the protease activity levels and/or by inducing the expression of PI-insensitive proteases. *Spodoptera frugiperda*, a highly polyphagous lepidopteran insect pest, is known for its ability to adapt to plant PIs. **OBJECTIVE:** To advance our molecular and functional knowledge regard the regulation of digestive proteases of *S. frugiperda* chronically exposed to *Inga laurina* trypsin inhibitor (ILTI) we performed a gene expression experiments through qPCR technique. **MATERIAL AND METHODS:** Fifth-instar ILTI-fed larvae (0.2% w/w) had the midgut dissected and used to RNA extraction using Trizol reagent. Complementary DNA was synthesized and subsequently used for qPCR experiments. The genes GAPDH and S30 were used as the reference genes; 7 trypsin and 13 chymotrypsin genes had it transcription levels analyzed. **RESULTS AND DISCUSSION:** Most protease genes from ILTI-fed larvae showed up regulation in comparison with control group. This response pattern was similar for other PIs. Among the seven trypsins, five showed increased expression, being SfTry2 and SfTry9 most up regulated. Among the chymotrypsins, 11 of 13 transcripts analyzed showed up regulation. However, unlike most inhibitors, ILTI was able to inhibit all the trypsin enzymes expressed during *S. frugiperda* adaptive response. The insect showed no insensitive proteases to this inhibitor. This was verified through biochemical analysis in a previously study. **CONCLUSION:** These findings demonstrated that ILTI is an important biological model due its unique inhibitory traits. Studying the molecular docking between ILTI and *S. frugiperda* trypsins we could obtain essential details about the molecular features of resistant trypsins in *S. frugiperda*. This stage of the project is currently being developed.

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