## University of Nebraska - Lincoln Digital Commons@University of Nebraska - Lincoln

Publications from USDA-ARS / UNL Faculty

USDA Agricultural Research Service -- Lincoln, Nebraska

6-1-2004

## Characterization of Protein Changes in Buffalograsses Challenged by Blissus Occiduus

Tiffany Heng-Moss thengmoss2@unl.edu

Gautam Sarath University of Nebraska - Lincoln, gsarath1@unl.edu

Frederick P. Baxendale University of Nebraska - Lincoln, fbaxendale1@unl.edu

D. Novak University of Nebraska - Lincoln

S. Bose University of Nebraska - Lincoln

See next page for additional authors

Follow this and additional works at: http://digitalcommons.unl.edu/usdaarsfacpub



Part of the Agricultural Science Commons

Heng-Moss, Tiffany; Sarath, Gautam; Baxendale, Frederick P.; Novak, D.; Bose, S.; Xinhi, N.; and Quisenberry, S., "Characterization of Protein Changes in Buffalograsses Challenged by Blissus Occiduus" (2004). Publications from USDA-ARS / UNL Faculty. Paper 26. http://digitalcommons.unl.edu/usdaarsfacpub/26

This Article is brought to you for free and open access by the USDA Agricultural Research Service -- Lincoln, Nebraska at Digital Commons@University of Nebraska - Lincoln. It has been accepted for inclusion in Publications from USDA-ARS / UNL Faculty by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

Authors Tiffany Heng-Moss, Gautam Sarath, Frederick P. Baxendale, D. Novak, S. Bose, N. Xinhi, and S. Quisenberry



Research Project: Improved Plants and Production Practices for Grasslands and Biomass Crops in the Mid-Continental Usa

Location: Grain, Forage & Bioenergy Research

**Title**: Characterization of Protein Changes in Buffalograsses Challenged by Blissus Occiduus

## Authors

- Heng-Moss, T UNI OF NE-LINCOLN
- Sarath, Gautam
- Baxendale, F UNI OF NE-LINCOLN
- Novak, D UNI OF NE-LINCOLN
- Bose, S UNI OF NE-LINCOLN
- Xinhi, N MONTANA STATE UNI
- Quisenberry, S MONTANA STATE UNI

**Submitted to:** Journal of Experimental Botany **Publication Type:** Peer Reviewed Journal

Publication Acceptance Date: January 26, 2004

Publication Date: June 1, 2004

**Citation**: Heng-Moss, T., Sarath, G., Baxendale, F., Novak, D., Bose, S., Xinhi, N., Quisenberry, S. 2004. Characterization of protein changes in buffalograsses challenged by blissus occiduus. J Econ Entomol. 97:1086-1095.

Interpretive Summary: Plant-insect interactions are of profound importance in agriculture. Herbivorous insects can inflict substantial damage to susceptible plants. Thus understanding the mechanisms of plant tolerance to herbivory can lead to breeding resistant plants. Although this area has been studied for many years, we are still largely unaware of the plant-related biochemical changes that result in tolerance or resistance mechanisms. This paucity of data is further complicated by the great range of insect herbivores and in several cases by an almost complete lack of molecular and biochemical information of the agronomically important plant species. We investigated

the role of plant proteins and some oxidative enzymes in the defense response of buffalograss, Buchloë dactyloides (Nuttall) Engelmann, to the chinch bug, Blissus occiduus Barber. Changes in catalase and peroxidase activity were observed in both resistant and susceptible buffalograsses in response to chinch bug feeding. Susceptible plants were shown to have a lower level of catalase activity when compared to their respective control plants. By contrast, catalase activities of resistant plants were similar between infested and control buffalograsses throughout the study. Resistant plants had higher levels of peroxidase activity when compared with their control plants, while peroxidase activities for control and infested susceptible plants remained at similar levels or were slightly lower for infested plants. These findings suggest that chinch bug feeding leads to a loss in catalase activity in susceptible buffalograsses. In contrast, resistant buffalograsses may be able to tolerate chinch bug feeding by increasing their peroxidase activity.

Technical Abstract: Modifications in plant protein profiles and alterations in plant oxidative enzyme levels have been reported to be among a plant=s first response to insect herbivory. This research investigated the role of plant proteins in the defense response of buffalograss, Buchloë dactyloides (Nuttall) Engelmann, to Blissus occiduus Barber. The objectives were two-fold: first, to compare protein content and enzyme activities (i.e., peroxidase, catalase, and polyphenol oxidase) of chinch bug resistant and susceptible buffalograsses, and second, to analyze extracted proteins by native and denaturing gel electrophoresis to obtain information about protein profiles of resistant and susceptible buffalograsses. Changes in catalase and peroxidase activity were observed in both resistant and susceptible buffalograsses in response to chinch bug feeding. Susceptible plants were shown to have a lower level of catalase activity when compared to their respective control plants. By contrast, catalase activities of resistant plants were similar between infested and control buffalograsses throughout the study. Resistant plants had higher levels of peroxidase activity when compared with their control plants, while peroxidase activities for control and infested susceptible plants remained at similar levels or were slightly lower for infested plants. These findings suggest that chinch bug feeding leads to a loss in catalase activity in susceptible buffalograsses. In contrast, resistant buffalograsses may be able to tolerate chinch bug feeding by increasing their peroxidase activity. Polyphenol oxidase activities were similar between control and infested plants for the buffalograsses evaluated.

## online at:

http://www.ars.usda.gov/research/publications/Publications.htm?seq\_no\_115=155870