ANALYSIS OF POTENTIAL COTTON PATHOGEN RESERVOIRS BASED ON *NEZARA VIRIDULA* (L.) COLLECTIONS FROM TWO DIFFERENT CROP SOURCES

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Abstract

The southern green stink bug (*Nezara viridula*, L.) can cause damage to developing green cotton bolls via feeding and/or transmission of plant pathogens. Previous work showed a relationship between stink bug associated boll damage and the surrounding cultivated crops that may serve as a reservoir. Here, we collected *N. viridula* from a corn field juxtaposed to a cotton field to determine if corn plants were a potential pathogen reservoir. In order to determine whether *N. viridula* found in cotton fields were carrying and transmitting pathogens from boll to boll, an additional collection of SGSB was conducted from an infested field. Insects from both collections were individually caged for five days with greenhouse grown bolls at two weeks post-anthesis that were previously pest protected. Following removal of the insects, the cages were resealed. Bolls were harvested two weeks later and analyzed for stink bug wounds and disease symptoms. Of the bolls caged with stink bugs from corn, 76% (n = 34) had signs of feeding wounds and 53% had disease symptoms. Conversely, 51% of the bolls (n = 37) caged with stink bugs collected from cotton had evidence of feeding damage with 19% showing disease. Collectively, these data indicate that the source of the stink bug may be an important factor of whether a cotton pathogen is acquired and thus propagate infections via feeding resulting in increased yield loss.

Introduction

The southern green stink bug (SGSB) is one of the most important pests of cotton due to changes in insecticide application programs (Esquivel et al. 2010, Greene et al. 2007, Williams 2009). Previously, we showed that boll damage typically associated with SGSB feeding actually depends on whether the insects harbor and transmit infective microorganisms (Medrano et al. 2007, 2009). If stink bugs that do not harbor cotton pathogens feed on developing bolls, then seed and lint is not noticeably affected. Alternatively, effects of feeding by stink bugs that carry and transmit a disease agent results in spoiled, unmarketable lint and seed. Additionally, we established that developing cotton bolls become immune to both insect damage and bacterial infections at three weeks post-anthesis.

Georgia Cotton Production consists of over 1.2 million planted acres that are spread across many small fields. Cotton growers typically rotate among peanuts, soybeans, and small grains. Other cultivated plants in the state include pines, vegetables, peaches, pecans, and tobacco. Collectively, both cultivated and non-cultivated plants are regarded as a Farmscape (Toews and Shurley 2009). As stink bugs can feed on >200 different hosts they are an economic issue in cotton production. The objective of this study was to determine whether corn is a potential cotton pathogen reservoir, and if stink bugs collected from cotton further propagate disease to secondary bolls.

Materials and Methods

Southern green stink bugs were targeted for collection from both a corn and cotton field in GA. The insects were transported overnight to TX where they were individually caged for 5 days with greenhouse grown bolls at two weeks post-anthesis. The cotton used (Fiber Max 966) had been planted in 6.6 L pots containing a 50/50 ratio of field collected soil and potting soil (Sunshine mix, Bellevue, WA) and maintained with daily watering and weekly fertilizing with a 5% solution of Peters fertilizer (20-20-20, N-P-K, Scott's Sierra Horticultural Products Marysville,

OH. Randomly selected cotton bolls were infested with an adult SGSB by enclosing them with a 15 x 11.5 cm nylon bag. Bolls where harvested two weeks after removal of the insects and assessed for pest damage and disease.

Results and Discussion

Field collected SGSB fed on the developing greenhouse grown bolls (Table 1). Damage to bolls by stink bugs alone versus those transmitting cotton pathogens could clearly be differentiated. The stink bugs collected from both corn and cotton had the capacity to transmit pathogens into healthy bolls resulting in disease.

Observational data suggest that pathogen incidence may be highly variable across years and fields. Research aimed toward determining how different stink bug species and host crops affect pathogen dispersal is ongoing. Collectively, these data warrant an adjustment of treatment thresholds to account for pathogen incidence.

Table 1. Cotton boll damage associated with *Nezara viridula* feeding and pathogen transmission by insects collected from a corn and cotton field.

Source	Insect-pierced Bolls	Diseased Bolls Brown
Cotton	24% (n=37)	19% (n=37)
Corn	76% (n=34)	53% (n=34)

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