*Identification of Mechanism(s) of Resistance in Kentucky Bluegrass (*Poa pratensis *L.) for Control of Black Cutworm in Turfgrass*

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Objectives:

1. Evaluate resistance of black cutworm larvae to subgroups and various cultivars of Kentucky bluegrass.
2. Characterize genetic relatedness of Kentucky bluegrass subgroups and cultivars using DNA marker technology and DNA content as well as correlate phenotypic reaction (i.e., tolerance) of black cutworm with genetic diversity of Kentucky bluegrass.

Start Date: 2001
Project Duration: 3 years
Total Funding: $72,740

Numerous feeding bioassays have revealed that Kentucky bluegrass, *Poa pratensis* L., is an unsuitable host and exhibits measurable resistance to black cutworm (BCW) larvae. A multitude of mechanisms can be responsible for plant resistance, however plant resistance can be superficially categorized into two primary mechanism classes: (1) plant chemistry (i.e., alleochemical) and (2) plant morphology (i.e., physical properties).

In an attempt to dismiss one of the primary mechanisms of resistance, a nutritional indices feeding bioassay was conducted to determine the digestibility of Kentucky bluegrass (i.e., resistant host) and creeping bentgrass (i.e., susceptible host) and the efficiency of conversion of ingested food to insect body mass. This study revealed that BCW larvae consumed measurably less Kentucky bluegrass leaf tissue than creeping bentgrass. Also, BCW larvae fed respective Kentucky bluegrass cultivars had significantly slower development (i.e., weight gain) as well as survival compared to BCW larvae fed creeping bentgrass cv. 'Penncross.'

This study is consistent with other BCW feeding bioassays that evoke the hypothesis that plant morphology may be the likely mechanism of resistance. This working hypothesis was supported by preliminary BCW feeding bioassays in which both young (i.e., vegetative) and older (i.e., reproductive) plant tissue from Kentucky bluegrass cultivars was fed to BCW larvae. BCW larvae consumed measurably more young than older leaf tissue and survivawas significantly greater when BCW fed on young leaf tissue.

In feeding assays, black cutworm larvae preferred creeping bentgrass over Kentucky bluegrass.

These results coupled with empirical observations that a noticeable physical (i.e., textural) difference between young and older leaf tissues exist suggest that plant morphology may be the mechanism(s) of resistance in Kentucky bluegrass. Moreover, it is hypothesized that plant morphology is likely influenced by plant tissue age. A comprehensive BCW feeding bioassay is currently being conducted to test both young (i.e, < 45 day) and older (i.e., > 365 day) plant tissue from 12 Kentucky bluegrass cultivars and one creeping bentgrass cultivar. In addition, the respective plant tissues will be evaluated for tissue toughness as well as silica and lignification of cell walls.

Due to the extreme variability of the DNA content in Kentucky bluegrass, no comparisons between DNA content and morphological characteristics of Kentucky bluegrass cultivars can be made, nor can a correlation be made between phenotypic reaction (i.e., tolerance) of black cutworm with DNA content of Kentucky bluegrass. Currently, chromosome counts are being conducted to determine ploidy level of respective Kentucky bluegrass cultivars. Once collected, an attempt will be made to correlate Kentucky bluegrass ploidy level with DNA content.

Summary Points

- Plant morphological characteristics such as tissue toughness, lignification of cell walls, or the presence of silica may be responsible for the resistance exhibited by Kentucky bluegrass to black cutworm.
- No correlation can be made between DNA content and morphological characteristics for older (i.e., reproductive) plant tissues. However, it may be possible to correlate ploidy level of Kentucky bluegrass with DNA content.