

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: 2 years

Total Funding: \$47,046

Several non-choice feeding bioassays were conducted to determine the development and survival of black cutworm (BCW) larvae on 24 Kentucky bluegrass cultivars and creeping bentgrass cv. Penncross. Two different types of bioassays (i.e., trials) were conducted using laboratory-cultured BCW larvae.

These bioassays included; 1) non-induced feeding bioassay and 2) induction feeding bioassay. BCW larvae and respective turfgrass treatments were placed into petri dishes containing filter paper and a moist dental wick. Each treatment was replicated six times. Larval survival, instar distribution, larval weight at 7 and 14 days, the number of days to pupation, and pupal and adult weights were recorded in each bioassay.

Non-induction feeding bioassay.

Upon egg hatch, ten BCW larvae were immediately placed in petri dishes and fed respective KB cultivars, and creeping

bentgrass. The results of this particular bioassay raised concern; BCW did not survive on any of the KB treatments. And, possibly of greater importance, BCW did not survive on the creeping bentgrass treatment. These findings are in direct conflict with Williamson and Potter, who determined that, minimally, BCW had >65% survival on creeping bentgrass cv. Penncross across multiple trials. Based on these results, this bioassay must and will be repeated.

Induction feeding bioassay Immediately after egg hatch, BCW larvae were fed a commercially available artificial BCW diet and held in an environmental growth chamber maintained at the light and temperature regime previously described. Once the BCW larvae attained the second larval instar in their developmental process, they were then removed from the artificial diet and subsequently fed respective KB cultivars and creeping bentgrass. Unlike the non-induction bioassay, all BCW larvae developed and survived to adulthood on creeping bentgrass. However, no BCW survived longer than four days on any KB cultivar.

Once the BCW larvae attained the sixth larval instar in their developmental process, they were then removed from the artificial diet and subsequently fed respective KB cultivars and creeping bentgrass. All BCW larvae developed and survived to adulthood on creeping bentgrass, however only one (1/144) BCW larva survived on KB cv. Shamrock.

Based on the results of the aforementioned feeding bioassays, no susceptible KB cultivar was discovered. Consequently, the necessary criteria required for characterization is not available. Thus, this objective may not be accomplished. However, since presenting these data to other scientific colleagues, Dr. Jim Reinert (Texas A&M) has suggested that there are several Kentucky bluegrass cultivars that we did not test that are susceptible to armyworms.

Because BCW and armyworms are in the same family of Lepidoptera (i.e., Noctuidae), it may be possible that a susceptible host exists. Subsequently, we plan to obtain the "susceptible" KB cultivars and include them in future bioassays.

Additional trials of both the non-induction and induction feeding bioassay will be repeated. Laboratory bioassays will be conducted using field collected BCW larvae. We also intend to evaluate additional KB cultivars suspected to be susceptible as well as two creeping bentgrass clones collected from naturalized populations which were discovered to have resistance to BCW.

Summary Points

- Using induction feeding bioassays, researchers found that only one out of 144 black cutworm larvae feeding on KB survived, whereas all BCW survived when feeding on creeping bentgrass.
- Researchers plan to repeat both the non-induction and induction feeding bioassays and evaluate additional KB cultivars, suspected to be susceptible as well as two creeping bentgrass clones collected from naturalized populations which were discovered to have resistance to BCW.



All black cutworm larvae developed and survived to adulthood on creeping bentgrass, however only one (1/144) black cutworm larva survived on Kentucky bluegrass.