Commentary

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Negative Affect of the Insect Populations on Refuge Plants

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Description

In the U.S. Corn Belt, seed blend, also known as refuge-in-the-bag has been used as a refuge strategy to generate insect populations that are tolerant of Bt maize resistance management. The cross-pollination of maize plants that results in Bt protein expression in refuge ear kernels is a major concern associated with the use of RIB. For ear-feeding insects like the corn earworm Helicoverpa zea, Bt protein expression in refuge ears can be detrimental to plant populations. Three populations of H. zea were collected from a pure stand of non-Bt maize, and the refuge ears of 90:10% were examined for reproduction. The F1 offspring of the three populations' growth, development, and reproduction. The developmental time from neonate to pupa, pupal weight, survival rate from neonate to adult, egg production, and adult net reproductive rate on meridic diet were all measured for the F1 offspring. The three populations' fitness and reproduction of the parents were comparable, and the patterns of seed blending had no significant impact on the fitness of the F1 offspring. This study's findings will be helpful in determining whether RIB is an effective strategy for managing Bt maize resistance.

In moth species, sexual pheromones are crucial for mating communication and reproduction. The pheromone gland (PG), which is typically situated in female moths between the 8th and 9th abdominal segments, is responsible for the biosynthesis and release of species-specific sex pheromones. The majority of moth sex pheromones are multi-component blends of C10–18 hydrocarbon chains with alcohol, acetate ester, or aldehyde as a functional group and one or more double bonds. Pheromone Biosynthesis Activating Neuropeptide (PBAN) which binds to a receptor on PGs to induce pheromone biosynthesis regulates the biosynthesis of moth sex pheromones. Fatty acyl-CoA desaturases insert double bonds into the fatty acyl chains following the biosynthesis of saturated fatty acids. Limited -oxidation enzymes may then perform one or two rounds of chain shortening. One of the functional groups is created by modifying the terminal carboxyl group Fatty acyl-CoA reductase, alcohol oxidase or fatty acyltransferase are used to convert alcohol, aldehyde, or acetate ester, respectively. Six desaturases and a number of FARs have been identified thus far. Despite being biochemically characterized in several moth pheromone gland assays, the genes for acetylation of fatty alcohols to acetate esters and oxidation of fatty alcohols to aldehydes have not been identified at the molecular level. Numerous moth PG transcriptomic studies have examined the key genes involved in pheromone biosynthesis. This is the first study to compare the transcriptomes of male and female PG-ovipositors, tarsi, and aldehyde pheromone production and the characterization of chemosensory organs that are not on the antennae or mouthparts.

Catalyze the Conversion of Fatty Acyl-Coa

Zea mays (L.) transgenic maize with the endotoxin of Bacillus thuringiensis subsp. Kurstaki was initially developed to combat the European corn borer, Ostrinia nubilalis but it may also be used to combat other Lepidoptera maize pests. The majority of Bt transgenic maize hybrids controlled ECB and Diatraea grandiosella, the southwestern corn borer, stalk feeding on maize grown in an irrigated, semi-arid environment with severe growing conditions of hot days, high winds, and low rainfall less than 220 mm during the growing season. Data on the management of corn borers and the corn earworm, Heliocoverpa zea Boddie, in the shanks and ears of Bt transgenic maize are presented in this paper. According to Wiseman and Morrison, field corn suffers annual losses of 2% from ECB, 1% from SWCB, and 2.5% from CEW. Corn borers primarily cause damage to the stalk but can also result in yield loss due to kernel feeding and shank tunneling, which can cause ears to fall from the plant. Different modes of endotoxin expression in the plant have been developed for a variety of transgenic Bt maize events. The Bt toxin only appears in the leaf, pith, root, and pollen of Event 176 in maize, but its titer decreases once the plant enters anthesis. Events Bt11 and Mon810, on the other hand, are expressed in both reproductive and foliage structures. As a result, we anticipate that the Bt events' effectiveness in controlling CEW in maize ears and shanks and corn borers will differ. Williams and others CEW fed Bt11 hybrid husks and silks had a lower survival rate and were smaller than larvae fed non-Bt plant material, according to 1998 To find a mate, most moths use sex pheromones that are released by the female. In the pheromone gland, females use a biosynthetic pathway that involves a number of important enzymes to make the sex pheromone. One of the key enzymes that catalyze the conversion of fatty acyl-CoA to the corresponding alcohol is fatty acyl-CoA reductase. This enzyme is critical in producing the final proportion of each pheromone component. In female

pheromone glands of Helicoverpa zea, (Z)-11-hexadecenal is the main sex pheromone component. In the past, both male and female tarsi contained a significant amount of hexadecanal. Twenty fatty acyl-CoA reductases were found in both tarsi and pheromone gland transcriptomes in our previous study. According to the transcriptome of tarsi and pheromone glands, we functionally characterized four FARs that were expressed at high levels in this study. Similar to other moth pheromone gland-specific fatty acyl-CoA reductases, fatty acyl-CoA reductase 1 was also found in male tarsi. Fatty acyl-CoA reductase 1 was the only enzyme capable of producing fatty alcohols, as evidenced by its functional expression in yeast cells. In addition, the production of (Z)-11-hexadecanal in male tarsi and hexadecanal in female pheromone glands and male tarsi significantly decreased when RNAi knockdown decreased the mRNA level of fatty acyl-CoA reductase 1.A fatty acyl-CoA reductase's direct function in male tarsi and its role in H. zea sex pheromone biosynthesis are both confirmed in this study for the first time.