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Identifying Lepidopteran resistance within hcf mutants

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Southwestern corn borer (SWCB) and fall armyworm (FAW) feeding on maize causes extensive crop damage in the United States. Total crop loss is valued at approximately 300 million dollars annually. Previous proteomic analysis comparing resistant and susceptible lines of maize has shown genes found in the photosystem II pathway are highly expressed in the resistant line. The high chlorophyll fluorescence mutants have defects in photosystem I or photosystem II genes. Preliminary feeding trials indicate hcf mutants have resistance to Lepidopteran feeding. A preference test was performed comparing hcf mutants to their wild-type siblings. Oy , pg , and g mutants were also compared to their wild-type siblings to ensure that the pigmentation was not a factor in insect resistance. Leaf tissue from both the hcf mutant and the wild-type plant were pinned to a piece of moist filter paper within a petri dish. A single SWCB or FAW was placed in between the two samples and allowed to choose which tissue sample it preferred. There were five replicates per genotype. Pictures were taken after four days and tissue damage area was assessed using AlphaEaseFC software. A few hcf mutants showed increased resistance to feeding than their wild-type siblings, while most hcf mutants did not. SWCB preferred the wild-type over hcf11-N1205A and hcf49-N1480 mutants, indicating these genes may be resistance factors. Some hcf mutants were preferred by SWCB, indicating they may represent susceptibility genes. These genotypes were Oyl-Andrew and hcf13-N1097B . hcf49-N1480 , hcf7-N1029D , and pg15-N340B had reduced FAW damage compared to wild-type siblings, indicating they may confer resistance. The genotype hcf44-N1278B showed increased susceptibility to FAW feeding compared to its wild-type sibling. Further analysis will be needed to examine the resistance capabilities of the hcf11-N1205A , hcf7-1029D , pg15-N340B , and hcf49-N1480 genotypes. The mutants evaluated for effects of pigmentation displayed varying results indicating color differences associated with some hcf mutants are unlikely to be responsible for the differences observed. This experiment has provided data showing that some hcf mutants confer resistance to insect feeding. These genes may be useful in increasing resistance to FAW and SWCB in commercial hybrids.