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Factors Influencing Host Plant Preference of *Phyllotreta striolata*

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Abstract

The striped flea beetle, *Phyllotreta striolata*, is a serious pest of crucifer crops in the tropics. This study aimed to elucidate the chemical interaction of this flea beetle species with its host plant to develop attractant-based lures, which may serve as efficient alternatives to chemical control. We focused on glucosinolates, the characteristic secondary metabolites of crucifers, and their hydrolysis products, which are known to be involved in host plant finding and/or acceptance of insect specialists, such as *P. striolata*. The feeding preference of *P. striolata* was examined among seven economically important crucifer crops (cabbage, kai-lan, Chinese cabbage, pak-choi, winter rape, leafy mustard, and radish). The leaf glucosinolate content and profile was analysed using high performance liquid chromatography and the total, aliphatic, and indolyl glucosinolate content was correlated with the bioassay data. The corresponding glucosinolate hydrolysis products were analysed with gas chromatography-mass spectrometry. Moreover, the leaf surface, which is the location of initial contact with the potential host plant, was examined using scanning electron microscopy. In multiple choice experiments, radish was the most preferred host plant, followed by leafy mustard, pak-choi, winter rape, and Chinese cabbage. Antixenosis (non-preference) was observed for *Brassica oleracea* var. *capitata* (cabbage) and var. alboglabra (kai-lan). The total glucosinolate content in the crops ranged from 10 μmole/g dry weight in cabbage to 130 μmole/g dry weight in radish and leafy mustard. Allylisothiocyanate, a volatile GS hydrolysis product and known attractant for *P. striolata* was detected in leafy mustard (1.5 μmole/g fresh weight) as well as in the non-preferred cabbage (0.02 μmole/g fresh weight). Although P. striolata prefers to feed on plants with a higher concentration of glucosinolates, especially of aliphatic glucosinolates, the rejection of kai-lan and cabbage could not be explained from the results. Upon examining the leaf surface of the host plants, crystal structures from epicuticular waxes occurred only on cabbage and kai-lan. The waxy surface may hinder *P. striolata* from attaching to the leaves and block access to nutrients or infochemicals such as glucosinolates; it could be contributing to the insects's antixenosis.

Keywords: Crucifer, glucosinolates, host plant preference, *Phyllotreta striolata*

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