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Novel synthetic compounds enhance the attractiveness of host-plant volatiles: An opportunity to boost detection and monitoring of Asian citrus psyllid?

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In the absence of pheromone attractants, host-plant volatiles offer the most likely means of improving capture levels of ACP with sticky cards and other types of visual traps. However, developing scent lures that can compete with the attractiveness of actual host-plants, especially those in flush, is challenging. We are developing a new class of synthetic scent lures that may enhance the attractiveness of naturally-occurring host-plant volatiles. These compounds are synthetic ligands that bind to chemosensory proteins (CSPs) found in the olfactory sensilla of target insects. These ligands may mimic naturally-occurring odorants and function as super-stimuli because of their strong affinity to CSPs. In our study, CSPs from ACP antennae were identified based on their reactivity to petitgrain oil (an essential oil extracted from sour orange leaves), an ACP attractant. Two behavioral assays were used to assess the biological activity of several candidate ligands. One assay measured ACP probing frequency into a line of emulsified wax (SPLAT®, ISCA Technologies) containing a test ligand, the other assay measured the retention time of psyllids in an airstream carrying the ligand. One ligand, nicknamed 'Titan', was more stimulatory than limonene, a common citrus volatile, while a mixture of Titan and limonene was significantly more stimulatory than either alone. Subsequent assays showed that Titan was as stimulatory to ACP as the odor emitted by flushing sprigs of orange jasmine, a favored host-plant. These results indicate that CSP ligands may synergize the attractiveness of naturally-occurring citrus volatiles and boost their effectiveness as scent lures for ACP.

ACP responded more strongly to low concentrations of Titan than to a higher concentration.