



Repelling Greening With Guava

In 2006, South Vietnamese farmers reported that planting guava trees among citrus trees reduced psyllid infestations and kept greening out of their groves. This created a great deal of interest and suggested that guava might produce some kind of volatile compound that kept psyllids out of citrus groves.

Seeing Is Believing

Drs. Tim Gottwald and David Hall from the USDA Horticultural Laboratory in Ft. Pierce and several growers went to Vietnam in 2007 to evaluate the situation. While there, they observed that the guava effect appeared to be real. In citrus groves that were interplanted with guava trees, they found no psyllids or greening. In groves that were within 100 yards that had no guavas, they found large numbers of psyllids, and greening was present. This led to the question that if guava was producing some kind of volatile compound that kept psyllids out, what was the active ingredient?

About this time, Dr. Russell Rouseff, a UF/IFAS food chemist, became interested in identifying the active volatile components in guava leaves that might repel or reduce psyllid populations. Citrus trees don't get



What's in guava that repels citrus psyllids? Florida researchers are studying this very question hoping to isolate the plant's volatile.

greening if the vector, the psyllid, does not get to the tree. If an effective repellent for the psyllid could be found, transmission of greening to other groves could be slowed or could even be stopped.

Concentrating On Compounds

Plants produce defensive volatile compounds, and insects are sensitive to some of these compounds. For example, neem trees produce volatiles that repel some insects. Dr. Rouseff decided to focus on sulfur compounds and enlisted the cooperation of Dr. Lukasz Stelinski, a UF/IFAS entomologist. The compound had to be found in guava and not citrus. Also, because psyllids were kept out year round, the compound must come from guava leaves rather than fruit, since fruit is on the tree for only part of the season.

The scientists injected samples from citrus and guava into a gas chromatograph with a specialized sulfur detector. In undamaged leaves, both citrus and guava produced similar sulfur chromatograms. But when the leaves were crushed, guava leaves produced dimethyl disulfide (DMDS),

which is highly toxic to most insect species. Citrus leaves that were crushed did not produce DMDS. Hence, it appears that when guava leaves are wounded by mechanical means or insect attack, they produce DMDS.

Synthetic Solution

The UF/IFAS team then needed to see how psyllids would respond in the lab to DMDS.

They used a device called an olfactometer, which has four arms. With this device, insects are exposed to different volatile compounds, and the psyllids make choices as to which arm they will go toward. When exposed to volatiles from citrus only, the psyllids chose the citrus arm. They did not go toward the arm with guava volatiles. When exposed to citrus leaves and DMDS, the psyllids avoided that arm. Synthetic DMDS repelled psyllids in the lab equally to real guava volatiles. Drs. Stelinski and Rouseff are now trying to employ a release system that can be applied to citrus trees in the field that will keep psyllids out of the grove.

In summary, this research shows that guava leaves produced DMDS when injured. This is one possible explanation for the repulsive effect of guava on the psyllid. We'll hope that some kind of method can be developed that uses this technology to keep psyllids out of citrus groves and slow the spread of greening. This is an example of how research combined with observations from different parts of the world can lead to new promising techniques. This is also another example of how funding from the Florida Citrus Production Research Advisory Council has benefited citrus growers today.



Not A Silver Bullet

Two disadvantages of planting guavas among citrus trees are:

1. Guavas take up space and possibly interfere with normal citrus-growing procedures.
2. Caribbean fruit flies are attracted to guava, and there are restrictions on exports of citrus from fruit fly areas.