COMPOSITIONS AND RELATED METHODS FOR AGRICULTURE

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims benefit of U.S. Provisional Application No. 62/703,304, filed July 25, 2018, the contents of which are incorporated herein by reference in their entirety.

SEQUENCE LISTING

The instant application contains a Sequence Listing which has been submitted electronically in ASCII format and is hereby incorporated by reference in its entirety. Said ASCII copy, created on July 17, 2019, is named 51215-012WO2_Sequence_Listing_07.17.19_ST25 and is 60,129 bytes in size.

BACKGROUND

Plant pests, including insect pests, are pervasive in the human environment.

SUMMARY

In a first example, the disclosure comprises a method for decreasing colonization by a bacterium of a gut of a stink bug, the method comprising (a) providing a composition comprising vanillin or an analog thereof; and (b) delivering said composition to an egg from which the stink bug will hatch, whereby colonization by the bacterium within the gut of the stink bug hatched from the egg treated with the composition is decreased relative to a stink bug hatched from an untreated egg.

In one aspect, the present disclosure refers to a method for decreasing colonization by a bacterium of a gut of a stink bug, the method comprising:

(a) providing a composition comprising vanillin or an analog of vanillin selected from Table 1; and

(b) delivering said composition to a stink bug egg, wherein the gut of the stink bug hatched from the egg has decreased colonization by the bacterium relative to the gut of a stink bug hatched from an untreated egg; wherein the bacterium is *Candidatus Pantoea carbekii*.

In some examples, the composition is delivered to an egg mass of a stink bug. In some examples, the decrease in colonization by the bacterium decreases the fitness of the stink bug, e.g., decreases reproductive ability, survival, rate of development, number of eggs, number of hatched eggs, adult emergence rate, body length, body width, body mass, or cuticle thickness.

In some examples, the colonization is in the v4 region of the gut. In some examples, colonization by the bacterium of the v4 region of the gut is decreased by at least 5%. In some examples, the size of the v4 region of the gut is decreased.

In some examples, the stink bug is a *Halyomorpha* species (e.g., *Halyomorpha halys*), a *Nezara* species, an *Oebalus* species, a *Chinavia* species, an *Euthyrhynchus* species, an *Euschistus* species, an *Alcaeorrhynchus* species, or a *Podisus* species.

In some examples, the bacterium is an endosymbiont, e.g., an endosymbiont is of the genus *Pantoea.* In some examples, the endosymbiont is *Candidatus Pantoea carbekii*.

In some examples, the composition is a liquid, a solid, an aerosol, a paste, a gel, or a gas composition. In some examples, the composition is delivered as a spray. In some examples, the composition comprises an agriculturally acceptable carrier. In some examples, the composition comprises a wetting solution.

Disclosed herein are compositions and methods for altering the fitness of insects for agriculture or commerce, wherein the composition includes a bacterial colonization-disrupting agent (e.g., an agent (e.g., a lipopolysaccharide (LPS) synthesis inhibitor or a polyhydroxyalkanoate (PHA) synthesis inhibitor) that decreases colonization of a bacteria (e.g., an endosymbiotic bacteria) in the gut of the insect.

What is claimed is:

Claims

1. A method for decreasing colonization by a bacterium of a gut of a stink bug, the method comprising:

(a) providing a composition comprising vanillin or an analog of vanillin selected from Table 1; and

(b) delivering said composition to a stink bug egg, wherein the gut of the stink bug hatched from the egg has decreased colonization by the bacterium relative to the gut of a stink bug hatched from an untreated egg;

wherein the bacterium is *Candidatus Pantoea carbekii*.

2. The method of claim 1, wherein the composition is delivered to an egg mass of a stink bug.

3. The method of claim 1, wherein the decrease in colonization by the bacterium decreases the fitness of the stink bug.

4. The method of claim 3, wherein the decrease in the fitness of the stink bug is a decrease in reproductive ability, survival, rate of development, number of eggs, number of hatched eggs, adult emergence rate, body length, body width, body mass, or cuticle thickness.

5. The method of claim 1, wherein the colonization is in the v4 region of the gut.

6. The method of claim 5, wherein colonization by the bacterium of the v4 region of the gut is decreased by at least 10%.

7. The method of claim 5, wherein the size of the v4 region of the gut is decreased.

8. The method of claim 1, wherein the stink bug is a *Halyomorpha* species.

9. The method of claim 8, wherein the stink bug is *Halyomorpha halys.*

10. The method of claim 1, wherein the composition is a liquid, a solid, an aerosol, a paste, a gel, or a gas composition.

11. The method of claim 1, wherein the composition is delivered as a spray.

12. The method of claim 1, wherein the composition comprises an agriculturally acceptable carrier.

13. The method of claim 1, wherein the composition comprises a wetting solution.