INSECT TRAPPING SYSTEMS

BACKGROUND

[0001] Conventionally, insect traps, especially those dealing with disease transmitting insects such as mosquitoes, have been designed to capture insects and do not discriminate between males and females or even species of insects. As a result, these traps may also result in undesirable by-catch (e.g., insects other than a target sex and/or other types of insects).

BRIEF SUMMARY

[0002] Various examples are described relating to insect trapping systems including insect trapping apparatuses, and corresponding methods.

[0003] One general aspect includes an insect trapping system, including a trapping container including a top, a bottom, and at least one side wall which together with the top and the bottom defines an interior volume, where an entrance hole is formed in the at least one side wall and allows access to the interior volume and the top is characterized by a planar interior surface that faces the interior volume. The insect trapping container also includes a diverter wall that extends between the planar interior surface of the top and the bottom and that divides the interior volume to define a first chamber and a second chamber, where distal edges of the diverter wall physically contact opposing surfaces of the at least one side wall, where the diverter wall is characterized by a length extending between the distal edges and a vertex region, where the vertex region is defined along the length, where a window is formed in the vertex region and is characterized by an axis that is transverse to the length, where the window is defined by a pair of opposing substantially parallel edges and connects the first chamber and the second chamber, and where a distal portion of the diverter wall is characterized by an edge profile that is held in physical contact with the planar interior surface. The insect trapping system also includes an acoustic lure device disposed within the first chamber between the entrance hole and the window, the acoustic lure device to output an acoustic tone for an insect population.

The insect trapping system also includes a support stand to physically support the trapping container, the support stand to function as a visual lure for the insect population.

[0004] Another general aspect includes an apparatus, including a trapping container including a top, a bottom, and at least one side wall that together define an interior volume, where the top is characterized by a planar interior surface that faces the interior volume. The apparatus also includes a diverter wall that extends between the planar interior surface of the top and the bottom and is positioned within the interior volume, the diverter wall dividing the interior volume to define a first chamber and a second chamber, where distal edges of the diverter wall physically contact opposing surfaces of the at least one side wall, wherein the diverter wall is characterized by a length extending between the distal edges and a vertex region, wherein the vertex region is defined along the length, where a window is formed in the vertex region of the diverter wall that connects the first chamber and the second chamber, where the window is characterized by an axis that is transverse to the length, where the window is defined by a pair of opposing substantially parallel edges, where an entrance hole is formed in the at least one side wall and allows access to the first chamber, and where a distal portion of the diverter wall is characterized by an edge profile that is held in physical contact with the planar interior surface. The apparatus also includes an acoustic lure device disposed within the first chamber between the entrance hole and the window, the acoustic lure device to output an acoustic tone.

[0005] Another general aspect includes a method, including providing a container that includes a top, a bottom and a perimeter wall that encircles the bottom to define an interior volume, where the top is characterized by a planar interior surface that faces the interior volume. The method also includes installing a diverter wall within the interior volume that extends between the planar interior surface of the top and the bottom and defines a first chamber and a second chamber, where the distal edges of the diverter wall contact opposing surfaces of the perimeter wall, where the diverter wall is characterized by a length extending between the distal edges and a vertex region, and where the vertex region is defined along the length. The method also includes forming an entrance hole in the

perimeter wall to enable access to the first chamber. The method also includes forming a window in the vertex region of the diverter wall that connects the first chamber and the second chamber, where the window is characterized by an axis that is transverse to the length, where the window is defined by a pair of opposing substantially parallel edges, and where a distal portion of the diverter wall is characterized by an edge profile that is held in physical contact with the planar interior surface. The method also includes installing an acoustic lure in the first chamber.

[0006] Another general aspect includes a computer-implemented method, including instructing an acoustic lure located within an interior volume of an insect trapping container to output an acoustic tone via an insect entrance hole formed in the insect trapping container. The computer-implemented method also includes receiving sensor data from a sensor package mounted to an interior surface of the trapping container adjacent the insect entrance hole, the sensor data representative of insects within the interior volume; responsive to receiving the sensor data. The computer-implemented method also includes instructing an imaging device to capture image data representative of the insects within the interior volume, or determining insect count data based on the sensor data. The computer-implemented method also includes transmitting output data to a remote computing system, the output data including at least one of a first portion of the image data or a second portion of the insect count data. Other embodiments of this aspect include corresponding computer systems, apparatus, and computer programs recorded on one or more computer storage devices, each configured to perform the actions of the methods.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] The accompanying drawings, which are incorporated into and constitute a part of this specification, illustrate one or more certain examples and, together with the description of the example, serve to explain the principles and implementations of the certain examples.

[0008] FIG. 1 illustrates a perspective view of an insect trapping system, according to at least one example.

[0009] FIG. 2 illustrates a side profile view of the insect trapping system of FIG. 1, according to at least one example.

[0010] FIG. 3 illustrates a top view of the insect trapping system of FIG. 1, according to at least one example.

[0011]

[0011] FIG. 4 illustrates an end view of the insect trapping system of FIG. 1, according to at least one example.

[0012] FIG. 5 illustrates a perspective view of the insect trapping system of FIG. 1, according to at least one example.

WHAT IS CLAIMED IS:

1. An insect trapping system, comprising:

a trapping container comprising:

a top;

a bottom;

at least one side wall, which together with the top and the bottom defines an interior volume, wherein an entrance hole is formed in the at least one side wall and allows access to the interior volume, wherein the top is characterized by a planar interior surface that faces the interior volume; and

a diverter wall that extends between the planar interior surface of the top and the bottom and that divides the interior volume to define a first chamber and a second chamber, wherein distal edges of the diverter wall physically contact opposing surfaces of the at least one side wall, wherein the diverter wall is characterized by a length extending between the distal edges and a vertex region, wherein the vertex region is defined along the length, wherein a window is formed in the vertex region and is characterized by an axis that is transverse to the length, wherein the window is defined by a pair of opposing substantially parallel edges and connects the first chamber and the second chamber, and wherein a distal portion of the diverter wall is characterized by an edge profile that is held in physical contact with the planar interior surface;

an acoustic lure device disposed within the first chamber between the entrance hole and the window, the acoustic lure device to output an acoustic tone for an insect population; and

a support stand to physically support the trapping container, the support stand to function as a visual lure for the insect population.

2. The insect trapping system of claim 1, wherein the entrance hole is formed as an inverted triangle, with a base leg at a first elevation and an apex at a second elevation that is below the first elevation.

3. The insect trapping system of claim 1, wherein the insect population comprises at least one of a sex of mosquitoes or a species of mosquitoes.

4. The insect trapping system of claim 3, wherein the species of mosquitoes comprises at least one of *Aedes aegypti or Aedes albopictus*.

5. The insect trapping system of claim 3, wherein one or more first properties of the acoustic tone and one or more second properties of the support stand are selected based at least in part on the species of mosquitoes.

6. The insect trapping system of claim 5, wherein the one or more first properties of the acoustic tone comprise a frequency, a volume, or a duration, and the one or more second properties of the support stand comprise a color or a height.

7. The insect trapping system of claim 1, further comprising:

a controller comprising one or more processors; and

one or more of:

a sensor package to detect when an insect passes through the entrance hole;

a transceiver device;

a memory module; or

an imaging device to capture images of the insect within the interior volume.

8. The insect trapping system of claim 7, wherein the sensor package comprises an infra-red sensor transmitter disposed at a first side of the entrance hole, an infra-red sensor receiver disposed at a second side of the entrance hole, and an optics lens disposed between the entrance hole and the infra-red sensor receiver.

9. The insect trapping system of claim 7, wherein the one or more processors are configured to:

receive sensor data from the sensor package; and

perform at least one action after receiving the sensor data.

10. The insect trapping system of claim 9, wherein the at least one action comprises determining a count of individual insects detected by the sensor package.

11. The insect trapping system of claim 10, wherein the at least one action further comprises at least one of storing the count locally within the memory module or transmitting the count via the transceiver device to a remote computing system.

12. The insect trapping system of claim 7, wherein the one or more processors are configured to:

activate the imaging device to capture images of insects within the interior volume;

activate the acoustic lure device to output the acoustic tone;

cause transmission of output data via the transceiver device; or

receive and store input data received via the transceiver device.

13. The insect trapping system of claim 1, further comprising an insect killing component comprising at least one of a glue panel or an insecticide.

14. The insect trapping system of claim 13, wherein the insect killing component is disposed in the second chamber.

15. The insect trapping system of claim 13, further comprising an imaging device disposed within the second chamber, the imaging device configured to capture images of insects within the second chamber.

16. An apparatus, comprising:

a trapping container comprising a top, a bottom, and at least one side wall that together define an interior volume, wherein the top is characterized by a planar interior surface that faces the interior volume;

a diverter wall that extends between the planar interior surface of the top and the bottom and is positioned within the interior volume, the diverter wall dividing the interior volume to define a first chamber and a second chamber, wherein distal edges of the diverter wall physically contact opposing surfaces of the at least one side wall, wherein the diverter wall is characterized by a length extending between the distal edges and a vertex region, wherein the vertex region is defined along the length, wherein a window is formed in the vertex region of the diverter wall that connects the first chamber and the second chamber, wherein the window is characterized by an axis that is transverse to the length, wherein the window is defined by a pair of opposing

substantially parallel edges, wherein an entrance hole is formed in the at least one side wall and allows access to the first chamber, and wherein a distal portion of the diverter wall is characterized by an edge profile that is held in physical contact with the planar interior surface; and

an acoustic lure device disposed within the first chamber between the entrance hole and the window, the acoustic lure device to output an acoustic tone.

17. The apparatus of claim 16, further comprising a controller located in the interior volume, the controller comprising one or more processors.

18. The apparatus of claim 16, further comprising a sensor package located in the first chamber adjacent to the entrance hole, the sensor package to detect when an insect passes through the entrance hole.

19. The apparatus of claim 18, further comprising a transceiver device to transmit sensor data from the sensor package to a remote computing system.

20. The apparatus of claim 16, wherein a first area on an exterior surface of the at least one side wall surrounding the entrance hole is coated with a light-colored material, and a second area on an interior surface of the at least one side wall surrounding the entrance hole is coated with a dark-colored material.

21. The apparatus of claim 16, further comprising an insect killing component disposed within the second chamber, the insect killing component comprising at least one of a glue panel or an insecticide.

22. A method, comprising:

providing a container that comprises a top, a bottom, and a perimeter wall that encircles the bottom to define an interior volume, wherein the top is characterized by a planar interior surface that faces the interior volume;

installing a diverter wall within the interior volume that extends between the planar interior surface of the top and the bottom and defines a first chamber and a second chamber, wherein distal edges of the diverter wall contact opposing surfaces of the perimeter wall, wherein

the diverter wall is characterized by a length extending between the distal edges and a vertex region, and wherein the vertex region is defined along the length;

forming an entrance hole in the perimeter wall to enable access to the first chamber;

forming a window in the vertex region of the diverter wall that connects the first chamber and the second chamber, wherein the window is characterized by an axis that is transverse to the length, wherein the window is defined by a pair of opposing substantially parallel edges, and wherein a distal portion of the diverter wall is characterized by an edge profile that is held in physical contact with the planar interior surface; and

installing an acoustic lure in the first chamber.

23. The method of claim 22, further comprising:

installing an insect killing component in the second chamber.

24. The method of claim 22, further comprising:

installing a controller in at least one of the first chamber or the second chamber, the controller comprising one or more processors; and

installing a sensor package in the first chamber at a location between the entrance hole and the acoustic lure, the sensor package to detect when an insect passes through the entrance hole.

25. The insect trapping system of claim 1, wherein the at least one side wall and the diverter wall of the trapping container are formed from a transparent or translucent material, and wherein the support stand is formed from an opaque dark-colored material.

26. The insect trapping system of claim 1, wherein the diverter wall has a curved V-shape, with the vertex region being defined at a valley of the curved V-shape.

27. The insect trapping system of claim 26, wherein the diverter wall is oriented with an interior of the curved V shape directed toward the entrance hole.

28. The insect trapping system of claim 1, wherein the top is removably connectable to the at least one side wall.

29. The insect trapping system of claim 1, wherein the edge profile is defined at a first top edge of the diverter wall, wherein the vertex region extends between the first top edge of the diverter wall and a first bottom edge of the diverter wall that is opposite the first top edge, and wherein the window is defined between the first top edge and the first bottom edge.

30. The insect trapping system of claim 1, wherein the distal edges of the diverter wall are substantially parallel, and wherein the opposing surfaces of the at least one side wall at which the distal edges contact are substantially parallel.