Pest Detection Device and Method

The present invention provides a device for attracting pest insects including, but not limited to, bed bugs, and the use of such devices in the methods for the detection of, and optionally controlling, pest insect infestations.

Background of the Invention

Bed bugs (Cimicidae) have been biting people since the beginning of recorded time. The common bed bug, *Cimex lectularius,* which feeds upon human blood, has a worldwide distribution. The biting nuisance caused by an infestation can have physical and mental effects on the human host. Blood feeding can result in allergic reactions to vasodilatory substances in the bed bug saliva and insect bite wounds can become infected by opportunistic pathogens, if inappropriately treated or in immuno-compromised individuals. Furthermore, realisation of a domestic bed bug infestation can affect mental health, causing a range of problems, including emotional distress, anxiety, insomnia and paranoia.

For most of the past 40 years, *C. lectularius* has been an unimportant pest in developed countries. However, in recent years, bed bugs have re-emerged as a significant global pest, with increased rates of infestations occurring in North America, Europe, Australia and elsewhere. The banning of certain insecticides, resistance to other insecticides and the increase in international travel are cited as the main reasons for the re-emergence of this pest problem. Bed bug infestations have a large impact on the hotel and hospitality industry which can be extremely costly. In the US, it is reported to represent around 20% of the US$4 billion extermination insect and pest control services sector. It has grown to be the third largest segment of this market.

Monitoring of bed bug infestations, both spatially and temporally, is essential for the development of targeted treatments. Early detection of bed bug activity is acknowledged as a key factor in reducing the disruption, cost and effort of remedial

treatment. The monitoring of bed bug populations can also be used to assess the efficacy of remedial and preventative treatment.

However, many currently available devices, such as simple sticky traps, are based on the principle of random interception and are not efficient at monitoring or controlling bed bug populations. Bed bugs will preferentially crawl under them, and they are not sufficiently sensitive to detect low-level infestations. In addition, these traps are not attractive in themselves, and so a person is required to sleep in the infested room as bait. Refuge-type monitors detect the presence of a bed bug infestation if the insects use the device as a temporary or permanent refuge. However, as with interceptive devices, these will be unlikely to detect low-level infestations. Traps that claim to attract bed bugs currently on the market use either heat or chemical lures or both. However, there are few scientific studies that have tested the efficacy of these devices. Some devices use CO_2 to attract bed bugs. However, traps baited with CO_2 are expensive and their maintenance is time consuming. Therefore, it is unlikely that such a device would be suitable for long term, wide scale bed bug surveillance. Furthermore, there are safety issues associated with the use of pressurised gas and/or chemical reactions for the production of CO_2.

Recent research has therefore begun to focus on the use of volatile semiochemicals for the attraction of bed bugs. For example, WO 2017/060682 discloses a group of discrete VOC compounds and combinations that are detected by beg bugs using antennal olfaction and effectively function to attract bed bugs. Exemplary bed bug attractant compositions disclosed in WO 2017/060682 comprise a combination of (E)-2-octenal and nonanal, either as a binary VOC combination or alongside additional bed bug aggregation semiochemicals.

With the high and increasing global prevalence of the common bed bug and other pest insects, there is an urgent need for devices for the detection, monitoring and control of bed bug or other such pest insect infestations that are simple, effective, highly sensitive, easy to handle, sustainable, affordable, discrete and easily deployable across a breadth of lodgings or sleeping quarters, particularly in hotels, hospitals and commercial vehicles that experience frequent occupancy changes. There is also a need for a method for quickly and efficiently monitoring such lodgings or sleeping quarters for bed bug infestations.

We herein disclose a device that addresses these needs, the device comprising a thin, substantially planar laminate structure that can be used with or without a volatile chemical attractant composition, and can be discretely deployed in confined spaces (e.g. in a horizontal or vertical orientation in between or underneath a mattress) to detect low-level infestation of pest insects, in particular bed bugs.

Statements of Invention

The present invention, in its various aspects, is as set out in the accompanying claims.

According to a first aspect of the invention there is provided a pest insect detection device, said device comprising:

a laminate and substantially planar structure comprising a first plate and a second plate, the first plate and the second plate being configured to physically connect together via engaging supporting structure(s) disposed in an inner or central connection region whilst maintaining a vertical spacing between said first and second plate throughout an outermost or peripheral insect detection region, wherein:

said insect detection region comprises an internal volume, defined by the inner surfaces of said first plate and said second plate, into which said insects may enter from the outer periphery of the device, and which tapers from a minimum vertical separation to a maximum vertical separation, measured between said first and second plate at the outermost periphery of the device, of from about 1mm to about 10 mm;

the inner surface of the first plate is coated in said peripheral region with an adhesive composition for catching and retaining insects; and

the inner surface of the second plate comprises a textured surface in said peripheral region, the textured surface comprising a series of regularly spaced tapered ridges that extend radially toward the periphery of the device, wherein the horizontal distance between the apex of each ridge, as measured at the outermost periphery of the device, is from about 3 mm to about 15 mm.

The devices of the invention have been shown to be highly sensitive bed bug detection devices, that are capable of detecting the presence of as few as a couple or even a single bed bug in a test environment. Therefore, in preferred embodiments, the pest insect detection device is a bed bug detection device.

As used herein, the term "bed bug" denotes insects in the family Cimicidae, and preferably *Cimex spp.* A particularly preferred *Cimex spp* is *Cimex lectularius,* the common bed bug. However, the device of the present invention is also provided for use in detecting other *Cimex spp*, including *Cimex hemipterus,* the tropical bed bug. *Leptocimex boueti* also occasionally feeds on humans and could be a target for detection using the device of the present invention. However, other pest insects could also be detected, aggregated, and/or otherwise monitored using the device of the invention, and so the devices can therefore also be used in methods that detect infestations of pest insects other than bed bugs such as, e.g., other blood-feeding hemiptera, or common household pests such as cockroaches or silverfish.

The device of the present invention comprises an internal space or volume, which is defined by the inner surfaces of the first plate and second plate, into which insects are free to enter from any point of the outer periphery of the device. Further, this internal space or volume tapers from a minimum vertical separation, measured between said first and second plate towards the centre of the device, to a maximum vertical separation, measured between said first and second plate at the outermost periphery of the device, of from about 1 mm to about 10 mm.

In preferred embodiments, the maximum vertical separation between said first and second plate is at least about 2 mm. Similarly, the maximum vertical separation between said first and second plate is preferably no more than about 5 mm. In particularly preferred embodiments, the maximum vertical separation between said first and second plate is about 3mm as traps having this inter-plate separation have been surprisingly found to outperform analogous traps having a narrower maximum spacing.

As noted above, this internal space or volume tapers to a minimum vertical separation towards the centre of the device. However, this minimum vertical separation between the first and second plate is not particularly limited and, in some embodiments, the

separation may be 0 mm, i.e., the first and second plates are in contact with each other. However, in some embodiments, the first and second plate remain separated in order to allow air to flow between the inner or central connection region and the insect detection region. In such embodiments, the minimum vertical separation between the first and second plate is preferably from about 0.2 mm to about 0.5 mm. Such an arrangement is particularly advantageous when an attractant composition is disposed in the central connection region.

The inner surface of the first plate is coated in the peripheral, insect detection region with an adhesive composition for catching and retaining insects in the insect detection region. As will be readily appreciated the particular choice of adhesive is not particularly limited but may be provided as a direct coating onto the surface of first plate or by adhering a glue board to the surface of said plate.

In contrast to the inner surface of the first plate (which is smooth), the inner surface of the second plate comprises a textured surface in the peripheral, insect detection region because it is well established that insects such as bed bugs are attracted to materials with a rough surface texture. In particular, this rough surface texture comprises a series of regularly spaced and radially extending tapered ridges, wherein the horizontal distance between the apex of each ridge, as measured at the outermost periphery of the device, is from about 3 mm to about 15 mm. However, in preferred embodiments, this inter ridge apex-to-apex distance is at least about 4 mm, and more preferably at least about 5mm. Similarly, this inter ridge apex-to-apex distance is preferably no more than about 12 mm, and more preferably no more than about 10 mm. In particularly preferred embodiments, the distance between each ridge is about 5mm as traps having this inter ridge separation distance have been surprisingly found to outperform analogous traps having a broader ridge separation distance.

As will be readily appreciated, the first and second plates of the device may be constructed from a wide variety of materials, and appropriate material(s) can be selected by the skilled person without difficulty depending on, e.g. environmental and/or durability issues. For example, where device durability is a concern, the first plate and said second plate are preferably each constructed from metal or a plastic material, wherein said plastic material is preferably selected from a polycarbonate or polypropylene material.

In such embodiments, the first plate and second plate are preferably releasably engageable, i.e. can be repeatedly connected and disconnected without damaging the device. The specific means by which the first and second plate are releasably engageable are not particularly limited, but includes mating (male-female) connectors or fasteners and/or conventional clip-on mechanisms. By providing such releasably engageable plates, the device can be repeatedly separated, cleaned and reused.

Further, depending on the materials used, the detection device may also be at least partially transparent. In particular, at least a portion of the first and/or second plates may be constructed from a transparent material to allow visual identification of the presence of insect(s) in the insect detection region without needing to separate or destroy the laminate structure. A wide range of suitable transparent plastic materials are available, including transparent polycarbonate and polypropylene materials, and can be selected by the skilled reader without difficulty.

Alternatively, particularly where environmental concerns outweigh device durability concerns, the first plate and said second plate may be non-releasably engaged and are each constructed from a biodegradable material, to provide a disposable, biodegradable device. The specific choice of biodegradable material is not particularly limited and the skilled person can select from a wide variety of suitable materials without difficulty. However, in preferred embodiments, the biodegradable material is selected from wood, paper, or a plant derived fibrous pulp material such as sugar cane pulp.

In embodiments in which the first plate and second plate are non-releasably engaged, i.e. cannot be disconnected without damaging the device structure, the specific means by which the first and second plate are connected is not particularly limited, However, in preferred embodiments, the first plate and said second plate may be glued or otherwise fused together.

The device of the present invention has been shown to be a highly sensitive insect detection device without the use of VOC rich attractant compositions. However, device sensitivity can be further improved by the use of an insect attractant composition. Therefore, in preferred embodiments, the inner connection region of the device comprises, or is configured to accept, a reservoir that is in fluid communication with

said peripheral layer and comprises an insect, preferably a bed bug, attractant composition.

As used herein, the term “reservoir” denotes any container or substrate that can store or hold a pheromone composition. In preferred embodiments, the reservoir is an absorbent layer that is impregnated, or is configured to be impregnated, with said insect attractant composition.

As will be readily appreciated the particular choice of attractant composition is not particularly limited, and an appropriate composition can be selected by the skilled person without difficulty depending on, e.g. the type of insect to be detected.

However, where the device is to be used as a bed bug detection device, the insect attractant composition is preferably a bed bug attractant composition as disclosed in WO 2017/060682. More preferably, the insect attractant composition comprises a combination of volatile organic compound (VOC) active ingredients and, optionally, a carrier and/or a preservative, wherein said VOC active ingredients optionally comprise or consist of (E)-2-octenal and nonanal. Suitable carriers are well known in the art and include, but are not limited to ethanol and diethyl ether.

In particularly preferred embodiments, the bed bug attractant composition comprises (E)-2-octenal in a concentration that is greater than about 0.384 times, alternatively at least 3.84 times, at least 38.4 times, or at least 384 times, the concentration of nonanal.

Exemplary bed bug attractant compositions disclosed in WO 2017/060682 and are suitable for use in the device of the present invention comprise or consist of the following VOC active ingredients:

(i) (*E*)-2-octenal and nonanal;

(ii) (*RS*)-1-octen-3-ol, (*E*)-2-octenal and nonanal;

(iii) hexanal, heptanal, benzaldehyde, (*RS*)-1-octen-3-ol, octanal, 3-carene, β-phellandrene, (*E*)-2-octenal, nonanal, (*E*)-2-nonenal, 2-decanone, decanal, dodecane, nonanoic acid, 2-(2-butoxyethyoxy)ethyl acetate and (*E*)-2-undecenal; or

(iv) hexanal, heptanal, benzaldehyde, (*RS*)-1-octen-3-ol, octanal, 3-carene, β-phellandrene, (*E*)-2-octenal, (3*E*, 5*E*)-octadien-2-one, nonanal, (*E*)-2-

nonenal, 2-decanone, decanal, dodecane, nonanoic acid, 2-(2-butoxyethyoxy)ethyl acetate, (*E*)-2-undecenal and (*S*)-(-)-germacrene D.

Whilst the simple design of the claimed device lends itself to simple visual checking of the insect detection region to confirm the presence or absence of an insect infestation, electronic sensing means can be introduced into the trap to automate this process. Therefore, in some embodiments, the inner connection region of the trap comprises, or is configured to accept, an electronic sensing arrangement that is configured to detect a VOC profile or other signal within the insect detection region that is indicative of the presence of the pest insect to be detected.

The devices of the invention may be used, for example, to detect the presence of insect, and preferably bed bug, infestation, and/or to monitor such insect populations and the efficacy of anti-infestation treatment regimens.

Therefore, according to a second aspect, the invention provides a method for detecting a pest insect, preferably a bed bug, infestation, the method comprising: (i) disposing a detection device according to the first aspect of the invention in a location to be monitored; and (ii) checking the device periodically to assess whether said device shows evidence of said pest insect contact therewith.

As will be readily appreciated, the specific process by which the device is checked to assess whether the device shows evidence of pest contact therewith is not particularly limited and can include any suitable confirmatory process, including e.g. electronic sensing (where applicable). However, in preferred embodiments, the process of checking the device is by visual confirmation.

Where evidence of said pest insect contact is found in step (ii), the method preferably further comprises the additional step of applying a conventional pest insect treatment regimen to said location in order to reduce or eliminate the pest insect infestation in that location.

As will be readily appreciated, the insect detection device may be disposed in any environment in which pest insect, preferably bed bug, detection is required. Therefore, such environments include any area intended for the purpose of sleeping arrangements for any person. For example, the device may be disposed in any

lodgings or sleeping quarters, particularly in hotels, hospitals and commercial vehicles that experience frequent occupancy changes. Therefore, in preferred embodiments, the insect detection device of the first aspect is disposed in human sleeping quarters, and optionally on or in a bed.

Further, whilst the features of the insect detection device have been described with reference to the device being in a substantially flat or horizontal orientation, the skilled person will appreciate that in use the device can be placed in any orientation, dependent on the space available. For example, where the device is to be disposed on or within a bed, the device can be disposed in substantially flat or horizontal orientation (e.g. under a mattress) or can be disposed in a substantially upright or vertical orientation (e.g. sandwiched between a mattress and a wall or headboard).

Preferred features of each aspect of the invention may be as described in connection with any of the other aspects.

Throughout the description and claims of this specification, except where the context requires otherwise due to express language or necessary implication, the words “comprise” and “contain” and variations of the words, for example “comprising” and “comprises” mean “including but not limited to” and do not exclude other moieties, additives, components, integers or steps.

Throughout the description and claims of this specification, the term “and/or” includes any and all combinations of one or more of the associated listed elements.

Throughout the description and claims of this specification, the singular encompasses the plural unless the context otherwise requires. In particular, where the indefinite article is used, the specification is to be understood as contemplating plurality as well as singularity, unless the context requires otherwise.

Throughout the description and claims of this specification, the word "about" means ± 5 %, alternatively ± 2 % unless the context otherwise requires.

All references, including any patent or patent application, cited in this specification are hereby incorporated by reference. No admission is made that any reference constitutes

prior art. Further, no admission is made that any of the prior art constitutes part of the common general knowledge in the art.

Other features of the present invention will become apparent from the following examples. Generally speaking, the invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including the accompanying claims and drawings). Thus, features, integers, characteristics, compounds or chemical moieties described in conjunction with a particular aspect, embodiment or example of the invention are to be understood to be applicable to any other aspect, embodiment or example described herein, unless incompatible therewith.

Moreover, unless stated otherwise, any feature disclosed herein may be replaced by an alternative feature serving the same or a similar purpose.

An embodiment of the present invention will now be described by way of example only with reference to the following, wherein:

Figure 1 is a perspective view of according to one embodiment of the pest detection device of the invention;

Figure 2 is a side view of the embodiment of Figure 1;

Figure 3 is perspective view of the second plate of the embodiment of Figure 1;

Figure 4 shows the effect of inter plate (vertical) separation on bed bug detection and catch rates in short range bioassays;

Figure 5 shows the effect of inter ridge (horizontal) apex-to-apex separation on bed bug detection and catch rates in short range bioassays; and

Figure 6 compares the percentage of detection of bed bugs in short range bioassays in an unbaited trap vs a trap baited with BugScents™ (comprising (E)-2-octenal and nonanal as active VOCs) attractant composition or lure.

The associated Figures 1 to 3 depict an exemplary configuration of the device according to the first aspect of the present invention. Other desired configurations and

shapes for the device are also contemplated, and are intended to fall within the scope of the present application.

As shown in **Figure 1** and **Figure 2**, a substantially planar, pest insect detection device 1 comprises a first plate 3 disposed above a second plate 5, wherein the first plate 3 and second plate 5 are releasably connected via engaging supporting structure(s) 7 or clips (shown in **Figure 3**) that are disposed in an inner or central connection region 9 on the inner surfaces of first plate 3 and second plate 5.

As best shown in **Figure 2,** and whilst connected at the central connection region 9, a vertical spacing 'y' is maintained between said first and second plate throughout the peripheral insect detection region 11, to provide an internal volume or area that serves to allow insects to enter the device from any point on the outer periphery of the device.

In the embodiment shown, this internal volume or area tapers from a minimum vertical separation, measured between said first plate 3 and said second plate 5 towards the centre of the device, of about than 0.2 mm, to a maximum vertical separation 'y', measured between said first plate 3 and said second plate 5 at the outermost periphery of the device, of about 3 mm, although other inter plate separations are also suitable.

Although not shown, the inner surface of first plate 3 is non textured and coated in the peripheral insect detection region 11 with an adhesive coating for catching and retaining insects. Further, and as best shown in **Figure 3**, the inner surface of second plate 5 comprises a textured surface in the peripheral insect detection region 11, which comprises a series of regularly spaced tapered ridges 13 that extend radially toward the periphery of the device and, in this embodiment, the horizontal distance 'x' between the apex of each ridge, as measured at the outermost periphery of the device, is about 5 mm, although other ridge spacings are also suitable.

Also best shown in **Figure 3**, first plate 3 and/or second plate 5 are configured to accept in the inner connection region 9 an absorbent substrate layer (not shown) that is impregnated with an insect attractant composition such as a bed bug attractant composition as disclosed in WO 2017/060682. However, the device may be easily adapted to accept alternative attractant composition containing reservoirs. When an attractant loaded reservoir or substrate is present, VOC will be released into the

atmosphere, in particular into the internal volume of the device, thereby attracting insect entry.

Experimental

As a proof of concept, and to test efficacy of the prototype devices, modifications of the above embodiment were prepared by 3D printing and tested in short range bioassays in order to ascertain the effect of varying the maximum vertical separation 'y' between the first plate 3 and second plate 5 (Example 1), and/or the inter ridge distance 'x' (Example 2), and/or the inclusion of a chemical attractant or lure composition (Example 3) has on insect, in particular bed bug, detection rates.

Materials and Methods

Bed Bugs

Male and female bed bugs were obtained from CimexStore. They were stored separately sexed in plastic colony pots (60 x 40 mm) in a controlled environment (27°C±2°C, 70% humidity ± 10%, 12h:12hr Light:Dark cycle) inside an incubator until used in testing.

Short Range Bioassay Methods

Plastic test arenas (20 litre Really Useful Storage Box, 71x44x12 cm) were lined with Benchkote and secured in place using masking tape. Sides of the test arena were lined with Fluon and double-sided sticky tape. 3D printed traps, either scent free or loaded with the commercially available BugScents™ (comprising (E)-2-octenal and nonanal VOCs), were placed 10 cm from one end of the arena and ten bedbugs (5 males and 5 females) were placed at the other end of the arena for 30 minutes to acclimatize to conditions before being released and left for 4-16 hours to roam freely within the test arena.

All testing was conducted in the dark, and were run overnight or the bed bugs were kept on a reverse light cycle and tests run during the day. Overnight assays were video recorded and the number of bed bugs captured in each trap estimated from the video footage. Tests conducted during the day were manually checked at each timepoint. The behavioral assays were conducted at 21±2°C temperature and relative humidity of 50±20%.

Example 1: Effect of inter plate (vertical) separation on Bed Bug detection performance

Two substantially identical, scent-free, polypropylene insect detection devices were prepared by 3D printing, the first comprising a maximum inter plate separation at the outermost periphery of the device of 3mm and the second comprising a maximum inter plate separation of 2mm.

Both trap designs were evaluated in short range bioassays, and were shown to be effective bed bug detection devices (catch rate and detection rate data provided in **Figure 4**).

However, this data also clearly demonstrates that a trap comprising a maximum inter plate separation (at the outermost periphery of the device) of 3mm outperformed the analogous device having a 2mm inter plate separation, both in terms of catch rate (i.e. percentage of bed bug test population in the test device at the test end point) and detection rate (i.e. percentage of tests in which at least one bed bug was present in the test device at the test end point).

Example 2: Effect of inter ridge (horizontal) separation on Bed Bug detection performance

Similar to Example 1, two substantially identical, scent-free, polypropylene insect detection devices, each having a maximum inter plate (vertical) separation at the outermost periphery of the device of 3mm, were prepared by 3D printing, wherein the tapered ridges were horizontally separated by an apex to apex distance (measured at

the outermost periphery of the device) of 5 mm or 10 mm in the first and second device, respectively.

Both trap designs were evaluated in short range bioassays, and were shown to be effective bed bug detection devices (catch rate and detection rate data provided in **Figure 5**).

However, this data also clearly demonstrates that a trap in which the tapered ridges are horizontally separated by a narrow apex to apex distance of 5 mm outperformed the analogous device in which the tapered ridges have a wider (10 mm) apex to apex separation, both in terms of catch rate and detection rate (i.e. percentage of tests in which at least one bed bug was present in the test device at the test end point).

Example 3: Effect of a bed bug chemical attractant or lure composition on Bed Bug detection performance.

The short range bioassay tests of Examples 1 and 2 were repeated using two structural identical polypropylene insect detection devices wherein the maximum inter plate (vertical) separation was 3mm, and the tapered ridges are separated by a horizontal apex to apex distance of 5 mm, and wherein the first device but not the second device was baited with the commercial available BugScents™ bed bug chemical attractant or lure.

Detection rate data for both the lure-free and lure baited trap are provided in **Figure 6,** which shows that both unbaited and baited traps according to the invention are effective bed bug detection devices, with unbaited traps detecting the presence of bed bugs in 82% of assays. Moreover, the addition of bed bug specific chemical lure was shown to increase detection rate to 100%.

Claims

1. A pest insect detection device, said device comprising:

a laminate and substantially planar structure comprising a first plate and a second plate, the first plate and the second plate being configured to physically connect together via engaging supporting structure(s) disposed in an inner or central connection region whilst maintaining a vertical spacing between said first and second plate throughout an outermost or peripheral insect detection region, wherein:

said insect detection region comprises an internal volume, defined by the inner surfaces of said first plate and said second plate, into which said insects may enter from the outer periphery of the device, and which tapers from a minimum vertical separation to a maximum vertical separation, measured between said first and second plate at the outermost periphery of the device, of from about 1mm to about 10 mm;

the inner surface of the first plate is coated in said peripheral region with an adhesive composition for catching and retaining insects; and

the inner surface of the second plate comprises a textured surface in said peripheral region, the textured surface comprising a series of regularly spaced tapered ridges that extend radially toward the periphery of the device, wherein the horizontal distance between the apex of each ridge, as measured at the outermost periphery of the device, is from about 3 mm to about 15 mm.

2. The device according to claim 1, wherein said insect pest is a bed bug.

3. The device according to claim 1 or claim 2, wherein said insect detection region comprises an internal volume that tapers from a minimum vertical separation to a maximum vertical separation of about 3 mm between said first and second plate at the outermost periphery of the device.

4. The device according to any of the preceding claims, wherein said distance between each ridge is about 5 mm.

5. The device according to any of the preceding claims, wherein said inner connection region comprises, or is configured to accept, a reservoir that is in fluid communication with said peripheral layer and comprises an insect, preferably a bed bug attractant composition.

6. The device according to claim 5, wherein said insect attractant composition comprises a combination of volatile organic compound (VOC) active ingredients and optionally one or both of a carrier and a preservative, and wherein said VOC active ingredients optionally comprise or consist of (E)-2-octenal and nonanal.

7. The device according to claim 6, wherein the bed bug attractant composition comprises an amount of (E)-2-octenal that is greater than about 0.384 times the concentration of nonanal.

8. The device according to any of the preceding claims, wherein said inner connection region comprises, or is configured to accept, an electronic sensing arrangement that is configured to detect a VOC profile or other signal within the insect detection region that is indicative of the presence of said pest insect.

9. The device according to any of the preceding claims, wherein said first plate and said second plate are each constructed from metal or a plastic material, wherein said plastic material is optionally selected from a polycarbonate or polypropylene material.

10. The device according to claim 9, wherein said first plate and said second plate are releasably engageable.

11. The device according to any of the preceding claims, wherein the detection device is at least partially transparent.

12. The device according to any of claims 1 to 8, wherein said first plate and said second plate are non-releasably engaged and are each constructed from a biodegradable material, wherein said biodegradable material is optionally selected from wood, paper, or a plant derived fibrous pulp material such as sugar cane pulp.

13. The device according to claim 12, wherein said first plate and said second plate are glued or otherwise fused together.

14. A method for detecting a pest insect infestation, the method comprising:
    a. disposing a detection device according to any one of claims 1 to 13 in a location to be monitored; and
    b. checking the device periodically to assess whether said device shows evidence of said pest insect contact therewith.

15. The method according to claim 14, for detecting a bed bug infestation.

16. The method according to claim 14 or claim 15, wherein if evidence of said pest insect contact is found in step b, the method further comprises applying a pest insect treatment regimen to said location in order to reduce or eliminate the pest insect infestation in that location.

17. The method according to any of claims 14 to 16, wherein said device is disposed in human sleeping quarters, and optionally on or in a bed.

18. The method according to any one of claims 14 to 17, wherein said device is disposed in a substantially flat or horizontal orientation.

19. The method according to any one of claims 14 to 17, wherein said device is disposed in a substantially vertical orientation.