

An Insect Trap

Field of the Invention

The present invention concerns insect traps comprising a body, at least one entrance and a trapping area. More particularly, but not exclusively, this invention concerns an insect trap comprising a flexible ramp.

Background of the Invention

Insect traps are used for pest control and are known in the art. Insect traps are placed in locations where insects are known to be present, for example an insect trap may be placed on a floor or wall in an area where insects have previously been spotted or in a likely hiding place for insects.

The placement of an insect trap is a key factor in its effectiveness. Normally, a user will optimise such placement through trial and error, noting general areas where traps appear to have been more effective. A user may alternatively use a more advanced insect trap which uses cameras and image analysis to collect data about the insects caught, however these solutions are much more expensive and require substantial computer processing.

Insect traps with adhesive, also known as adhesive traps, are known in the art. Insects enter adhesive traps and stick to the adhesive, becoming trapped. Alternative traps such as pitfall traps are also available which trap insects by having a pit, usually concealed, into which insects fall and from which they cannot escape.

Insect traps are often disposable and need replacing once they become full or are no longer effective. Disposable insect traps produce waste and periodic replacement of insect traps has an associated cost.

The present invention seeks to mitigate the above-mentioned problems. Alternatively or additionally, the present invention seeks to provide an improved insect trap.

Summary of the Invention

The present invention provides, according to a first aspect, an insect trap comprising:

- a body, wherein the body comprises a cover, a base and a plurality of walls forming a substantially enclosed interior of the insect trap,

- a trapping area within the interior arranged to capture insects;

- a first entrance to the interior of the insect trap formed of an aperture in a first wall of the plurality of walls, and

- a second entrance to the interior of the insect trap formed of an aperture in a second wall of the plurality of walls;

- wherein the first entrance is opposite the second entrance such that the trap has two entrances on opposite ends of the body.

More insects are likely to enter the insect trap as they are able enter via either the first entrance or the second entrance. Insects in the surrounding area on either of the two sides may enter the interior of the insect trap by one of the two entrances being in their path.

The substantially enclosed interior of the insect trap provides an attractive space for insects as it is warmer and/or darker than the surrounding area.

The insect trap may be moveable between a closed configuration, wherein the insect trap forms the substantially enclosed interior, and an open configuration, wherein a user can access the interior of the insect trap, for example for servicing or monitoring.

The trapping area may comprise an adhesive layer. Additionally or alternatively, the insect trap may comprise a drop such that insects fall down the drop into the trapping area.

The substantially enclosed interior may be such that only minimal, if any, light from the surrounding area enters the insect trap. The skilled person will appreciate that a substantially enclosed interior does not exclude the presence of apertures in the body, for example apertures forming an entrance for insects to enter the insect trap.

The substantially enclosed interior may be such that insects caught in the insect trap are not visible from the outside of the insect trap when the insect trap is in a closed configuration.

Each of the plurality of walls may be planar and adjacent walls may be substantially perpendicular to one another. The body may have a substantially cuboidal shape. The body may have a rectangular cross-section. Alternatively, the body may be any other suitable shape. For example, the walls may be curved, the plurality of walls forming a substantially cylindrical box having a circular cross-section.

The height of the body may be less than or equal to 30mm, preferably less than 25mm. The length of the body may be between 195mm and 255mm, preferably between 210mm and 240mm. The width of the body may be between 70mm and 130mm, preferably between 80mm and 120mm. In this case, the height of the body is preferably the distance extending between the upper surface of the cover and the lower surface of the base. The length of the body is preferably the distance extending between two of the plurality of walls, more preferably being the distance between the first wall of the plurality of walls and the second wall of the plurality of walls. The width of the body is preferably the distance extending between two of the plurality of walls, more preferably the distance extending between a third wall of the plurality of walls and a fourth wall of the plurality of walls.

The insect trap may be for trapping insects of a height from 0.2mm. The insects to be trapped may include different varieties of beetles and cockroaches.

The first wall, having an aperture forming a first entrance, of the plurality of walls may be opposite and/or facing the second wall, having an aperture forming a second entrance. The first entrance may be in the path of insects coming from a first side of the insect trap and the second entrance may be in the path of insects coming from a second opposite side of the insect trap, thereby insects on both the first and second sides of the insect trap are likely to enter the insect trap. The first wall may be parallel to the second wall. A third wall and a fourth wall of the body may extend between the ends of the first wall and the second wall.

The apertures in the first and second walls may be aligned along an axis parallel to length of the body of the insect trap. The axis may intersect the centre of the apertures in the first and second walls. The axis may be perpendicular to the plane of the first and second walls. Alternatively, the apertures may be offset from one another along the width of the body.

The insect trap may further comprise a divider between the first and second entrances wherein the divider is for blocking light.

The divider stops light entering into the interior of the trap from the first entrance being visible from the second entrance and vice versa. The divider creates a darker, more attractive environment for insects entering from each entrance.

The divider may extend across the whole width of the interior of the insect trap. The divider may extend across the whole height of the interior of the insect trap.

The divider may be opaque, completely blocking light. Additionally or alternatively, the divider may be made of black and/or a matt material.

The divider may be positioned halfway along the length of the body. The divider may be positioned at a point between 40% and 60% along the length of the body, or between 40% and 60% of the total distance between the first and second wall, measured from one of said walls. More preferably, between 45% and 55% along the length of the body, or between 45% and 55% of the total distance between the first and second wall, measured from one of said walls.

The cover of the body may comprise the divider such that the divider extends down from the cover, preferably from the underside of the cover, into the interior of the trap. The divider may be attachable to/removable from the cover. Alternatively, the divider may be an integral part of the cover.

The third and fourth walls of the body which extend along the length of the insect trap may have guides for the divider. The guides may be a recess in each wall such that the divider sits within the guides when the insect trap is in a closed configuration.

Alternatively, the base of the body may comprise the divider such that the divider extends up from the base, preferably from the upper surface of the base, into the interior of the trap. The divider may be attachable to/removable from the base or the divider may be an integral part of the base.

The divider may split the trapping area of the insect trap into first and second smaller sub-trapping areas such that insects entering the trap from the first entrance are trapped in the first sub-trapping area and insects entering the trap from the second entrance are trapped in the second sub-trapping area. The first sub-trapping area may have substantially the same surface area as the second sub-trapping area.

The features discussed in relation to the first aspect of the invention may also be incorporated into the following aspects of the invention.

According to a second aspect of the invention there is also provided an insect trap comprising:

- a body, wherein the body comprises a cover, a base and a plurality of walls, forming a substantially enclosed interior of the insect trap,
- a trapping area within the interior arranged to capture insects, and
- at least one entrance to the interior of the insect trap;

wherein the trapping area comprises a layer of adhesive for trapping insects.

The layer of adhesive of the trapping area in the substantially enclosed interior of the insect trap remains effective for a longer period of time than if it was instead in a substantially exposed interior. Particularly, the cover of the body is such that it reduces the amount of dust particles and/or fibres from the surrounding environment landing on the layer of adhesive which reduces its effectiveness. Insects crawl into the insect trap and onto the layer of adhesive, becoming trapped.

The cover of the body may cover more than 50% of the trapping area. Preferably the cover of the body covers the entirety of the trapping area.

The at least one entrance may be formed of an aperture in one of the plurality of walls. The at least one entrance may be a first entrance and the trap may have an additional second entrance, like in the first aspect of the invention.

The layer of adhesive may be located on the base of the body forming a sticky bottom surface of the interior of the insect trap. The layer of adhesive may cover more than 50% of the surface area of the base of the body, preferably the layer of adhesive covers more than 70% of the surface area of the base of the body.

The insect trap may further comprise a removable board wherein the removable board comprises the layer of adhesive for trapping insects, the removable board forming at least part the trapping area of the insect trap.

Preferably, the removable board forms the trapping area of the insect trap.

The base of the body of the insect trap may comprise a cavity. The cavity in the base of the body may be of a greater surface area than the material base, the bottom of the interior of the trap being formed of a material border surrounding the cavity. The cavity in the base of the body may be rectangular. Alternatively, the base of the body may be

completely void. Alternatively, the base of the body may have no cavity and be entirely solid.

When the removable board is assembled with the body of the insect trap, the surface of the removable board having the layer of adhesive may occupy the cavity, or void, in the base of the body such that the bottom surface of the insect trap is formed substantially, if not entirely, of the removable board having the adhesive layer.

Alternatively, the removable board may rest on the surface of the solid base of the body.

The removable board may be attached to the body of the insect trap by any suitable means. For example, the removable board may be fixable to a border of the base of the body, alternatively the removable board may be fixable to at least one of the plurality of walls.

The layer of adhesive forming the trapping area being on a removable board provides a more economic and cost-effective solution as, once the adhesive is no longer effective or once the trapping area is full, the removable board may be replaced with a new removable board. Replacing the removable board in the insect trap is an easy, cost-effective way of reusing the insect trap without replacing all parts of the insect trap.

The insect trap may further comprise a drop to the trapping area such that insects, having entered the interior of the insect trap, fall onto the layer of adhesive.

The drop may have a height between 5mm and 10mm, preferably of approximately 7.5mm.

The trapping area involving both a drop and a layer of adhesive provides more effective trapping. Insects are kept in the trapping area as a result of being stuck to the layer of adhesive and/or being unable to climb out of the trapping area. Each method of trapping may be more effective for different species and sizes of insects. Therefore, the trapping area involving both a drop and a layer of adhesive may offer effective trapping for a wider range of insects than if only one method were incorporated into the insect trap.

The drop may be formed of any raised surface adjacent to, or extending over, the layer of adhesive. For example, the height of the base of the insect trap adjacent the trapping area may be greater than the height of the trapping area. The trapping area may be a pit. Additionally or alternatively, insects may climb up at least one ramp such that they are raised above the trapping area and, once they walk beyond the innermost edge of the at

least one ramp, they fall down the drop into the trapping area. The ramp may extend over the trapping area, beyond an outer edge or perimeter of the trapping area.

The insect trap may comprise a divider between a first entrance and a second entrance of the insect trap. The divider may be for blocking light. The divider may extend down from the cover of the body into the interior, dividing the layer of adhesive and forming two sub-trapping areas.

The features discussed in relation to the second aspect of the invention may be incorporated into the preceding aspect, or following aspects, of the invention.

According to a third aspect of the invention there is also provided an insect trap comprising:

- a body, wherein the body comprises a base and a plurality of walls forming an interior of the insect trap,

- a trapping area within the interior arranged to capture insects,

- at least one entrance to the interior of the insect trap, and

- a ramp at the entrance for insects to access the interior of the insect trap.

The body of the insect trap may further comprise a cover, similarly to the insect traps according to other aspects of the invention, such that the interior of the insect trap is substantially enclosed.

The insect trap may have a first entrance and a second entrance with a ramp at each entrance. Insects may ascend the first ramp to enter the interior of the insect trap via the first entrance and insects may ascend the second ramp to enter the interior of the insect trap via the second entrance.

Each ramp may have an outermost edge, which is farthest from the centre of the interior of the insect trap, and an innermost edge, which is closest to the centre of the interior. The outermost edge of the ramp may be tapered, the thickness of the ramp decreasing from the innermost edge to the outermost edge.

The ramp may comprise a supporting structure and a flexible layer. The flexible layer may be supported by the supporting structure. The flexible layer may extend beyond the supporting structure on the outermost edge of the ramp, such that the flexible layer forms a tapered edge of the ramp. The tapered edge of the ramp formed of the flexible layer may rest on a floor that the insect trap is placed on.

The ramp may be attached to the body of the insect trap by the supporting structure while the flexible layer is for insects to mount and climb on.

The at least one ramp, or the first and/or second ramp, may be outside the body of the insect trap such that it leads up to and terminates at the corresponding aperture of the body of the insect trap. Alternatively, the at least one ramp, or the first and/or second ramp, may be entirely within the interior of the insect trap such that the ramp starts at the corresponding aperture of the body of the insect trap, or even starts within the interior of the insect trap. Alternatively, the at least one ramp, or the first and/or second ramp may straddle the aperture of the body of the insect trap such that it starts outside the body of the insect trap and terminates within the interior of the insect trap.

The ramp may be integral with the body of the insect trap. Alternatively, the ramp may be attachable to, and removable from, the body of the insect trap. If attachable to and removable from, the ramp may be replaced once damaged or no longer effective so that the insect trap does not need to be replaced due to failure of a single component i.e. the ramp. Any suitable means of attaching the ramp to the main body may be used.

The insect trap may further comprise a drop to the trapping area such that insects, having entered the interior of the insect trap via the ramp, fall off the edge of the ramp and down the drop to the trapping area.

The drop may be formed of any suitable structure, for example the options discussed in relation to the second aspect of the invention. The trapping area may be below the highest point of the ramp thereby resulting in the drop.

The trapping area may comprise a layer of adhesive for trapping insects.

The layer of adhesive offers an additional means of keeping the trapped insects within the trapping area. The layer of adhesive may cover substantially the entire surface area of the trapping area, the layer of adhesive at least covers the area beneath the ramp.

An upper surface of the ramp may be textured.

Where the ramp has a flexible layer, the flexible layer may be textured.

Insects are more likely to enter the trap via a textured ramp as its texture may encourage the insects to walk along the ramp and into the interior of the insect trap.

The ramp may be textured in the sense that it is non-smooth. The surface of the ramp may have a surface roughness greater than 10 micrometres, more preferably having a

surface roughness greater than 15 micrometres. The ramp may comprise ridges on its upper surface such that the surface is non-smooth.

The ramp, or its flexible layer, may be made from rubber or have a rubber coating. Alternatively, the ramp may be made from a flexible polymeric material or any other suitable material.

The ramp may be flexible. In this way, when the insect trap is placed on an uneven surface, the ramp may compliantly adapt to the uneven surface.

The ramp may have a tapered edge. The tapered edge, or outer-most edge of the ramp, may maintain positive contact with a floor surface as a result of only the weight of the trap.

When the insect trap is placed on a floor, the outermost, lowest edge of the ramp may deform to conform with the surface of the floor. As such, insects need not step up to the base of the body of the insect trap, which may be raised above the floor as a result of imperfections in the surface of the floor.

The features discussed in relation to the third aspect of the invention may be incorporated into any of the preceding aspects, or the following, aspect of the invention.

According to a fourth aspect of the invention there is also provided an insect trap comprising:

- a body, wherein the body comprises a base and a plurality of walls forming an interior of the insect trap,

- a trapping area within the interior arranged to capture insects, and

- a sensing system configured to sense, along a sensing axis, the presence of an insect entering the insect trap;

- wherein the sensing system comprises at least one emitter configured to emit radiation along the sensing axis, and at least one receiver configured to receive radiation along the sensing axis, the sensing system detecting an insect that intersects the sensing axis thereby preventing radiation emitted by the emitter being received by the receiver.

The insect trap may further comprise at least one entrance, or a first entrance and a second entrance, through which the insects enter the insect trap. The body of the insect trap may further comprise a cover such that it forms a substantially enclosed interior of the insect trap, as in other aspects of the invention.

The sensing system may be configured to collect data about insects that enter the insect trap. Such data may include the quantity, frequency, size, height, and/or appearance of the insects. Using data, for example by data collection, data transfer, data processing and/or data analysis, may improve insect trapping by facilitating optimisation of insect trap placement. The data collected may also improve understanding of insect behaviour.

The insect trap may further comprise a data transmission system configured to transmit the data collected by the sensing system. The data transmission system may comprise a transmitter for transmitting data to a remote device. The transmitter may be configured to transmit data via a proprietary network system, via Wi-Fi, via cellular and/or via Bluetooth.

The at least one emitter may be on a side of the body of the insect trap, preferably mounted on the third wall of the plurality of walls and the receiver may be mounted on an opposite side of the body of the insect trap, preferably mounted on the fourth wall of the plurality of walls.

Alternatively, the emitter and receiver may be on the same side of the body, for example mounted in the same location on one of the plurality of walls. In such cases, the sensing system may further comprise a reflector. The reflector may be located on an opposite side of the body to the emitter and receiver such that the reflector reflects the radiation emitted from the emitter back to the receiver.

The sensing axis may extend across the width of the insect trap. The sensing axis may be perpendicular to the wall of the body on which the emitter and/or receiver is mounted. The sensing axis may be parallel to the first wall and/or the second wall of body having an aperture through which an insect may have entered.

The sensing system, more particularly the at least one emitter and at least one receiver forming a sensing pair, may comprise one or more suitable types of sensors for detecting the presence of an insect. For example, the sensing system may comprise a photoelectric sensor, such as a through-beam sensor, wherein the emitter emits red light along the sensing axis, which is then received by the receiver. Additionally or alternatively, the sensing system may comprise at least one motion sensor or any other suitable sensor(s).

The at least one receiver may be configured to detect an insect by measuring electromagnetic radiation. The electromagnetic radiation being measured may not be in the visible light spectrum.

The electromagnetic radiation being measured by the receiver may have a wavelength of less than 380 nanometres. Additionally or alternatively, the electromagnetic radiation being measured by the receiver may have a wavelength of greater than 700 nanometres. As such the interior of the insect trap remains dark and is therefore attractive to insects. The electromagnetic radiation being measured may be infrared radiation, infrared radiation being of wavelengths between 780 nanometres to 1 millimetre.

The transmitter and receiver may be integral with each other, adjacent each other or in substantially the same place. The receiver may register presence of an insect when the signal transmitted from the transmitter is not reflected back to the receiver i.e. a beam break sensor. Or the receiver may measure the infrared radiation, registering presence of an insect dependent on the amount of infrared radiation that is absorbed. The sensing system may further comprise a reflector for reflecting the signal transmitted from the transmitter back to the receiver. The point sensor may be a retro-reflective sensor.

The sensor may be a binary sensor, for example the receiver detecting the presence or absence of a beam and determining the presence of an insect when the beam has been broken/obstructed. Alternatively, the sensor may be an analogue sensor, for example the receiver measuring the strength of infrared radiation.

The sensing system may comprise;

a first sensing pair comprising a first emitter and a first receiver; and

a second sensing pair comprising a second emitter and a second receiver;

wherein a first sensing axis extends from the first emitter and wherein a second sensing axis extends from the second emitter.

The second sensing pair may be located at a different position along the length of the body. The first sensing pair may be located adjacent a first entrance of the trap and the second sensing pair may be located adjacent a second entrance of the trap. The sensing system collects data about insects entering each entrance separately. In cases where the insect trap further comprises a divider between the two entrances, the first sensing pair may be for detecting insects entering a first side of the divided trapping area and the

second sensing pair may be for detecting insects entering a second side of the divided trapping area.

The sensing pair, and therefore sensing axis, may be located at a point along the length of the body adjacent the innermost edge of a ramp. As such, if the insect trap has a drop to the trapping area, the sensing pair will only detect insects just before they fall down the drop, minimising the number of false positives that may arise if the sensing system detects insects that subsequently exit the insect trap and do not fall into the trapping area.

In cases where the trapping area has a layer of adhesive, the sensing pair and therefor sensing axis may be located at a point along the perimeter of the layer of adhesive such that it only detects insects that are about to crawl onto the adhesive and become trapped.

The first sensing pair may be at a first height and the second sensing pair may be at a second height; wherein the heights are measured from the base of the body and the second height is greater than the first height; and wherein the first sensing axis and the second sensing axis are both located at a fixed distance along the length of the body of the insect trap such that the first and second sensing pairs can be used detect a height of an insect in the interior of the insect trap.

The first and second sensing pairs being arranged in such a way as to collect data on the height of insects entering the insect trap is a simpler and more cost-effective way of collecting data about the insects, particularly when compared to solutions that use cameras and image processing to collect data on the insects.

If an insect triggers the first sensing pair but does not trigger the second sensing pair, this indicates that it has a height between the first height and the second height. If the insect triggers the first sensing pair and the second sensing pair, this indicates that its height is equal to or greater than the second height.

The first height may be less than or equal to 0.2mm. The second height may be 4mm, alternatively the second height may be greater than 4mm and less than 12mm.

The sensing system may comprise a plurality of sensing pairs arranged in various ways, some aligned along the length of the body of the insect trap, others aligned along the height of the insect trap.

The sensing system may comprise four sensing pairs, a first sensing pair and a third sensing pair at a first height and a second sensing pair and a fourth sensing pair at a second height, wherein the first and second sensing pair are located at a first distance along the length of the body of the insect trap such that the first and second sensing pairs can be used detect a height of an insect that has entered via a first entrance, and wherein the third and fourth sensing pair are located at a second distance along the length of the body of the insect trap such that the third and fourth sensing pairs can be used detect a height of an insect that has entered via a second entrance.

The sensing system may further comprise a camera for detecting insects entering the insect trap.

The camera may be used in conjunction with some image processing to generate further data on the insects in the interior of the insect trap.

The sensing system may comprise a reset mechanism configured to reset data collection of data from the sensing system.

The reset mechanism may be used in data processing for registering a change of location such that the data can be used to optimise future placement of the insect trap. Additionally or alternatively, the reset mechanism may be used when a replaceable board with a layer of adhesive is replaced such that a user can monitor when the insect trap may have become full so that it can be replaced again.

The reset mechanism may comprise an actuatable button on the surface of the cover which can be pushed to trigger the reset. Additionally or alternatively, the reset mechanism may be entirely electronic and triggered by a command issued by the user, for example through a remote device.

The optional features discussed in relation to the fourth aspect of the invention apply to the preceding aspects of the invention discussed.

Any of the aspects of the invention may incorporate any of the preceding or subsequent optional features discussed, irrespective of which aspect they are discussed in relation to. The following features may be incorporated into any of the aspects of the invention and in any combination with previously disclosed optional features.

The outer surface of the body may be smooth so that insects cannot crawl across the outer surface.

The outer surface of the body may have a surface roughness of less than or equal to 0.1 micrometers. The insect trap is only effective when the insect travels into the interior of the insect trap and therefore the insect trap is designed to deter insects from climbing over the insect trap.

At least part of the surface of the interior of the insect trap may be smooth so that insects cannot crawl out of the trapping area, or to encourage insects to crawl into the trapping area.

The inner surface of the plurality of walls may be relatively smooth such that insects are deterred from climbing up the walls.

The interior of the insect trap may be black.

The insect trap may be made from black material, preferably black plastic.

At least part of the interior of the insect trap may be matt so that the interior surfaces of the insect trap reflect limited light.

The overall height of the insect trap may be less than 40mm, preferably less than 35mm.

The body may comprise a hinge which enables movement of the insect trap between an open configuration and a closed configuration wherein, when the insect trap is in the closed configuration, the interior of the insect trap is not visible.

It is desirable that dead insects are not visible while the insect trap is in use, however it is advantageous to be able to see into and access the interior of the insect trap for servicing and monitoring. This is particularly advantageous when elements of the insect trap, for example a ramp or ramps and/or a board with an adhesive layer, are replaceable.

The hinge may be between the cover and one of the plurality of walls of the body of the insect trap.

It will of course be appreciated that features described in relation to one aspect of the present invention may be incorporated into other aspects of the present invention.

Description of the Drawings

Embodiments of the present invention will now be described by way of example only with reference to the accompanying schematic drawings of which:

Figure 1 shows a perspective view of an insect trap according to a first embodiment of the invention while it is in a closed configuration;

Figure 2a shows a perspective side view of the insect trap in a partially open configuration;

Figure 2b shows a perspective end view of the insect trap in the partially open configuration;

Figure 3 shows a perspective end view of the insect trap in a fully open configuration;

Figure 4 shows an exploded view of the insect trap; and

Figure 5 shows a side view of the insect trap showing its cross-section along its length.

Detailed Description

An insect trap 100 according to an embodiment of the invention is shown in a closed configuration in Figure 1, in a partially open configuration in Figures 2a and 2b, and in an open configuration in Figure 3.

The insect trap 100 has an overall cuboidal shape formed of four substantially perpendicular walls; a first wall 121, a second wall 122, a third wall 123 and a fourth wall 124. The first wall 121 and the second wall 122 are substantially parallel to each other and the third wall 123 and the fourth wall 124 are substantially to each other. The first and second walls 121, 122 extend along the width of the insect trap 100 and are shorter than the third and fourth walls 123, 124 which extend along the length of the insect trap 100.

The insect trap 100 has a base 110 and a cover 130 which, with the walls 121, 122, 123, 124, form an enclosed interior of the insect trap when it is in the closed configuration. The cover 130 is rotatable with respect to the base 110 and walls 121, 122, 123, 124 by a hinge 140 located at the top edge of the curved fourth wall 124 such that it can move between an open configuration, shown in Figure 3, and a closed configuration, shown in Figure 1.

The length of the insect trap 100 is 200mm, the width of the insect trap 100 is 100mm and the height (measured from the bottom of the base 110 to the top of the cover 130) of the insect trap 100 is 30mm.

The insect trap 100 has two entrances 200a, 200b. The first entrance 200a is formed of an aperture 210a in the first wall 121. The second entrance 200b is formed of an aperture 210b in the second wall 122.

The insect trap 100 has two ramps 220a, 220b at the two entrances 200a, 200b, respectively. The first ramp 220a has a tapered edge at the aperture 210a in the first wall 121, and extends upwards and along the length of the insect trap 100 into its interior.

The ramps 220a, 220b are formed of a support frame and a rubber layer. The support frame is made of plastic and the rubber layer has a surface roughness of 15 micrometres. The rubber layer extends beyond the edge of the support frame such that it is unsupported at the free end. The rubber layer's free end is farthest from the interior of the insect trap 100 and, because it is not supported by the frame, is flexible and can move with contours of an uneven surface.

In the interior of the insect trap 100, there is a trapping area 300 with a layer of adhesive 310. In this embodiment, the trapping area 300 is bordered by the base 110. In other embodiments of the invention, the trapping area 300 is on the upper surface of the base 110 which is entirely solid.

The two ramps 220a, 220b terminate above the trapping area 300. The distance between the upper surface of the ramp and the trapping area is 6.5mm, forming a drop/pit into the trapping area 300.

Batteries 430 for powering the sensing system and data transmission system, which are described in more detail with respect to Figure 5, are held in position by the cover 130. When the insect trap 100 is in the closed configuration, the batteries 430 rest along the inner surface of the fourth wall 224, which has a curved shape that corresponds to the shape of the batteries 430.

The cover 130 has a divider 131 extending from the inner surface of the cover 130 into the interior of the insect trap 100. The divider 131 is opaque and matt and stops light entering the trap from the first entrance 200a being visible from the second entrance 200b and vice versa. When the insect trap 100 is in the closed configuration, the divider 131 extends across the full height of the interior of the insect trap 100, essentially dividing the

trapping area 300 into two sub-trapping areas 311, 312 which are shown in Figure 5. Insects entering from the first entrance 200a are caught in the first sub-trapping area 311 and insects entering from the second entrance 200b are caught in the second sub-trapping area 312.

A reset button 420 is on the upper surface of the cover 130.

The insect trap 100 is formed of black plastic. The majority of the surface area of the interior of the insect trap 100 has rough, matt finish which reflects minimal light. The areas of the inner surface of the third and fourth walls 123, 124 that are adjacent the trapping area 300 are smooth. The exterior of the insect trap 100 has a smooth shiny exterior with a low surface roughness to deter insects from climbing across the outer surface of the cover 130 and the walls 121, 122, 123, 124 of the insect trap 100.

The exploded view of the assembly of the insect trap 100 shown in Figure 4 demonstrates how the insect trap 100 is assembled.

The cover 130, the base 110 and the hinge 140 connecting them are one integral part. The ramps 220a, 220b are separate parts and are mountable to the base 110. The walls 121, 122, 123, 124 are a single chassis and the chassis mountable to the base 110 and the cover 130. The divider 131 is mountable to the inner surface of the cover 130 and, when assembled, is positioned halfway along the length of the chassis.

In this embodiment, the layer of adhesive 310 is on a removable board 320 that can be secured to the base 110. When required, the removable board 320 with adhesive can be removed and replaced with another removable board 320 with a fresh layer of adhesive 310.

In some embodiments, the fresh layer of adhesive 310 is covered by a film which can be removed by a user when it is to be used, keeping the adhesive effective for longer.

The cross-section of the insect trap 100 along its length is shown in Figure 5, showing the interior of the insect trap 100 and some of its internal components. The sensing system of the insect trap 100 will now be discussed with reference to Figure 5.

A first sensing sub-system 410 is on a first side of the divider 131, closer to the first entrance 200a, while a second sensing sub-system 420 is on a second side of the divider 131, closer to the second entrance 200b. The first and second sensing sub-system 410, 420 have the same structure and work the same way.

The first sensing sub-system 410 has two infrared radiation (IR) sensors 411, 412. The lower sensor 412 is positioned such that it can detect the presence of an insect of height 0.2mm or more. The higher sensor 411 is positioned directly above the lower sensor 412 such that it can detect the presence of an insect of a height of more than 4mm.

The first sensing sub-system 410 is positioned at the edge of the first ramp 220a such that it senses insects just before they fall into the trapping area 300, particularly the first sub-trapping area 311.

The second sensing sub-system 220 also has two infrared sensors (not shown in the figures) and has a lens 423 over the sensors to protect the sensors. The first sensing sub-system 410 also has a lens (not shown in the figure).

The sensing system of the insect trap 100 also involves electronics that are not shown in the figure. The sensing system is connected to a data transmission system that transmits the data collected about the insects to a remote device.

In use, a user assembles the insect trap 100 and places it in a location where they might expect insects to be. Insects in the surrounding area are attracted to the dark interior of the insect trap 100 and crawl into its interior via one of the two entrances 200a, 200b and up the corresponding ramp 220a, 220b. The divider 131 prevents the interior of the insect trap 100 becoming too light and so deterring an insect from entering, despite there being the two entrances 200a, 200b.

The flexible nature of the ramps 220a, 220b allow their outer edges to conform to the surface of the ground, even when the ground is uneven, so allowing insects to easily crawl upon them and into the insect trap 100. Further, as the surface of the ramps 220a, 220b are matt and textured, insects can easily crawl onto them. In contrast, the exterior surface of the insect trap 100, and also the interior surfaces of the insect trap 100 other than the ramps, are smooth, so encouraging insects to travel (only) up the ramp inside the insect trap 100.

Once the insect reaches the edge of the ramp, the corresponding sensing sub-system will detect its presence. If only the lower sensor 412 detects the insect, it will be identified as a small insect of height between 0.2mm and under 4mm. If the higher sensor 411 also detects the insect, it will be identified as a large insect of height of 4mm or greater. This data is stored and transmitted to a remote device via the data transmission

system. Once the insect steps off the edge of the ramp, it will fall down the drop into the trapping area and stick to the adhesive layer.

Over time, more insects will be caught in the trapping area 300. This can be monitored by the user by looking at the data collected by the sensing system. Once the trapping area 300 is full, or the adhesive is no longer effective, a user opens the insect trap 100 and replaces the removable board 320. They also press the reset button 420 to register the reset.

The user may also wish to place the insect trap 100 in a different position and, using the data collected, decide which location is most effective for trapping insects.

Whilst the present invention has been described and illustrated with reference to particular embodiments, it will be appreciated by those of ordinary skill in the art that the invention lends itself to many different variations not specifically illustrated herein.

Where in the foregoing description, integers or elements are mentioned which have known, obvious or foreseeable equivalents, then such equivalents are herein incorporated as if individually set forth. Reference should be made to the claims for determining the true scope of the present invention, which should be construed so as to encompass any such equivalents. It will also be appreciated by the reader that integers or features of the invention that are described as preferable, advantageous, convenient or the like are optional and do not limit the scope of the independent claims. Moreover, it is to be understood that such optional integers or features, whilst of possible benefit in some embodiments of the invention, may not be desirable, and may therefore be absent, in other embodiments.

Claims

1. An insect trap comprising:
 - a body, wherein the body comprises a base and a plurality of walls forming an interior of the insect trap;
 - a trapping area within the interior arranged to capture insects;
 - at least one entrance to the interior of the insect trap; and
 - a ramp at the entrance for insects to access the interior of the insect trap;wherein the ramp is flexible.
2. An insect trap according to claim 1 wherein an upper surface of the ramp is textured.
3. An insect trap according to claim 1 or claim 2, wherein the insect trap further comprises a drop to the trapping area such that insects, having entered the interior of the insect trap via the ramp, fall off an edge of the ramp and down the drop to the trapping area.
4. An insect trap according to any preceding claim, wherein the trapping area comprises a layer of adhesive for trapping insects.
5. An insect trap according to claim 4, further comprising a removable board, wherein the removable board comprises the layer of adhesive for trapping insects, the removable board forming at least part of the trapping area of the insect trap.
6. An insect trap according to any preceding claim, wherein the body further comprises a cover, and wherein the cover, base and plurality of walls form a substantially enclosed interior of the insect trap;
 - wherein the insect trap further comprises a second entrance to the interior of the insect trap formed of an aperture in a second wall of the plurality of walls, wherein the first entrance is opposite the second entrance such that the trap has two entrances on opposite ends of the body; and
 - wherein the insect trap further comprises a divider between the first and second entrances, wherein the divider is for blocking light.

7. An insect trap according to claim 6, wherein the divider extends down from the cover of the body into the interior, dividing the trapping area and forming two sub-trapping areas.

8. An insect trap comprising:

- a body, wherein the body comprises a cover, a base and a plurality of walls forming a substantially enclosed interior of the insect trap;

- a trapping area within the interior arranged to capture insects;

- a first entrance to the interior of the insect trap formed of an aperture in a first wall of the plurality of walls; and

- a second entrance to the interior of the insect trap formed of an aperture in a second wall of the plurality of walls;

wherein the first entrance is opposite the second entrance such that the trap has two entrances on opposite ends of the body; and

wherein the insect trap further comprises a divider between the first and second entrances, wherein the divider is for blocking light.

9. An insect trap according to claim 8, wherein the divider extends down from the cover of the body into the interior, dividing the trapping area and forming two sub-trapping areas.

10. An insect trap according to claim 8 or claim 9, wherein the trapping area comprises a layer of adhesive for trapping insects.

11. An insect trap according to claim 10, further comprising a removable board wherein the removable board comprises the layer of adhesive for trapping insects, the removable board forming at least part of the trapping area of the insect trap.

12. An insect trap according to any of claims 8 to 11, wherein the insect trap further comprises a drop to the trapping area such that insects, having entered the interior of the insect trap, fall onto the layer of adhesive.

13. An insect trap according to any preceding claim, wherein the outer surface of the body is smooth so that insects cannot crawl across the outer surface.

14. An insect trap according to any preceding claim, wherein at least part of the surface of the interior of the insect trap is smooth so that insects cannot crawl out of the trapping area.

15. An insect trap according to any preceding claim, wherein the interior of the insect trap is black.

16. An insect trap according to any preceding claim, wherein at least part of the interior of the insect trap is matt so that so that the interior surfaces of the insect trap reflect minimal light.

17. An insect trap according to any preceding claim, wherein the overall height of the insect trap is less than 40mm, preferably less than 35mm.

18. An insect trap according to any preceding claim, wherein the body comprises a hinge which enables movement of the insect trap between an open configuration and a closed configuration wherein, when the insect trap is in the closed configuration, the interior of the insect trap is not visible.