

<p style="text-align: center;">FORM 2</p> <p style="text-align: center;">THE PATENTS ACT, 1970</p> <p style="text-align: center;">(39 of 1970)</p> <p style="text-align: center;">AND</p> <p style="text-align: center;">The Patents Rules, 2003</p> <p style="text-align: center;">COMPLETE SPECIFICATION</p> <p style="text-align: center;">(See section 10 and rule13)</p>
<p>1. TITLE OF THE INVENTION:</p> <p style="text-align: center;">“INSECTICIDAL INCENSE FORMULATION COMPOSITION, METHOD OF MANUFACTURE AND APPLICATIONS THEREOF”</p>
<p>2. APPLICANT:</p> <p>(a) NAME: SHOGUN ORGANICS LIMITED</p> <p>(b) NATIONALITY: Indian Company incorporated under the Companies Act, 1956</p> <p>(c) ADDRESS: A-106 Kotia Nirman, New Link Road, Andheri (West), Mumbai 400 058, Maharashtra, India.</p>
<p>3.PREAMBLE TO THE DESCRIPTION:</p> <p>The following specification describes the invention and the manner in which it is to be performed.</p>

Technical field:

The present invention relates to stable and safe incense formulation product containing insecticidal active ingredient Renofluthrin. Particularly, the invention relates to effective products containing Renofluthrin as active ingredient, preferably in incense and burning forms like coils and sticks, wherein the said composition exhibits significant mosquitoes and insect's repellent activity.

Background and Prior art:

Insecticides of various classes of chemical compounds such as pyrethroids, organophosphates, carbamates, etc. can be applied to control the pest species. These chemicals are included in the composition of the insecticidal products as active ingredients. The insectoacaricidal formulations are available in the form of containerized aerosols, ready to-use liquids in propellant free package, dustable powders, wettable powders, soluble powders, tablets and granules, emulsions and their concentrates (macro-, micro-, suspoemulsions, flowable and microencapsulated formulations), baits of all the kinds, bait stations, sticky traps, electric heaters with mosquito mats and liquid vaporizers, coils, spirals, incense, crayons, gels, creams, lotions, shampoos etc.

Most commonly used mosquito control products in homes are incense and burning forms such as coils, cylindrical, spirals, sticks, and other shapes. Insecticidal incense forms are popular and commonly used household items. All these product types use burning / glowing / smouldering / diffusion / smoke / fumes, to release the active ingredient substance into air. The release of the active ingredient repels or kills target flying insects in households. Some incense formulation types, use water in the process of manufacture. Burning duration of various incense forms and shapes can range from few minutes to many hours.

Moreover the composition of insecticidal incense forms, including coils, spirals, sticks and other shapes, normally include, but not limited to, the following ingredients:

- a) **Fillers:** like Brown saw Dust, wood flour, Coconut shell powder etc. Sometimes in case of black coil, charcoal is added, along with option of clay dust, calcite dust in the range of 65% to 92% w/w;
- b) **Binders:** like Starch, Jigget, Guar gum, Tamarind seed powder, etc. in the range of 10% to 22% w/w;
- c) **Burning agent / Smouldering agent :** like Pottasium nitrate in the range of 0.1% to 0.4% w/w;
- d) **Preservative :** like Sodium Benzoate in the range of 0.1% to 1.5% w/w;
- e) **Colour and Perfume:** Various colors are used , red and green are common. Charcoal based coils are black. Perfume for aroma while burning. Color and perfume together in the range of 0.1% to 2% w/w;
- f) **Insecticide active ingredient:** 0.005% to 3% w/w along with optional addition of emulsifiers / surfactants .

Forms like Coils (spirals) are placed on a stand before burning. Incense forms like incense sticks (commonly known as ‘agarbatti’) are supported by a stick in the centre (the stick can be made from bamboo or other materials).

Commonly known process to make insecticidal incense products comprises the below detailed methodology :

Insecticide active ingredient is mixed with around equal or less quantity of surfactant (emulsifier like alcohol ethoxylates, or any similar ‘oil and water’ surfactants) and stirred for 30 to 40 minutes. Separately, in water (water at warm temperature or room temperature), smouldering agent (like Pottasium nitrate) and Preservative (like Sodium Benzoate) are added and stirred to make clear solution. Then preferred color was added in this mix. In a separate vessel, water was mixed with the earlier prepared mixture (of active ingredient and surfactant), with subsequent addition of perfume.

These ingredients are mixed together in desired percentage weight by weight of the composition. Further process steps such as Kneading, Extrusion, Shaping and Drying are involved in preparation of insecticidal formulation, as detailed below.

Kneading: In this process coil powder (mixture contains saw Dust, Coconut Shell Powder and Binders etc.) and water is added in the Kneader, ingredients are mixed, solution of potassium nitrate and sodium benzoate is added. Further the solution of insecticide active ingredient emulsion and perfume is added to the mixture. Kneading of the mixture to form evenly mixed dough.

Extrusion, stamping and drying: The dough is crushed, extruded and given desired shape of incense. Once incense of desired shape; size and weight is made, they are kept for drying. In case of incense stick, the incense is shaped around a centre stick. Drying can be done at room temperature, by sunlight, or by heating. In some cases, heating is carried out (sometimes with release of moisture) at temperatures of 50° to 85°C. In some cases the incense can also be dried naturally at room temperature indoors or outdoors.

In an alternate process, the insecticide active ingredient is not added during the incense ingredients mixing and kneading process. Active ingredient is added by spraying, dosing or dipping after the incense is made and dried. Insecticidal active is added to the finished and shaped incense or to dried incense. Sometimes along with the active ingredient insecticide, perfume can also be added, dosed, sprayed or dipped.

The weight of the mosquito coil insecticidal incense can be increased or decreased. The proportion of the different ingredients in the composition can be varied depending on the needs. Emulsifiers / surfactants and their quantity in proportion to the active ingredient can also be adjusted depending on needs. All these changes can vary the burning time, strength, hardness, properties of the incense. Insecticidal incense can be in any shape or form like stick, tube, cylindrical, or spiral (like mosquito coils) and others.

Noritada Matsuo et al. (Sumitomo Kagaku 2005-II) and Sugano M et al. in Top Curr Chem. 2012;314:203-20 describes various formulation of pyrethroid insecticide 'Metofluthrin' The Metofluthrin formulation is applicable to not only existing formulations and devices such as a mosquito coil and a liquid vaporizer, but also various other type products such as a fan vaporizer, a paper emanator and a resin emanator.

Indian Patent Application No.115/CHE/2004 discloses EC (Emulsifiable Concentrate) formulation and incense preparation which is made from insecticide 'Metofluthrin' mixed with calcium alkylbenzene sulfonate, polyoxyalkylene alkyl ether and other base.

Another Indian patent application No. 8431/DELNP/2011 discloses the mixture of insecticide active ingredient with emulsifiers /surfactants. This patent application discloses dilution of the insecticide active ingredient in solvents like D100 (Exxon), and the spraying / dosing of this on incense. It discloses active ingredient compound mixed with surfactants / emulsifiers, along with stabilizers / antioxidants like BHT (Butylated hydroxytoluene) and solvent. This mixture is then used in the preparation of incense.

Recently, the present inventors have developed active ingredient 'Renofluthrin' (Application No.4121/MUM/2013) which is found to be effective in home insecticidal formulations. Renofluthrin is found to be effective and practical for use in existing known formulations types and also has potential to adapt for developing new formulations and delivery systems. Active ingredient, 'Renofluthrin' is isomeric composition of 2,3,5,6-tetrafluoro-4-(methoxymethyl)benzyl 3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropanecarboxylate, wherein isomers (1R,3S) and (1S,3R) are present in range of 90% to 99.90% and balance being isomers (1R,3R) and (1S,3S).

Renofluthrin is not soluble in solvent D100 (Exxon) and similar solvents. Hence the methods disclosed in the prior art are not suitable to prepare incense and other formulation product forms containing Renofluthrin as active ingredient. Other formulation types have their own limitations. In case of most insecticides and pesticides, the MUP (manufacture use product) is EC (Emulsifiable Concentrate) formulation. Other popular formulations used are, Soluble Concentrate (SL), Suspension Concentrate (SC). These types of formulations like EC / SC / SL etc. have certain limitations, and they are useful only when the formulation requires water, i.e. water in the manufacture process, or water in the end formulation composition. Therefore in such formulations where insecticide active ingredient is sprayed or dosed on dried incense, the EC / SL / SC formulations are not useful.

In certain forms of household use insect repellents/insect killer / mosquito control formulations (RTU formulations), use of EC / SC / SL etc may interfere with the working of the product formulation. Emulsifiers / surfactants can affect performance of the product. For example, in case of Aerosol spray forms, it can sometimes cause problem with the valves. In liquid evaporation systems that use a Wick with capillary action, some surfactants / emulsifiers can cause blocks, thereby causing changes in rate of evaporation release affecting performance of the product. The effect and efficacy of the insect repellent (RTU formulation) is reduced when there is block to the release of the active ingredient. Hence use of EC / SC / SL has limitations and is not practical and usable for many product types and forms.

To overcome the above problem, MUP (manufacture use product) formulation was created and prepared for Renofluthrin. The inventors have developed colourless, minimal to no odour, intermediate manufacturing use formulation of Renofluthrin called as Manufacturing Use Product (MUP) formulation (2087/MUM/2014) which is safe and easier for handling with low toxicity and good storage stability. Renofluthrin is diluted in solvent "SOL01GE", mixture of Glycol Ethers and aromatic hydrocarbon solvents, which provides a flexible system that can be used to prepare many different RTU (Ready To Use) product formulations.

In the light of the foregoing, there appears a need in the art for fast acting mosquito control products and insecticidal incense compositions containing Renofluthrin as active ingredient which becomes the objective of the invention for which protection is sought.

Abbreviations:

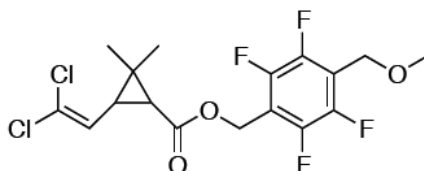
* “ % w/w ” = percentage weight / weight

** Renofluthrin MUP can contain between 2.5% to 18% w/w of Renofluthrin. For illustration purposes in these examples, Renofluthrin 5% w/w MUP has been mentioned)

Summary of the invention:

In line with the above objective, the invention provides a stable insecticidal incense composition containing active ingredient 'Renofluthrin'. In another aspect, the invention provides cost effective, simple process for manufacturing the incense composition comprising 'Renofluthrin'.

Renofluthrin is an isomeric composition of 2,3,5,6-tetrafluoro-4-(methoxymethyl)benzyl 3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropane carboxylate, wherein total trans isomers ranging from 90% to 99.90% and total cis isomers ranging from 0.1% to 10% , having the below structure:



Renofluthrin is found to be effective, when used as insecticide in the manufacture of mosquito repellent and other household pest repellents. 'Renofluthrin' has total trans isomers ranging from 90% to 99.90% and rest being cis isomers.

In an aspect, the invention provides ready-to-use products, solid formulations as insecticidal compositions comprising lower concentration of Renofluthrin, prepared from active ingredient, or technical grade, or from its MUP formulation, having better insecticidal activity.

According to preferred aspect, the invention provides insecticidal incense containing Renofluthrin, 2,3,5,6-tetrafluoro-4-(methoxymethyl)benzyl 3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropane carboxylate, wherein isomers (1R,3S) and (1S,3R) are present in range of 90% to 99.90% and the balance being isomers (1R,3R) and (1S,3S).

According to the invention, the insecticidal incense compositions comprise 'Renofluthrin' or its diluted forms, including manufacture use product (MUP) and other formulations.

According to another aspect of the invention, the Renofluthrin is diluted in solvent or mix of solvents and /or along with emulsifiers/surfactants.

According to another aspect of the invention, the insecticidal incense comprises Renofluthrin in the range of 0.005 % to 5% w/w.

According to another aspect of the invention, the invention provides insecticidal incense comprising Renofluthrin of various shapes and sizes including coils, spirals, sticks, fumigants, evaporators and other burning or heating forms and other shapes and forms.

The insecticidal incense according to the invention will have burning duration time ranging from minutes to many hours, in all forms of burning / smouldering / incense etc. causing evaporation / diffusion /release of Renofluthrin in air.

The insecticide incense composition according to invention comprises Renofluthrin along with fillers, binders, emulsifiers, surfactants, burning agent, preserving agent, color, perfume etc.

In yet another aspect, the invention provides a process for preparation of incense containing Renofluthrin which comprises;

- a) Preparing incense dough by mixing incense ingredients in desired ratio or % weight/weight (w/w);
- b) Mixing Renofluthrin directly, or its MUP formulation, along with surfactants or emulsifiers followed by dilution in water;
- c) Adding the ingredient mix of step (b) during kneading to the mix of step (a);
- d) Extruding; shaping and drying the mix to obtain insecticidal incense in desired shapes such as Spirals / Coils / Stick or other forms or optionally
- e) Spraying or dosing Renofluthrin (directly, or through its diluted formulations, or MUP formulations) to the prepared incense.

The surfactants / emulsifiers as used in the invention are selected from the group consisting of Nonyl or Octyl Phenol Ethylene and its oxides and condensates, Lauryl

alcohol ethoxylates, Lauryl alcohol ethylene oxide condensates, Isotridecyl alcohol ,and its oxylates and condensates, etc.

According to another process variant, the Renofluthrin can be added into the incense composition after the incense composition is made, i.e. after kneading and shaping OR after kneading, shaping and drying. Thus Renofluthrin or Renofluthrin MUP can be added by spraying or dosing on the incense composition, or by dipping in liquid solution containing Renofluthrin prior to drying. In this process variant, the use of emulsifier or surfactant is not required. Additionally, perfume or aroma ingredients can also be dosed or sprayed on incense along with Renofluthrin or Renofluthrin MUP.

In yet another aspect, the invention provides insecticidal incense containing Renofluthrin for use in mosquito and other insect control applications.

In a further aspect, the invention provides method of controlling/repelling the mosquitoes and other insects from an area which method comprises treating the area with an incense composition comprising Renofluthrin.

Detailed Description of the Invention:

The invention will now be described in detail in connection with certain preferred and optional embodiments, so that various aspects thereof may be more fully understood and appreciated.

In an embodiment, the invention provides an insect repellent/insect control formulation of Renofluthrin with better efficacy. The active ingredient, Renofluthrin, or its MUP (manufacture use product) are used to make various formulations, including insecticidal incense. Renofluthrin 5% MUP (containing active ingredient 5% w/w based on purity) or other % w/w dilutions can be used in the preparation of RTU (Ready to Use) formulations and insecticidal incense.

In a preferred embodiment, the invention provides Renofluthrin, the active ingredient or Renofluthrin MUP in the manufacture of different forms of RTU (Ready To Use)

formulations and products, including but not limited to, incense, sprays, liquid evaporation systems, and other burning, glowing, smouldering, evaporation products, etc. According to the invention, Renofluthrin MUP is a practical and suitable route to prepare various types of RTU formulations. 'Renofluthrin' is known to be effective against mosquitoes and other flying insects.

The instant insecticidal incense formulations of Renofluthrin according to the present invention are selected from the group consisting of mosquito coils, spirals, stick, cylindrical shapes, agarbatti, incense stick, tube shapes, other shapes, fumigants, evaporators and other burning or heating forms and like thereof. The products and compositions presented herein are also referred to as insecticidal incense, incense, incense stick (commonly known as 'agarbatti'), incense coil, spirals, mosquito coils, mosquito sticks, etc.

The active ingredient, Renofluthrin used in the insecticidal incense formulations exhibits limited scope of solubility. It is almost insoluble in water and soluble in some hydrocarbon aromatic solvents. However, the aromatic solvents have strong smell and cannot be used in evaporation based insecticides for use in home applications. Even in combinations with other solvents, the smell of aromatic solvent is still dominant, hence cannot be used on regular basis within households. Therefore, Renofluthrin or its MUP formulation has been used to manufacture insecticidal incense compositions. Also, Renofluthrin diluted forms like manufacturing use products (MUP) are ideal for making various types of end use RTU (Ready to use) formulation products for consumer use, including insecticidal incense.

According to preferred embodiment, Renofluthrin MUP liquid composition with active ingredient content between 2.5% to 18%, is provided as intermediate or manufacturing use product (MUP) in the preparations of lower concentration insecticidal compositions and formulations.

'Renofluthrin' content in the final insecticidal incense composition provided in accordance with the invention can range from 0.005 % to 5% w/w.

It is remarkable that even at lower concentration of Renofluthrin in the incense composition; it exhibits significantly better bio-efficacy over other known pyrethroid based incense compositions. Insecticidal activity of incense is demonstrated in subsequent embodiments.

In another embodiment, the invention provides a process for preparation of different compositions of insecticidal incense containing Renofluthrin that result in better efficacy.

Accordingly, in one embodiment, the invention provides process for preparation of spiral incense or incense coils (commonly known as mosquito coils). In another embodiment, the invention provides process for preparation of incense sticks (commonly known as Agarbatti).

The process for preparation of insecticidal incense containing Renofluthrin according to the invention comprises of mixing ingredients in desired ratio or percentage (%) weight/weight (w/w) followed by kneading them to form dough. Then the dough is converted into desired shapes such as Spirals / Coils / Stick or other forms. In case of incense sticks, the incense is supported by stick in the centre wherein the stick can be made from bamboo or other materials. Renofluthrin can be added into the composition in various ways. At the stage of kneading to form dough, Renofluthrin can be added directly or can be added through Renofluthrin MUP formulation. Preferred forms of addition at kneading stage include mixing Renofluthrin directly, or optionally along with surfactants or emulsifiers, or mixing its MUP formulation directly or optionally along with surfactants or emulsifiers; diluting this mix in water and adding the same to kneader mix. Surfactants / Emulsifiers can be chosen from any of the following types including but not limited to Nonyl or Octyl Phenol Ethylene and its oxides and condensates, Lauryl alcohol ethoxylates, Lauryl alcohol ethylene oxide condensates, Isotridecyl alcohol ,and its oxylates and condensates, etc. Many of these are commonly used in the manufacture of insecticidal incense.

In another process variant, Renofluthrin can be added in incense composition after the incense composition is made, i.e. after kneading and shaping OR after kneading, shaping

and drying. In this case, the emulsifier or surfactant may not be required. Renofluthrin or Renofluthrin MUP, or diluted Renofluthrin can be sprayed or dosed on the incense composition. The insecticidal incense can also be dipped in liquid solution containing Renofluthrin and then dried. Additionally or as an option, perfume or aroma ingredient can also be dosed or sprayed on incense along with Renofluthrin or Renofluthrin MUP. Once the final insecticidal incense composition is prepared, it should preferably contain 0.005 % to 5% w/w of Renofluthrin. These incense composition may be provided in various shapes like coils, spirals, sticks and other shapes. The burning time duration of these insecticidal incense may vary from a few minutes to many hours, depending on the size, weight and shape of the incense composition.

In a further embodiment, the invention provides insecticidal incense containing Renofluthrin for use in mosquito and other insect control applications.

In yet another embodiment, the invention provides method of controlling/repelling mosquitoes and other insects from an area which method comprises treating the area with an incense composition comprising Renofluthrin.

The following examples, which include preferred embodiments, will serve to illustrate the practice of this invention, it being understood that the particulars shown are by way of example and for purpose of illustrative discussion of preferred embodiments of the invention.

Examples:

Example 1:

Renofluthrin 5% MUP added in incense mixture at kneading stage, to make incense containing 0.025% w/w Renofluthrin.

Quantity 0.5% of 'Renofluthrin 5% MUP', (i.e. 0.5% of total incense weight) along with equal quantity of surfactant/emulsifier was mixed. This mix was further diluted in equal quantity of water , and added in the incense mixture dough during kneading. (i.e. if

the incense ingredients mixture total is 100 Kgs, Renofluthrin 5% MUP added will be 0.5 Kg). This composition after kneading, extruding, shape and drying, gives insecticidal incense containing Renofluthrin 0.025% w/w.

Example 2:

Renofluthrin 5% MUP added in incense mixture at kneading stage, to make incense containing 0.05% w/w Renofluthrin.

Quantity 1% w/w of Renofluthrin 5% MUP, (i.e. 1% of total incense weight) along with equal quantity of surfactant/emulsifier was mixed. This mix was further diluted in equal quantity of water , and added in the incense mixture dough during kneading. This composition after kneading, extruding, shape and drying, gives insecticidal incense containing Renofluthrin 0.05% w/w.

Example 3:

Renofluthrin 5% MUP added after incense is prepared, to make incense containing 0.025% w/w Renofluthrin.

Ingredients of incense are mixed. This mixture after kneading, extruding, shape and drying is kept. Quantity of Renofluthrin 5% MUP at 0.5% w/w of incense weight is sprayed on the incense and dried, giving insecticidal incense containing Renofluthrin 0.025% w/w.

(As an optional feature, perfume or aroma ingredient can also be mixed with the MUP and sprayed on incense)

Example 4 :

Renofluthrin diluted solution added in stick shape incense, to make incense containing 1% w/w Renofluthrin

Straight stick shape incense is prepared. These prepared incense sticks are dipped in diluted Renofluthrin liquid solution (like MUP). After dipping in solution, incense sticks

are removed and dried. The increase in weight of the incense sticks is calculated to arrive at % w/w of Renofluthrin content in incense. For example, if incense stick weighing 2 grams is dipped in liquid solution containing 5% Renofluthrin, and weight of incense stick increases to 2.50 grams this gives insecticidal incense stick containing Renofluthrin 1% w/w.

(As an optional feature, perfume or aroma ingredient can also be mixed in diluted liquid solution in which incense is dipped)

Example 5:

Renofluthrin added in stick shape incense, to make incense containing 0.5 % w/w Renofluthrin

Incense stick is prepared. In normal process, perfume or aroma ingredient(s) is added in these sticks (agarbatti), by diluting the perfume in solvents or phthalate esters (like dibutyl phthalate or diethyl phthalate). The said addition is done either by dipping the sticks in diluted perfume solution or by spraying diluted perfume solution on the sticks, and then drying the same.

For preparation of insecticidal incense, Renofluthrin is directly added in diluted perfume solution and stirred well to make it clear solution. The incense sticks are then dipped in this diluted solution. Sticks are removed and dried. Increase in weight of the incense sticks can be used to estimate % w/w of Renofluthrin content in incense stick. For example, in the diluted perfume solution if Renofluthrin 3% w/w is added, and incense stick weighing 1.50 grams is dipped in this liquid solution. If weight of incense sticks increases to 1.80 grams, this gives insecticidal incense stick containing Renofluthrin 0.5 % w/w. Similar dosing can also be carried out by spraying on the incense sticks.

Bio-efficacy and activity of insecticidal incense containing Renofluthrin:

The comparative bio-efficacy of Renofluthrin incense composition, on target pests has been established vis-à-vis commonly marketed incense composition containing 0.1% w/w “d-trans allethrin”. Mosquito species ‘*Culex quinquefasciatus*’ is seen all over India in and around human dwellings. It is major vector of various virus and diseases. Mosquito species ‘*Aedes aegypti*’ is a major vector of dengue fever, chikungunya and yellow fever viruses, and other viral diseases. The effectiveness and efficacy of insecticidal incense coils was tested on these species in ‘Peet Grady Chamber’ in Lab. Insecticidal incense in form of ‘mosquito coil’ (spiral) is common and popular. The most widely available incense form in India contains insecticide 0.1% w/w “d-trans allethrin”.

An incense composition containing 0.1% w/w d-trans allethrin was prepared. Another incense of same total weight, containing 0.025% w/w Renofluthrin was prepared. Content of Renofluthrin is 4 times lower than d-trans allethrin in the incense composition. Lower insecticide active content makes the incense safer, and also gives economic advantage. The effectiveness / efficacy of mosquito repellent formulation is normally measured in “Knock-down time” (KT) in minutes of percentage of the test population of mosquitoes i.e. KT50 values, referring to knock down time of 50% of the test insects quantity. Lower the time in minutes required for KT50, higher the effectiveness of the insecticide. Results can vary based on study conditions, mosquito species, and protocols. Both the incense compositions prepared are tested on two species of mosquitoes in ‘Peet Grady Chamber’ and the KT50 measured are presented in the below table 1 .

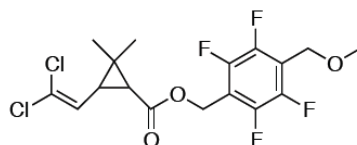
Table 1 showing KT50 in Minutes
(lower minutes shows better effect)

Incense	Against ‘<i>Culex quinquefasciatus</i>’ KT50 in mins	Against ‘<i>Aedes aegypti</i>’ KT50 in mins
D-trans allethrin 0.1% Coil	22.77	20.10
Renofluthrin 0.025% Coil	17.99	16.50

As shown in the above table 1, the incense compositions containing Renofluthrin at much lower concentration shows much better and faster effect on both species of mosquitoes, compared to incense containing d-trans allethrin. Faster knock down action is important for protection of people from mosquito bites. The content of 'Renofluthrin' in incense is 4 times lower than content of 'd-trans allethrin' in incense. Even at four times lower content, Renofluthrin exhibits higher effect on mosquitoes than the most common and widely available 'd-trans allethrin' incense mosquito coil in India.

We claim:

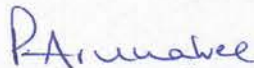
1. Insecticidal incense containing 'Renofluthrin' 2,3,5,6-tetrafluoro-4-(methoxymethyl)benzyl3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropane carboxylate, wherein isomers (1R,3S) and (1S,3R) are present in range of 90% to 99.90% and balance being being isomers (1R,3R) and (1S,3S), having the following structure :



2. The insecticidal incense according to claim 1, wherein the incense comprises of 'Renofluthrin' or its diluted forms, including manufacture use product (MUP) or other formulations.
3. The insecticidal incense according to claim 1 and 2, wherein, the Renofluthrin is diluted in solvent or mix of solvents, and / or along with emulsifiers / surfactants.
4. The insecticidal incense according to any of the preceding claims, comprising Renofluthrin in the range of 0.005 % to 5% w/w.
5. The insecticidal incense according to claim 1, wherein the incense composition is of various shapes and sizes which includes coils, spirals, sticks, fumigants, agarbattis, evaporators and other burning or heating forms and other shapes and forms.
6. The insecticidal incense according to claim 1, comprising Renofluthrin, having burning duration time ranging from minutes to many hours, in all forms of burning / smoldering / incense etc , causing evaporation /diffusion / release of Renofluthrin in air.
7. The insecticide incense composition according to claim 1 comprising Renofluthrin along with fillers, binders, emulsifiers, surfactants, burning agent, preserving agent, color, perfume etc.

8. Process for preparation of insecticidal incense containing Renofluthrin prepared by :
- a) Adding Renofluthrin or any of its diluted forms (like MUP or other diluted formulations) in dough mixture for kneading, then extruding, shaping and drying the incense, or
 - b) Adding Renofluthrin or any of its diluted forms (like MUP or other diluted formulations), after the incense is prepared, by dosing, spraying, dipping, soaking, absorbing, etc. and drying the incense.
9. The process according to claim 8, wherein, the Renofluthrin can optionally be added in incense composition after the incense composition is made, i.e. after kneading and shaping OR after kneading, shaping and drying.
10. The process according to claim 8 and 9, wherein, perfume or aroma ingredients can also be added in incense along with Renofluthrin or any of its diluted forms (like MUP or other diluted formulations)
11. Insecticidal incense containing Renofluthrin or any of its diluted forms, for use in mosquito and other insect control applications.
12. A method of controlling/repelling the mosquitoes and other insects from an area which method comprises treating the area with an incense composition comprising Renofluthrin or any of its diluted forms, through release of Renofluthrin in air by burning/glowing/smouldering / diffusion/smoke/fumes etc.

Dated this 3rd day of September, 2015


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Abstract:

Disclosed herein are insecticidal incense compositions, preparations containing Renofluthrin as insecticide active ingredient and applications thereof. Particularly, the invention relates to effective compositions of Renofluthrin comprising of Renofluthrin and/or its diluted forms in incense of various shapes and types, which exhibit significant mosquito / insect control activity.