

INSECTICIDAL COMPOSITION

The present invention relates to an insecticidal composition.

The senko refers to a substance for volatilizing an active ingredient in the air by incomplete
5 combustion. Usually, specific examples of the senko include an insecticidal senko called a mosquito coil etc., and a perfume-emitting senko called an incense stick which includes for example a senko for Buddhist mass called a joss stick.

10 Hitherto, a method for killing mosquitoes, flies, etc. by combustion of a senko containing an insecticidal compound, namely, by using mosquito coils has been employed, and improvement of mosquito coils for effective utilization of insecticidal compounds has been
15 attempted.

However, conventional mosquito coils are wasteful in that a considerable amount of insecticidal compound which is an active ingredient decomposes due to the combustion heat of mosquito coils. Therefore,
20 improvement of volatility of insecticidal compound has been desired.

The present invention has solved the above problems and provides an insecticidal composition comprising a senko pasted on one or more sheets
25 containing an insecticidal compound.

Fig. 1 is a plan view of one example of the

insecticidal composition of the present invention.

Fig. 2 is a side view of one example of the insecticidal composition of the present invention, in which the reference numeral 1 indicates a sheet
5 containing an insecticidal compound.

The insects to be killed using the insecticidal composition of the present invention include not only mosquitoes, but also flies, gnats, cockroaches, fleas, ticks, etc.

10 Examples of the insecticidal compounds used in the present invention include for example, pyrethroid compounds such as pyrethrin, allethrin, prallethrin, furamethrin, empenethrin, resmethrin, bioallethrin, esbiothrin, transfluthrin and terallethrin.

15 The insecticidal composition of the present invention can be simply produced by pasting one or more sheets containing an insecticidal compound on one or more surfaces of senko containing no insecticidal compounds which is previously prepared, thereby to form
20 one or more layers containing an insecticidal compound on the surface of the senko.

In preparing the sheet containing insecticidal compound, the insecticidal compound may be used as it is or may be formulated into oil solution, emulsifiable
25 concentrate, microencapsulated formulation, etc. and the insecticidal compound or the formulated one are contained in the sheet by impregnation, etc. As the sheet bases, there may be used paper bases, natural

fiber bases, synthetic fiber bases, synthetic resin bases, etc. The paper bases include woodfree paper, medium-grade paper, low-grade paper, neutral paper, photogravure paper, high-grade groundwood paper, 5 groundwood paper, wrapping paper, coated paper, Kent paper, kraft paper, newsprint paper, regenerated paper, specialty paper, paraffin paper, brown paper, synthetic paper, processed paper, glassine paper, oil resistance paper, clay art paper, Manila paper, container board, 10 tracing paper, embossed paper, filter paper, Japanese paper, paperboard, India paper, photographic paper, pulp sheet, ceramic paper, etc. The natural fiber bases include cotton fiber, silk fiber, wool fiber, cellulosic fiber, hemp fiber, etc. The synthetic fiber bases 15 include nylon fiber (e.g., nylon-6, nylon-66), vinylon fiber, acetate fiber, polyester fiber (e.g., polyethylene terephthalate, polyhydroxybutyrate, polylactic acid), acrylic fiber (e.g., polymethyl methacrylate, polyacrylonitrile), polyolefin fiber (e.g., high-density 20 polyethylene, chlorinated polyethylene, polypropylene), phenolic fiber (e.g., Bakelite), polyurethane fiber, polyurea fiber, vinyl fiber (e.g., polystyrene, polyvinyl acetate), aramid fiber, cupra fiber, Novoloid fiber, vinylidene fiber (e.g., polyvinylidene chloride), 25 polysulfone fiber, polycarbonate fiber, glass fiber, carbon fiber, alumina fiber, silica fiber, etc. The synthetic resin bases include polyvinyl chloride, polyvinyl alcohol, polystyrene, polyethylene,

polypropylene, acrylic resin, fluoroplastics,
polycarbonate, methylpentene resin, polyurethane,
phenolic resin, melamine resin, epoxy resin, etc.

Thickness of the sheet comprising the above
5 base is usually about 0.001-2 mm, and amount of the
insecticidal compound contained in the sheet is usually
about 0.02-2 mg/cm².

The senko on which the sheet containing the
insecticidal compound is pasted is not limited and can
10 be obtained by mixing a usual organic filler and binder,
and optionally coloring matter, perfume, antifungal
agent, combustion improver, etc., kneading the mixture
with addition of water, shaping the kneaded product by
press molding, extruding, stamping, etc., and then,
15 drying the shaped product. The senko is usually in the
form of a coil, but may be in other forms, for example,
a stick such as column or prism.

Furthermore, the sheet may be pasted to cover
the whole of senko or to partially cover the senko, for
20 example, to cover only one side.

The organic filler include dry powders of
woody parts of, for example, juniper, sandalwood,
camphor tree, fir tree, Japanese cedar, willow,
kalopanax pictus, Magnolia hypoleuca, lime tree, orange
25 peel, yellow poplar, Japanese Judes-tree, acacia,
poplar, Tilia maximowicziana, Toisusu Urbaniana,
Pterocarya rhoifolia, Thuja standishii, Paulownia,

Fraxinus platypoda, balsa, lauan, white birch, citrus tree and dry powders of plants such as woods for shiitake fungus; plant powders such as Compositae, Umbelliferae, Meliaceae, Thymelaeaceae, Myrtaceae, 5 Moraceae, Oleaceae, Labiatae, Rubeaceae and Caprifoliaceae; plant extract powders such as pyrethrum extract (pyrethrum marc), charcoal powder; and active carbon powder; and mixtures thereof. The organic filler is contained in an amount of about 20 to 80% by weight 10 in the senko.

The binders for senko include natural polymers such as starch, α -starch (e.g., rice, wheat, corn, potatoes, cassava), mannan, algae extract powder, hibiscus powder, tragacanth gum, gum arabic, gua gum, 15 gambier extract powder, bark extract powder of tabu tree (*Machilus thunbergii*) (tabu-powder) and casein; synthetic polymers such as polyvinyl alcohol, polyacrylamide, sodium polyacrylate, polyethylene oxide, polyvinyl pyrrolidone, methylcellulose, ethylcellulose, 20 hydroxyethylcellulose, hydroxypropylcellulose, carboxymethylcellulose salts, carboxymethyl starch salts, dialdehyde starch and cationized starch; and mixtures thereof. The binder is contained in an amount of about 10 to 40% by weight in the senko.

25 The coloring matters for senko include organic pigments such as Malachite Green, inorganic pigments, dyes, etc. The antifungal agents include acids such as benzoic acid, sorbic acid and dehydroacetic acid, and

salts thereof, p-hydroxybenzoic acid esters, propionic acid salts, o-phenylphenol, etc. The combustion improvers include nitrates such as potassium nitrate and sodium nitrate, peroxyarbonates such as sodium
5 peroxyarbonate, perhalogenates such as potassium perchlorate, peroxides such as sodium peroxide, etc. The coloring matter, antifungal agent and combustion improver are contained in an amount of about 0 to 0.5% by weight, about 0 to 0.5% by weight and about 0 to 2%
10 by weight in the senko, respectively.

The senko used in the present invention is shaped to such as a stick and a coil. The dimensions of the senko are not limited, but are, for example, about 3 mm to 20 mm in diameter, about 10 cm to 200 cm in length
15 for the stick and about 3 cm to 30 cm in outer diameter, about 2 mm to 10 mm in thickness for the coil. The senko having such dimensions are manageable.

The insecticidal composition of the present invention is obtained by pasting the sheet containing
20 the insecticidal compound on one side, the whole surface, etc. of the senko. As adhesives used for pasting of the sheet, there may be used natural polymers such as starch, α -starch (those produced from e.g., rice, wheat, corn, potatoes, cassava), mannan,
25 tragacanth gum, gum arabic, gua gum, and casein, and synthetic polymers such as polyvinyl alcohol, polyacrylamide, sodium polyacrylate, polyethylene oxide, polyvinyl pyrrolidone, methylcellulose, ethylcellulose,

hydroxyethylcellulose, hydroxypropylcellulose, carboxymethylcellulose salts, carboxymethyl starch salts, dialdehyde starch and cationized starch, etc.

The present invention will be explained by the following examples, which are not to be construed to limit the scope thereof.

First, Preparation Examples will be shown. The part in the Preparation Examples is by weight.

Preparation Example 1

To 50 parts of pyrethrum marc, 30 parts of tabu-powder, 0.3 part of Malachite Green and 0.2 part of sodium dehydroacetate, were added a cedar powder to make up 100 parts in total. The mixture was well kneaded with addition of a suitable amount of water, shaped into a coil by extrusion, and dried to obtain a senko. A coil having the same shape as the resulting senko was cut out from an incombustible paper (specialty paper), and this coil paper was impregnated with a solution of prallethrin in acetone so as to contain prallethrin in an amount of 0.2 mg/cm², and then, was air-dried. The resulting sheet containing prallethrin was pasted on the senko obtained above with a starch paste to obtain an insecticidal composition of the present invention.

Preparation Example 2

To 50 parts of pyrethrum marc, 30 parts of tabu-powder, 0.3 part of Malachite Green and 0.2 part of

sodium dehydroacetate, were added a cedar powder to make up 100 parts in total. The mixture was well kneaded with addition of a suitable amount of water, shaped into a coil by extrusion, and dried to obtain a senko. A
5 coil having the same shape as the resulting senko was cut out from Sorbron (polyvinyl alcohol sheet manufactured by Aicello Chemical Co., Ltd.), and this coil sheet was impregnated with a solution of prallethrin in acetone so as to contain prallethrin in an amount of 0.2
10 mg/cm², and then, was air-dried. The resulting sheet containing prallethrin was pasted on the senko obtained above with a starch paste to obtain the insecticidal composition of the present invention shown in Fig. 1 and Fig. 2.

15 Next, a Preparation Example of an insecticidal composition used for comparison in the Test Example will be shown as a Comparative Preparation Example.

Comparative Preparation Example

 A cedar powder was added to 0.1 part of
20 prallethrin emulsifiable concentrate comprising 0.08 part of prallethrin, 0.01 part of Himal BLZ which is a surface active agent manufactured by Matsumoto Yushi Co., Ltd., 0.001 part of Himal 1002Z which is a surface active agent manufactured by Matsumoto Yushi Co., Ltd.
25 and 0.009 part of Solvesso 150 which is a solvent manufactured by Exxon Chemical Co., Ltd., 50 parts of

pyrethrum marc, 30 parts of tabu-powder, 0.3 part of Malachite Green and 0.2 part of sodium dehydroacetate, thereby to make up 100 parts in total. The mixture was well kneaded with addition of a suitable amount of
5 water, shaped into a coil by extrusion, and dried to obtain an insecticidal composition for comparison.

Volatility test on the insecticidal compositions obtained in the above Preparation Examples and Comparative Preparation Example is shown below as a Test
10 Example.

Test Example

A sample (insecticidal composition) weighed was set on a mosquito coil holder and combusted in a wide-mouthed funnel. The combustion smoke was adsorbed
15 and trapped on a silica gel while being sucked by a pressure reducing pump. Then, the silica gel and inside of the measuring instruments such as the wide-mouthed funnel were washed with methanol, and amount of prallethrin in methanol was determined by gas
20 chromatography.

The results are shown in Table 1.

Table 1

Sample	Volatility (%)
Preparation Example 1	83
Preparation Example 2	76
Comparative Preparation Example	59

As can be seen from the above results of Table 1, the insecticidal compositions of the present invention showed superior volatility as compared with the conventional insecticidal composition (Comparative Preparation Example).

The insecticidal composition of the present invention can efficiently volatilize the insecticidal active ingredient. Thus, the insecticidal compound can be effectively utilized.



What is claimed is:

1. An insecticidal composition which comprises a senko pasted on one or more sheets containing an insecticidal compound.
2. The insecticidal composition according to claim 1, wherein the insecticidal compound is a pyrethroid compound.
3. The insecticidal composition according to claim 1, wherein the insecticidal compound is pyrethrin, allethrin, prallethrin, furamethrin, empenthrin, resmethrin, bioallethrin, esbiothrin, transfluthrin or terallethrin.
4. The insecticidal composition according to claim 1, wherein the insecticidal compound is prallethrin.
5. The insecticidal composition according to any one of claims 1 to 4, wherein the sheet has a thickness of 0.001-2 mm.
6. The insecticidal composition according to any one of claims 1 to 4, wherein the sheet contains the insecticidal compound in an amount of 0.02-2 mg/cm².