

**Title of****Invention A HERBAL INSECTICIDAL COMPOSITION FOR CONTROLLING INSECT
PEST****Abstract**

The present invention relates to the extraction of bioactive from non edible vegetable oil from tree species, combining the said fraction with residual waste material of plant essential oils and extract of tobacco dust generated by not restricted to but more particularly chewing tobacco industry. Synergistic combination not previously used as active ingredients has been used to develop a pesticidal formulation. Storage stable formulation with a suitable carrier and optionally, with a suitable surface active agent is prepared in concentrate form for pesticidal use. The invention also relates to controlling pests by applying pesticidal effective amount of the above formulation with synergistic effects to loci where pest control is desired.

Full FIELD OF INVENTION

Text The present invention relates, to a herbal insecticidal composition for controllig. More particularly it relates to insecticidal compositions for controlling insect pests and, in particular, to a composition comprising a synergistically effective combination of extract of tobacco dust generated by the tobacco industry in general, particularly of chewing tobacco industry but not limited to this; non edible tree borne seed crude oils standardized for their active metabolites; in admixture with residual waste material of plant essential oils not previously used as active ingredients in a synergistic mode in insecticidal formulations. The present invention further relates to a method for preparing the said composition in varying proportions of ingredients that result in synergistic effect. The present invention also relates to controlling insect pests by the application of effective amounts of the above synergistic insecticidal compositions to a locus where pest control is desired.

BACKGROUND OF THE INVENTION AND PRIOR ART

Over the years, synthetic chemical pesticides have provided an effective means of pest control. For example, one prior approach involves the use of complex, organic insecticides, such as those disclosed in U.S. Pat. Nos. 4,376,784 and 4,308,279. Other prior approaches employ absorbent organic polymers for widespread dehydration of the insects. See, U.S. Pat. Nos. 4,985,251; 4,983,390; 4,818,534; and 4,983,389. Use of inorganic salts as components of pesticides has also been tried, as disclosed in U.S. Pat. Nos. 2,423,284 and 4,948,013, Chemical Abstract 119(5):43357q (1993) and Farm Chemicals Handbook, page c102 (1987).

Infestation of pests continues to threaten the health of humans and animals, and caused damages to plants, household pets. Extensive use of broad-spectrum pesticides has created more problems than resolving them. Hence, there is a need to develop method that is capable of reducing the large-scale utilization of synthetic pesticides for crop protection. Among the methods

used in Integrated Pest Management, plants and their by products have played a significant role.

There have been research studies involving several economically useful plants (such as using cloves as

grain protectants (Vrba, 1998: US Patent 5330512; Hsu et al. 2001: US patent 6231865) that can be used as pesticides, however, it is uneconomical to suggest use of edible or economically useful plants as insecticides for economic and food availability reasons. Use of waste materials and non edible plants or their extracts can make a very profitable proposition.

India is one of the three major tobacco producing countries. Tobacco processing for cigarettes, bidis and chewing tobacco renders huge quantities of waste. Andhra Pradesh and Gujarat in India contribute 87 % of the tobacco dust generated at present. The surplus of tobacco dust is so huge that India has been exporting tobacco dust, mainly to USA and Japan. Tobacco is rich in protein, oil and various useful chemicals like aromatic compounds, Solanesol, Nicotine, Organic acids etc. Current waste tobacco is 2/3 flakes and 1/3 dust and fine matter. Substantial amounts of waste tobacco particularly tobacco dust are generated in tobacco manufacturing. Such waste materials generally have no utility in manufacturing and incur additional costs for dust disposal. Tobacco dust obtained from species/varieties such as *Nicotiana tabacum* (SDCT; Sun cured chewing tobacco) and *Nicotiana erecta* (Calkatti chowperia) are rich in nutrients in addition to biologically active metabolites. Tobacco dust is generally disposed of by burning after separation from tobacco components.

Tobacco dust finds its use in preparation of variety of products. The natural nicotine used for cigarette is extracted from tobacco dust and is used as the additive of cigarette. Tobacco paper can be prepared from scrap, dust, or cuttings of tobacco (Patent No.: GB191201254). Tobacco foil has been developed by mixing an aqueous tobacco dust binder suspension and an aqueous fiber-binder suspension. (Patents: GB988843, DE19949983).

Aromatic matter can be extracted from tobacco dust and has been used as seasoning. (European patent: CN1408288).

Other products developed based on dust are: medicinal cigarette used in medical trade for curing cough (European Patent: CN1092311), cigarette candy which is manufactured by extracting harmful nicotine out of cigarette (European patent: CN1090149).

Nicotine from tobacco genus has found their use as an insecticide (Nauen et al. 1996; Neog et al. 1996). There have been several studies where tobacco has been used to control pests for example Fajimi et al. 2003 used aqueous tobacco extract in heavily parasitized West African dwarf goats for anti-lice activity with success.

The U.S. Environmental Protection Agency (EPA) first registered a pesticide product containing dried blood in 1958. This product also contained naphthalene and tobacco dust as active ingredients for three end-use products as rabbit and dog repellents. These products were dust formulations for use around ornamental plants, trees, and shrubs.

Organic tobacco dust products are sold in the market for use as pesticides (<http://www.vegbay.com/auctiondetails.php?id=103397>). In fact many of these products are registered to be used as pesticides. Most of these contain nicotine in small quantities (Nicotine and its Derivatives from Tobacco Waste, <http://www.tifac.org.in/offer/tlbo/rep>).

These products have been registered as pesticides for the Nursery with very low harmful effect warnings. (<http://woodypest.ifas.ufl.edu/register.htm>)

Tobacco waste has some ingredient of nicotine. This varies in cigarette tobacco, bidi tobacco and chewing tobacco. Use of Nicotine has been reported for pest control. Nicotine formulation has been developed with 40% nicotine sulfate, which is effective against sucking pests like aphids' leaf hoppers and mites (Patents: GB191211758, CN1074103). Tobacco dust can be processed in a way that nicotine is not extracted. In fact nicotine free extracts have useful properties as evidenced by studies of Schachter et al 2003. They reported that tobacco dust is a complex mixture of different organic ingredients and it may have clinical and therapeutic implications for the acute and chronic respiratory symptoms and lung function changes experienced by tobacco workers. They reported that dust has endotoxins. The formulations used by them did not have nicotine in the extracts. Their study indicated that the harmful effect such as constrictor activity appears to be primarily in the tobacco fraction with a molecular weight CN1337164 relates to a microbiological fungicide made up by using 85-90% of plant pulverized materials of tobacco stem powder or wood dust and wheat bran and 8-12% of trichoderma. The invention is based on wood dust or stem powder and not of dust from tobacco industry.

An assessment of tobacco waste for control of the gastropod has been made in Taiwan, where tobacco

dust is applied at 1 ton per acre as a pesticide. Phytochemical options from tobacco waste have been given in a book entitled "Phytochemical Biopesticides" by Opendar Koul, G. S. Dhaliwal. Publ. Taylor & Francis, 2000.

Nicotine is a non-persistent non-systemic, contact insecticide with some ovicidal properties. Nicotine is useful as a fumigant in closed spaces. Nicotine is prepared from tobacco by steam distillation or solvent extraction. However, Nicotine is harmful to bees, dangerous to fish, livestock, game, wild birds and animals. Following formulations of nicotine are available in the market: The 95% alkaloid, nicotine sulphate [40% alkaloid], and 3-5% dusts. For fumigation nicotine shreds are burnt, or the liquid nicotine is applied to a heated metal surface. Among the 126 popular pesticides used world over 108 chemicals in various categories are as effective as nicotine on Aphids, Heteroptera, Thysanoptera, Diptera, Hymenoptera. Nicotine derived from tobacco species, is one of the most toxic substances sold for use in the garden. However, for any gardener Nicotine sulphate must be a weapon of last resort. Nicotine sulphate biodegrades rapidly and has no residual effect. In India usage of Nicotine sulphate has been restricted under the pesticide act 1968. Till such time the safety precautions to be taken while using Nicotine are standardized market for Nicotine sulphate in India will be only from the organized farmers and green house projects. Unless the chemical insecticides, which leave residues on the food crop, are totally banned, the market for nicotine sulphate may not improve in India (Nicotine and its Derivatives from Tobacco Waste, <http://www.tifac.org.in/> offer).

Most of the patents on tobacco use as pesticides are on extraction of nicotine based actives. Patent on "Process and apparatus for semi continuous extraction of Nicotine from tobacco" (EP 0323699) relates to extraction procedures of nicotine. However, the patent (US 4289147) relates to a process for removing protein, Nicotine and Green pigment material from tobacco.

Tobacco Waste or dust is generated at various stages of post harvest processing of tobacco and also while manufacturing various tobacco products mainly during manufacture of tobacco products. Tobacco dust of cigarette factories is usually reused. Dust from Bidi factories in India have a very high nicotine content, however the same from chewing tobacco industry is very low. More than 600 tones per year of Nicotine Sulphate is

manufactured however this can only be manufactured when the waste has on average 2% nicotine content. Tobacco dust more particularly of chewing tobacco industry has very low nicotine. Nicotine extraction is further reduced when the dust is extracted in a manner that will reduce nicotine content of the formulation. The tobacco extract was first defatted with diethylether followed by extraction with polar eluents such as but not limited to methanol. The composition will have good market potential as it is based on waste of tobacco industry and essential oil industry.

The nicotine content varies between 2.8% to 6.5% for Beedi tobacco waste and 1.2% to 2.7% for other tobacco wastes. There are special varieties used for Chewing tobacco. These are cultivated extensively grown in Tamil Nadu, Bihar, West Bengal, Orissa and Parts of Kerala. Waste generated during the manufacture of chewing tobacco, Hookah tobacco and Snuff is between 12% - 15% of tobacco handled. Hence the dust produced in chewing tobacco industry is very low nicotine content (Nicotine and its Derivatives from Tobacco Waste, <http://www.tifac.org.in/offer/tlbo/rep/TMS158.htm>).

There are several Chinese patents in which root, stem, twig, leaves, bark, shell, kernel and oil of tobacco is used in insecticidal as well as fertilizer compositions in combination with other medicinal plants. (CN 1387766, 1318302, 1326680, 1318293, 1307809, 1206559, 1109708, 1408288, 1237567, 1247847, 02128923, 02144933, 2128923, 2144923, 90108926, 91103632). However, there is no patent available on the use of tobacco dust in insecticidal composition.

Recent awareness about the hazards of persistent synthetic pesticides to environment and their high cost have generated the need of intensified research on pesticides of plant origin, neem is perhaps the most promising tree species to address this urgent need.

Out of the various parts of the neem tree the neem seeds in different forms like neem oil, neem cake, neem seed extracts have found wide application in various fields. In agriculture the Neem seeds and its various forms are used as nitrogen fertilizer, pesticide, fungicides, nematocides etc., the usage of neem seed is more advisable than usage of other parts like green leaves, bark and not because these will affect the life of the neem tree where as neem seed will not.

Neem has a number of bitter principles called limonoids that have been isolated from different part of the

tree. The most important limonoids, azadirachtin and other similar compounds such as salanin, meliantriol are found extremely effective against variety of pests, even in minute quantity. Azadirachtin repels insects, inhibits feeding, and affects their hormonal balance by preventing their maturity. Recent finding indicate growth disrupting, antifeedant, toxic and repellent effect of neem extracts on several group of insects such as agricultural, household, storage and veterinary pests.

There are several neem (azadirachtin) based insecticidal formulations available in the market. However, the efficacy of such products in controlling pests in field level is limited due to obvious reasons.

Degradation of Azadirachtin in field is considered as one of the major reason. Recent invention (US Patent 6855351) describes a pesticidal formulation based on neem containing azadirachtin and Salanin in a formulated product with neem oil.

Schmutterer et al., 1980; Schmutterer and Ascher, 1987; Jacobson, 1986; Randhawa and Parmar, 1993 have given several instances where neem can control pests. Neem seed is a storehouse of over 100 tetranortriterpenoids and diverse isoprenoids (Devakumar and Sukh Dev 1993) with insecticidal property. The most important and biologically proven active constituent of Neem seeds is Azadirachtin. Several isomers of azadirachtin have been identified and out of the isomers the most potent and active component is the Azadirachtin A.

There are a number of articles reporting the insect antifeedant and insect growth inhibitory properties of azadirachtin for a variety of insect pests (Butterworth J. H. and Morgan, E. D., J.Chem.Soc.Chem. Cummins, 23 1968; Schmutterer, H and Rembold, H. Z, Angew. Ent. 2,179-188, 1980; Warthen, J. D. Jr., ARMNE-4 USDA, SEA, Agricultural review and manuals, 1979; Kubo, I and Klocke, J. A., Agricultural and Biological Chemistry, 46,1951, 1982; Champagne, D. E., Koul, O., Isman, M. B., Scudder, G. E. and Towers, G. H. N., Phytochemistry, 31, 377,1992).

Azadirachtin has also been reported to be Non-mutagenic (Jacobson.M., proceedings of the first International Neem conference, Rottach Egern, 33, 1980; in natural pesticides from the Neem tree, Azadirachta indica A.Juss, Schmutterer, H., Ascher, K. R. S., German agency for technical cooperation, Eschborn, Germany, 1981) and it appears to have no apparent mammalian toxicity (Nakashini, K., Recent advances in phytochemistry,5,283, 1975; Morgan, E. D., Proceedings of the First international Neem conference, Rottach Egern, 43, 1980; in Natural pesticides from Neem tree, Azadirachta indica A.Juss, Schmutterer, H., Ascher, K. R. S., Rembold, H., Eds., German Agency for Technical cooperation, Eschborn, Germany 1981). Damarla et al. 2002 (US Patent 634048); Lidert, 1990 (US Patent 4943434) have disclosed that nimbin was one of the component in their pesticidal formulation

It has also been reported that Neem products with or without azadirachtin has shown very good control over 300 inset pests and infections by nematodes viruses and some pathogenic fungi (Devakumar. C, and Parmar. B. S., 1993). The other limonoids or the bitter principle such as Azadirachtin, Salanin, Meliantriol, deacetylsalanin and nimbin contained in the Neem oil are also responsible for the pesticidal activity of Neem oil (Vimal O. P and Naphade, K. T., 1980 Jour.Sc.Ind.Res. Vol.39, P 197-211). Use of neem as insecticide is a prior art.

Karanj (*Pongamia pinnata* Pierre) tree, a tropical evergreen, is not very common in use as a source of pesticides; however, it has pesticidal properties and so far insects have not developed resistance. Unlike neem, Karanj is not extensively used in pesticidal formulations. The active principles present in Karanj seed oil i.e. karanjin, pongamol, glabrin, and pinnatin etc. are known to possess various insecticidal properties. Crude oil also shows some insecticidal properties but it contains very low concentration of active metabolites (Karanj oil contains 1.25-2% Karanjin and 0.85% pongamol). Mathur et al., 1990 have reported that karanjin is effective against large number of insects. So far no work has been done to isolate active fraction and thus develop formulation on enriched actives.

Plant oils are being used for hundreds of years for control of insect pests of crops such as, fruit crops (Pless et al/1995; Rock and Crabtree, 1987; Tascheberg, 1952), Vegetables and cotton (Butler et al., 1988; Butler and Henneberry, 1990) and storage (Giga and Munetsi, 1990; Hill and Schoonhoven, 1981; Ran et al., 1988; Salas, 1985; Salas and Hernandez, 1985). Fatty acid salts are used for control of soft-bodied insects and mites (U.S. Pat. No. 5631290)

Karanj oil, Neem oil and other non edible oils are effective against large number of insect pests such as, shoot and fruit borers (Rao et al/2002), Leaf minors (Katole et al., 1993), aphids (Kulat et al., 1997), white flies, Plant hoppers (Hiremath et al., 1997) leaf hoppers (Mariappan et al., 1988), mites, leaf feeding beetles (Reddy et al., 1990), storage pests (Gupta et al/1988) dipteran flies (Mathur et al., 1990) and

mosquito larva (Sagar et al., 1999).

US patent 6,989,150 describes use of actives from *Pongamia pinnata* extract for cosmetics. However they have not claimed pesticidal application. US Patent 6,482,857 refers to use of *Pongamia* (among several plants) for extraction of Betulinic acid for their reported compositions which contain triterpenes for regulating hair growth. There is no claim of pesticidal application, moreover, *Pongamia* has been stated as one of several plants that contain Betulinic acid which is a prior art.

There are research publications where affectivity of different non-edible oils when combined with Karanj oil for control of insect pests (Mukesh and Singh 2002; Rao et al., 2002) has been reported.

Pongamia extract Pongamol has been used in a menthyl-2 pyrrolidone-5-carboxylate based formulation as an insect repellent in US patent 6,451,844. The formulation is proposed for control of mosquitoes which is based on menthyl-2 pyrrolidone-5-carboxylate.

The world production of essential oils is estimated about 1, 10,000 tonnes where India stands at number three position with a share of about 16-17 %. India's production of essential oil is estimated about 17000 tonnes, which can be divided into the following categories;

- Essential oil for fragrances (exotic)- 40-45 tonnes
- Essential oil for flavors (exotic)-1200- 1400 tonnes
- Essential oil for processing-16000 tonnes

Oil is processed by fractional distillation or by synthesis. The sole purpose of the processing is value addition. After separation of different chemicals mainly terpenes as main ingredients, the residual part is usually not used though it contains useful ingredients. Processing of Raima Rosa oil produces about 5- 10 % of residual matter that is used for incense sticks which is a low value use. The approximate price of this residual matter (pitch) is about Rs 50 (US \$ 1) per kg.

Pesticidal compositions containing one or more plant essential oils and/or derivatives thereof have been used as contact pesticide and repellent against human body louse (US patent 6,969,522; 6,974,584), as contact pesticide in containers or cartons where food and other products are stored (US patent 6,949,587) as contact pesticide against termites (US patent 6,858,653). US patent 6,689,395 relates to pesticidal compositions containing plant essential oils and/or derivatives thereof against mites and for use as a contact pesticide in containers or cartons where food products are stored. Control of household pests, such as cockroaches and ants using peppermint oil (or corn mint oil); optionally blended with one or more plant essential oils has been claimed in US patent 6,531,163. Similarly, US patent 20050214337 relates to a composition for the controlled release of an essential oil having pesticidal or fungicidal activity comprises a carrier material for said essential oil and a component that controls the release of said essential oil from the carrier mate. Vetiver oil has been used for repelling ants, ticks, and cockroaches in US patent 20040157935.

US patent 20030091657 relates to compositions and methods for controlling plant-infesting acaricides with plant extracts and notably with compositions comprising oil extracts derived from plant material. The plant acaricidal composition comprises alpha.-terpinene, .rho.-cymene, limonene, carvacrol, carveol, nerol, thymol, and carvone.

Known pesticidal agents from plants such as chrysanthemums usually grown in Kenya have been used for control of mosquitoes. US patent 6,849,614 describes use of essential oils, benzyl alcohol and pyrethrum as pesticidal formulation against cockroaches and other pests. They have used thymol and other essential oils. They claimed residual pesticidal compositions containing certain plant essential oils and/or their constituents in admixture with known active pesticidal compounds and other compounds, synthetic or natural. However, the present invention does not use essential oil of their derivatives, rather the pitch, which is a waste from essential oil industries as one of the constituent in a formulation consisting of synergistic combination of herbals for use as a pesticide.

Earlier inventions have reported synergistic effect of plant extracts. US Patent 5,679,662 describes significant synergism in an insecticidal formulation containing Pyrethrum and appropriate amounts of azadirachtin and clarified Neem oil. Similarly, combinations of bifenthrin with azadirachtin-containing Neem seed extracts has been used for controlling acarids, especially pyrethroid-resistant mites (US Patent 5,472,700). The combinations are also used for the control of ectoparasites on animals. US Patent 6855351 discloses pesticidal formulation produced in a combination of Neem and custard apple extracts for pest control with increased bio-efficacy with synergism of Neem. However there is no invention that describes use of *Pongamia pinnata* (Karanj) in a synergistic formulation with other

plant extracts.

Ammonia or an ammonia compound is used as an ingredient of a liquid insecticide or fungicides, instead of alcohol. It is mixed with other ingredients such as quassia wood extract, alkaline sulphides, soap, and any preparation of tobacco containing nicotine.

However, none of the hitherto reported literature recites a herbal synergistic formulation for control of insect pests using tobacco dust in combination with other vegetable oils.

OBJECTS OF THE INVENTION

Thus, the main objective of the present invention is to develop a synergistic herbal insecticidal composition which obviates the limitations as stated above.

Another objective of the present invention is to provide a herbal insecticidal formulation consisting of synergistically effective combination of tobacco dust extract, cold press vegetable oils from non-edible trees (preferably neem and karanj) either singly or in combination, pitch (residue of essential oil and an appropriate amount and emulsifier.

Yet another object of the present invention is to provide novel pesticidal composition that has a combination of two plant seed oils, waste of plant essential oil industry and plant extract of tobacco dust generated by chewing tobacco industry and its use thereof, as a synergistic pesticidal formulation.

Still another object of the present invention is to provide an insecticidal composition which utilizes the waste generated by essential oil and tobacco industry particularly in pesticidal compositions. The extraction of tobacco dust has been undertaken in a way that the claimed product is not nicotine based but actives that are non toxic.

A further object of the present invention is to provide an insecticidal composition which is economically cheaper and more effective.

Still another object of the present invention is to provide an insecticidal composition which is made by using by products generated by tobacco and essential oil industries.

Yet another object of the present invention is to provide a safe, non-toxic pesticidal composition and method that will not harm the environment.

SUMMARY OF THE INVENTION

The present invention discloses a novel herbal insecticidal composition which comprises (1) extract of tobacco dust; (2) cold press vegetable oils from non edible trees either singly or in combination (3) pitch (residue of essential oils and (4) an appropriate amount of emulsifier.

Furthermore the present invention discloses a novel insecticidal composition comprising synergistically effective combination of

1. tobacco dust extract (5- 10 %; w/v)
2. Neem oil (20-80 %; v/v),
3. Karanj oil (20-80 %; v/v),
4. Pitch (5- 15 %; v/v)
5. Emulsifier (10- 5 %; v/v).

Further the invention provides a novel synergistic insecticidal composition which utilizes the waste generated by tobacco and essential oil industry. In another aspect the present invention provides a synergistically herbal insecticidal composition that is found to be very effective against several insects when tested in laboratory as well as in field trials. Still another aspect of the present invention is to provide a synergistically herbal

insecticidal composition that is cost effective compared to other commercial products available in the market.

Accordingly, the present invention provides a herbal insecticidal composition for controlling insect pests comprising a synergistically effective combination of: (1) extract of tobacco dust; (2) cold press vegetable oils from non-edible trees either singly or in combination (3) pitch (residue of essential oils) and (4) an appropriate amount of emulsifier.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

The present invention provides a synergistic and residual pesticidal composition comprising, in admixture of at least two non edible tree borne seed oils, extract of tobacco dust and residue of one plant essential oil such as that of species of Cymbopogon, preferably Raima Rosa with a suitable carrier and optionally with a suitable surface active agent.

In particular, the formulation is prepared to be water miscible by using solvent that is water miscible,

preferably with low toxicity to mammals such as human and livestock. When used as a pesticide, a water-miscible composition may be safer to human than that formulated with highly volatile organic solvents such as xylene, kerosene and diesel.

Examples of such water miscible solvents include, but are not limited to, ethanol, methanol, butanol, acetone, alkyl ketones, ethyl acetate, methyl acetate, dimethyl sulfoxide, dimethyl acetamide, benzyl alcohol, ethylene glycol diethyl ether, ethylene glycol dimethyl ether and tetrahydrofuran. The water-miscible solvent may be used in combination to render the formulation water-miscible.

In another embodiment, the formulation has naturally occurring insecticidal compounds such as azadirachtin and nimbin; and that azadirachtin is present in neem oil in not less than 300 ppm concentration.

In other embodiment, the naturally occurring insecticidal compounds karanjin present in karanj oil is not less than 800 ppm.

Tobacco waste more particularly of tobacco dust chewing tobacco industry has very low nicotine. Nicotine extraction is further reduced when the dust is extracted in a manner that will reduce nicotine content of the formulation. The tobacco dust extract (TDE) was first defatted with diethylether followed by extraction with polar eluents such as but not limited to methanol.

Accordingly the formulation may further comprise an emulsifier or a surfactant. Any emulsifier may be used to enhance the solubility and/ or stabilize the composition, preferably an emulsifier that is generally regarded as safe for agricultural and household uses.

Optionally, the formulation may further comprise a combination of emulsifiers with complementary hydrophilic and hydrophobic parameters. For examples, the emulsifiers may be a combination of non-ionic surfactant and anionic surfactant.

Examples of non-ionic surfactant include, but are not limited to, polyoxyethylated alkylphenols, polyoxyethylated sorbitan monoesters, TWEEN 20-80, ethylene oxide. Examples of anionic emulsifier include, but are not limited to alkyl, alkyl-aryl and aryl sulfonates, sulfates and phosphate, soaps.

The concentration of the surfactant that is included in the formulation may preferably be between about 0.1 %- 20 % (w/v), more preferably be between 1 %- 15 % (w/v) to get concentration of emulsifier/surfactant around 0.1-0.01 % upon dilution with water at the time of spray application.

The stability of the formulation, before dilution and application may preferably be between 80-100 %, preferably 90-100 % and retained pesticidal activity after two years of storage at room temperature.

The term 'pest', as used herein, refers to insects harmful to plants.

The term 'natural substances' as used herein, refers to flavonoids extracted from karanj oil and azadirachtin, nimbin and Salanin from neem seeds.

The term 'insecticide' as employed in the specification and claims of the application is confined to the means, which adversely affects the existence, growth of the target organism. Such means may comprise a complete killing action, eradicate, arresting growth, inhibition, reducing in number or any combination thereof.

The term 'control' as employed in the specification and claims of the application is to be construed as meaning insecticidal or protecting plants from insect damage.

The term 'emulsion' as used herein, refers to a stable mixture of two or more immiscible held in suspension.

The term 'surfactant' as used herein refers to surface-active compounds that reduce surface tension when dissolved in water or which reduces interfacial tension between two liquids.

The term 'non-ionic surfactant' as used herein refers to the surfactants that do not ionize in water and thus are not subject to hydrolysis by aqueous solution of acid or alkali.

The present invented herbal composition was evaluated for its bio activity against several insect pests stated below and also compared with commercially insecticidal product available in the market. However, it may be noted that in India till date there is no synergistic herbal formulation available in the market.

The synergistic composition of the present invention will be further illustrated in the following, non-limiting Examples. The Examples are

illustrative of various embodiments only and do not limit the claimed invention regarding the materials, conditions, weight ratios, process parameters and the like recited herein.

Example 1

Individual and combined efficacy of neem oil, karanj oil, residue of Palmarosa oil and alcoholic extract of

tobacco dust against *Spodoptera litura*

Crude seed oils of neem and karanj, residue of palmarosa essential oil and methanolic extract of tobacco dust were tested against 2nd instar larvae of *S. litura* by direct topical application. Neem and karanj oil were used alone at the rate of 2 % each, whereas residue of palmarosa essential oil was used at 100 ppm. Methanolic extract of tobacco dust was applied at 1 % concentration. Five larvae were used for each treatment and each treatment was done in triplicate.

(Table Removed)

Example 2

Individual and combined efficacy of neem oil, karanj oil, residue of Palmarosa oil and alcoholic extract of tobacco dust against *Spodoptera litura*

Crude seed oils of neem and karanj, residue of palmarosa essential oil and methanolic extract of tobacco dust were tested against 2nd instar larvae of *S. litura* for their antifeedant and growth reduction activity by leaf disc no-choice bioassays. Neem and karanj oil were used alone at the rate of 5 % each, whereas residue of palmarosa essential oil was used at 100 ppm on castor leaves. Methanolic extract of tobacco dust was applied at 1 % concentration. Five larvae were used for each treatment and each treatment was done in triplicate.

(Table Removed)

Example 3

Individual and combined efficacy of neem oil, karanj oil, residue of Palmarosa oil and alcoholic extract of tobacco dust against *Heliothis armigera*

Crude seed oils of neem and karanj, residue of palmarosa essential oil and methanolic extract of tobacco dust were tested against 2nd instar larvae of *S. litura* by direct topical application. Neem and karanj oil were used alone at

the rate of 2 % each, whereas residue of palmarosa essential oil was used at 100 ppm. Methanolic extract of tobacco dust was applied at 1 % concentration. Five larvae were used for each treatment and each treatment was done in triplicate.

(Table Removed)

Example 4

Individual and combined efficacy of neem oil, karanj oil, residue of Palmarosa oil and alcoholic extract of tobacco dust against Spider mites (*Tetranychus* sp)

Crude seed oils of neem and karanj, residue of palmarosa essential oil and methanolic extract of tobacco dust were tested for their toxic activity against adult mites on *Withania* leaf discs. Neem and karanj oil were used alone at the rate of 1 % each, whereas residue of palmarosa essential oil was used at 100 ppm on castor leaves. Methanolic extract of tobacco dust was applied at 1 % concentration. Treatments consisted of spraying adult mites (direct toxicity) and observing for toxicity versus survival. For each treatment there were 5 replicates with 10 mites in each. Mortality was determined. Results are shown below.

(Table Removed)

Example 5

Individual and combined efficacy of neem oil, karanj oil, residue of Palmarosa oil and alcoholic extract of tobacco dust against aphids

Crude seed oils of neem and karanj, residue of palmarosa essential oil and methanolic extract of tobacco dust were tested for their toxic activity against aphids infesting rose plants. Neem and karanj oil were used alone at the rate of 1 % each, whereas residue of palmarosa essential oil was used at 100 ppm on castor leaves. Methanolic extract of tobacco dust was applied at 1 % concentration. Treatments consisted of spraying adult mites (direct toxicity) and observing for toxicity versus survival. For each treatment there were 5 replicates with 10 mites in each. Percentage protection was determined. Results are shown below.

(Table Removed)

Example 6

Field efficacy of the formulations against pests of cabbage

The formulations are tested at 1% concentration of two months plants of cabbage the all formulations are sprayed @ 200lits/ac

(Table Removed)

The formulation provide better protection (100%) against aphids, aphids and Spodoptera litura on cabbage plants

Preferable compositions of pesticidal formulation Formulation.1

Neem oil 25 % (v/v)

Karanj oil 35 % (v/v)

Pitch of Palma Rosa essential oil 15 % (v/v)

Tobacco dust 15 % (w/v)

Emulsifier 10 % (v/v)

Formulation.2

Neem oil 30 % (v/v)

Karanj oil 30 % (v/v)

Pitch of Palma Rosa essential oil 25 % (v/v)

Tobacco dust 5 % (w/v)

Emulsifier 10 % (v/v)

Formulation.3

Neem oil 35 % (v/v)

Karanj oil 30 % (v/v)

Pitch of Palma Rosa essential oil 30 % (v/v)

Tobacco dust 5 % (w/v)

Emulsifier 10 % (v/v)

Formulation.4

Neem oil 35 % (v/v)

Karanj oil 35 % (v/v)

Pitch of Raima Rosa essential oil 15 % (v/v)

Tobacco dust 5 % (w/v)

Emulsifier 10 % (v/v)

Formulation.5

Neem oil 35 % (v/v)

Karanj oil 35 % (v/v)

Pitch of Palma Rosa essential oil 10 % (v/v)

Tobacco dust 5 % (w/v)

Emulsifier 15 % (v/v)

Formulation.6

Neem oil 35 % (v/v)

Karanj oil 35 % (v/v)

Pitch of Palma Rosa essential oil 10 % (v/v)

Tobacco dust 10 % (w/v)

Emulsifier 10 % (v/v)

Formulation.7

Neem oil 40 % (v/v)

Karanj oil 30 % (v/v)

Pitch of Palma Rosa essential oil 10 % (v/v)

Tobacco dust 10 % (w/v)

Emulsifier 10 % (v/v)

Formulation.8

Neem oil 30 % (v/v)

Karanj oil 40 % (v/v)

Pitch of Palma Rosa essential oil 10 % (v/v)

Tobacco dust 10 % (w/v)

Emulsifier 10 % (v/v)

Formulation.9

Neem oil 40 % v/v [20 to 40 % v/v]

Karanj oil 25 % v/v [20 to 40 % v/v]

Pitch of Paima Rosa essential oil 15 % v/v [5 to 15 % v/v]

Tobacco dust 10 % w/v [5 to 10 % w/v]

Emulsifier 10 % v/v

We claim:

1. A herbal insecticidal composition for controlling insect pests comprising a synergistically effective combination of: (1) extract of tobacco dust; (2) cold press vegetable oils from non-edible trees either singly or in combination; (3) pitch (residue of essential oils) and (4) an appropriate amount of emulsifier.
2. A composition as claimed in claim 1, wherein the tobacco dust extract ranges from 5 to 10 % (w/v).
3. A composition as claimed in claim 1, wherein the cold press oil is in the range of 20 to 80 % (v/v).
4. A composition as claimed in claim 1, wherein the pitch (residue of essential oil) ranges from 5 to 15 % (v/v).
5. A composition as claimed in claim 1, wherein the emulsifiers range from 10 to 15 % (v/v).
6. A composition as claimed in claim 1, wherein the cold press vegetable oil is neem oil ranging from 20 to 80 % (v/v).
7. A composition as claimed in claim 1, wherein the cold press oil is karanj oil ranging from 20- 80 % (v/v).
8. A composition as claimed in claim 1, wherein the pitch is the residue of Palma Rosa essential oil in the range of 5 to 15 % (v/v).
9. A composition as claimed in claim 1, wherein the tobacco dust is defatted with non-polar solvents followed by extraction with polar solvents.
10. A composition as claimed in claim 1, wherein the non-polar solvents are selected from diethyl ether, petroleum ether, hexane, cyclohexane either individually or combination thereof.
11. A composition as claimed in claim 1, wherein the polar solvents are selected from methanol, ethanol, butanol, propanol, ethyl acetate, chloroform either individually or combination thereof.
12. A composition as claimed in claim 1, comprising a synergistically effective combination of tobacco dust extract (5 to 10 %; w/v), neem oil (20 to 80 %; v/v), karanj oil (20 to 80 %; v/v), pitch (5 to 15 %; v/v) and emulsifier (10 to 5 %; v/v).
13. A composition as claimed in claim 1, wherein the neem oil used contains naturally existing pesticidal compounds such as azadirachtin and nimbin.
14. A composition as claimed in claim 1, wherein the karanj oil used contains naturally existing pesticidal compound karanjin.
15. A composition as claimed in claim 1, wherein the said composition is useful for controlling pests of agricultural crops such as but not limited to vegetable crops, floriculture, ornamental crops, medicinal, and economic plants.
16. A composition as claimed in claim 1, wherein the said composition controls the pests such as but not limited to the Order Orthoptera, Acarida, Isoptera, Thysanoptera, Heteroptera, Homoptera, Lepidoptera, Coleoptera, Hymenoptera.

Documents:

1826-DEL-2006-Abstract-(27-03-2012).pdf (<http://ipindiaonline.gov.in/patentsearch/GrantedSearch/pdfviewer.aspx?AppNo=MTgyNi1ERUwtMjAwNi1BYnN0cmFjdC0oMjctMDMtMjAxMikucGRm>)

1826-del-2006-abstract.pdf (<http://ipindiaonline.gov.in/patentsearch/GrantedSearch/pdfviewer.aspx?AppNo=MTgyNi1kZWwtMjAwNi1hYnN0cmFjdC5wZGY=>)

1826-DEL-2006-Claims-(27-03-2012).pdf (<http://ipindiaonline.gov.in/patentsearch/GrantedSearch/pdfviewer.aspx?AppNo=MTgyNi1ERUwtMjAwNi1DbGFpbXMtKDI3LTAzLTIwMTIpLnBkZg==>)

1826-del-2006-claims.pdf (<http://ipindiaonline.gov.in/patentsearch/GrantedSearch/pdfviewer.aspx?AppNo=MTgyNi1kZWwtMjAwNi1jbGFpbXMucGRm>)

1826-DEL-2006-Correspondence Others-(27-03-2012).pdf
(<http://ipindiaonline.gov.in/patentsearch/GrantedSearch/pdfviewer.aspx?AppNo=MTgyNi1ERUwtMjAwNi1Db3JyZXNwb25kZW5jZSBPdGhlcnMtKDI3LTAzLTIwMTIpLnBkZg==>)

1826-del-2006-correspondence-others.pdf (<http://ipindiaonline.gov.in/patentsearch/GrantedSearch/pdfviewer.aspx?AppNo=MTgyNi1kZWwtMjAwNi1jb3JyZXNwb25kZW5jZS1vdGhlcnMucGRm>)

1826-DEL-2006-Description (Complete)-(27-03-2012).pdf
(<http://ipindiaonline.gov.in/patentsearch/GrantedSearch/pdfviewer.aspx?AppNo=MTgyNi1ERUwtMjAwNi1EZXNjcmlwdGlvbiAoQ29tcGxldGUPLSgyNy0wMy0yMDEyKS5wZGY=>)

1826-del-2006-description (complete).pdf (<http://ipindiaonline.gov.in/patentsearch/GrantedSearch/pdfviewer.aspx?AppNo=MTgyNi1kZWwtMjAwNi1kZXNjcmlwdGlvbiAoY29tcGxldGUPLnBkZg==>)

1826-del-2006-form-1.pdf (<http://ipindiaonline.gov.in/patentsearch/GrantedSearch/pdfviewer.aspx?AppNo=MTgyNi1kZWwtMjAwNi1mb3JtLTEucGRm>)

1826-DEL-2006-Form-2-(27-03-2012).pdf (<http://ipindiaonline.gov.in/patentsearch/GrantedSearch/pdfviewer.aspx?AppNo=MTgyNi1ERUwtMjAwNi1Gb3JtLTItKDI3LTAzLTIwMTIpLnBkZg==>)

1826-del-2006-form-2.pdf (<http://ipindiaonline.gov.in/patentsearch/GrantedSearch/pdfviewer.aspx?AppNo=MTgyNi1kZWwtMjAwNi1mb3JtLTlucGRm>)

1826-DEL-2006-Form-3-(27-03-2012).pdf (<http://ipindiaonline.gov.in/patentsearch/GrantedSearch/pdfviewer.aspx?AppNo=MTgyNi1ERUwtMjAwNi1Gb3JtLTMtKDI3LTAzLTIwMTIpLnBkZg==>)

1826-del-2006-form-3.pdf (<http://ipindiaonline.gov.in/patentsearch/GrantedSearch/pdfviewer.aspx?AppNo=MTgyNi1kZWwtMjAwNi1mb3JtLTMucGRm>)

1826-del-2006-form-5.pdf (<http://ipindiaonline.gov.in/patentsearch/GrantedSearch/pdfviewer.aspx?AppNo=MTgyNi1kZWwtMjAwNi1mb3JtLTUucGRm>)

« Previous Patent (<https://www.allindianpatents.com/patents/253065-a-distributed-control-and-or-monitoring-system-within-an-industrial-plant>)

Next Patent » (<https://www.allindianpatents.com/patents/253067-an-improved-process-for-the-preparation-of-16-ehydropregenolone-acetate-16-dpa>)

Patent Number	253066
Indian Patent Application Number	1826/DEL/2006
PG Journal Number	26/2012
Publication Date	29-Jun-2012
Grant Date	21-Jun-2012
Date of Filing	14-Aug-2006
Name of Patentee	COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH
Applicant Address	ANUSANDHAN BHAWAN, RAFI MARG NEW DELHI-110 001, INDIA.

Inventors:

#	Inventor's Name	Inventor's Address
1	BEHL HARI MOHAN	NATIONAL BOTANICAL RESEARCH INSTITUTE, LUCKNOW.
2	KUMAR VISHAL	NATIONAL BOTANICAL RESEARCH INSTITUTE, LUCKNOW.
3	KRISHNAPPA CHANDRASHEKAR	NATIONAL BOTANICAL RESEARCH INSTITUTE, LUCKNOW.
4	LEHRI ALOK	NATIONAL BOTANICAL RESEARCH INSTITUTE, LUCKNOW.
5	SHUKLA VINOD KUMAR	NATIONAL BOTANICAL RESEARCH INSTITUTE, LUCKNOW.
6	SINGH NANDITA	NATIONAL BOTANICAL RESEARCH INSTITUTE, LUCKNOW.
7	SIDHU OM PRAKASH	NATIONAL BOTANICAL RESEARCH INSTITUTE, LUCKNOW.

PCT International Classification Number C04B 28/02

PCT International Application Number N/A

PCT International Filing date

PCT Conventions:

#	PCT Application Number	Date of Convention	Priority Country
1			NA

© All Indian Patents, 2013-2016.

Patent data available in the public domain from Indian Patents Office, Department of Industrial Policy and Promotions, Ministry of Commerce and Industry, Government of India.