SCOPE GREEN TERMITICIDE

SCOPE OF GREEN TERMITICIDE IN BUILDINGS

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ABSTRACT

Use of green termiticide in buildings is lucrative for pest management professionals as well as for home owners. They are derived from organic sources and are considered less harmful for human beings and the eco-system. We are confident that very soon "Green Termiticide" blended with good anti-oxidant molecules incorporating important specifications e.g. rapid knock down effect and long-lasting residual persistence in all types of soil etc. will come up for anti-termite treatment in buildings as an outcome of important innovation, till then we have to use safer synthetic pesticides and other alternatives.

Introduction

Termite is a soil borne organism. In more than 95% cases, it enters into buildings in search of food through the foundations voids and cracks. It damages all the cellulosic and even some non-cellulosic materials also. The termite species like *Odontotermes assmuthi, Mastotermes darwiniensis, Coptotermes acinaciformis, Coptotermes havilandi and Coptotermes niger etc.* are reported to damage plastics and synthetic fibre such as - plasticized polyvinyl chloride, low-density polyethylene, polystyrene, poly-urethane foam, cellulose easter and nylon etc. The Formosan termite has been known to attack non-cellulosic materials such as thin sheet of soft metal (lead or copper) asphalt, plaster, mortar, creosote and rubber etc. Termite lives in special nest called colony. A colony of subterranean termites may be as deep as 20 feet below the soil surface. It's activities may remain undetectable even after serious termite damage is done.

The basic principle of all termite control measures is to break the line of contact between its food and the nest. Till date pesticide based anti-termite treatment (ATT) is widely used, accepted and established method for buildings in India. Huge quantity of pesticidal solution is used for soil treatment in pre-constructional stages, while it is injected under the floor through the drilled holes during post-construction ATT. Usage of pesticide in office buildings, homes, gardens, lawns and public parks etc. is four times higher in terms of per square feet application in agricultural usage. Chlorpyrifos 20 E.C. and Lindane 20 E.C. are registered termiticide for buildings in India. Once, Chlorpyrifos (an organophosphate compound) was the commonly used pesticide in U.S. with consumption of over 30 million lb/year. In 2010, the consumption of Chlorpyrifos globally reached 80,000 tonnes (technical) with CAGR of about 12% in the past five years. Its production in China and India accounts for more than 70% of the global total supply. It is predicted that by 2015, demand of Chlorpyrifos will reach more than 100,000 tonnes (technical) with CAGR of 5% for the next five years (1). India is the second largest Chlorpyrifos technical producer in Asia as well as in the world, which has produced 21,300 tonnes of Chlorpyrifos technical in 2010 (2). Similarly, Global use of Lindane is estimated to be 720,000 tonnes, with Canada being the sixth largest global user of Lindane (Gamma-HCH). Additionally, it is estimated that 55,000 tonnes of technical HCH are used worldwide (3,4).

Chemical prevention is normally guaranteed for 5-7 years and introduces toxins in the environment. Due to environmental and health concern, nowadays pesticidal toxicity in the inbuilt environment is an important major issue. On reaching inside the body of living being, it is transformed into Chlorpyrifos- oxon, which is 300 times more toxic than the parent compound (5). Pesticidal exposure occurs through inhalation, ingestion and dermal absorption (6,7). Perri Ruckart et al. compared the children of organophosphate insecticide treated and untreated areas of Mississippi and Ohio. They found that the children of treated areas had greater difficulty with tasks involving short-term memory and sustained attention than children in untreated areas (8). Carozza et al. also correlated short - term memory functions and hand-eye coordination to pesticide exposure (9). An analysis of pesticide residues in blood samples from villages of Punjab (India) was carried out by Mathur et al. in 2005. They detected Chlorpyrifos at mean level of 0.0662 mg/l in the samples analyzed (10- 15). Similarly, the *International Agency for Research on Cancer* has concluded that there is sufficient evidence to show that one of the Lindane isomers is carcinogenic and limited evidence to establish the carcinogenicity of the beta and gamma isomers.

On the other hand, plants are the natural store-house of bioactive organic chemicals, secondary metabolites such as alkaloids, terpenoids, steroids, polyacetylenes, unsaturated isobutylamide and rotenoids etc. (16-34). The most important example of natural pesticide is pyrethrin which is obtained from *Chrysanthemum cinerifolium.* It is being used as insecticide from ancient times. Rotenone is also a herbal insecticide obtained from *Derris, Lonchocarpous* and *Tephrosia* species. Similarly, Alkaloids like nicotine obtained from many species of *Nicotiana*, veratrdine from *Subadilla* and *Veratrum*, quassin from *Quassia amara* and *ryanoidine* from *Ryania* species.Unsaturated isobutylamides like pellitorine from *Anacyclus pyrethrum*,(35) affinine from *Heliopsis longipes and* pipercide from *Piper nigrum* L etc. (36,37). The terpenoids are pleasantly aromatic and can also be used as pesticide with very low mammalian toxicity. The important terpenoids like 1,8, cineole, bornyl acetate, p-cymene, terpene, camphor obtained from tansy plants, carvone obtained from *Anethum graveolens (38).* Some terpenoids plays synergistic role when used in combination with synthetic insecticides like apiol, myristicin and carvone etc. Limnoids which includes deacetyl salanin, salanin, epimimbin, nimbin, azadirachtin and deacetyl azadirachtinil etc which are obtained from *Azadirachta indica* (39-43).

Herbal toxicants are frequently lethal to insect upon contact or their vapours may kill the insect by fumigation. Most of the pesticides of herbal origin have been reported to possess insect repellent, anti-feedant, feeding deterrent, oviposition deterrent and growth and reproduction inhibition properties. They can also be used for preservation of wood (44). Some of the amides shows rapid knock down effect and kills flying insects immediately. Therefore, herbal compounds may serve as a lead material for chemical synthesis of more effective biopesticide. The main disadvantage is lack of persistence due to the instability in presence of light and air. Amides are also unstable in the environment and degrade quickly after application. These herbal pesticides or formulations may be good for spot –treatment of termite infested areas in buildings but repeated application is required. Stability of biopesticides can be improved after incorporation of anti-oxidants like hydroquinone, resorcinol etc but it require more research in this direction. Further, most awaited green termiticide must have binding properties with the soil molecules and persistence in the soil to achieve long lasting effect in treated buildings. Moreover, if we compare it with leading synthetic termiticide like Chlorpyrifos; persistence in the soil is essential requirement because massive drilling is required in post-construction ATT which is not desirable. In addition to environment and health impact, quality and cost of the herbal termiticide is also a major issue. It is believed that green termiticide are comparatively safer than synthetic ones, but they are not always more safe, both can cause harm to living beings (45). Keeping all facts in view, green termiticides should also be used judiciously. Most of the work on herbal termiticide has been carried out by the Japanese scientists and patented (46-53).

We are confident that very soon "*Green Termiticide*" blended with good anti-oxidant molecules will come up for buildings as an outcome of important innovation till then we have to use safer synthetic pesticides and other alternatives. Indian pest management professionals are eagerly waiting for revised version of IS: 6313 (2001) with safer alternatives of toxic termiticides and baiting system etc.

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World's smallest fly discovered

Scientists have discovered what they say is the world's smallest known fly which feeds on tiny ants, probably decapitating them and using their head casings as its home. With a length of just 0.4 mm, the fly, called *Euryplatea nanaknihali*, is five times smaller than a fruit fly and tinier than a grain of salt, the researchers said. "It's so small you can barely see it with the naked eye on a microscope slide. It's smaller than a flake of pepper," said Brian Brown, of the Natural History Museum of Los Angeles County, who identified the new species.