Division Of City School-Valenzuela

Gen T. De Leon National Highschool

SCIENCE INVESTIGATORY PROJECT

NEEM AS INSECTICIDE

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TITLE OF THE STUDY

Neem As Insecticide

ABSTRACT:

We all know that alot of people are suffering from dengue nowadays , and some of the insecticide bought in stores are too expensive that's why , we made a product that can help us to save our money by using cheap ingredients like neem leaves and neem seeds as an effective and cheap insecticide that could eliminate dengue caused by the mosquito , aegis egypti. Chili , Garlic and Tanglad is also added to strengthen its efficacy .

Materials used in the preparation of the insecticide are mortar and pestle , chopping board , knife , funnel , tripod , alcohol burner , beaker and blender. The collected substance is orange-green fluid containing the extract from the mixture of neem leaves , neem fruits , chili , garlic and tanglad. The product was tested to insects such as mosquito , wigglers , ants and other plant insect and the results showed that the substance itself is really effective as an insecticide.

INTRODUCTION:

Alot of people today are suffering from diseases that are brought by different kind of insects , and one of the insects is the mosquito , aegis egypti that causes dengue fever . We can only eliminate this kind of mosquito by spraying insecticides but alot of people today are financially unable. That's why we decided to make a product that could be the answer in this problem. This is by mixing-up the neem leaves , neem fruits , chili ,garlic and tanglad extract, from this we were able to come up with an alternative botanical insecticide that can kill harmful insects such as mosquito , ants and other plant insects that could be usedby people who can't afford to buy expensive insecticides.

STATEMENT OF THE PROBLEM:

- Is neem leaves and neem fruits can be a good ingredient in making an organic insecticide ?
- Are garlic , chili and tanglad can strength the efficacy of the neem to make an insecticide ?
- Can this be a solution to the dengue disease ?

HYPOTHESIS:

If neem leaves and neem fruits together with garlic , chili and tanglad is a good source in making an effective an all natural insecticide then it could kill harmful insects.

SIGNIFICANCE OF THE STUDY:

The purpose of every experiment conducted is to help people to extinguish pest and insects that could destroy our daily routines. This problem could alter huge population of persons that are tired of killing pests and insects and could be also made in every house. This query is current interest for many individuals , because almost all home owners considered insects as one of the reasons why their life become uneasy for them. This could eliminate any existing pest infestation and prevent any future pest problems that could possibly go back again in your house. Our research finding mat lead to some useful change in best practice because it could lessen the population of domestic insects at every house.

SCOPE AND LIMITATIONS:

In this study we gathered evaluations on how effective an insecticide is with the combination of natural ingredients such as neem leaves , neem fruits , garlic , chili and tanglad. And also how do insects react when they are sprayes with the insecticide. We did not study the reaction of other insects such as termites , alupihan and other , and it is only concentrated to mosquito , ants , wigglers and plant insects.

DEFINITION OF TERMS:

Allicin is an organosulfur compound obtained from garlic, a species in the familyAlliaceae. It was first isolated and studied in the laboratory by Chester J. Cavallito and John Hays Bailey in 1944. This colorless liquid has a distinctively pungent smell. This compound exhibits antibacterial and anti-fungal properties.Allicin is garlic's defense mechanism against attacks by pests.

Capsaicin /kæpˈseɪ.ɪsɪn/; 8-methyl-*N*-vanillyl-6-nonenamide, $(CH_3)_2CHCH=CH(CH_2)_4CONHCH_2C_6H_3$-4-(OH)-3-($OCH_3$)) is the active component ofchili peppers, which are plants belonging to the genus *Capsicum*. It is an irritant formammals, including humans, and produces a sensation of burning in any tissue with which it comes into contact. Capsaicin and several related compounds are called**capsaicinoids** and are produced as a secondary metabolite by chili peppers, probably as deterrents against certain herbivores and fungi Pure capsaicin is a hydrophobic, colorless, odorless, crystalline to waxy compound.

REVIEW OF RELATED LITERATURE & STUDIES:

Azadirachta indica (نیم Neem (Urdu), (नीम Neem (Hindi), নিম Nim (Bengali)) is a treein the mahogany family Meliaceae. It is one of two species in the genus Azadirachta, and is native to Pakistan, India and Bangladesh growing in tropical and semi-tropical regions. Its fruits and seeds are the source of neem oil.

Neem is a fast-growing tree that can reach a height of 15–20 metres (49–66 ft), rarely to 35–40 metres (115–130 ft). It is evergreen, but in severe drought it may shed most or nearly all of its leaves. The branches are wide spread. The fairly dense crown is roundish or ovular and may reach the diameter of 15–20 metres (49–66 ft) in old, free-standing specimens.

The opposite, pinnate leaves are 20–40 centimetres (7.9–16 in) long, with 20 to 31 medium to dark green leaflets about 3–8 centimetres (1.2–3.1 in) long. The terminal leaflet is often missing. The petioles are short. The leaves are also used in Pakistan to give baths to children suffering from skin diseases.The leaves are used in this manner that first they are washed thoroughly. Then 5- 10 leaves along with the branch are boiled till the water turns green The water is then used for varying purposes. Elders find it useful in controlling high blood sugar level and is said to clean up the blood. Neem is also used to give baths to the Muslim dead. Neem leaves are dried in Pakistan and placed in cupboards to prevent insects eating the clothes. Neem leaves are dried and burnt in the tropical regions of Pakistan to keep away mosquitoes. These leaves are also used in many Indian festivals (by making them into garlands)

Uses

All parts of the tree are said to have medicinal properties (seeds, leaves, flowers and bark) and are used for preparing many different medical preparations.

The chemical constituents nimbidin and nimbin have some spermicidal activity

Neem oil is used for preparing cosmetics (soap, neem shampoo, balms and creams such as Margo soap) and many oral health products.

Besides its use in traditional Indian medicine, the neem tree is of great importance for its anti-desertification properties and possibly as a good carbon dioxide sink.

Practitioners of traditional Indian medicine recommend that patients with chicken pox sleep on neem leaves.
Neem gum is used as a bulking agent and for the preparation of special purpose food.
Traditionally, slender neem branches have been chewed to clean one's teeth. Neem twigs are still collected and sold in markets for this use, and in rural India one often sees youngsters in the streets chewing on neem twigs(for the neem twigs and branches have great dental effects).
Neem blossoms are used in Andhra Pradesh, Tamil Nadu and Karnataka to prepareUgadi pachhadi. "Bevina hoovina gojju" (a type of curry prepared with neem blossoms) is common in Karnataka throughout the year. Dried blossoms are used when fresh blossoms are not available. In Tamilnadu, a rasam (veppam poo rasam) made with neem blossoms is a culinary specialty.
A mixture of neem flowers and bella (jaggery or unrefined brown sugar) is prepared and offered to friends and relatives, symbolic of sweet and bitter events in the upcoming new year.
Extract of neem leaves is thought to be helpful as malaria prophylaxis despite the fact that no comprehensive clinical studies are yet available. In several cases, private initiatives in Senegal were successful in preventing malaria.[5] However, major NGOs and other organizations such as USAID are not supposed to use neem tree extracts unless the medical benefit has been proved with clinical studies.
Neem extracts as insecticides: Neem products are unique in that they are not outright killers. Instead, they alter an insects behaviour or life processes in ways that can be extremely subtle. Eventually, however, the insect can no longer feed or breed or metamorphose and can cause no further damage.

- **Azadirachtin :** One of the first active ingredients isolated from neem, Azadirachtin has proved to be the trees main agent for battling insects. It appears to cause some 90% of the effect on most pests.
- **Fungicides** : Neem has proved effective against certain fungi that infect the human body. Such fungi are an increasing problems & have been difficult to control by synthetic fungicides.
- **Antibacterials** : In trials neem oil has suppressed several species of pathogenic bacteria including Staphylococcus & Salmonella spp.
- **Antiviral agents** : In India, there is much interesting, but anecdotal information attributing antiviral activity of Neem. Its efficacy particularly against pox viruses is strongly believed, even among those of advanced medical training. Small pox, chicken pox have traditionally been treated with a paste of neem leaves – usually rubbed directly on to the infected skin.
- **Dermatological Insects** : In India, villagers apply neem oil to the hair to kill head lice, reportedly with great success. Neem seed oil and leaf extracts may be the wonder cure for psoriasis. It relieves the itching and pain while reducing the scale and redness of the patchy lesions.
- **Dental Treatments** : In India, millions of people use twigs as "tooth brushes" every day. Dentists have endorsed this ancient practice, finding it effective in preventing periodontal disease.
- **Malaria :** Practitioners of the Indian Ayurvedic Medicine system have been preparing neem in oral doses for malarial patients for centuries. Neem's antimalarial activity was reported in Ayurveda books as far back as 2000 BC by Charaka & 1500 BC by Sushruta.
- **Pain Relief & Fever Reduction** : Neem may also be a ready source of low cost analgesic (pain relieving), or antipyretic (fever reducing) compounds. In trials, positive results have been obtained for significant analgesic, antipyretic & anti-inflammatory effects.
- **Contraceptive Agents :** Indian scientists from the Defence Institute of Physiology & Allied Sciences (DIPAS) have applied for patents on chemicals isolated from the neem oil which have proved to be promising contraceptive agents which are DK-1 & DNM-5. A third active agent coded as DNM-7 acts as an abortifacient causing abortion if administered orally after

implantation has already occurred. A Neem oil formulation called "Sensal" is now sold in India for contraceptive purposes.

- **Veterinary Medicine** : Ancient practice & initial testing of neem derivatives against various livestock pests indicated that this is an area of particular promise for the future. Insects of veterinary importance are obvious targets for neem products.
- **Cosmetics** : Neem is perceived in India as a beauty aid. Powdered leaves are a major component of at least one widely used facial cream. Purified neem oil is also used in nail polish & other cosmetics.
- **Lubricants** : Neem oil is non drying and it resists degradation better than most vegetable oils. In rural India, it is commonly used to grease cart wheels.
- **Fertilizers** : Neem has demonstrated considerable potential as a fertilizer. Neem cake is widely used to fertilize cash crops particularly sugarcane & vegetables. Ploughed into the soil, it protects plant roots from nematodes & white ants, probably due to its contents of the residual limonoids. In Karnataka, people grow the tree mainly for its green leaves & twigs, which they puddle into flooded rice fields before the rice seedlings are transplanted.
- **Resin** : An exudate can be tapped from the trunk by woundings the bark. This high protein material is not a substitute for polysaccharide gum, such as gum arabic. It may however, have a potential as a food additive, and it is widely used in South Asia as "Neem glue".
- **Bark** : Neem bark contains 14% tannins, an amount similar to that in conventional tannin yieldings tree (such as Acacia decurrens). Moreover, it yields a strong, coarse fibre commonly woven into ropes in the villages of India.
- **Honey :** In parts of Asia neem honey commands premium prices & people promote apiculture / apiary by planting neem trees.
- **Neem fruits :** The fruits are recommended for urinary diseases, piles, intestinal worms, leprosy etc. The dry fruits are bruised in water & employed to treat cutaneous diseases.
- **Soap :** India's supply of neem oil is now used mostly by soap manufacturers. Although much of it goes to small scale speciality soaps, large scale producers also use it, mainly because it is cheap. Generally, the crude oil is used to produce coarse laundry soaps.

Medicinal Use

In India, the plant is variously known as "Sacred Tree," "Heal All," "Nature's Drugstore," "Village Pharmacy" and "Panacea for all diseases". Products made from neem trees have been used in India for over two millennia for their medicinal properties: neem products are believed to be anthelmintic, antifungal, antidiabetic, antibacterial, antiviral, contraceptive and sedative.Neem products are also used in selectively controlling pests in plants. It is considered a major component in Ayurvedic and Unani medicineand is particularly prescribed for skin disease.

Pest and disease control

Neem is a key ingredient in non-pesticidal management (NPM), providing a natural alternative to synthetic pesticides. Neem seeds are ground into a powder that is soaked overnight in water and sprayed onto the crop. To be effective, it is necessary to apply repeatedly, at least every ten days. Neem does not directly kill insects on the crop. It acts as an anti-feedant, repellent, and egg-laying deterrent, protecting the crop from damage. The insects starve and die within a few days. Neem also suppresses the hatching of pest insects from their eggs. Neem cake is often sold as a fertilizer.

Allium sativum, commonly known as garlic, is a species in the onion genus, Allium. Its close relatives include the onion, shallot, leek, chive, and rakkyo With a history of human use of over 7,000 years, garlic is native to central Asia, and has long been a staple in the Mediterranean region, as well as a frequent seasoning in Asia, Africa, and Europe. It was known to Ancient Egyptians, and has been

used for both culinary and medicinal purposes. Allium sativum is a bulb. It grows up to 0.5 m (2ft) in height. Its hardiness is USDA Zone 8. It produces hermaphrodite flowers. Pollination occurs by insects and bees.

When crushed, Allium sativum yields allicin, an antibiotic and antifungal compound (phytoncide) discovered by Chester J. Cavallitoand colleagues in 1944. It has been claimed that allicin from crushed garlic can be used as a home remedy to help speed recovery fromstrep throat or other minor ailments because of its antibiotic propertieFresh or crushed garlic also affords the sulfur-containing compounds alliin, ajoene, diallyl polysulfides, vinyldithiins, S-allylcysteine, and enzymes, B vitamins, proteins, minerals,saponins, flavonoids, and Maillard reaction products, which are not sulfur-containing compounds. Furthermore, a phytoalexin (allixin) was found, a nonsulfur compound with a γ-pyrone skeleton structure with antioxidant effects, antimicrobial effects, antitumor promoting effects,[inhibition of aflatoxin B2 DNA binding,[72] and neurotrophic effects. Allixin showed an antitumor promoting effect in vivo, inhibiting skin tumor formation by TPA and DMBA initiated mice. Analogs of this compound have exhibited antitumor promoting effects in in vitro experimental conditions. Herein, allixin and/or its analogs may be expected useful compounds for cancer prevention or chemotherapy agents for other diseases.

The composition of the bulbs is approximately 84.09% water, 13.38% organic matter, and 1.53% inorganic matter, while the leaves are 87.14% water, 11.27% organic matter, and 1.59% inorganic matter.

The phytochemicals responsible for the sharp flavor of garlic are produced when the plant's cells are damaged. When a cell is broken by chopping, chewing, or crushing, enzymes stored in cell vacuoles trigger the breakdown of several sulfur-containing compounds stored in the cell fluids (cytosol). The resultant compounds are responsible for the sharp or hot taste and strong smell of garlic. Some of the compounds are unstable and continue to react over time. Among the members of the onion family, garlic has by far the highest concentrations of initial reaction products, making garlic much more potent than onion, shallot, or leeks. Although many humans enjoy the taste of garlic, these compounds are believed to have evolved as a defensive mechanism, deterring animals such as birds,insects, and worms from eating the plant.

A large number of sulfur compounds contribute to the smell and taste of garlic. Allicin has been found to be the compound most responsible for the "hot" sensation of raw garlic. This chemical opens thermotransient receptor potential channels that are responsible for the burning sense of heat in foods. The process of cooking garlic removes allicin, thus mellowing its spiciness. Allicin, along with its decomposition products diallyl disulfide and diallyl trisulfide, are major contributors to the characteristic odor of garlic, while other allicin-derived compounds, such as vinyldithiins and ajoene show beneficial in vitro biological activity. Because of its strong odor, garlic is sometimes called the "stinking rose". When eaten in quantity, garlic may be strongly evident in the diner's sweat and garlic breath the following day. This is because garlic's strong-smelling sulfur compounds are metabolized, forming allyl methyl sulfide. Allyl methyl sulfide (AMS) cannot be digested and is passed into the blood. It is carried to the lungs and the skin, where it is excreted. Since digestion takes several hours, and release of AMS several hours more, the effect of eating garlic may be present for a long time.

This well-known phenomenon of "garlic breath" is alleged to be alleviated by eating fresh parsley. The herb is, therefore, included in many garlic recipes, such as pistou, persillade, and the garlic butter spread used in garlic bread. However, since the odor results mainly from digestive processes placing compounds such as AMS in the blood, and AMS is then released through the lungs over the course of many hours, eating parsley provides only a temporary masking. One way of accelerating the release of AMS from the body is the use of a sauna.

Because of the AMS in the bloodstream, it is believed by some to act as a mosquito repellent, but no clinically reported evidence suggests it is actually effective.

Medicinal use and health benefits

In in vitro studies, garlic has been found to have antibacterial antiviral, and antifungal activity. However, these actions are less clear in vivo. Garlic is also claimed to help prevent heart disease (including atherosclerosis, high cholesterol, and high blood pressure) and cancer. Garlic is used to prevent certain types of cancer, including stomach and colon cancers. Animal studies, and some early research studies in humans, have suggested possible cardiovascular benefits of garlic. A Czech study found garlic supplementation reduced accumulation of cholesterol on the vascular walls of animals. Another study had similar results, with garlic supplementation significantly reducing aortic plaque deposits of cholesterol-fed rabbits. Another study showed supplementation with garlic extract inhibited vascular calcification in human patients with high blood cholesterolThe known vasodilative effect of garlic is possibly caused by catabolism of garlic-derived polysulfides to hydrogen sulfide in red blood cells (RBCs), a reaction that is dependent on reduced thiols in or on the RBC membrane. Hydrogen sulfide is an endogenous cardioprotective vascular cell-signaling molecule.

A randomized clinical trial funded by the National Institutes of Health (NIH) in the United States and published in the Archives of Internal Medicine in 2007 found the consumption of garlic in any form did not reduce blood cholesterol levels in patients with moderately high baseline cholesterol levels.According to Heart.org, "despite decades of research suggesting that garlic can improve cholesterol profiles, a new NIH-funded trial found absolutely no effects of raw garlic or garlic supplements on LDL,HDL, or triglycerides... The findings underscore the hazards of meta-analyses made up of small, flawed studies and the value of rigorously studying popular herbal remedies". In an editorial regarding the initial report's findings, two physicians from Weill Cornell Medical College of Cornell University, pointed out that there may "be effects of garlic on atherosclerosis specifically that were not picked up in the study".

Allium sativum has been found to reduce platelet aggregation andhyperlipidemia.

In 2007, the BBC reported Allium sativum may have other beneficial properties, such as preventing and fighting the common cold. This assertion has the backing of long tradition in herbal medicine, which has used garlic for hoarseness and coughs. The Cherokee also used it as anexpectorant for coughs and croup. However, in contrast to these earlier claims concerning the cold-preventing properties of garlic, a 2012 report in the Cochrane Database of Systematic Reviews concludes that "there is insufficient clinical trial evidence regarding the effects of garlic in preventing or treating the common cold. A single trial suggested that garlic may prevent occurrences of the common cold but more studies are needed to validate this finding. Claims of effectiveness appear to rely largely on poor-quality evidence."

Garlic is also alleged to help regulate blood sugar levels. Regular and prolonged use of therapeutic amounts of aged garlic extracts lower bloodhomocysteine levels and has been shown to prevent some complications of diabetes mellitus. People taking insulin should not consume medicinal amounts of garlic without consulting a physician.

Garlic was used as an antiseptic to prevent gangrene during World War I and World War II. More recently, it has been found from a clinical trial that a mouthwash containing 2.5% fresh garlic shows good antimicrobial activity, although the majority of the participants reported an unpleasant taste and halitosis.

Garlic cloves are used as a remedy for infections (especially chest problems), digestive disorders, and fungal infections such as thrush. Garlic can be used as a disinfectant because of its bacteriostatic and bacteriocidal properties.

Garlic has been found to enhance thiamin absorption, and therefore reduces the likelihood for developing the thiamin deficiency beriberi.

In 1924, it was found to be an effective way to prevent scurvy, because of its high vitamin C content. Garlic has been used reasonably successfully in AIDS patients to treat Cryptosporidium in an uncontrolled study in China. It has also been used by at least one AIDS patient to treat toxoplasmosis, another protozoal disease.
Garlic supplementation has been shown to boost testosterone levels in rats fed a high protein diet.
A 2010 double-blind, parallel, randomised, placebo-controlled trial, involving 50 patients whose routine clinical records in general practice documented treated but uncontrolled hypertension, concluded, "Our trial suggests that aged garlic extract is superior to placebo in lowering systolic blood pressure similarly to current first line medications in patients with treated but uncontrolled hypertension.

1. Chili pepper (also chile pepper or chilli pepper, from Nahuatl chilli) is the fruit of plants from the genusCapsicum, members of the nightshade family, Solanaceae. The term in British English and in Australia, New Zealand, India, Malaysia and other Asian countries is just chilli without pepper.

Chili peppers originated in the Americas. After the Columbian Exchange, many cultivars of chili pepper spread across the world, used in both food and medicine.

2. Medicinal

Capsaicin is a safe and effective topical analgesic agent in the management of arthritis pain, herpes zoster-related pain, diabetic neuropathy, postmastectomy pain, and headaches.
Irritant weapon

3. Pepper spray

Capsaicin extracted from chilis is used in a spray as a non-lethal weapon.

4. Crop defense

Farmers in Africa and South Asia have found the use of chilis effective in crop defense against elephants. The chilis are spread on fences and other structures to keep the elephants away. Because the elephants have a large and sensitive olfactory and nasal system the smell of the chilli causes them discomfort and deters them from feeding on the crops. This can lessen dangerous physical confrontation between people and elephants.

5. Food defense

As birds have a lessened sensitivity to the effects of chili it can be used to keep mammalian vermin from bird seed .

6. METHODOLOGY:

Ingredients:

Neem leaves

Neem fruits

Chili

Garlic

Tanglad or lemon grass

Materials :

Beaker

Mortar and pestle

Chopping board and knife

Tripod and alcohol burner

Small pot

PROCEDURE:

- Collect all the ingredients
- Boil neem leaves for 5minutes
- Get the extract of neem leaves
- Boil the neem fruit for 10 minutes
- Get the extract of fruit
- combine it with the extract of leaves
- Chop and pinch the garlic and chili and put it in boiling water
- Boil it with 5 minutes
- get the extract and combine it with the extract of the neem
- blend the extract using blender to mix it well
- blend the leaves,fruits,chili,garlic and make it liquid
- boil tanglad or lemon grass for 2 minutes
- put the extract of it in the mixture of the neem , chili & garlic
- Then after you blend it strain it with strainer
- Then mix it with the mixture
- Put it in the sprayer after you strain it finally you can use it to kill insects.

7. DATA AND RESULTS:

KIND OF INSECT	NEEM INSECTICIDE (present experiment)	YERBA BUENA INSECTICIDE (last experiment)	NO.OF INSECTS	NO OF SPRAY
MOSQUITO	It killed 5	It killed 3	OUT OF 5	10 sprays
WIGGLER	It killed 10	It killed 7	OUT of 15	15 sprays
ANTS	It killed 4	It killed 3	Out of 5	10 prays

FINDINGS & RESULTS:

Neem insecticide is an equally effective compared to our last experiment because from the data that we collected it showed that it is also an effective insecticide that could kill harmful insects and in this product we can save more and our product improved.

SUMMARY, CONCLUSION AND RECOMENDATION:

Neem leaves , neem fruits with chili , garlic and tanglad as insecticide has been proved from this investigatory project that it can be an effective yet cheap insecticide from data that bwe gathered through research and investigation. Neem leaves , neem fruits combined with garlic , chili and lemon grass or tanglad can be an effective insecticide.

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