International Journal of Social Science and Economic Research

ISSN: 2455-8834

Volume:07, Issue:04 "April 2022"

BIO-PESTICIDAL EFFICACY OF NEEM AND TURMERIC EXTRACT

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DOI: 10.46609/IJSSER.2022.v07i04.008 URL: https://doi.org/10.46609/IJSSER.2022.v07i04.008

Received: 10 April 2022 / Accepted: 18 April 2022 / Published: 30 April 2022

ABSTRACT

The compounds derived from the Azadiracta indica (Neem tree) are a type of bio-pesticide that can be used as an alternative to synthetic insecticides. Up to 150 compounds are isolated from different parts of the neem tree. Many studies have reported the modifying effect on larva and pupa have been done and have shown positive results of these compounds on pests. So, in this research study we have attempt to formulate a bio-pesticides which have low side-effect on beneficial organisms can be used together with other pest control methods in both organic and conventional agriculture.

We have found satisfactory potential of Curcuma longa (Turmeric) and neem as a natural pesticide for possible use in crop protection and thus has promising future and effectiveness over the pests of turmeric and neem products as a cheap and more environmentally friendly alternative to chemical pesticides already used for the same purpose.

Key words: Azadiracta indica, Curcuma longa, Neem, bio-pesticide.

INTRODUCTION

In developing countries, the losses of crops are due to pest, plant disease and competition from weeds is great. In households, pest and insects such as mosquitoes, cockroaches, mice etc. pose risks such as the destruction of furniture, clothing and to the causation of various diseases, most seriously; malaria. Pesticides produced to kill these pests in order to prevent this damage, also tend to have adverse effects on humans in various ways, most especially those produced from synthetic materials. These adverse effects of headache, dizziness, catarrh and other factors make this topic worth investigating. The insecticides range from agricultural to household pesticides. Every category has its own effect, both on the targeted pest/insect and the environment in which

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it lives. This research targets insecticide produced from natural products and the need to choose these pesticides rather than those of synthetic origin.

Biopesticides are various biologically active natural substances that exist in nature and have inhibitory effects on crop diseases and insect pests. In general, the creation of biopesticide depends to a large extent on biological resources. China's soil, climate, crop diversity and microbial diversity have unique advantages in biopesticide resources.[1]

In this experimental study the have used the extract of neem leaves and turmeric followed by combination of different ratios.

Azadiracta indica, commonly known as neem, nimtree or Indian lilac, and in Nigeria called dogoyaro or dogonyaro,is a tree in the mahogany family Meliaceae . It is one of two species in the genus Azadircictci**,** and is native to the Indian subcontinent and most of the countries in Africa. It is typically grown in tropical and semi-tropical regions. Neem trees also grow on islands in southern Iran. Its fruits and seeds are the source of neem oil.[2]

Neem fruit, seeds, leaves, stems, and bark contain diverse phytochemicals, some of which were first discovered in Azadiracta seed extracts, such as azadirachtin established in the 1960s as an insect antifeedant, growth disruptor, and insecticide. The yield of azadirachtin from crushing 2 kg of seeds is about 5 g. In addition to azadirachtin and related limonoids, the seed oil contains glycerides, diverse polyphenols, nimbolide, triterpenes, and beta-sitosterol. The yellow, bitter oil has a garlic-like odor and contains about 2% of limonoid compounds. The leaves contain quercetin, catechins, carotenes, and vitamin C.[3]

Neem is a key ingredient in non-pesticidal management (NPM), providing a natural alternative to synthetic pesticides. Neem seeds are ground into powder that is soaked overnight in water and sprayed on the crop. To be effective, it must be applied repeatedly, at least every ten days. Neem does not directly kill insects. It acts as an anti-feedant, repellent, and egg-laying deterrent and thus protects the crop from damage. The insects starve and die within a few days. Neem also suppresses the subsequent hatching of their eggs. Neem-based fertilizers have been effective against southern armyworm. Neem cake may be used as a fertilizer.[4,5]

Azadirachtin, a chemical compound belonging to the limonoid group, is a secondary metabolite present in neem seeds. It is a highly oxidized tetranortriterpenoid which boasts a plethora of oxygen-bearing functional groups, including an enol ether, acetal, hemiacetal, tetra substituted epoxide and a variety of carboxylic esters.

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Azadirachta indica, commonly known as neem, has attracted worldwide prominence in recent years, owing to its wide range of medicinal properties. Neem has been extensively used in Ayurveda, Unani and Homoeopathic medicine and has become a cynosure of modern medicine. Neem elaborates a vast array of biologically active compounds that are chemically diverse and structurally complex. More than 140 compounds have been isolated from different parts of neem. All parts of the neem tree- leaves, flowers, seeds, fruits, roots and bark have been used traditionally for the treatment of inflammation, infections, fever, skin diseases and dental disorders.[6,7]

The medicinal utilities have been described especially for neem leaf. Neem leaf and its constituents have been demonstrated to exhibit immunomodulatory, anti-inflammatory, antihyperglycemic, antiulcer, antimalarial, antifungal, antibacterial, antiviral, antioxidant, antimutagenic and anticarcinogenic properties.[8,9]

Turmeric is a flowering plant, Curcuma longa of the ginger family, Zingiberaceae, the rhizomes of which are used in cooking. The plant is a perennial, rhizomatous, herbaceous plant native to the Indian subcontinent and Southeast Asia, that requires temperatures between 20 and 30 °C (68 and 86 °F) and a considerable amount of annual rainfall to thrive. Plants are gathered each year for their rhizomes, some for propagation in the following season and some for consumption. From India, it spread to Southeast Asia along with Hinduism and Buddhism, as the yellow dye is used to color the robes of monks and priests. Turmeric has also been found in Tahiti, Hawaii and Easter Island before European contact. There is linguistic and circumstantial evidence of the spread and use of turmeric by the Austronesian peoples into Oceania and Madagascar. Turmeric is a perennial herbaceous plant that reaches up to 1 m (3 ft 3 in) tall. Highly branched, yellow to orange, cylindrical, aromatic rhizomes are found.[10,11,12]

The leaves are alternate and arranged in two rows. They are divided into leaf sheath, petiole, and leaf blade.From the leaf sheaths, a false stem is formed. The petiole is 50 to 115 cm (2045 in) long. The simple leaf blades are usually 76 to 115 cm (30-45 in) long and rarely up to 230 cm (7 ft 7 in). They have a width of 38 to 45 cm (15 to 17+^2 in) and are oblong to elliptical, narrowing at the tip.

Turmeric powder is about 60-70% carbohydrates, 6-13% water, 6-8% protein, 5-10% fat,3-7% dietary minerals, 3-7% essential oils, 2-7% dietary fiber, and 1 -6% curcuminoids.

Phytochemical components of turmeric include diarylheptanoids, a class including numerous curcuminoids, such as curcumin, demethoxycurcumin, and bisdemethoxycurcumln. Curcumin constitutes up to 3.14% of assayed commercial samples of turmeric powder (the average was

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1.51 %); curry powder contains much less (an average of 0.29%). Some 34 essential oils arepresent in turmeric, among which turmerone, germacrone, atlantone, and zingiberene are major constituents.

Pharmacological action.[13,14]

Turmeric possesses several biological activities including anti-inflammatory, antioxidant, anticancer, antimutagenic, antimicrobial, antiobesity, hypolipidemic, cardioprotective, and neuroprotective effects. These reported pharmacologic activities make turmeric an important option for further clinical research.

Selection of part of herb

Neem leaves and Turmeric legumes are selected for the extraction based on their pesticidal property. Neem contain azadirachtin, the leading constituent of the neem that have the pesticidal property. The turmeric has a boosting role as a pesticide. The extraction of Azadiracta indica (neem) and curcuma longa (turmeric) have been performed to determine the potency of the extract as a biopesticide on the pest taken in experiment.[15,16]

With the growing demand for environmentally sound strategies in the control of pests, the development of alternative pesticides with minimal ecological hazards has now become an imperative need. This demand is also supported by the increasing concerns over the level of pesticide residues in food and over the level of resistance of pests to several pesticides, which both result from the overuse of chemical pesticides.[17]

Drying and processing

Turmeric was processed to powder in the pharmacognosy lab by the help of mixer. Neem leaves were washed and dried in the sunlight and then crushed into coarse powder.

Each of 70 g of the powder of Neem and Turmeric were weighed on a weighing balance and then thimble was made using filter paper. The weighed powder was incorporated into the thimble using cotton plug on the both sides of the thimble.

The thimble was placed into the Soxhlet chamber. After pouring the menstrum into it, the final hot continuous extraction process starts.[18,19]

Extraction process

Hot and continuous extraction

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Soxhlet extraction is one of the most popular techniques for extraction of analytes from solid materials. Since its discovery in 1879, the standard Soxhlet technique has been routinely applied in almost every analytical laboratory. Even today, Soxhlet extraction technique remains a standard technique to which the performance of modern extraction techniques is compared. Over the years, intensive research on different modifications has been carried out in order to overcome the main disadvantages of conventional Soxhlet technique and to make it more effective.

MATERIAL AND METHOD

The process of extraction was conducted in the lab Pharmacognosy in the campus of Corporate Institute of Pharmacy, Hataikheda, Bhopal,Madhya Pradesh.The sample of neem leaves were obtained from the botanical garden of the campus and the *Curcuma longa*legumes are purchased from the market and then crushed into powder.

PROCEDURE

The Soxhlet apparatus was assembled in the Pharmacognosy Lab and hot and continuous extraction was performed for 24 hours.

Method:[20]

Hot and continuous extraction

Firstly, we assemble the Soxhlet apparatus, the Soxhlet extraction procedure involves the following steps.

First, the sample materialthe turmeric powder and neem leaves powder (70 g each) separately. is packed in filter paper and placed in the thimble.

Next, vapors of a fresh solvent(Ethanol 500ml in each of the apparatus), produced in a distillation flask, pass through the thimble containing the material to be extracted and are liquefied in the condenser.(78-degreeCelsius boiling point of ethanol).

Let the process of extraction continued for 24 hours.

Collect the eluent and let it be vaporized the alcohol content.

The concentrated part i.e., extract is collected and transferred into the Petri dish.

OBSERVATION AND RESULT

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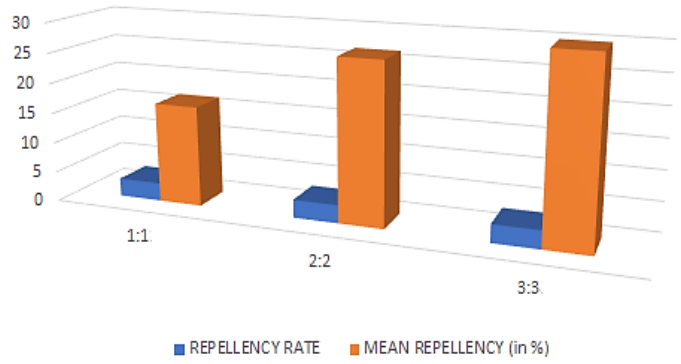
Final extract of the turmeric and neem is taken out in a beaker and a slur is prepared indifferent three composition as 1:1, 3:3, and 5:5 that is 1:1 means 1 ml of turmeric slurry and 1ml of neem slurry.

Repellency test of different combination ratios of Neem and Turmeric extract in given HAT (hours after treatment) on brown planthopper (out of 10)

Table 1: repellency rate observation of brown planthopper.

COMBINATION OF NEEM AND TURMERIC EXTRACT	REPELLENCY RATE			MEAN REPELLENCY (in %)
	1HAT	2HAT	3HAT	
1:1	3	1	1	16.66
3:3	5	2	1	26.66
5:5	6	3	0	30

Fig 1: Mean repellency observation in percentage



CONCLUSION

Turmeric and neem extract use as bio-pesticides effectively repelled the infestation of insects obtained an excellent and acceptable score in terms of color, flavor and, taste. These bio-pesticides are better alternative over synthetic pesticides processors can be able to use crude turmeric and neem extracts for controlling dermestid beetle. If the turmeric and neem extract is taken in the combination of 1:1, 3:3 and 5:5 ratio as in our case, the result was good enough specially for 5:5 ratio that can justify the effort of this research.

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The final result of this experiment has been listed in the given table. The repellency rate of the test had been tested after every hour of treatment of the formulation made with three combinations of the neem and turmeric extract.

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