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VIVEKANAND COLLEGE, KOLHAPUR

(Empowered Autonomous)

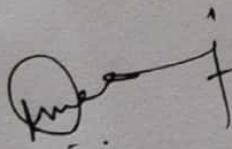
Department of Botany

Project Name- *AZADIRACHTA AND CURCUMA USED AS A
TRADITIONAL BIOPESTICIDE*

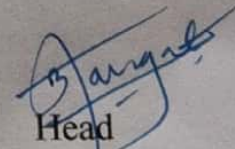
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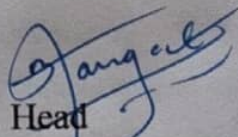
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CERTIFICATE

This is certify that, the project work entitled **AZADIRACHTA AND CURCUMA USED AS A TRADITIONAL BIOPESTICIDE** is being submitted by Miss. Vaishnavi Devane and Mr. Aaditya Muthe under the guidance of Dr. Mrunalini N. Desai, Assistant Professor, Department of Botany, Vivekanand College, Kolhapur (Empowered Autonomous).




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AZADIRACHTA AND CURCUMA USED AS A TRADITIONAL BIOPESTICIDE

INTRODUCTION

In developed and developing countries, agriculture plays an important role not only fulfilling the food requirements but also improving the economy of the country. To get more product, farmers use chemical pesticides which may have bad impacts on environment (Kandpal 2014). Biopesticides are the naturally occurring compounds or agents that obtain from the animals, plants and micro-organisms. Biopesticides are eco-friendly and host specific (Kumar *et al.*, 2021). Basing on the nature and origin, biopesticides are various type such as botanical, growth promoters, predators and pheromones (Semeniue *et al.*, 2017). Due to some antimicrobial agents and bioactive compounds, plants and microorganisms are the major source of biopesticides (Nefzi *et al.*, 2016). Different plant families have different types of bioactive compounds (Lengai and Muthorni 2018). Mainly, biopesticides are of three types. Firstly, microbial pesticides which is important for plant disease managements. It contains a microorganism which can control a various kind of pests. They can be used to control mosquitoes and black flies (Kalra and Khanuja 2007). Secondly, plant incorporated protectants which is a substance derived from the genetic material of a plant and thirdly biochemical pesticides which occur naturally from plant extracts, fatty acid, pheromones and control pest by non-toxin mechanism. It includes the substance that act as growth regulators or repel or attract insects (Kumar *et al.*, 2021). As biopesticides are eco- friendly, efficacy and sustainable, it attracts special interest and one of the promising alternatives to manage environmental pollution. It also gains interest in growing organic food (Bailey *et al.*, 2010). Most of the countries minimize the use of chemical pesticides and promote the use of biopesticides (Kumar and Singh 2014). Pest control is a major concern for human, plant health and productivity. People are in a searching to discover agents for pest control alternative to synthetic pesticide. Biopesticides is the alternate option as it is cost effective, safer and readily available (Gupta and Dikshit 2010).

Biopesticides can be derived from some bacteria like *Bacillus thuringiensis*, some fungi, viruses, protozoa and some beneficial nematodes which are used in field crop and garden use. Microbes and their metabolomic products are identified as



biopesticides (EPA 2013).

Neem (*Azadirachta indica*) belongs to Meliaceae family, is a tropical evergreen tree, often referred to as "Tree of 21st century". All parts of the plant particularly bark, leaves and root extracts were found effective against many pests and insects thus they possess biopesticidal activity. The presence of azadirachtin, a chemical compound obtained from neem acts as potential biopesticides. It inhibits their feeding ability, disrupts their growth and reproduction. The presence of azadirachtin, a chemical compound obtained from neem acts as potential biopesticides. It inhibits their feeding ability, disrupts their growth and reproduction.

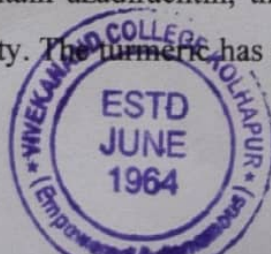
Turmeric is a flowering plant, *Curcuma longa* of the ginger family, Zingiberaceae, the rhizomes of which are used in cooking. The plant is a perennial, rhizomatous, herbaceous plant. Turmeric powder is about 60-70% carbohydrates, 6-13% water, 6-8% protein, 5-10% fat, 3-7% dietary minerals, 3-7% essential 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 bisdemethoxycurcumin. Curcumin constitutes up to 3.14% of assayed commercial samples of turmeric powder (the average was 1.51 %); curry powder contains much less (an average of 0.29%). Some 34 essential oils are present in turmeric, among which turmerone, germacrone, atlantone, and zingiberene are major constituents.

MATERIAL AND METHOD

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.

Turmeric was processed to powder in the lab by the help of mixer. Neem leaves were washed and dried in the sunlight and then crushed into coarse powder. The general preparation method was boiling the fresh plant material in water or grinding the material then soaking in the water. The extracts are made to emulsion and applied on the plant to kill the pest.

Neem leaves and Turmeric rhizome 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.

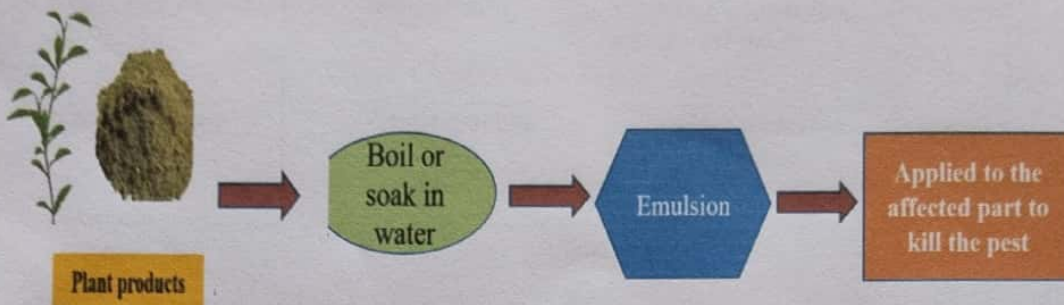


Figure 1. Preparation of biopesticide

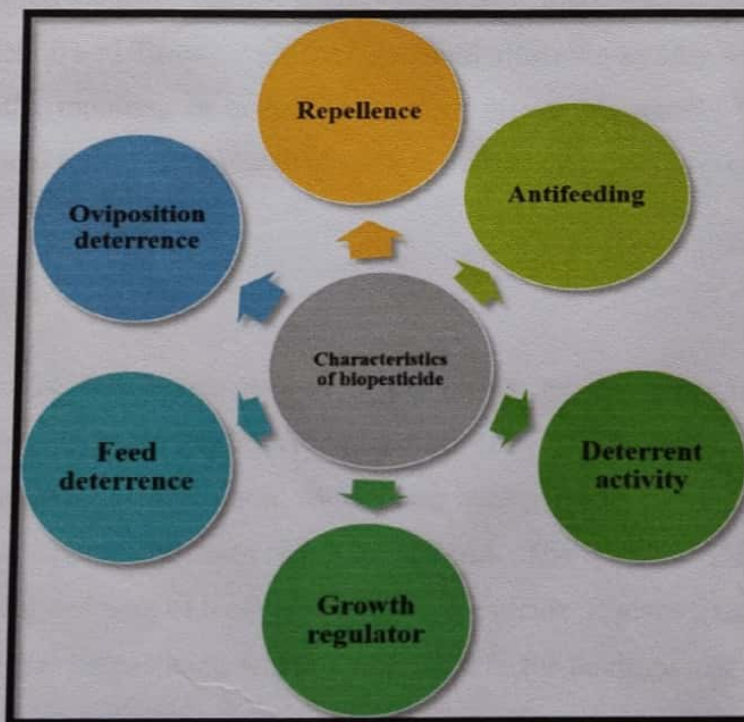


Figure 2: Characteristics of biopesticides

Table 1: List of plants used as biopesticide

Botanical name	Family	Hosts
<i>Azadirachta indica</i>	Meliaceae	<i>Clitoria ternatea</i> , <i>Draceana</i> <i>sp. Areca palm</i>
<i>Curcuma longa</i>	Zingiberaceae	<i>Clitoria ternatea</i> , <i>Draceana</i> <i>sp. Areca palm</i>

RESULTS

The powder made from the leaves of Neem and Rhizome powder of Turmeric is used as a insecticide as both of the plants has insecticidal properties. Formulated neem and turmeric product has significant effect against white flies of all three garden plants. The neem product Azadirachtin and Turmeric product curcumin affect the activity of enzyme ecdysone by suppressing the moulting or ecdysis process of insects by entering into insect's larva through feeding and restrict the passage of larva to pupal stage, thus leading to death.

CONCLUSION

The bioactive compounds present in the plants are known to have the pesticidal effects. The biopesticides derived from the plants are eco-friendly, safe and beneficial for the environment. It does not harm the soil, water or air quality of the environment. Hence, plant derived pesticides should be used for pest control. The present study highlights the importance & traditional uses of local plants as a biopesticide. It gives a base line data for the formulation of herbal biopesticide which could be safe for environment and human health care.

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 biopesticides are better alternative over synthetic pesticides processors can be able to use crude turmeric and neem extracts for controlling dermestid beetle.





Infected (Before treatment)



After treatment



Infected (Before treatment)



After treatment



Infected (Before treatment)



After treatment