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Traditional Knowledge on Termite Control in North Kerala, India and Their Preliminary Laboratory Screening

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Abstract Termites are one of the most destructive insect pests of buildings across the world. Though chemical termiticides are widely used for controlling termites, it has many limitations for indoor use. Thus, an attempt was made to collect the traditional knowledge on termite control in Northern Kerala, and to test out the promising methods in the laboratory. Thirty houses each were surveyed in three geographical areas- Highland, Midland and Coastal area. Questionnaire survey was done for collecting information on the control methods adopted or known by the homeowners. The study showed that all the 90 homeowners are aware of at least one traditional method of termite control and 54 among them attempted controlling the termites using any of such methods. Ten traditional control methods were selected for preliminary screening in the laboratory of which seven were disproved. The three materials that gave positive results included Kerosene (undiluted), salt solution (1:1 in water) and *Acrostichum aureum* (The Golden Leather Fern). But these results only have indicative value and requires further detailed studies to understand better. The scope of present study was limited to collection of traditional knowledge and their preliminary screening mainly to falsify the ineffective methods.

Keywords: *Acrostichum aureum, Building termites, Termite control, Traditional knowledge, kerosene*

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1. Introduction

Termites are a group of social insects belonging to the order Blattodea (Infra order: Isoptera). They play a very significant role in the ecosystem as an efficient decomposer. They are also one of the most destructive insect pests of buildings, crops and forests across the world. Several methods are being employed for controlling the termite attack by farmers and home owners worldwide. Mostly chemical insecticides with many known ill effects are used to overcome the issue. Use of locally available materials and methods for termite control is also a common practice in many areas of the Indian subcontinent since ages [1,2,3]. Such traditional knowledge has to be documented and tested scientifically for conservation of the knowledge and wider acceptance and use. Proving the efficacy of a traditional method would be a laborious task, but disproving the claim would be much easier. The present study is an attempt for collecting the traditional knowledge on termite control and their preliminary screening in the laboratory.

2. Methodology

2.1. Study Area

The survey on traditional knowledge was done in the two Northern Districts of the Kerala State viz. Kannur and Kasaragod. Kannur District is located within the geographical limits 11˚52'08" N latitude and 75˚21'20" E longitude and Kasaragod District is located within 11° 18' to 12° 48' N latitude and 74° 52' to 75° 26' E longitude. The whole area is geographically divided in to three zones – the Coastal area on the west, the Western Ghats on the east (Highland / hill area) and the Laterite plain (Midland / plane area) in between the two. The three areas differ in terms of altitude from sea level, soil type and wood materials used for building. The three areas were selected for survey, expecting a difference in the traditional knowledge mainly due to difference in the availability of plant materials.

2.2. Survey

Thirty houses each were selected at random from each area viz., Hill, Plain and Coastal area. Older houses with

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Termite sampling methods: A comparative study in four habitats of north Kerala

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ABSTRACT: Initially, three termite sampling methods were compared in a coastal area of North Kerala to check the efficiency of the widely followed standardized belt transect protocol (Jones and Eggleton, 2000) with a simplified belt transect protocol and random search method. Of the total 11 species that belong to 4 genera collected during the study, the standardized belt transect protocol recorded only two genera and 5 species in 20 hours of sampling effort, while the simplified protocol with half the effort (10 hours) recorded two genera and 4 species. Random search method with least effort (6h) recorded 4 genera and 11 species that included all the species collected in the earlier methods. There was a marked difference in sampling efficiency; the random sampling method yielded 1.87 species per hour while standardized belt transect protocol and simplified belt transect protocol yielded only 0.25 and 0.4 species per hour respectively. The result of the study was further verified in three more habitats viz. natural forest, coffee plantation and tea plantation which gave similar results. The study indicates that the random search method which covers more area in less time yield more representative termite fauna in all the four habitats tested, than the standardized belt transect protocol which spends more time covering less area.

KEY WORDS: Random search, standardized transect protocol, sampling efficiency

Appropriate sampling methods are important for studying the diversity of any organism. There are different sampling protocols for different organisms and different habitats. Absence of adequate sampling strategies is an impediment to our understanding of many groups of organisms. Soil organisms in general and termites in particular are among such organisms. In spite of their high diversity and importance, an efficient and foolproof sampling strategy is still lacking.

Davies *et al*. (2012) reported that a particular sampling method may not be the most appropriate or effective for all habitats and active searching (modified version of standardized belt transect of Jones and Eggletton, 2000) was most effective method of termite sampling in mesic savannas and baiting in arid savannas. Zeidler *et al.* (2004) also suggests baiting experiments to arid environments. The major limitation with bait experiment is that it only document cellulose feeding termite species, thereby excluding the soil feeding termites and it is less effective in wet season (Davies *et al*., 2021).

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ARTICLE

Synthesis, DNA Binding, DFT Calculations and Molecular Docking Studies of Biologically Active *N*-((3-(4-nitrophenyl)-1-phenyl-1*H*-pyrazol-4-yl)methylene)naphthyl Derivatives

P.V. Sandhya[1,✉], P.R. Swaran[2] and E. Harikrishnan[3]

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ABSTRACT

Six novel pyrazole compounds were synthesized, characterized and its antimicrobial activity was also evaluated. *In vitro* antibacterial activity against diverse bacterial and fungal strains was tested and the results were compared to the standard drug. The DNA binding properties of calf thymus DNA (*ct*-DNA) were investigated using electronic absorption and fluorescence spectroscopies . The software performed computer-aided molecular docking experimentations on proteins and (*ct*-DNA). Synthesized compounds revealed moderate to satisfactory biological activities both experimentally and theoretically.

KEYWORDS

Pyrazole derivatives, Biological activities, DNA binding, Molecular docking.

INTRODUCTION

Heterocycles with different functionalities have recently emerged as lead compounds with different biological activities. Pyrazoles are five-membered heterocycles that are essential, significant and abundant in the structural subunits of more complex natural products such as vitamins, hormones and alkaloids [1,2]. NOS inhibitor [3], monoamine oxidase inhibitor [4], antibacterial [5], antiamoebic [6], anti-inflammatory [7], antiviral, antitumor [8], antidepressant [9], anticonvulsant [10], antimicrobial, antibacterial [11], antifungal, anticancer [12], antihistaminic activities [13], proton pump inhibitor, antioxidant, antihypertensive [14], anticoagulant and agrochemical agents [15]. More, *N*-phenyl pyrazole compounds have increased biological activity, especially in antitumor and antimicrobial screening [16]. In addition, pyrazole derivatives have been found use in pesticides, pesticides and herbicides [17]. These properties make pyrazole attached derivatives an important compound in the development of new drugs.

According to the literature, compounds containing imine or azomethine groups in the skeletal have a wide range of pharmacological activities including antibacterial, antifungal, DNA and RNA inhibitory activity, protein synthesis, nitrogen fixation and carcinogenesis [18]. Imino compounds had already found application in the field of nervous system hypnotic drugs [19]. Similarly, DNA has a greater affinity for several hetero-

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