



Identification of Terpenoids from Essential Oils of Mentha, Anona, Cinnamomum and Eucalyptus A Biosource for Sustainable Pest Management - A Green Solutions

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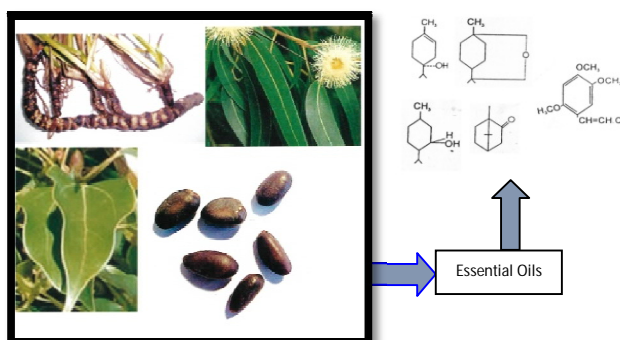
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ABSTRACT

The Essential oils from Mentha, Anona, Cinnamomum and Eucalyptus were evaluated. Each of the essential oils was subjected to GCMS and maximum concentration of the terpenes as active principle, menthol, terpinen-4-ol, camphor and 1,8 cineole were identified. The oxygenated terpenoids were observed to show promising result.

Graphical Abstract



Keywords: Essential oils, oxygenated terpenoids, GCMS.

INTRODUCTION

Natural products are the compounds isolate from natural sources such as plants, animals, microbes, insects, plant pathogens and marine [1] These are secondary metabolites formed by enzymatic reactions of primary metabolites (amino acids, sugars, vitamins). Terpenes are simple hydrocarbons, while terpenoids are modified class of terpenes with different functional groups [2].

Terpenoids with variation in their structures are biologically active and traditionally plant based terpenoids have been used by humans in the food, pharmaceutical, chemical industry and

development of biofuel products. The ecological importance of terpenoids has gained increased attention to develop for sustainable pest control [13].

Increasing incidence of pesticidal resistances is fueling for the need of some new eco-friendly pesticides [3, 4]. The insecticidal treatment is hazardous to human health as well as considerable damage is caused by the insect pest [5]. Many terpenoids inhibit human cancer cell and used as anticancer drugs such as Taxol. Terpenes and its derivatives play a diverse role in field of drugs, cosmetics hormones, vitamins [5].

Plant with their self defense properties could give wealth information for the future chemist to obtained non-hazardous economic pesticides. The present study the essential oils and active terpenoids were studied for pesticidal activity.

MATERIALS AND METHODS

The study materials i.e. plant part, leaves of eucalyptus (*Eucalyptus globulus*), peppermint (*mentha piperita*), camphor (*cinamomum camphora*) and seed of custard apple (*Anona squamosa*) were dried and grind into powder and were subjected to hydro distillation in a modified clewenger apparatus [6, 7]. The oil collected were dehydrated with anhydrous sodium sulphate and stored in refrigerator for further studies.

- Crude essential oil were subjected to GCMS (Gas chromatography and mass spectrometry).
- The major terpenoids of each crude essential oil was identified as menthol (*mentha piperita*);, terpinen 4-ol (*Annona squamosa*), 1,8, cineole (*Eucalyptus globulus*) respectively.

The terpenoids were identified by comparison with the retention times and mass spectra obtained with authentic standards on the GC-MS system. (The wiley registry of mass spectral data 6th ed) [8]. Bio activity for terpenoids for concentrations i.e. 0.5%, 1.0%, 1.5% and 2.0% were recorded at 24 h, 96 hrs, 168 h and 240 h.

RESULTS AND DISCUSSION

Terpenoids shows maximum mortality after 240 h exposure to 2.0% concentration higher in menthol 90%, terpinen - 4- ol (79%), camphor 61% and 1-8 cineole (54%) over control other coworkers made similar observation [9, 10].

Keen observation of their structure reveals them to be oxygenated terpenoid exhibiting higher activity than hydrocarbon. [11]. Thus menthol, terpinen-4-ol containing alcoholic group is more crucial for its activity against microorganisms [12]. The ketonic group of camphor and 1-8- cineole showed optimum mortality (Table 1). Terpenoids and their chemical composition plays an important role in determining their bio-activity. The structure activity relationship was observed in following trends. Alcoholic terpenoids > ketonic Terpenoids.

Table 1. Results of statistical percentage mortality of terpenoids after 240 h

Concentration	Menthol	Terpinen- 4-ol	Camphor	1-8 cineole
Control	00	00	00	00
0.5%	56.84	65.96	45.00	39.21
1.0%	63.55	65.96	50.77	43.08
1.5%	68.58	75.03	56.84	45.00
2.0%	90.00	79.54	61.11	54.73
S Em [±]	1.23	1.75	1.09	0.81
CD at 5%	3.89	5.51	3.46	2.56

Values obtained by angular transformations

APPLICATION

These results bring awareness for eco-friendly nonhazardous pest management and develop sustainable pest control.

CONCLUSION

The present study shows that the naturally occurring plant defense i.e. terpenoids could easily replace hazardous chemical pesticides or futuristic insecticidal to obtain non-hazardous pesticides¹³. Therefore use of Plant seen to offer desirable green solution.

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