APPENDIX-IV

1. Cineole: \((C_{10}H_{18}O)\) (Eucalptol, Cajeputol, Cineol - 1:8)

![Cineole structure](image)

Colourless liquid. It is a compound in liquid and alliphatic and ester. Constituent of oils of eucalyptus, cajeput, wormseed and lavender. M.P. +5°C, B.P. 176-7°C, \(D^20\) 0.9267, \(n^15\) 1.4584. Heat of comb 1460.1 cal. Forms add comp. with \(H_3PO_4\) (m.p 80°C) with resorcinol and other phenols.

2. Eugenol: \((C_{10}H_{12}O_2)\) (1-allyl-4-hydroxyl-3-methoxybenzene, 4-allyl-2-methoxyphenol, 5 allyl guiacol).

![Eugenol structure](image)

3. **Citronellal** (C₁₀H₁₈O)

(3 : 7 - Dimethyl-6-octenal, rhodinal)

(CH₃)₂ C : CH₂CH₂CH₂CH(CH₃)C₂H₂CHO.

Optically active liquid with odour of lemon rind. It is aldehyde and acetate with (C = O) carbonyl group. Chief constituent of citronella oil. Also contained in lemon, rose and other ethereal oils. B.P. 204-5°C (208°C), 90°C/14 mm. D¹⁷ 0.855. n²⁰ D 1.4456. (α)²⁰ < 10.6°, (α)¹⁵ < 13.09°.

Nattg in dil AcOH - citronellol. Ac₂O, dil H₂SO₄ or on long standing isopulegol. Ox→ isopulegone. Forms a bisulphite comp.

4. **Geraniol** (C₁₀H₁₈O)

3 : 7 - Dimethyl-2:6 (or 2:7)-octadienol,

2 : 6 - dimethyl-2:6 (or 1:6)-octadienol-8

CH₃ C : CH₂CH₂CH₂CH(CH₃)C₂H₂CHO.

or

CH₃ C : CH₂CH₂CH₂CH(CH₃)C₂H₂CHO.

5. **Citronellol** \((C_{10}H_{20}O)\)

\[
(\text{3:7 - Dimethyl-6-octen-1-ol, rhodinol})
\]

\[
(\text{CH}_3)_2 \text{C} = \text{CH} . \text{CH}_2 . \text{CH}_2 . \text{CH}(\text{CH}_2) . \text{CH}_2 . \text{CH}_2 \text{OH}.
\]

Colourless liquid with pleasant odour of lemon rind. It is liquid alcohol and aliphatic. Constituent of oil of geranium and certain rose and citronella oils. B.P. 222\(^\circ\)C, 118\(^\circ\)/17 mm, 106.8\(^\circ\)/12 mm. \(D^{20}\) 0.8590. \(D^{17}\) 0.8565. \(n_D^{20}\) 1.45659. \(\alpha_D^{17}\) + 4\(^\circ\). Ox \(\rightarrow\) citronellol Red \((\text{PtO}_2)\) \(\rightarrow\) dihydrocitronellol.

6. **Geranyl acetate**: Occurs in citronella, orange flower and other volatile oils. B.P. 242-5\(^\circ\)/764 mm. decomp. 130-2\(^\circ\)/22 mm. \(D^{15}\) 0.9174. \(n_D^{15}\) 1.4628.

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Toxicity and repellency of certain north east Indian plants for the land leech, Haemadipsa sylvestris (blanchard)

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INTRODUCTION

CHEMICAL pesticides are notably poisonous and their use has contaminated the eco-system to a considerable extent due to their persistence and consequent accumulation in the environment (Quadri, 1973). To escape this hazard of pesticides use, considerable investigation are being carried out to develop safer sources of pest control, notably from plant sources. Plant components have been found to exhibit appreciable potentialities for control several pests and pathogens and in this respect considerable investigation are under way in various parts of the world to develop plant based pesticides against insect, fungi, bacteria etc. However, against leeches, a primary pest of human being and domestic animals, investigation in this line are very few. As regards North East India, only a few plants were reported to show toxicity and repellency for leeches (Panerjec and Gaiomly, 1976, Saxena et al 1974). Therefore, based on ethno-botanic informations, an investigation was undertaken with 15 indigenous plants of North East India, with the purpose of identifying possible plant products having promising biological activity against Haemadipsa sylvestris: a very harmful land leech, causing serious inconveniences to defence personel, cultivators and general population in different habitats and which is also one of the most prevalent species reported so far from Assam (Koshi and Verma 1965).

MATERIALS AND METHODS

15 plants collected from various parts of North East India were taken up for investigation. Water extracts of 10 plants were used in the investigation while in the case of five plants viz. Cymbopogon winterianus, Ocimum gratissimum, O. basilicum, Eucalyptus citriodora and Cinnamomum camphora the essential oils were used.

The extracts were prepared by boiling, the powdered and dried, plant samples with sterile distilled water for five minutes and allowed to cool at room temperature. They were first filtered through sterilized muslin cloth and subsequently through sterile Whatman No. 1 filter paper and the filtrate was used in the investigation.

Essential oils of the above mentioned plants were extracted in the Clevangers hydrodistillation method. About 500 gms fresh leaves of the plants were respectively subjected to extraction with distilled water for about three hours, after which the oils were collected in small vials. The oils were then made moisture free by addition of anhydrous sodium sulphate and stored in-5°C till use.

Modified Ribbands method (Ramaachandran et al 1971) was used for testing repellency of the plant products and toxicity tests were carried out using a residue film method (Koshi and Verma, 1965).

The extracts/oils were at first evaluated in 1:10 dilution of Ace-tone and the one showing promising toxicity/repellency were further evaluated in five concentrations viz. 1.0, 0.5, 0.25, 0.125 and 0.0625% and the results were subjected to probit analysis (Finney, 1962).

The entire investigation was carried out at 27±2°C and 70±5% R.H.

RESULTS AND DISCUSSION

The results of the experiment with 15 plants for toxicity-repellency against H sylvestris is presented in Table No. 1. As regards toxicity: water extracts of Acorus calamus roots and Entada scandens stems have given the highest response (mortality above 80%), while Cucumis sativus fruit peel and Solanum khasianum fruits has shown moderate action (30-60%, mortality) in both the time intervals and rest of the plants could exhibit only mild action. Extracts of three plants viz. Spilanthis acmella (aerial parts), Agaratum conyzae (leaves), Tephrosia purpurea (whole plants) and essential oils of two plants viz. Ocimum gratissimum, and O basilicum, which could cause only mild toxicity in six hours have recorded moderate to good toxicity (60-80% mortality) in 10 hours duration.

Essential Gils of Cymbopogon winterianus, Ocimum gratissimum, O basilicum and Eucalyptus citriodora could cause repellency of above 70% while that of Cinnamomum camphora has shown a repellency of 68.7% and 62.2% in 1 and 2 hours interval respectively, whereas rest of the plants showed only mild to moderate action.

Results of the dose-dependency studies with water extracts/oils of the plants showing promising toxicity/repellency is expressed in Table No. 2. It may be seen that the plants, Acorus calamus and Entada scandens has considerable potentialities as regards Leech toxicity while three plants viz. Cymbopogon...
Plants | Test material | Regression equation | Slope | Median lethal/ effective conc. [LC₅₀]
--- | --- | --- | --- | ---
Acorus calamus | Water extract | Y = 5.9 + 1.3x | 1.3 ± 0.021 | 0.18
Entada scandens | Water extract | Y = 6.4 + 1.5x | 1.5 ± 0.02 | 0.1
Cymbopogon winterianus | Essential oil | Y = 6.3 + 1.4x | 1.4 ± 0.024 | 0.11
Ocimum gratissimum | Essential oil | Y = 6.0 + 1.4x | 1.4 ± 0.022 | 0.18
O basilicum | Essential oil | Y = 5.3 + 1.36x | 1.36 ± 0.021 | 0.23

winterianus. Ocimum gratissimum & O basilicum has shown sufficient promise as Leech repellent as expressed by the considerably low LC₅₀ values and further investigations in this line may help in developing new potential plant based Leech control agents.

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