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NOTE

Essential Oil Constituents and Antifungal Activity of *Plectranthus japonicus* K.

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The chemical constituents of the essential oil from *Plectranthus japonicus* K. have been identified by using GC, GC-MS and spectral analysis. The oil was screened for antifungal activity against *Aspergillus niger, Alternaria alternata, Penicillium citrimum, Rhizopus nigricans* and *Trichodermis viride.*

Key Words: Essential oil, *Plectranthus japonicus* K, GC, GC-MS, Antifungal.

Though many in *vivo*[1–4] and in *vitro*[5–7] studies have been carried out, yet the essential oils have apparently not received the attention that their activity warrants. The essential oil from the fresh plant material of *P. japonicus* was extracted by steam distillation. The significant result have been obtained with oil against culture of several species of fungi employing filter paper disc diffusion method.

The essential oil from the fresh plant material was extracted by steam distillation and the chemical constituents of the oil were identified by GC, GC-MS and spectral analysis. "Potato dextro Agar"[6] was used to perform fungicidal activity. The sterilized "Potato dextro Agar" was poured into sterilized petridishes and allowed to harden. The plates were screened with test fungi in water suspension. Whatman No. 1 filter paper discs of 10.0 mm diameter moistened with the known quantity of oil (approx. 0.003 g per disc) were placed on the agar plates. The plates were incubated at 25 ± 2°C for 2 to 3 days or untill growth developed. The zones of inhibition appeared were measured. The control test in each case was also kept under identical conditions. The testings with standard antifungal antibiotics, *viz.*, tetracycline etc. were also performed under similar conditions.

The GC, GC-MS and spectral analysis of *P. japonicus* oil showed 26 constituents, 15 of which were identified on the basis of spectral data (Table-1). *cis*-piperitone oxide and piperitenone oxide constitute over 63% of the oil followed by monoterpene and sesquiterpene hydrocarbons. However in *P. incanus* oil *cis*-piperitone oxide and piperitenone oxide constitute over 80% of the oil

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followed by fenchone and sesquiterpene hydrocarbons[8]. A literatue survey on the genus *Plectranthus* reveals the presence of sabinyl acetate (>60%) as major compound in *P. fruiticosus* and sesquiterpene hydrocarbons as major compounds in *P. rugosus*, while little or no *p*-menthane epoxides were found.[8]

TABLE-1
CHEMICAL CONSTITUENTS OF *PLECTRANTHUS JAPONICUS* OIL

Compound	Area (%)
α-pinene	3.21
Limonene	4.64
Camphene	5.21
trans-piperitone oxide	1.82
cis-piperitone	21.50
Hydroxy piperitone isomers	1.52
Piperitenone oxide	42.34
α-copaene	0.82
β-cubebene	1.82
β-canyophyllene	3.63
α-humulene	1.39
β-bisabolene	0.86
α-cadinene	0.60
δ-cadinene	0.78
Unidentified	9.86

TABLE-2
INHIBITORY RESPONSE OF ESSENTIAL OIL ON 'TEST FUNGI'

Fungi	Diameter of zone of inhibition (mm)
Aspergillus niger	11.0
Alternaria alternata	17.0
Penicillium citrinum	24.0
Rhizopus nigricans	15.0
Trichodermis viride	20.0

The results of antifungal study are given in Table-2. It may be observed that the oil is more active against all the test fungi. The oil is highly active against *Penicillium citrinum* (24 mm) and *Trichodermis viride* (19 mm), moderately active against *Alternaria alternata* (12 mm), *Rhizopus nigricans* (15 mm) and *Aspergillus niger* (11 mm). However, the essential oil from dried leaves and flowering tops of *P. incanus* have been reported to possess antimicrobial and pharmacological activities.[9, 10]

REFERENCES

1. K. Okazaki and T. Kawaguchi, *J. Pharm. Soc. Japan*, **72**, 651 (1952).
2. Difco Manual, Difco Laboratories, Detroit-1, Michigan, U.S.A., 9th Edn., p. 43 (1953).
3. H. Martin and E.S. Solmon, *Nature*, **126**, 58 (1930).
4. H.B. Myers, *J. Am. Med. Assoc.*, **89**, 1834 (1927).
5. Plants Pathologist's Pocket Book, Compiled by C.M.I. Kew Survey, England, p. 229 (1968).
6. K. Okazaki and S. Oshima, *J. Pharm. Soc. Japan*, **72**, 564 (1952).
7. N.D. Murari and C.S. Mathela, *Indian Perfumer*, **22**, 291 (1978).
8. G.C. Shah, R. Bhandri and C.S. Mathela, *J. Essen. Oil Res.*, **4**, 57 (1992).
9. K.C. Verma and R.K. Sharma, *Indian J. Pharm.*, **25**, 189 (1963).
10. R.K. Sharma and S.M. Ali, *Indian J. Pharm.*, **28**, 31 (1966).

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