Research Article

Chemical Composition of the Essential Oil from Seeds of *Pinda concanensis:* *An* Endemic Plant from Western Ghats of India

S. V. Patil[1], R. P. Mane[1], S. D. Mane[1], P. V. Anbhule[1,2], V. B. Shimpale[1,3*]

[1]Department of Agrochemicals and Pest Management, Shivaji University, Kolhapur-416 004, (MS) India.

[2]Department of Chemistry, Shivaji University, Kolhapur-416 004, (MS) India.

[3]Department of Botany, The New College, Kolhapur-416 004, (MS) India.

***Corresponding author's E-mail:** shimpale@yahoo.com

Accepted on: 20-08-2016; **Finalized on:** 31-10-2016.

ABSTRACT

Essential oil of *Pinda concanensis* were extracted by hydrodistillation. Liquid chromatography mass spectroscopy (LCMS) analysis of the essential oil of seeds identified 30 compounds such as wightin, violanthin, tomentosanol D, Fraxin, Daphnin, Coumarin which are responsible to antioxidant activity. And the compounds like Voriconazole, Tridemorph, Thicyofen, Pyrifenox, Propineb exhibits the antifungal ability. Hence the essential oil from the seeds *P. concanensis* is probable source of antioxidant and antifungal properties.

Keywords: *Pinda concanensis*, essential oil, coumarin.

INTRODUCTION

The Apiaceae (Umbelliferae) is one of the best known plant families with peculiar botanical characters such as the typical umbellate inflorescences and the specialized dry fruits splitting into two one-seeded mericarps. They are widely distributed in temperate climate regions where they often are used as spices or drugs due to the presence of useful secondary metabolites such as coumarins, essential oils and sesquiterpenes.[1] The family Apiaceae (Umbelliferare) is represented by about 3540 species in the world[2] while in India it comprises about 240 species.[3]

As the genus Pinda is monotypic belongs to family apiaceae, it is represented by only species i.e. *Pinda concanensis*. It is endemic to Northern Western Ghats of India. The tuberous roots are eaten as row by local folklore. Pinda is an annual herb with tuberous roots, grows upto 1-2 feet in high, commonly known as Kokan pinda. This narrow endemic and locally used plant species is evaluated for the first analysis of the essential oil. This work boosts the biodiversity of aromatic plants for their medicinal as well as dietary properties.

MATERIALS AND METHODS

Collection of Plant Material and isolation of essential oil

The plant materials of *Pinda concanensis* were collected from Gaganbawda village in Kolhapur District. The species was authentically identified with the relevant literature and the voucher specimens were deposited in the Herbarium, Department of Botany, The New College, Kolhapur (Vouch. No. VBS-3901). The seeds were subjected to hydrodistillation for 6 hours by using Clevenger apparatus. The coupling of liquid chromatography with mass spectrometry (LC/MS) has been established as one of the most powerful tools in analytical chemistry over the last decade and has turned out to be a versatile tool for the analysis of environmental and biological samples.[4-8]

Liquid Chromatography Mass Spectroscopy analysis

The analysis of the oil was carried out on high performance liquid chromatography (HPLC) (Agilent) mass spectrometer equipped with electrospray ionization (ESI) probe. Sample of 3µL was injected via autosampler. Various components eluted at retention time (RT) mentioned in the table. Gradient conditions were carried out for analysis using a C18 column with mobile phase flow rate of 0.4 mL/ min. The mobile phase was composed of methanol and water; gradient program was used for analysis. The column temperature was maintained at 40ºC. The LC-MS analysis was performed in positive polarity by multiple reaction monitoring (MRM). Experimental results were calculated using the Mass hunter qualitative software. The identification of the components was performed on the basis of retention indices and those compared with mass spectra from Wiley library.

RESULTS AND DISCUSSION

Results acquired for components of essential oil by LCMS analysis are given in Table.1 Thirty compounds were identified from the essential oil extracted from seeds of *Pinda concanensis*. The major compositions of oil were wightin, violanthin, tomentosanol D, Fraxin, Daphnin, Coumarin. These compounds show the antioxidant ability. And the compounds like Voriconazole, Tridemorph, Thicyofen, Pyrifenox, Propineb having the antifungal property. coumarin compound was identified from the essential oil of the P. concanensis. Compound chromatogram and structure of coumarin is shown in figure 1. Coumarins are a large group of secondary metabolites distributed in the Apiaceae, Rutaceae, Asteraceae, and Fabaceae. They are involved in defense

against pathogens and the response to some types of stress, among other things.[9]

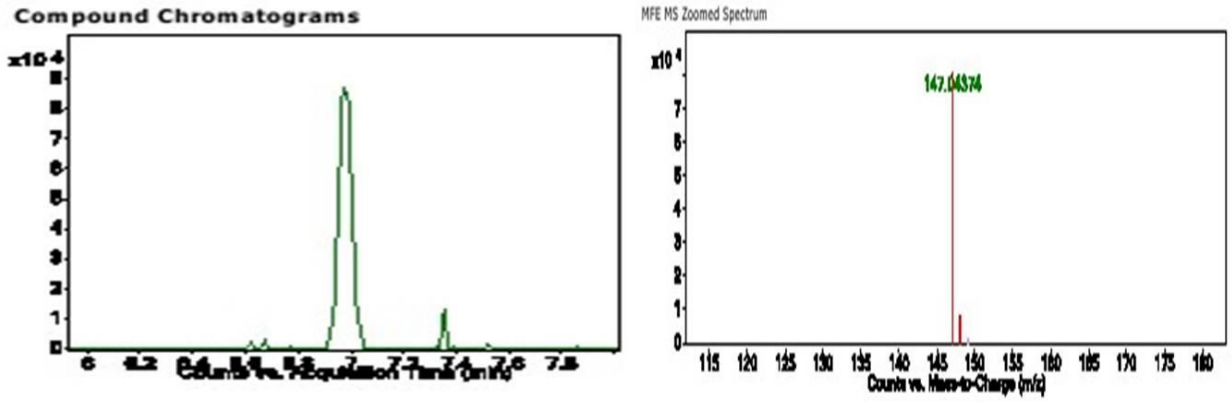
From the present investigation, the essential oil from seeds of P. concanens is used as antioxidant and antimicrobial agents. Future work is to determine the potential of bioactive compounds.

Table 1: Analyzed LC-MS Parameters of the Essential Oil.

Sr.No.	Compound Name	Polarity	Retention Time (RT)	Molecular Formula	Mass (m/z)
1	Wightin	Positive	6.722	$C_{18}H16O_7$	345.0981
2	Voriconazole	Positive	5.151	$C_{16}H_{14}F_3N_5O$	350.1235
3	Violanthin	Positive	8.089	$C_{27}H_{30}O_{14}$	579.1679
4	Tridemorph	Positive	18.041	$C_{19}H_{39}NO$	298.3099
5	Tomentosanol D	Positive	9.426	$C_{20}H_{20}O_6$	357.133
6	Ticarcillin penicilloate	Positive	5.913	$C_{15}H_{18}N_2O_7S_2$	403.0632
7	Thicyofen	Positive	19.87	$C_8H_5ClN_2OS_2$	244.9604
8	Tetracenomycin B3	Positive	8.194	$C_{21}H_{14}O_8$	395.0751
9	Tazobactam	Positive	2.37	$C_{10}H_{12}N_4O_5S$	323.0426
10	Taurolithocholic acid 3-sulfate	Positive	7.52	$C_{26}H_{45}NO_8S_2$	586.2491
11	Spectinomycin	Positive	19.451	$C_{14}H_{24}N_2O_7$	333.1673
12	Scytonemin	Positive	17.972	$C_{36}H_{20}N_2O_4$	545.1491
13	Pyrifenox	Positive	13.372	$C_{14}H_{12}C_{l2}N_2O$	295.0396
14	Propineb	Positive	1.146	$C_5H_{10}N_2S_4$	226.9792
15	Proacacipetalin	Positive	1.113	$C_{11}H_{17}NO_6$	260.1131
16	Nitrofurazone	Positive	1.764	$C_6H_6N_4O_4$	199.0457
17	Kaempferol 3-(2''-hydroxypropionylglucoside)-4'-glucoside	Positive	9.173	$C_{30}H_{34}O_{18}$	705.1626
18	Fraxin	Positive	8.242	$C_{16}H_{18}O_{10}$	393.0781
19	Flutrimazole	Positive	3.413	$C_{22}H_{16}F_2N_2$	369.1157
20	Encelin	Positive	17.005	$C_{15}H_{16}O_3$	245.1175
21	Dihydrodeoxystreptomycin	Positive	8.622	$C_{21}H_{41}N_7O_{11}$	568.2954
22	Daphnin	Positive	5.014	$C_{15}H_{16}O_9$	341.0862
23	Coumarin	Positive	6.975	$C_9H_6O_2$	147.0437
24	Clotrimazole	Positive	6.558	$C_{22}H_{17}ClN_2$	367.0985
25	Clofoctol	Positive	7.475	$C_{21}H_{26}Cl_2O$	387.1255
26	Ciprofloxacin	Positive	1.15	$C_{17}H_{18}FN_3O_3$	332.1392
27	Chlortetracycline	Positive	19.466	$C_{22}H_{23}ClN_2O_8$	501.1056
28	Chloramphenicol succinate	Positive	1.07	$C_{15}H_{16}Cl_2N_2O_8$	423.0372
29	cefpiramide	Positive	1.082	$C_{25}H_{24}N_8O_7S_2$	635.109
30	Butin	Positive	8.242	$C_{15}H_{12}O_5$	273.077

Compound label	Name	m/z	RT	Algorithm	Mass
Cpd 1143: 147,04374	Coumarin	147.04374	6.975	Find by molecular feature	146.0365

Figure 1: Compound chromatogram and structure of coumarin



REFERENCES

1. Heywood VH, Biology and Chemistry of the Umbelliferae, 1971, Academic Press, London.
2. Mabberley DJ, The Plant—Book: A Portable Dictionary of the Vascular Plants, 2nd edn. Cambridge University Press, Cambridge, UK, 2005, 124 & 137pp.
3. Mukherjee PK, Constance L, Umbelliferae (Apiaceae) of India. Amer. Inst. of Ind. Studies 1993 pp. 279.
4. Gelpí E, Biomedical and biochemical applications of liquid chromatography-mass spectrometry. J. Chromatogr. A, 703, 1995, 59-80.
5. Niessen WMA, Progrss in liquid chromatography-mass sprctrometry instrumentation and its impact on high-throughput screening. J. Chromatogr.A, 1000, 2003, 413-436.
6. Reemtsma T, Liquid chromatography-mass sprctrometry and strategies for trace-level analysis of polar organic pollutants. J. Chromatogr. A, 1000, 2003, 477-501.
7. Kohler M, Heeb NV, Determination of nitrated phenolic compounds in rain by liquid chromatography/atmospheric pressure chemical ionization mass spectrometry. Anal. Chem., 75, 2003, 3115-3121.
8. Bonnington L, Eljarrat E, Guillamón M, Eichhorn P, Taberner A, Barceló, D. Development of liquid-chromatography-electrospray-tandem mass spectrometry method for the quantitative determination of benzoxazinone derivatives in plants. Anal. Chem. 75(13), 2003, 3128-36.
9. Razavi SM, Plant coumarins as allelopathic agents. Int J Biol Chem. 5, 2011, 86-90.

Source of Support: Nil, **Conflict of Interest:** None.