International Journal of Chemical Studies

P-ISSN 2349–8528
E-ISSN 2321–4902
IJCS 2015; 3(2): 120-121

Received: 15-06-2015
Accepted: 20-07-20015

PS Rajpoot
Associate Professor, Laboratory of Natural Product, Department of Chemistry, Govt. P.G. College, Chharra, Aligarh, Uttar Pradesh, India.

Correspondence:
PS Rajpoot
Associate Professor, Laboratory of Natural Product, Department of Chemistry, Govt. P.G. College, Chharra, Aligarh, Uttar Pradesh, India.

Chemical investigation of essential oil of *Polygonatum verticillatum* (Liliaceae)

PS Rajpoot

Abstract
Polygonatum verticillatum (Liliaceae) is an erect glabrous natural herb growing at an altitude of 9000-12500 ft. of Kumaon Himalayan Mountains in Uttaranchal, India. The root stock of the plant is sweet, cooling, emollient, diuretic, aphrodisiac, galactagogue, appetizing. The plant belongs to Astorg group medicinal Plants rhizomes used is as an ingredient of Chyawanprash and an important Ayurvedic tonic. It is useful in vitiated conditions of Pitta and Vata, Burning sensation, fever, strangury seminal weakness, female weakness and in problems of reproductive systems.

Keywords: *Polygonatum verticillatum*, Liliaceae, *Polygonatum*, rhizome, essential oil composition, natural fatty, acids & esters

Introduction
Polygonatum verticillatum (Liliaceae) is an erect glabrous natural herb growing at an altitude of 9000-12500 ft. of Kumaon Himalayan Mountains in Uttaranchal, India. The root stock of the plant is sweet, cooling, emollient, diuretic, aphrodisiac, galactagogue, appetizing. The plant belongs to Astorg group medicinal Plants rhizomes used is as an ingredient of Chyawanprash and an important Ayurvedic tonic. It is useful in vitiated conditions of Pitta and Vata, Burning sensation, fever, strangury seminal weakness, female weakness and in problems of reproductive systems. Literature search revealed that glucose, galactose, four saponosides Lectins, Lysine, Serine, aspartic acid reported from this plant and suggested this plant as a new source for diosgenin production. As part of a search for useful high altitude Himalayan herb this plant was collected and chemical investigated. There is no literature report on essential oil of *P. verticillatum* so for this is the first work essential oil of *P. Verticillatum* and first time and first time the plant has been found to be rich in natural long chain fatty acids and esters.

Results and Discussion
The compounds of essential oil of *P. verticillatum* were identified on the basis of their GC/GC-MS analysis and by comparison of their mass spectra with their authentic compounds existing in literature. The volatile constituents identified in the essential oil of *P. verticillatum* along with their retention times, percentage areas mass spectra are given in Table-1. The compounds are listed according to their retention time from DB-5 Column. The oil was rich with long chain fatty acids and esters. Lauric acid, Myristic acid palmitic acid, B-Methyl, Methyl ester and Hexadecanoic acid present in the oil.
Lauric acid or dodecanoic acid – CH_3-$(CH_2)_{10}$-COOH,
Myristic acid or Tetradecanoic acid – CH_3-$(CH_2)_{12}$-COOH,
Pentadecanoic acid CH_3-$(CH_2)_{13}$-COOH,
Pentadecanoic acid 13-methyl-methylester CH_3-$(CH_2)_{15}$-COOH,
Palmitic acid or n-hexadecanoic acid CH_3-$(CH_2)_{14}$-COOH

Experimental
Plant Material: The whole plant *P. verticillatum* (Liliaceae) was collected the month of October 1998-2003 from Munsyari region of Kumaon Himalaya, Uttaranchal, India at an altitude of 11000-125000 ft. the plant was identified in the Department of Botany, Kumaon University, Nainital as well as at Forest Research Institute, Dehradun.

Extraction of Oil: Rhizome of *P. Verticillatum* (500gm.) was used for essential oil extraction by clevenger's apparatus the condensate was treated with n-Lexane. The n-Hexane. The hexane layer separated. The organic phase was dried over Na_2SO_4 and the solvent was evaporated, under reduced pressure in a thin film rotary evaporator at 30 ^{0}C yield of the oil was 3 ml.

GC Analysis: The oil was analysed by GC using flame ionization detector (FID). The temp. program 60-240 ^{0}C at 3 ^{0}C/min. insector temp. 240 ^{0}C, detector temp. 280 ^{0}C, total run time 35 min.

GC-MS Analysis: GC-MS was done using fused silica gel capillary column (30x0.25mm) liquid phase DB-5 with helium as a carrier gas in a Hewlett-Packed 5840. GC interfaced with Hewlett-Packard 5985 mass spectrometer. The Column Temperature was programmed at 3/min. from 60^0-240 ^{0}C, the analysis by electron impact, 70 ev.

Table 1: GC-MS of the Oil of Rhizome of *P. Verticillatum*

Sr. No.	Ref. Time	Area%	[M$^+$] Mad spectra	Compounds
1.	19.44	13.0%	200	Lauric Acid
2.	24.96	40.0%	228	Myristic Acid
3.	27.36	25.0%	242	Pentadecylic Acid
4.	28.82	12.0%	270	13-Methyl-Methyester
5.	30.14	88.0%	256	Palmitic Acid

Table-1 reports the result of the essential oil of *P. Verticillatum* shade dried rhizome.

Acknowledgement: We thank to RSIC and CDRI Lucknow for GC-MS studies and Prof. K.S. Khetwal, Dept. of Chemistry, Nainital University.

References

1. Chopra RN, Nayar SL, Chopra IC. Glossary of Indian Medicinal Plant CSIR, New Delhi, 1956.
2. Janeczko Z, Sibiga A, Herba Pol. 1982;28(3-4):11-22.
3. Khetwal KS, Verma DL, Pathak RP *et al*. Indian drugs. 1985;2(3):126-128.
4. Koves, Margit, Penksza, Karoly, Turesangi, Gabor *et al*.; Verh Gas Oekol. 1996;25:147-152.
5. Rastogi RP, Mehrotra BN. Compendium of Indian Medicinal Plants.1980-1984;3:1980-1984.
6. Shankar V Prakas S, Unijal MR. Nature, Appl., Sci. Bull. 1970;22(3-4):139.
7. Albert Y Leung. (John Willy and Sons, New York) Encyclopedia of common natural ingredients used in food and cosmetics, 1980.
8. Antonjuek VO. *et al*. 1993.
9. Chopra RN, Nayr SL, Chopra IC. Indigenous drugs of India, 1958.
10. Davidson SR, Passmore JF, Brock, Truswell AS. (eds) Human Nutrition and dieties 6th edi. Churchill Livingstone Edinbarg, 1972, 1975.