

PHYTOCHEMICAL ANALYSIS OF *TEPHROSIA PENTAPHYLLA* (ROXB.) G. Don.

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ABSTRACT

The genus *Tephrosia*, belonging to family Leguminosae is widely distributed throughout the world and is used as a folk medicine for the treatment of large number of diseases. Present investigation was undertaken in order to analyse bioactive constituents present in *Tephrosia pentaphylla* by using High Resolution- Liquid Chromatography-Mass Spectrometry (HR-LCMS). The study revealed the presence of secondary metabolites like alkaloid (Ruspolinone), Flavonoids (5,7,4'-Trimethoxyflavan), Coumarin (Dihydrosamidin), tetranortriter penoid (Swietenine) and Phenolic compounds.

Key words; *Tephrosia*, Coumarin, Chromatography, Metabolites, Flavonoids, HRLCMS.

Introduction;

The genus *Tephrosia* is represented by 27 species and one variety in India (Sanjappa 1992), of which 13 species are found in Maharashtra state. (Singh et. al., 2000), while 8 species in Marathwada region of the Maharashtra state (Naik, 1998). The species belonging to the genus *Tephrosia* are well known for their diverse pharmacological properties, as those are rich in medicinally important phyto-constituents. Present investigation was undertaken to identify various phytochemical compounds present in *Tephrosia pentaphylla* (Roxb.) G. (Don.)

Material and method;

The root, stem and leaves of *Tephrosia pentaphylla* were collected from Paithan Tehsil, District Aurangabad. on 10-10-2021, and it was identified following Naik (1998) and Singh et al (2000). The Voucher specimens were deposited in BAMU Herbarium, Department of Botany Dr. Babasaheb Ambedkar Marathwada University, Aurangabad. (MS).

The root, stem and leaves were dried in shade and finely powdered. It was then

extracted with ethanol using a Soxhlet extractor, The extracts were concentrated to remove the solvents completely by using Rotary evaporator. The plant extracts were sent for qualitative analysis of their chemical constituent at SAIF, IIT, Mumbai by HRLC-MS technique. The instrument used was Agilent technologies G6550A-ifunnel, Q-TOF, LC/MS. Column type is ZORBAX RRHDSBC18, with 100mm length, 2.1mm diameter and 1.8 pore size. It was carried out with mass spectrometry mainly for the classes of compound which are non-volatile, like higher terpenoids, phenolic compounds, alkaloids, flavonoids, lipids, sugars, amino acid etc.

Result and discussion

The HRLC-MS analysis of *Tephrosia pentaphylla* root showed presences of 25 compounds as shown in Table1. The compound, 7 Desmethyl-papaverine-eglucuronide was identified as the metabolite of papaverine. It has been reported by Davila et, al, (1991).that, papaverine and its metabolites may have toxic effect on liver. Another compound, 6,7-dihydroxy bergamottin, belongs to the group furanocoumarin and it is reversible

mechanism-based inhibitor of CYP3A enzyme, which is effective for the prevention of bone loss, especially in osteoporotic diseases (Kaboudin et.al., 2022).Cetiedil has been reported to be a pain killer in case of the patients suffering from Sickle cell anaemia, as it possesses anti-sickling properties (Berkowitz et, al. 1981).

The stem portion of *Tephrosia pentaphylla* showed presence of 19 compounds (Table 2). Adefovir Dipivoxil, is a nucleotide analogue, that possess antiviral

activity against human Immno-deficiency Another compound, 4,4'- Dihydroxychalcone shows cytotoxic and inhibitory effect on proliferation of human leukemic HL-60 cells (Saydam et, al. 2003

The leaves showed presence of 22 compounds (Table 3). Out of these, Molephantinin, has been shown to possess anti-neoplastic activity in rodents. The effect of molephantinin on carcinoma cells was found to be responsible for inhibition of DNA and protein synthesis, (Iris et al, 1982.

Table 1 : Biochemical compounds present in the root of *Tephrosia pentaphylla*

Sr.no.	Compound name	Group	Formula	Mass	R.T.	D.B. Diff.(PPM)
1.	7-Desmethylpapaverine glucuronide	Alkaloid	C ₂₅ H ₂₇ NO ₁₀	501.1602	6.696	6.56
2	6,7-dihydroxy Bergamottin	furanocoumarin	C ₂₁ H ₂₄ O ₆	372.1568	12.145	1.29
3	Estradiol mustard	Steroid ester	C ₄₂ H ₅₀ C ₁₄ N ₂ O ₄	786.2539	12.525	-1.76
4.	Gravacridonetriolglucoside	glycosylglycerol	C ₂₅ H ₂₉ NO ₁₁	519.1696	5.302	8.64
5	5-Methyl-2(3H)-furanone	butenolides	C ₅ H ₆ O ₂	98.0376	5.324	-8.3
6	(R)-1-O-b-D-glucopyranosyl1,3-octanediol	carbohydrate	C ₁₄ H ₂₈ O ₇	308.1823	5.644	4
7.	Cetiedil	azepanes	C ₂₀ H ₃₁ NO ₂ S	349.2103	6.083	-7.99
8	Grandiflorone	Quinone benzoquinone	C ₁₉ H ₂₂ O ₄	314.1519	12.924	-0.42
9	Geranylgeranyl cysteine	polyprenyl	C ₂₃ H ₃₇ NO ₃ S	407.2495	6.425	-0.14
10	Norophthalmic acid	oligopeptide	C ₁₀ H ₁₇ N ₃ O ₆	275.1119	4.155	-0.7
11	Allamandin	Terpene lactone	C ₁₅ H ₁₆ O ₇	308.0889	6.969	2.25
12	5,7,4'-Trimethoxyflavan	Flavonoids	C ₁₈ H ₂₀ O ₄	300.1355	14.901	2.09
13	Licoagrodin	Flavanones	C ₄₅ H ₄₄ O ₉	728.304	8.188	-7.51
14	Epigallocatechin	Flavan catechin	C ₁₅ H ₁₄ O ₇	306.0734	8.354	1.91
15	Italidipyron	Alkyl-phenylketones	C ₂₉ H ₃₄ O ₁₀	542.2137	8.434	2.84
16	trans-O-Methylgrandmarin		C ₁₆ H ₁₈ O	306.1099	8.537	1.28
17	Asteltoxin	Furofuran	C ₂₃ H ₃₀ O ₇	418.198	8.769	2.85
18	4-Hydroxy Nisoldipine	dihydropyridine	C ₂₀ H ₂₄ N ₂ O ₇	404.1589	12.279	-1.46
19	Lactucin	Sesquiterpene	C ₁₅ H ₁₆ O ₅	276.0998	9.409	-0.03
20	b-D-Glucopyranosiduronic acid, 3-(6-hydroxy-2-naphthalenyl)-1-methylpropyl	phenol	C ₂₀ H ₂₄ O ₈	392.1462	9.801	2.23
21	Afzelechin	Flavonoid	C ₁₅ H ₁₄ O ₅	274.084	9.836	0.3
22	Nobilin	germacranolide	C ₂₀ H ₂₆ O ₅	346.1772	10.088	2.46
23	PKC 412	midostaurin	C ₃₅ H ₃₀ N ₄ O ₄	570.223	15.494	6.5
24	Semilepidinoside B	Glycoside	C ₁₇ H ₂₂ N ₂ O ₇	366.143	11.347	-0.7
25	alpha-Peroxyachifolide	Sesquiterpene lactone	C ₂₀ H ₂₄ O ₇	11.777	11.777	0.73

Table 2 : Biochemical compounds present in the stem of *Tephrosia pentaphylla*

Sr. no.	Compound name	Group	Formula	Mass	R.T.	D.B. Diff.,PPM
1	2',4'-Dihydroxy-4,6'-dimethoxydihydrochalcone	Chalcone	C ₁₇ H ₁₈ O ₅	302.1148	6.393	2.17
2	Hellebrin	Glucorhamn oside	C ₃₆ H ₅₂ O ₁₅	724.3228	7.588	10.83
3	O-Demethylpuromycin	puromycin	C ₂₁ H ₂₇ N ₇ O ₅	457.2097	8.438	-5.1
4	AdefovirDipivoxil	Adefovir	C ₂₀ H ₃₂ N ₅ O ₈ P	501.1985	8.487	8.487
5	trans-O-Methylgrandmarin	pyranocoum arins	C ₁₆ H ₁₈ O ₆	306.1098	9.017	1.81
6	Apigeniflavan 5-O-xyloside	hydroxyflavon oid	C ₂₀ H ₂₂ O ₈	390.1303	10.072	3.06
7	Swietenine	tetranortriter penoid	C ₁₈ H ₂₀ N ₂ O ₉	408.1173	10.173	-0.98
8	2-(4-Ethoxyphenyl)-5,6,7,8-tetramethoxy-4H-1-benzopyran-4-one	benzopyran	C ₂₁ H ₂₂ O ₇	386.1356	10.565	2.42
9	Chidamide	benzamide	C ₂₂ H ₁₉ F N ₄ O ₂	390.1484	11.382	2.17
10	Xanthohumol D	Chalcones	C ₂₁ H ₂₂ O ₆	370.1407	11.387	2.41
11	Orientanol A	pterocarpan	C ₂₁ H ₂₄ O ₈	404.1459	11.623	3.07
12	4,4'-Dihydroxychalcone	Chalcone	C ₁₅ H ₁₂ O ₃	240.0783	11.654	1.46
13	Quercetol B	Flavons	C ₂₃ H ₂₈ O ₄	368.1976	19.257	3.05
14	Octadecylfumarate	Fatty acid ester	C ₂₂ H ₄₀ O ₄	368.292	19.509	1.8
15	Swietenine	tetranotriterp enoid	C ₃₂ H ₄₀ O ₉	568.2658	17.531	2.43
16	Avocadene 4-acetate	Fatty alcohol	C ₁₉ H ₃₆ O ₄	328.2605	13.026	2.76
17	4'-Hydroxy-5,7-dimethoxy-8-methylflavan	Flavonoids	C ₁₈ H ₂₀ O ₄	300.1359	12.648	0.74
18	p-Anisic acid	Methoxyben zoic acid	C ₈ H ₈ O ₃	152.0478	12.644	-2.94
19	E)-4'-Methylresveratr ol 3- glucoside	Stilbenoid	C ₂₁ H ₂₄ O ₈	404.1465	11.969	1.51

Table 3: Biochemical compounds present in the leaves of *Tephrosia pentaphylla*

Sr.no.	Compound name	Group	Formula	Mass	R.T.	D.B. Diff.(PPM)
1.	Aceclidine	germacranolide	C ₉ H ₁₅ N O ₂	169.1098	3.05	2.79
2	Ruspolinone	Alkaloids	C ₁₄ H ₁₉ NO ₃	249.1352	3.736	5.04
3	Ethyl 3 -(N-butylacetamido) propionate	Acetaamide	C ₁₁ H ₂₁ NO ₃	215.1517	4.086	1.86
5	Molephantin	germacranolide	C ₁₉ H ₂₂ O ₆	346.1408	12.012	2.28
6	Neouralenol	Flavones	C ₂₀ H ₁₈ O ₇	370.1046	12.257	1.83
7.	E)-4'-Methylresveratrol 3 - glucoside	Polyophenol	C ₂₁ H ₂₄ O ₈	404.147	11.941	0.17
8	7-Hydroxyflavanone beta - Dglucopyranoside	flavanone	C ₂₁ H ₂₂ O ₈	402.1303	11.495	2.99
9	Myricetin hexamethyl ether	flavonoid	C ₂₁ H ₂₂ O ₈	402.1316	11.142	-0.32
10	(2S)-5,6,7,3',4'- Pentamethoxyflavanone	flavanone	C ₂₀ H ₂₂ O ₇	374.1357	10.909	2.22
11	trans-BTP Dioxolane	Tetrahydrofuran	C ₂₁ H ₂₆ O ₈	406.1614	10.612	3.33
12	7-Hydroxy-5,4',dimethoxy-8- methylisoflavone7-O-rhamnoside	isoflavone	C ₂₄ H ₂₆ O ₉	458.154	10.385	7.97
13	pha-D-Galactosyl-1,3-beta-D-galactosyl-1,4-N-acetyl-D-glucosamine	Carbohydrate	C ₂₀ H ₃₅ NO ₁₆	545.1999	8.913	-7.95
14	cis-Etoposide	podophyllotoxin	C ₂₉ H ₃₂ O ₁₃	588.1799	8.286	7.38
15	Nalidixic acid glucuronide	Quinolone	C ₁₈ H ₂₀ N ₂ O ₉	408.1173	8.274	-1.14
16	N-isobutyl-2,4,8,10,12-tetradecapentaenamide	Amide	C ₁₈ H ₂₇ N O	273.2085	7.744	2.78
17	Eriodictyol 5,3' -di-O-glucoside	flavanone	C ₂₇ H ₃₂ O ₁₆	612.1658	7.14	5.24
18	Quercetin	flavonoid	C ₁₅ H ₁₀ O ₇	302.0395	6.303	10.00
19	(S)-Nerolidol 3 -O-[a-L-Rhamnopyranosyl-(1->4)-a-L-rhamnopyranosyl-(1->2)-b-Dglucopyranoside]	Carbohydrate	C ₃₃ H ₅₆ O ₁₄	676.3624	12.462	6.86
20	Dihydrosamidin	Coumarins	C ₂₁ H ₂₄ O ₇	388.1514	13.419	2.15
21	8-Hydroxygalangin 3-methyl ether 8 methylbutyrate	Gossypetin	C ₂₁ H ₂₀ O ₇	384.1204	12.97	1.21
22	7-Hydroxyflavanone beta - D-glucopyranoside	flavanone	C ₂₁ H ₂₂ O ₈	402.1305	12.991	2.44

Thus the ethanolic extract of *Tephrosia pentaphylla* root, stem and leaves revealed the presence of therapeutically important bioactive compounds like flavonoids, flavones, flavanone, glycosides, alkaloids, coumarins, furanocoumarin terpenoids, Sesquiterpene tetranotriterpenoid, Chalcones, Adefovir, Glucorhamnoside, puromycin, midostaurin, catechin, Steroid, azepanes, oligopeptide buteneolide, with anolide, germacranolide, Quinolone, podophyllotoxin.. These

compounds are species specific and can be used to standardize the species.

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