

STUDIES ON PHYTOCHEMICAL PROFILE OF *CHAMAECRISTA PUMILA* (LAM.) SINGH AND *CHAMAECRISTA MIMOSOIDES* (L.) GREENE WITH THE HELP OF HRLC-MS TECHNIQUES

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ABSTRACT

Chamaecrista pumila (Lam.) Singh and *Chamaecrista mimosoides* (L.) Greene. are closely related species of the genus *Chamaecrista*, subfamily Caesalpinioideae, Family Leguminaceae. Wide range of chemical compounds were isolated from various parts of these two species, using high resonance liquid chromatography technique (HRLC-MS). The information can be employed to delimit species, and standardize drug.

Keywords: Phytochemicals, *Chamaecrista*, metabolites, HRLC-MS.

Introduction:

Secondary metabolites are biologically active, naturally occurring chemical compounds which protect plants from diseases and damages. They also contribute to the plant's colour, aroma and flavour. Secondary metabolites accumulate in different plant parts. During present investigation separation and purification of plant constituents was carried out by employing high resonance liquid chromatography (HRLC) as described by Raman (2006).

Materials and Methods:

The different parts of the plants were collected. The plants were identified following different district and state floras like flora of Akola district (Kamble and Pradhan, 1986) ; Flora of Buldhana district (Diwakar and Sharma, 2000; Flora of Nasik (Lakshminarashiman, and Sharma, 1991); Flora of Nagpur (Ugemuge, 1986); Flora of Marathwada (Naik, 1998), Flora of Maharashtra (Singh and Karthikeyan, 2000), Flora of Bombay presidency (Cooke; 1902) and Essiett, and Basse, (2013); Hada, and Sharma, K. (2015); Sermakkani, and Thangapandian, (2012). The identified plants deposited in BAMU Herbarium, Department of

Botany, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad, (MS) India.

The stem, leaves, barks and seeds of *Chamaecrista pumila* and *Chamaecrista mimosoides* were dried under shade and powdered with the help of grinder. Ethanol extracts of the dried and powdered plant parts (5 g) were prepared by using 300 ml 95 % ethyl alcohol in Soxhlet's extraction unit for 76 hours. Phytochemical analysis of the extracts was undertaken with the help of high resonance liquid chromatography technique (HRLC) and the results obtained have been presented in Tables 1-6 and Figures A. F.

Results and Discussion:

Chamaecrista pumila (Lam.) Singh. in J. Econ. Taxon. Bot. 16(3): 600. 1992. *Cassia pumila* Lam. Encycle. Meth. Bot. 1 (2): 651. 1785; *Chamaecrista pumila* (Lam.) K. Larsen in Nordic J. Bot. 13: 404. 1993

Annual, prostrate or diffuse, spreading, branched, 10-40 cm long herb, leaflets 12-20 pairs.

Flowering and Fruiting: August-December.

Distribution: Common throughout Maharashtra.

Ecology: Common in grassy habitats of waste lands and forests.

Exsiccata: S. V. Dongre & A. S. Dhabe, 005218, September 2016. Grassland, Jalna.

Table 1: Phytochemical analysis of leaves of *Chamaecrista pumila*

Sr no	Compound name	Group	Formula	Mass	Rt	DB Diff (ppm)
1	Mundoserone	Opiate	C ₁₉ H ₁₈ O ₆	342.1069	0.943	10.19
2	10-Deoxymethymycin		C ₂₅ H ₄₃ N O ₆	453.3054	5.945	8.05
3	1alpha,25-dihydroxy-26,27-dimethyl-20,21,22,22,23,23-hexadehydro-24ahomovitamin D3 / 1alpha,25-dihy	Vitamin D3	C ₃₀ H ₄₄ O ₃	452.3251	6.477	8.72
4	Guanidinosuccinic Acid	Aspartic acid	C ₅ H ₉ N ₃ O ₄	175.0589	8.819	2.5
5	Pivampicillin	Ampicillin	C ₂₂ H ₂₉ N ₃ O ₆ S	463.1752	10.666	5.51
6	Trifluridine	Fluorinated pyrimidine	C ₁₀ H ₁₁ F ₃ N ₂ O ₅	296.0613	13.078	2.33
7	Cepharanthine	Alkaloid	C ₃₇ H ₃₈ N ₂ O ₆	606.2695	18.649	5.71

Table 2: Phytochemical analysis of stem of *Chamaecrista pumila*

Sr no	Compound name	Group	Formula	Mass	Rt	DB Diff (ppm)
1	Penicillamine Disulfide	Chelating agent	C ₁₀ H ₂₀ N ₂ O ₄ S ₂	296.0838	1.278	8.83
2	10-Deoxymethymycin		C ₂₅ H ₄₃ N O ₆	453.306	5.214	6.76
3	Tolazamide	Sulfonylurea	C ₁₄ H ₂₁ N ₃ O ₃ S	311.1301	5.458	0.85
4	Carvedilol glucuronide		C ₃₀ H ₃₄ N ₂ O ₁₀	582.2176	5.516	6.39
5	26,26,26,27,27,27-hexafluoro-1alpha,25dihydroxy16,17,23,23,24,24-Hexadehydro vitamin D3	Vitamin	C ₂₇ H ₃₂ F ₆ O ₃	518.2222	7.836	6.53
6	Acetohexamide	Sulfonylurea	C ₁₅ H ₂₀ N ₂ O ₄ S	324.1117	8.781	8.35
7	Cepharanthine	Alkaloid	C ₃₇ H ₃₈ N ₂ O ₆	606.2705	18.54	4.06

Table 3: Phytochemical analysis of seeds of *Chamaecrista pumila*

Sr no	Compound name	Group	Formula	Mass	Rt	DB Diff (ppm)
1	Mundoserone	Opiate	C ₁₉ H ₁₈ O ₆	342.1073	0.938	8.89
2	10-Deoxymethymycin		C ₂₅ H ₄₃ N O ₆	453.3064	5.943	5.91
3	5,6-Dihydrouridine	Glycosylamine	C ₉ H ₁₄ N ₂ O ₆	246.0839	7.65	5.37
4	N,O-Didesmethylverapamil	Antiarrhythmia	C ₂₅ H ₃₄ N ₂ O ₄	426.2494	9.402	5.69
5	2-Pyrrolidinone, 1-ethyl-4-[2-[(2-hydroxyethyl)amino]ethyl]-3,3-diphenyl-(7Cl,8Cl,9Cl)	Lactum	C ₂₂ H ₂₈ N ₂ O ₂	352.2148	9.621	0.8

Chamaecrista mimosoides (L.) Greene. in pittonia 4: 27. 1899. *Chamaecrista mimosoides* (L.) Standley in Smithson. Misc. coll. 68(5): 5. 1917.

Erect or diffuse, branched, 30-90 cm tall herb, leaflets 30-60 pairs.

Flowering and Fruiting: August-November.
Distribution: Common throughout Maharashtra.

Ecology: Usually found as undergrowth in forests.

Exsiccata: S. V. Dongre & A. S. Dhabe; 005219; September 2016. Grassland, Jalna.

Table 4: Phytochemical analysis of leaves of *Chamaecrista mimosoides*.

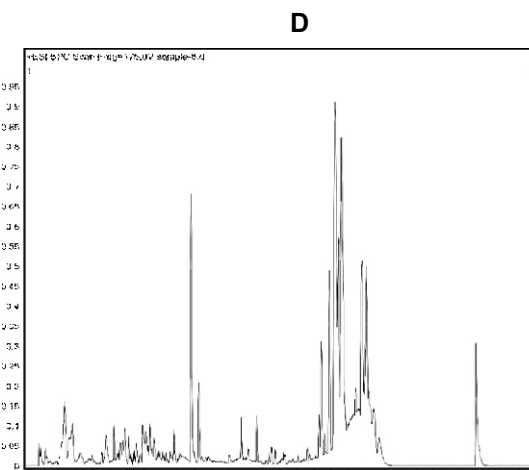
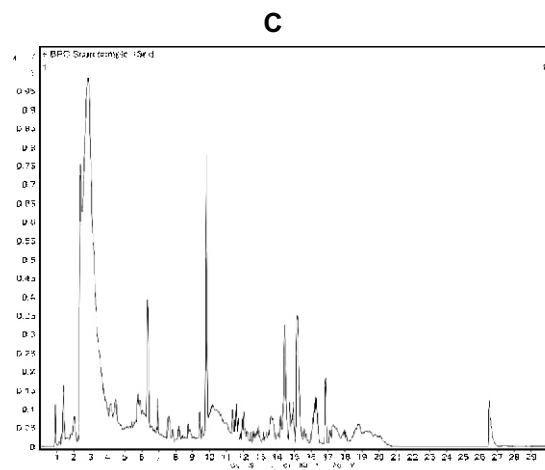
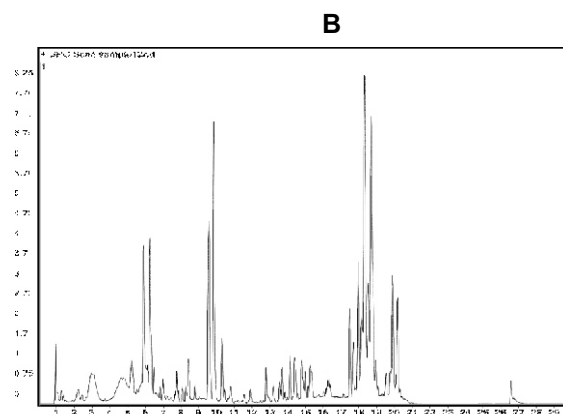
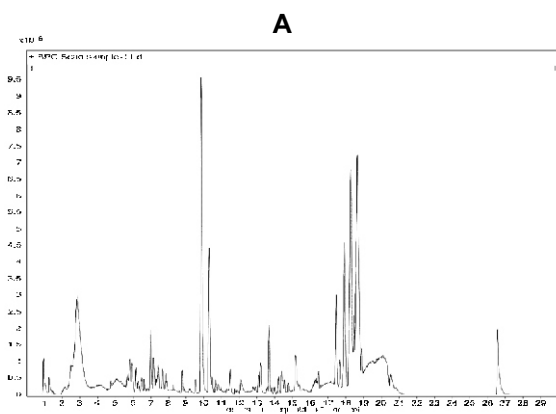
Sr no	Compound name	Group	Formula	Mass	Rt	DB Diff (ppm)
1	Iodovulone I	Diterpenes	C ₂₁ H ₂₉ I O ₄	472.108	0.932	6.45
2	S-Nitroso-Nacetyl penicillamine	S- Nitrosothiol	C ₇ H ₁₂ N ₂ O ₄ S	220.0508	0.942	4.3
3	Methyl Bisnorbiotinyl Ketone	Thienoimidazolidines	C ₉ H ₁₄ N ₂ O ₂ S	214.0765	2.165	5.25
4	Dehydro Rotenone	Isoflavone	C ₂₃ H ₂₀ O ₆	392.1222	3.325	9.69
5	Nifedipine	Calcium Channel Blocker	C ₁₇ H ₁₈ N ₂ O ₆	346.1161	3.435	1.11
6	Trandolapril glucuronide	Carboxylic acid and derivatives	C ₂₈ H ₃₈ N ₂ O ₁₁	578.2416	4.95	10.35
7	Glutathione, oxidized	Antioxidant	C ₂₅ H ₄₃ N O ₆	453.3059	5.951	6.92
8	Ethyl phenothiazine-2-Carbamate		C ₁₅ H ₁₄ N ₂ O ₂ S	286.0772	15.281	1.5
9	Cepharanthine		C ₃₇ H ₃₈ N ₂ O ₆	606.2694	18.656	5.98
10	Sulfoglycolithocholate		C ₂₆ H ₄₂ N O ₇ S	512.2681	18.901	0.12

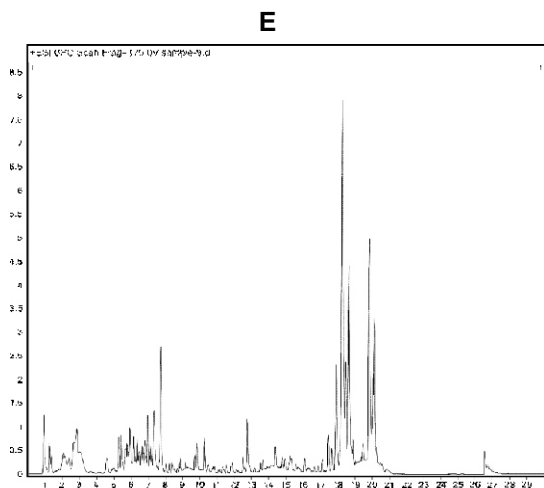
Table 5: Phytochemical analysis of stem of *Chamaecrista mimosoides*.

Sr no	Compound name	Group	Formula	Mass	Rt	DB Diff (ppm)
1	3,5-Pyridinedicarboxylic acid, 2-(hydroxymethyl)-6-methyl-4-(3-nitrophenyl)-, 5-(2-hydroxyethyl) ester		C ₁₇ H ₁₆ N ₂ O ₈	376.0904	0.961	
2	2,4,6-Heptatrienoic acid, 5-methyl-7-(2,6,6-trimethyl-3-oxo-1-cyclohexen-1-yl)		C ₁₇ H ₂₂ O ₃	274.1568	0.994	0.39
3	Probenecid	uricosurics	C ₁₃ H ₁₉ N O ₄ S	285.1005	2.076	10.32
4	2-Pyrrolidinone, 1-ethyl-4- [2-[(2-hydroxyethyl) amino]ethyl] - 3,3-diphenyl	Lactum	C ₂₂ H ₂₈ N ₂ O ₂	352.2126	9.719	7.17
5	Amikacin	Aminoglycosides	C ₂₂ H ₄₃ N ₅ O ₁₃	585.2844	9.837	2.36
6	Fentanyl	Opioids	C ₂₂ H ₂₈ N ₂ O	336.2183	12.518	5.54
7	Ansamitocin P3		C ₃₂ H ₄₃ Cl N ₂ O ₉	634.262	18.54	5.82
8	Cepharanthine	Alkaloid	C ₃₇ H ₃₈ N ₂ O ₆	606.2679	18.655	8.41

Table 6: Phytochemical analysis of seeds of *Chamaecrista mimosoides*.

Sr no	Compound name	Group	Formula	Mass	Rt	DB Diff (ppm)
1	Iodovulone I	Diterpenes	C ₂₁ H ₂₉ I O ₄	472.1069	0.926	8.77
2	Elephantopin		C ₁₉ H ₂₀ O ₇	360.1171	0.94	10.63
3	Glibornuride M2 (p carboxyglibornuride)	Monoterpenoids	C ₁₈ H ₂₄ N ₂ O ₆ S	396.132	5.262	8.88
4	5,6-Dihydrouridine	Glycosylamines	C ₉ H ₁₄ N ₂ O ₆	246.0833	7.653	7.63
5	N-Carbamylglutamate		C ₆ H ₁₀ N ₂ O ₅	190.0581	7.745	4.69
6	3-Quinolinecarboxylic acid, 7-amino-1-ethyl-6-fluoro-1,4-dihydro-4-oxo-		C ₁₂ H ₁₁ F N ₂ O ₃	232.068	8.036	77595.06
7	2-Pyrrolidinone,	Lactum	C ₂₂ H ₂₈ N ₂ O ₂	352.2146	12.198	1.43

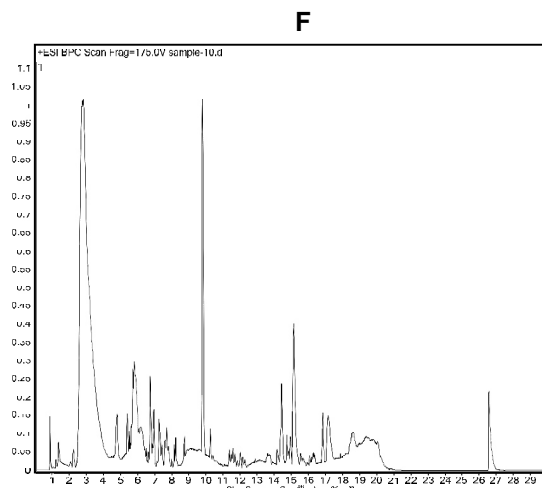




Chromatogram Details: *Chamaecrista pumila* A: Leaves; B: Stem; C: Seeds
Chamaecrista mimosoides D : Leaves. E: Stem; F: Seeds.

The separation of isolated compound from mixture was carried out by HPLC technique followed by the ionisation and separation of ions on the basis of their mass/charge ratio. The compounds were then identified by chromatograms, from each peak and detection of compound was based mass spectrum (MS).

Cepharanthine, Dihydrouridin and Pyrrolidinone were of common occurrence in both of the species. The isolated compounds like Mundoserone, 10-Deoxymethymycin, Guanidosuccinic Acid, Pivampicillin, Trifluridine, Cepharanthine, Penicillamine Disulphide, Tolazamide, Carvedilol glucuronide, acetohexamide, Dihydrouridine, N,O-Didesmethylverapamil and 2-Pyrrolidinone were found to be species specific and were observed in *Chamaecrista pumila* alone. On the other hand 3,5-Pyridine dicarboxylic acid, Probenecid, Amikacin, Fentanyl, Ansamitocin P3, iodovulone I, Elephantopin, Glibornuride N-Carbamylglutamate, 3-Quinoline carboxylic acid were found to be species specific and were observed in *Chamaecrista mimosoides*.



Conclusion:

Chamaecrista pumila and *Chamaecrista mimosoides* morphologically look similar but differ phytochemically. The phytochemicals can be employed to delimit the species and standardize the drug.

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