



PHYTOCHEMICAL STUDIES ON *RUELLIA TUBEROSA*: A REVIEW

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ABSTRACT

Ruellia tuberosa is a perennial herb belongs to family *acanthaceae*. Pharmacological study by different workers on this plant proved Its antioxidant, antimicrobial, anticancer, gastroprotective, antinociceptive, and anti-inflammatory activities. Alkaloids, benzoxazinoids, flavonoids, lignans, phenolic compounds, triterpenoids, sterols have been isolated from this plant. This paper presents a review on compounds isolated from *Ruellia tuberosa* along with its medicinal properties.

KEY WORDS

Ruellia tuberosa

INTRODUCTION:

Ruellia tuberosa belongs to family *Acanthaceae* (Acanthus family) which is a large family of about 250 genera mostly found in hot countries, tropical and subtropical regions of the world, and also found in Mediterranean regions, Australia and USA.¹⁻⁴ It is an perennial herb up to 60–70 cm tall and is a native of Central America, introduced into Indian garden as ornament. *R. tuberosa* is commonly known as “Cracker plant”⁵⁻⁷. In folk medicine, it has been used as diuretic, antipyretic, antidiabetic, antidote, thirst-quenching agent and analgesic and anti-hypertensive activity⁸⁻⁹. In Siddha system of medicine, leaves are given with liquid copal as remedy for gonorrhoea and ear diseases¹⁰. It is also used in stomach cancer¹¹. Dried and ground roots in dose of two ounces cause abortion and also used in sore eyes¹². The herb exhibits emetic activity and employed substitute of ipecac, also used in bladder stones and decoction of leaves used in treatment of

Bronchitis¹³. In Suriname’s traditional medicine system, it is used as anthelmintic and in management of joint pain and strained muscles. *Ruellia tuberosa* is used as cooling in urinary problem and uterine fibroids¹⁴⁻¹⁵. It has recently been incorporated as a component in a herbal drink in Taiwan¹⁶. Pharmacological study by different workers on this plant proved Its antioxidant¹⁷, antimicrobial¹⁸, anticancer¹⁹, gastroprotective activity²⁰, antinociceptive, and anti-inflammatory activity²¹. This paper presents a review on compounds isolated from *Ruellia tuberosa* along with its medicinal properties.

Compounds Isolated:

The chemical constituents of *Ruellia tuberosa* includes alkaloids, benzoxazinoids, flavonoids, lignans, megastigmanes, phenolic compounds, Phenyl ethanoids, steroids, triterpenoids, and others. Their structures, **1-43** are given below in **Fig.-1** and their names along with references are listed in **Table-1**.

Table-1: Isolates of *Ruellia tuberosa*

Class of compound	Name	Ref	Structure No.
Alkaloid	Indole-3-carboxaldehyde	22	1
Benzoxazinoids	DIBOA-Glc	25	2
Flavonoids	Cirsimaritin	22	3
	Cirsimarin		4
	Cirsilioi-4'-glucoside		5
	Sorbifolin		6
	Pedalitin		7
	Luteoline-7-o-glucoside	23	8
	Apegenin -7-o-glucoside		9
	Apegenin -7-o-glucuronide		10
	Apegenin -7-o-rutinoside		11
	Hispidulin 7-O-β-D-glucuronopyranoside	24	12
	Comanthoside B		13
	Hispidulin 7-O-α-L-rhamnopyranosyl-(1'''→2'')-O- β -D-glucuronopyranoside		14
	Pectolinarigenin 7 - O- α - L -rhamnopyranosyl-(1'''→2'')-O- β -D-glucuronopyranoside		15
	Nepetin7-O-β-D-glucopyranoside	25	16
	Demethoxycentaureidin 7-O-β-D-glucopyranoside		17
	Pectolinarigenin 7-O- β-D-glucopyranoside		18
Lignans	(-)-Lyoniresinol 3α-O-β-D-glucopyranoside	25	19
	3-hydroxy-1-(4-hydroxy-3-methoxyphenyl)-2-[4-(3-hydroxy-1-(E)-propenyl)-2-methoxyphenoxy] propyl-β-D-glucopyranoside		20
	Syringaresinol 4,4'-O-bis-β-D-glucopyranoside.		21
Megastigmanes	(6S,9R)-Roseoside	25	22
Phenolic compounds	Syringin	25	23
Phenyl ethanoids	Acteoside	24, 25	24
	Isoacteoside	24	25
	Nuomioside		26
	Isonuomioside		27
	Forsythoside B		28
	Paucifloside		29
	Cassifolioside		30
	Isocassifolioside		31
	Cistanoside F		32
steroid	b- sitosterol	26, 27	33
	b- sitosterol glucoside	25	34
	Stigmasterol	26, 27	35
	campesterol		36
triterpene	Lupeol	27	37
	Betulin	22	38
	21-Methyldammer-22-ene-3b-,18,27- triol	28	39
Others	Trtriacontan-6-one	29	40
	5-Hydroxytetratriacontan-9-one		41

n-Tritriacontane

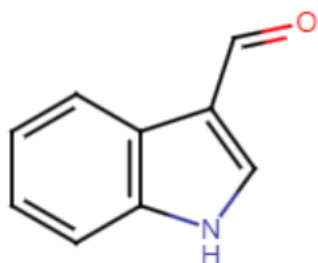
42

Vanillic acid

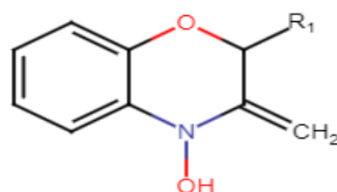
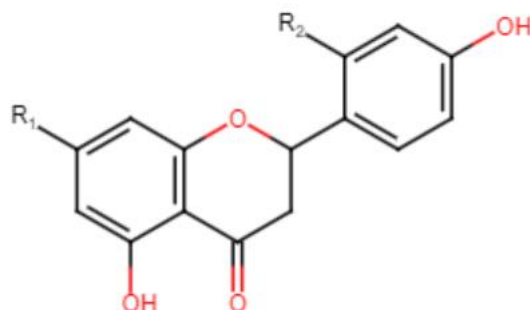
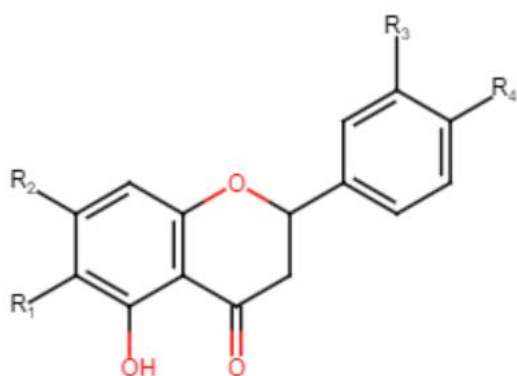
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Fig.-1

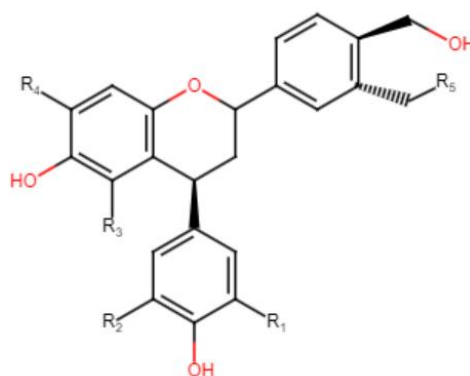


1


2 R₁=OGlc


Str.	R1	R2	R3	R4
3	OMe	OMe	H	OH
4	OMe	OMe	H	OGlc
5	OMe	OMe	OH	OGlc
6	OH	OMe	H	OH
7	OH	OMe	OH	OH
8	H	OGlc	OH	OH
12	OMe	OGlcA	H	OH
13	OMe	OGlcA	H	OMe
14	OMe	OGlcA ²⁻ Rha	H	OH
15	OMe	OGlcA ²⁻ Rha	H	OMe
16	OMe	OGlc	OH	OH
17	OMe	OGlc	OH	OMe
18	OMe	OGlc	H	OMe

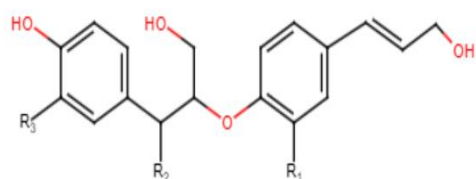
Str. No.	R1	R2
9	Glc	H
10	GlcA	H
11	Rut	H



19

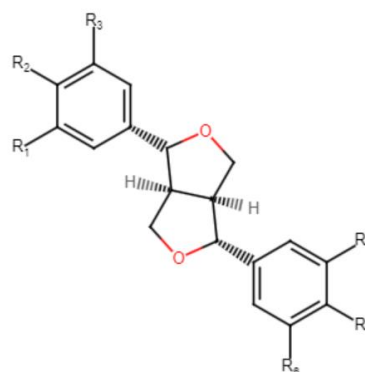
R₁ R₂ R₃ R₄ = OMe

R₅ = OGlc



20 R1 R3= OMe, R2= OGlc

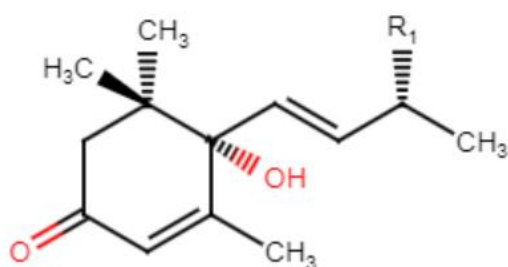
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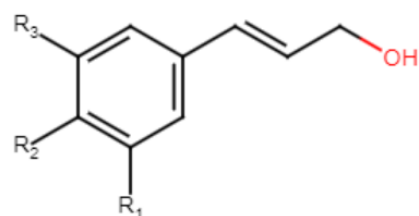
R1 R3 R6 = OMe

R2 R5 = OGlc

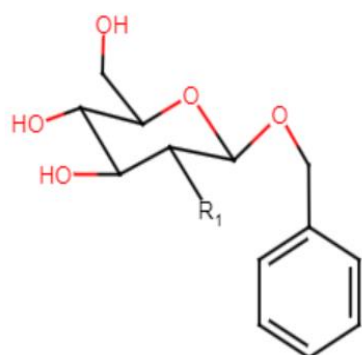
22 R1 =OGlc



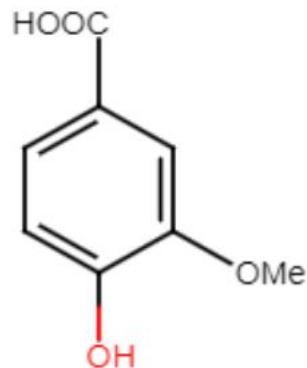
23 R1 R3 OMe, R2 OGlc



43



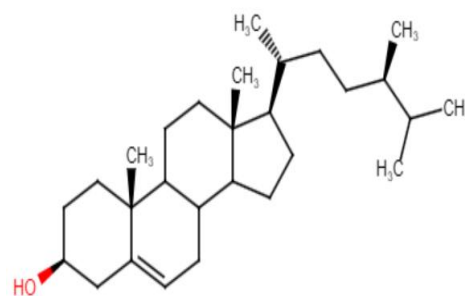
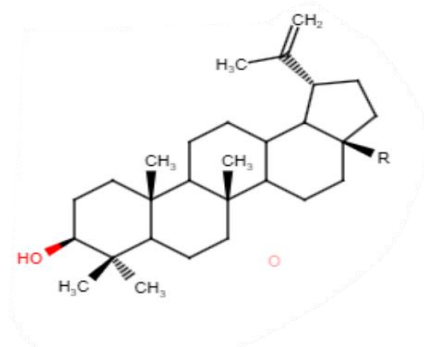
32 R1=OXyl



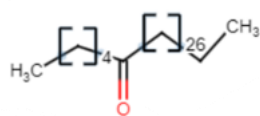
R

37 CH₃

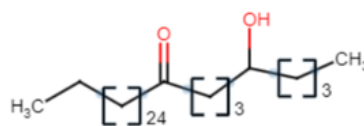
38 CH₂OH



36



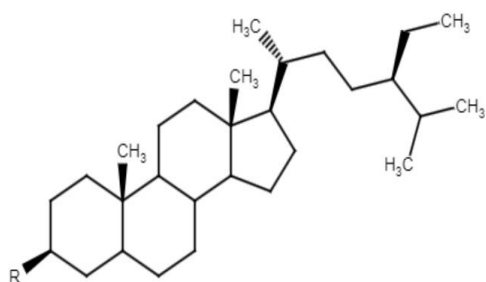
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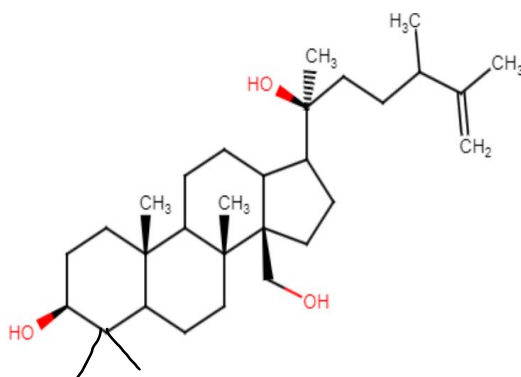
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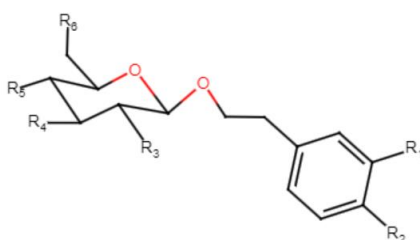
33 R = OH

34 R = OGlc

35 R = OH, nine, twenty-two dien



39



	R1	R2	R3	R4	R5	R6
24	OH	OH	OH	ORha	OH	Caffeoyl
25	OH	OH	OH	OApi	OH	Caffeoyl
26	OH	OH	OH	OApi	Caffeoyl	OH
27	OH	OH	OH	ORha	Caffeoyl	OApi
28	OH	OH	OH	OApi	O Caffeoyl	OApi
29	OH	OH	ORha	ORha	O Caffeoyl	OH
30	OH	OH	ORha	ORha	OH	OCaffeoyl
31	OMe	OH	OH	ORha	OH	OH

Conflict of Interests: No

REFERENCES:

- Chopra GL: Angiosperms. Jullundur: S. S.Nagin 1973.
- Bailey LH: The Standard Cyclopedia of Horticulture, the MacMillan Company, Vol. I.1963.
- Willis JC: A Dictionary of the Flowering Plants and Ferns. Cambridge University Press: London, New York, New Rochelle, Melbourne Sydney, Eighth Edition 1973.
- Trease GE, Evans: Pharmacognosy. Baillere and Tindall Press: London, Fifteenth Edition 2002.
- C. N. Pandey, Medicinal Plants of Gujarat, Gujarat Ecological Education and Research Foundation, Gujarat, India, 2005.
- Medicinal Plants of the Guiana's (Guyana, Surinam, French Guiana).
- D. L. Chothani, M. B. Patel, H. U. Vaghasiya, and S. H. Mishra, "Review on Ruellia tuberosa (cracker plant),"

- Pharmacognosy Journal, vol. 2, no. 12, pp. 506–512, 2010.
8. N. Y. Chiu and K. H. Chang, "The illustrated medicinal plants of Taiwan," Mingtong Medical Journal, vol. 226, no. 1, 1995.
 9. F. A. Chen, A. B. Wu, P. Shieh, D. H. Kuo, and C. Y. Hsieh, "Evaluation of the antioxidant activity of *Ruellia tuberosa*," Food Chemistry, vol. 94, no. 1, pp. 14–18, 2006.
 10. L. Suseela and S. Prema., "Pharmacognostic study on *Ruellia tuberosa*," Journal of Medicinal and Aromatic Plant Sciences, vol. 29, pp. 117–122, 2007.
 11. M. B. Reddy, K. R. Reddy, and M. N. Reddy, "Ethnobotany of Cuddapah district, Andhra Pradesh, India," International Journal of Pharmacognosy, vol. 29, no. 4, pp. 273–280, 1991.
 12. B. D. Kirtikar and B. D. Basu, Indian Medicinal Plants, vol. 3, International Book Distributors, Deheradun, India, 1935.
 13. The Wealth Of India, A Dictionary Of Indian, Raw Material and Industrial Product, Publication and Information Directorate, Council of Scientific and Industrial Research, New Delhi, India, 1972.
 14. C. A. Lans, Creole remedies. Case studies of ethnoveterinary medicine in Trinidad and Tobago, Ph.D.Dissertation, Wageningen University, Wageningen, The Netherlands, 2001, no. 2992.
 15. C. A. Lans, "Ethnomedicines used in Trinidad and Tobago for urinary problems and diabetes mellitus," Journal of Ethnobiology and Ethnomedicine, vol. 2, article 45, pp. 1–11, 2006.
 16. M. J. Balick, F. Kronenberg, A. L. Ososki et al., "Medicinal plants used by latino healers for women's health conditions in New York City," Economic Botany, vol. 54, no. 3, pp. 344–357, 2000.
 17. F. A. Chen, A. B. Wu, P. Shieh, D. H. Kuo, and C. Y. Hsieh, "Evaluation of the antioxidant activity of *Ruellia tuberosa*," Food Chemistry, vol. 94, no. 1, pp. 14–18, 2006.
 18. C. Wiart, M. Hannah, M. Yassim, H. Hamimah, and M. Sulaiman, "Anti-microbial activity of *Ruellia tuberosa* L," American Journal of Chinese Medicine, vol. 33, no. 4, pp. 683– 685, 2005.
 19. S. Arun, P. Giridharan, A. Suthar et al., Isolation of Tylocrebrine from *Ruellia tuberosa* through Bioassay Directed Column Chromatography and Elucidating its Anti-Cancer and AntiInflammatory Potential, 7th Joint Meeting of GA, AFERP, ASP, PSI & SIF, Athens, Greece, 2008.
 20. L. S. R. Arambewela, R. Thambugala, and W. D. Ratnasooriya, "Gastroprotective activity of *Ruellia tuberosa* root extract in rats," Journal of Tropical Medicinal Plants, vol. 4, no. 2, pp. 191– 194, 2003.
 21. M. A. Alam, N. Subhan, M. A. Awal et al., "Antinociceptive and anti-inflammatory properties of *Ruellia tuberosa*," Pharmaceutical Biology, vol. 47, no. 3, pp. 209–214, 2009.
 22. Lin C, Huang Y, Cheng L, Sheu S, Chen C: Bioactive flavonoids from *Ruellia tuberosa*. Journal of Chinese Medicine 2006; 17:103-109.
 23. Nair AGR, Subramanian SS: Apigenin glycosides from *Thunbergia fragrans* and *Ruellia tuberosa*. Current Science .1974; 43:480.
 24. Phakeovilay C, Disadee W, Sahakitpichan P, Sitthimonchai S, Kittakoop P, Ruchirawat S, Kanchanapoom T: Phenylethanoid and flavone glycosides from *Ruellia tuberosa* L. Journal of Natural Medicine 2003; 67:228-233.
 25. Samy MN, Khalil HE, Wanas AS, Kamel MS, Sugimoto S, Matsunami K, Otsuka H: Chemical constituents from the leaves of *Ruellia tuberosa*. Chemistry of Natural Compounds 2013; 49:175–176.
 26. Behari M, Goyal MM, Streibl M: Natural products from *Ruellia tuberosa* L. Journal of Indian Chemical Society 1981; 58:176-177.
 27. Andhiwal CK, Has C, Varshney RP: Hydrocarbons, lupeol and phytosterols from the tubers of *Ruellia tuberosa* Linn. Indian Drugs1985; 23:48-49.
 28. Singh RS, Pandey HS, Pandey RP, Singh BK: A new triterpenoid from *Ruellia tuberosa* Linn. Indian Journal of Chemistry 2002; 41B:1754-1756.
 29. Misra TN, Singh RS, Pandey HS, Pandey RP, Singh BK: Two new aliphatic compounds from *Ruellia tuberosa* Linn. Indian Journal of Chemistry 1997; 36B:1194-1197.

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