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Production of wine from *Ficus racemosa* L. fruits and phytochemical screening through HRLC-MS technique

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Abstract

A genus *Ficus*, is widely distributed in Maharashtra state. It has been used in production of Wine and many Medicines for treatment of various diseases. Present investigation was undertaken in order to production of wine by yeast (*Saccharomyces cerevisiae*) fermentation technique and Phytochemical screening of wine from *Ficus racemosa* L. (Fruits) by using High Resolution-Lipid Chromatography-Mass Spectrometry (HRLC-MS).

The study revealed the presence of Alkaloids (Gentisyl Alcohol, Cassythine), Flavonoids (+)-Taxifolin, Lipids (Micromelin, C₁₆ Sphiganine), Fatty acyls (18-hydroxy-9Z-octadecenoic acid, 3-Ketosphinganine), Amino Acids (Arginyl-threonine, Prolyl-Arginine, N-(1-Deoxy-1-fructosyl) phenylalanine) and other phytochemical compounds in the wine of *F. racemosa* L.

Keywords: *Ficus racemosa*, wine, alkaloid, HRLC-MS

Introduction

The genus *Ficus* currently recognized with 700 species, *Ficus racemosa* L. syn. *Ficus glomerata* Roxb., one of them, is extensively scattered over northern Australia, India, and other areas of Asia [1]. The leaves, fruits, latex, and root sap of this plant are all valuable medicinal use in India's traditional medical system [2]. The fruits resemble the figs (cauliflory) and are green when raw, turning orange, dull reddish or dark crimson on ripening. The seeds are tiny, innumerable, grain like [3].

When creating novel goods with altered physiochemical and sensory properties particularly flavor and nutritional components. Fermentation of alcohol frequently used to prepare drinks that have significant amount of alcohol. The wine is one of them, which produced by yeast (*Saccharomyces cerevisiae*) fermentation gives ethanol and carbon dioxide as a by-product. Fermented fruit juice has an alcohol percentage about 7 – 9% [4]. Wine production play an important role in Economy mostly covers food industries and also in medicinal and health sector [5].

Material And Method:**Collection of fruits and Yeast:**

Fully ripened, healthy fruits of *F. racemosa* were collected from Dr. Babasaheb Ambedkar Marathwada University Campus, Chhatrapati Sambhajanagar-431004, Maharashtra on 02 Oct. 2023. The voucher herbarium specimen has been prepared [7] and deposited in BAMU herbarium having accession number- 000929. The yeast (*Saccharomyces cerevisiae*) standard strain was obtained from Department of Botany, Dr. B. A. M. University, Chhatrapati Sambhajanagar.

Preparation of fruit juice:

The 500 grams fresh fruits were washed by solution of Sodium Carbonate (NaCO₃) and Sodium Chloride (NaCl) and distilled water. Fruits were completely dried and chopped by stainless-steel knife. Added 4 times more distilled water and boiled it for 30-40 min. The pulp was pressed manually by muslin cloth to obtained clear juice. Total 1700-1800 milliliters of juice obtained from 500 grams fruits.

Preparation of yeast and fruit juice inoculum:

In normal warm 50 milliliters water added 25 grams jaggery powder and make solution. Inoculated the loopful of Yeast (*Saccharomyces cerevisiae*) in that solution at 30-37 Degree Celsius for 5-8 hours for first activation of yeast. For second activation of yeast again inoculated the 50 milliliters. water and 25 grams jaggery solution in first activated yeast inoculum. Total volume of yeast inoculum was 100-150 milliliters.

For preparation of juice inoculum added 1/3 times jaggery powder in fruits juice and inoculated the yeast inoculum. Total volume of juice inoculum 2000-2100 milliliters and allow for fermentation.

Result and Discussion**Fruit Wine**

After 20 to 25 days of fermentation wine was obtained for decantation and phytochemical screening.

Analysis of wine

The further phytochemical screening of the wine was done from Sophisticated Analytical and Instrumentation Facility, IIT Bombay by using standard method High Resolution Liquid Chromatography- Mass Spectroscopy (HRLC-MS). The HR-LCMS analysis of fermented juice of *F. racemosa* L. fruits showed presence of 20 compounds shown in Table no. 1., which has some medicinal uses. The compound (+/-)-3-[(2-methyl-3-fury) thio]-2-butanone is Aryl thioethers which

play role as food additive and flavoring agent [12]. Amino acid Arginyl threonine is effective for digestive system, immune system, liver health and supporting to bones, muscles as well as connective tissues [13]. Cassythine and Gentisyl Alcohol are Alkaloids, Gentisyl Alcohol play role as an Antioxidant, an Antineoplastic agent, an Apoptosis inhibitor and a Fungal metabolite [12]. Prolyl-Arginine belongs to class Amino acid which necessary for making proteins and is commonly used for circulation [13]. Amino acid N-(1-Deoxy-1-fructosyl) phenylalanine plays role as defense or signaling molecules [14]. Taxifolin compound is Flavonoid which has Antioxidant, Anti-inflammatory, Antimicrobial activity, Anticancer, Antiangiogenic activity, Cardiovascular activity, and Pulmonary activity which make it an effective for treatment against various diseases [6]. Isoferulic Acid has Antitumor activity [11], Antioxidant [16]. 3-ketosphinganine is provokes the accumulation of dihydrosphingo lipids and induces autophagy in cancer cells [15].

The fruits of *F. racemosa* has many phytochemicals like Alkaloids, Flavonoids, Glauanol, Hentriacontane, Tiglic acid, Easters of Taraxasterol, Phytosterol, Tannins, Steroids [8], Phenols and Phenolic compounds [9], Carbohydrates and Lipids [10]. The fruits coproducts are rich in Amino acids Ankita *et al.*, 2022) [9]. The important phytochemicals from *F. racemosa* fruit wine are Alkaloids, Flavonoids, Phenols and Phenolic Compounds, Carbohydrates and Lipids, as well as Amino acids.

Table 1: Chemical compounds present in the wine of *Ficus racemosa* fruits

Sr. No.	Compound Name	Formula	Class	Mass	R.T.	DB Diff.
1.	8-Hydroxy-3- Chlorodibenzofuran	C ₁₂ H ₇ ClO ₂	Heterocyclic compound	218.0138	1.171	-1.8
2.	(+/-)-3-[(2-methyl-3- Fury)thio]-2-butanone	C ₉ H ₁₂ O ₂ S	Aryl thioethers	184.0573	1.217	-8.09
3.	Arginyl-threonine	C ₁₀ H ₂₁ N ₅ O ₄	Amino acid	275.1594	1.517	-0.27
4.	Cassythine	C ₁₉ H ₁₉ NO ₅	Alkaloid	341.1274	1.616	-3.12
5.	De-O-methylsimmondsin	C ₁₅ H ₂₃ NO ₉	Carbohydrates	361.1365	1.623	2.2
6.	Prolyl-Arginine	C ₁₁ H ₂₁ N ₅ O ₃	Amino acid	271.1644/271.1645	1.899/2.231	0.17/-0.22
7.	Prometon	C ₁₀ H ₁₉ N ₅ O	Triazines	225.16	2.009	-4.44
8.	N-(1-Deoxy-1-fructosyl) phenylalanine	C ₁₅ H ₂₁ NO ₇	Amino acid	327.1307	3.15	3.3
9.	Gentisyl alcohol	C ₇ H ₈ O ₃	Alkaloids	140.0471	4.893	3.07
10.	2-Hydroxy-3-(4-hydroxyphenyl) propenoic acid	C ₉ H ₈ O ₄	Phenylpropanoids and polyketides	180.0417	5.502	3.07
11.	3-hydroxy-4-methoxymandelate	C ₉ H ₁₀ O ₅	Phenols	198.0524	6.321	2.02
12.	Plantagoside	C ₂₁ H ₂₂ O ₁₂		466.11	6.886	2.4
13.	(+)-Taxifolin	C ₁₅ H ₁₂ O ₇	Flavonoids	304.0568	10.174	4.84
14.	Micromelin	C ₁₅ H ₁₂ O ₆	Lipid	288.062	11.284	4.87
15.	2-methyl-3-(propyldithio)furan	C ₈ H ₁₂ OS ₂	Organoheterocyclic compounds- Heteromatic compounds	188.0317	11.613	6.58
16.	C16 sphinganine	C ₁₆ H ₃₅ NO ₂	Lipid	273.2654	12.72	5.12
17.	Isoferulic Acid	C ₁₀ H ₁₀ O ₄	Hydroxycinnamic acid	194.057	14.325	4.74
18.	18-hydroxy-9Z-octadecenoic acid	C ₁₈ H ₃₄ O ₃	Lipid	298.2486	15.179	7.41
19.	3-Ketosphinganine	C ₁₈ H ₃₇ NO ₂	Fatty acyls	299.2805	15.539	6.3
20.	Orsellinic Acid	C ₈ H ₈ O ₄	Dihydroxybenzoic acid- Resorcinols	168.0415	3.886	4.61

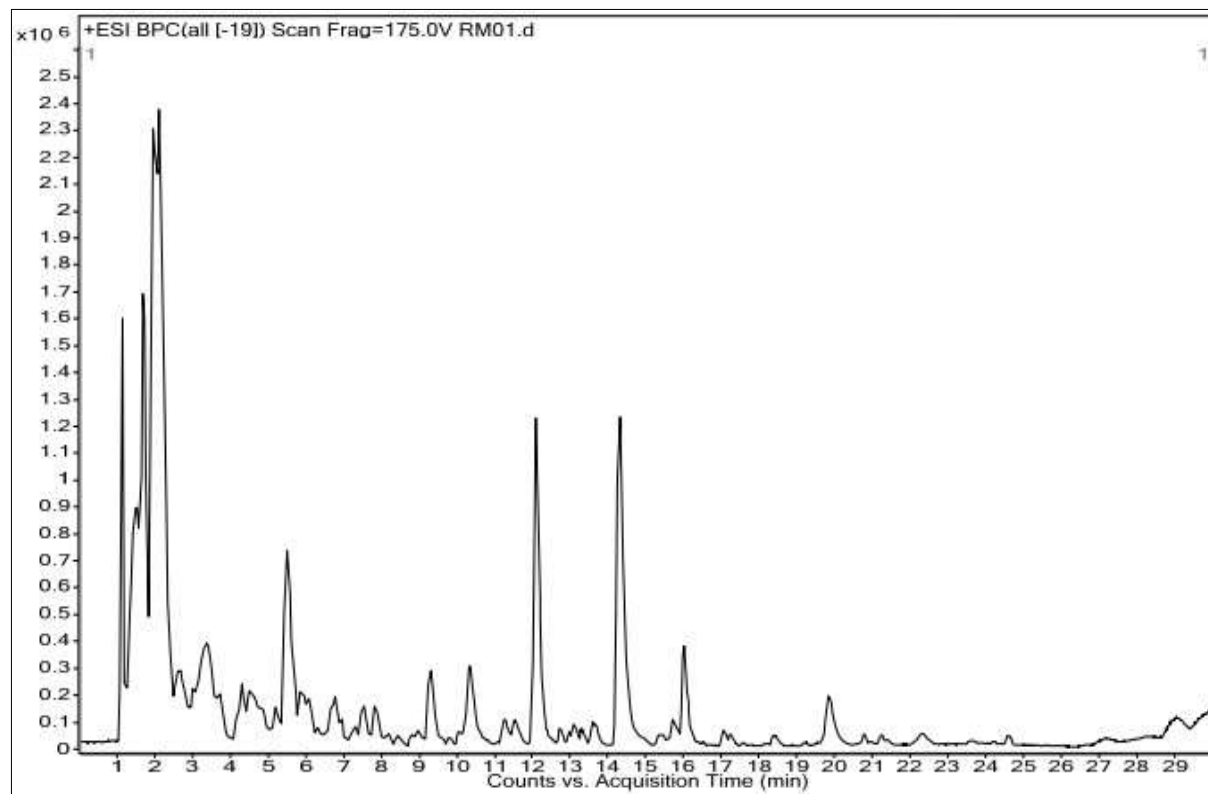


Fig 1: HR-LCMS Chromatogram

Conclusion

The phytochemical screening of the wine from *Ficus racemosa* fruits revealed that the presence of about 20 medicinally important compounds. These compounds belong to various classes like Alkaloids, Flavonoids and Phenols. Due to many medicinal properties like Antioxidant, an Antineoplastic, Anti-inflammatory, Antimicrobial, Antiangiogenic, Cardiovascular, Pulmonary, Antitumor activities hence, this wine has health benefits.

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References

- Sharma, Smrati and Ramesh Kumar. Free radical scavenging activity and GC-MS Analysis of Methanolic extract of *Ficus racemosa* L. leaves of Bundelkhand region. *Journal of Phytological Research*. 2021;1:34.
- Murti K, Kumar U, Lambole V, *et al.* Pharmacological properties of *Ficus racemosa* L.- a review. *Pharmacology online*. 2010;2:802-807.
- Zulfiker AHM, Saha MR, Sarwar S, Nahar L, Hamid K, Rana MS. Hypoglycemic and in-vitro antioxidant activity of ethanolic extract of *Ficus racemosa* L. fruits. *American Journal of Science and Industrial Research*. 2011;2(3):391-400.
- Saranraj P, Sivasakthivelan P, Naveen M. Fermentation of fruit wine and its quality analysis- A review. *Australian Journal of Science and Technology*. 2017;1(2):85-97.
- Ferrer-Gallego R and Silva P. The wine industry by-products: Applications for food industry and health benefits. *MDPI Antioxidants*. 2022;11(10).
- Yang Liu, Xiaolu Shi, Ye Tian, Shaobo Zhai, Yuyan Liu, Zhengrong Xiong, *et al.* An insight into novel therapeutic potential of taxifolin. *Front. Pharmacol*. 2023, 14.
- Survase SA, Dhabe AS. BAMU herbarium and herbarium techniques. *Bioinfolet*. 2023;10(4a):1177-1180.
- Gitesh Kishor Chaware, Vikas Kumar, Satish Kumar, Pankaj Kumar. Bioactive Compounds, Pharmacological Activity and Food Application of *Ficus racemosa*: A Critical Review. *International Journal of Fruit Science*. 2020;20(2).
- Ankita Walia, Naveen Kumar, Rajat Singh, Harish Kumar, Vikas Kumar, Ravinder Kaushik, *et al.* Bioactive Compounds in *Ficus* fruits, Their Bioactivities, and Associated Health Benefits: A Review 2022. *Journal of Food Quality*. 2022, 19
- Bhogaonkar PY, Chavhan VN, Kanerkar UR. Nutritional potential of *Ficus racemosa* L. fruits. *Bioscience Discovery*. 2014;5(2):150-153
- Zhiguo Long, Guangjia Feng, Na Zhao, Lei Wu, Hongbo Zhu. Isoferulic acid inhibits human leukemia cell growth through induction of G2/M-phase arrest and inhibition of Akt/mTOR signaling. 2020, 1035-1042.
- NIH-PubChem. <https://pubchem.ncbi.nlm.nih.gov>; c2004.
- WebMD. <https://www.webmed.com>; c1998
- HMDB-Human Metabolome Database. <https://hmdb.ca>; c2022.
- NIH-PubMed. <https://pubmed.ncbi.nlm.nih.gov>; c1996.
- EMBL-EBI. <https://www.ebi.ac.uk>; c1974.