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Chromatographic Analysis of Bioactive Metabolites from a Traditional Food Combination of (semi) Arid Regions – *Panchkuta*: Insights for Sustainable Functional Foods Development

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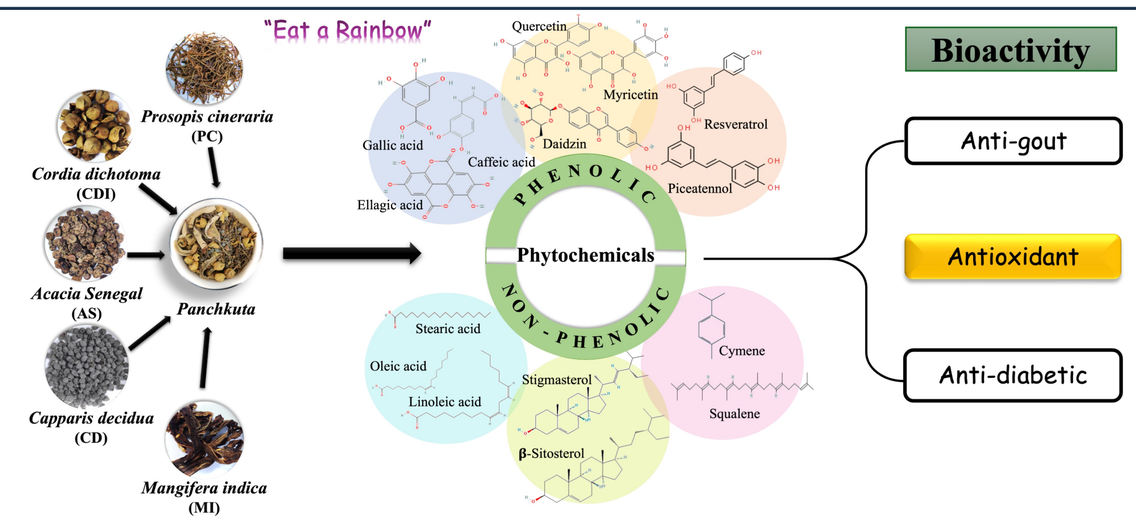
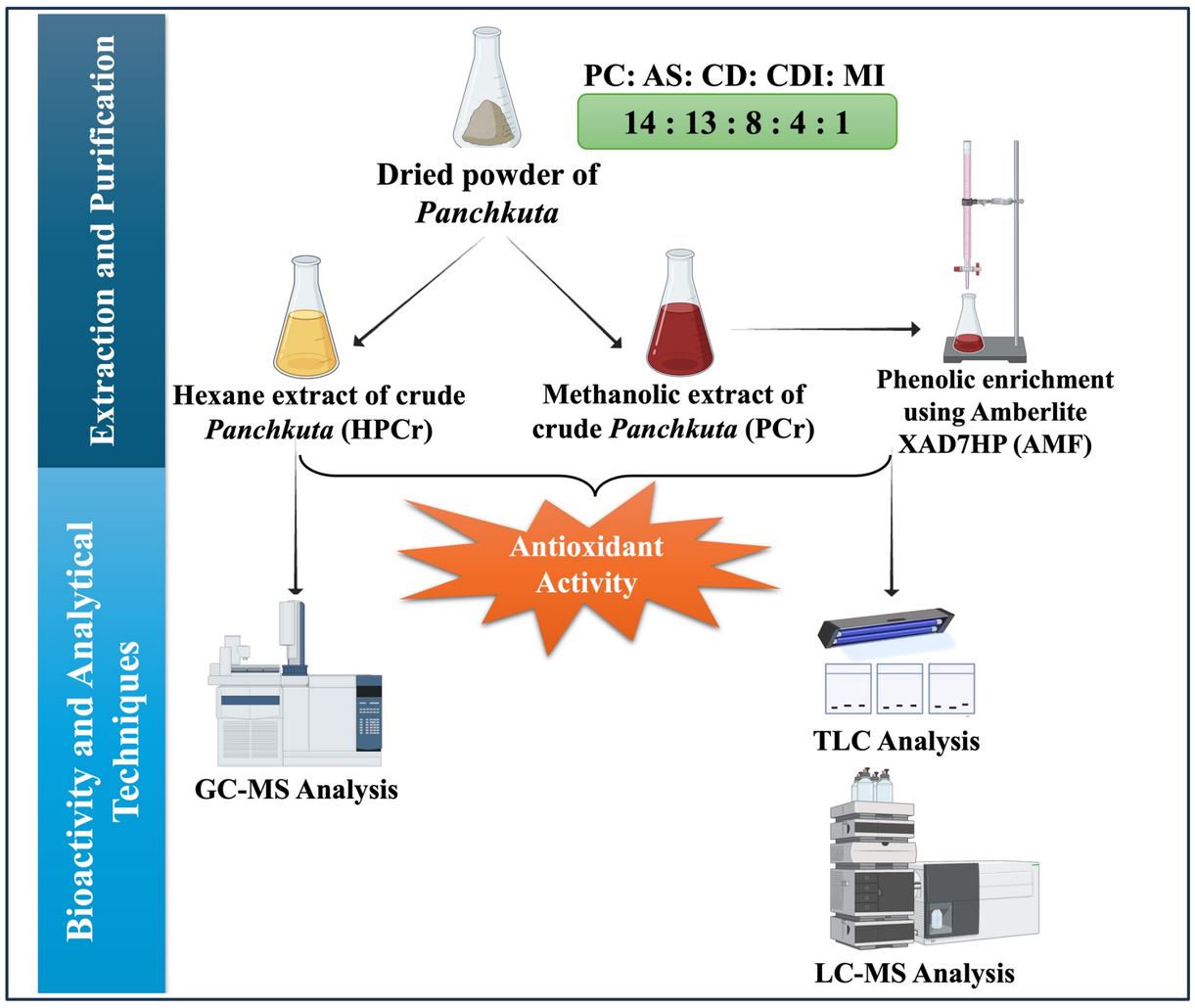
INTRODUCTION



- Desert plants provide sustainable alternatives for development of functional foods.
- '*Panchkuta*', a traditional food in (semi) arid regions in India, is a blend of fruits/pods of five plants, namely, *Prosopis cineraria*, *Cordia dichotoma*, *Capparis decidua*, *Acacia senegal*, and *Mangifera indica.*
- These plants are mixed in varying ratios according to flavor and geographical availability.
- We have previously reported that the binary combinations of these plants act synergistically and enhance their antioxidant activities.

METHODOLOGY



RESULTS AND DISCUSSION

Antioxidant activity of crude and phenolics enriched *Panchkuta* extracts

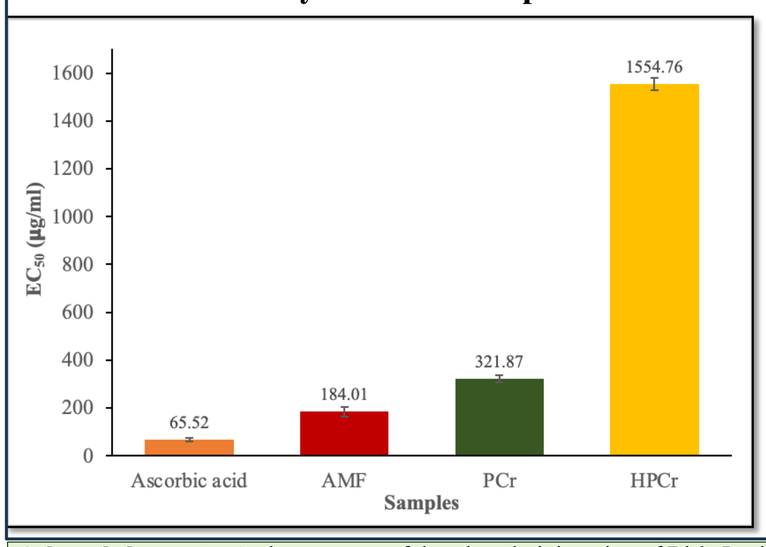


Figure 1: Antioxidant activity of hexane and methanolic extracts of *Panchkuta* measured by DPPH assay. AMF-Amberlite Methanolic Fraction, PCr- methanolic extract of crude *Panchkuta*, HPCr-hexane extract of crude *Panchkuta.*
Methanolic extracts showed better antioxidant activity compared to the hexane extract

RESULTS AND DISCUSSION

Table 1. Bioactive metabolites in *Panchkuta* identified by GC-MS analysis

S.No.	Rt (min)	Area (%)	Tentative identified metabolites	Type of compound
1.	2.664	1.41	2-ethyl-3-methylbutanal	Aliphatic aldehyde
2.	4.501	0.27	p-cymene	Monoterpene
3.	6.100	0.36	Dodecane	n-alkane hydrocarbon
4.	11.261	0.11	Heneicosane	Alkane hydrocarbon
5.	12.410	0.10	Eicosane	Alkane
6.	15.181	3.48	n-Hexadecanoic acid (Palmitic acid)	Fatty acid
7.	16.304	0.62	9-Octadecenoic acid, methyl ester	Fatty acid methyl ester
8.	16.398	0.94	Phytol	Diterpene alcohol
9.	16.584	2.77	9,12-Octadecadienoic acid (Linoleic acid)	Fatty acid
10.	16.623	4.83	Oleic acid	Fatty acid
11.	16.757	2.32	Octadecanoic acid (Stearic acid)	Fatty acid
12.	18.456	0.83	Methyl 5,11,14-eicosatrienoate	Fatty acid methyl ester
13.	18.476	0.88	Glycidyl oleate	Carboxylic ester and epoxide
14.	18.586	0.45	Pentatriacontane	Alkane hydrocarbon
15.	18.745	0.10	Phthalic acid, di(6-methylhept-2-yl) ester	Aromatic carboxylic acid ester
16.	19.440	2.58	Tetrapentacontane	Alkane hydrocarbon
17.	19.924	0.37	Squalene	Triterpenoid hydrocarbon
18.	20.288	8.06	Dotriacontane	Alkane hydrocarbon
19.	21.108	0.44	gamma-Tocopherol	Vitamin
20.	21.337	0.96	Triacontanol	Fatty alcohol
21.	21.571	0.66	alpha-Tocopherol-beta-D-mannoside	Vitamin
22.	22.436	5.61	Campesterol	Phytosterol
23.	22.630	6.70	Stigmasterol	Phytosterol
24.	22.728	5.25	1-Hexacosanol	Fatty alcohol
25.	22.978	2.13	26,27-Dinorergosta-5,24-dien-3-ol, (3 beta)-	Phytosterol
26.	23.165	14.05	gamma-Sitosterol	Phytosterol
27.	23.255	4.13	Stigmasta-5,24(28)-dien-3-ol, (3.beta,24Z)	Phytosterol
28.	23.751	1.17	Lup-20(29)-en-3-one	Triterpene
29.	24.041	1.92	Lup-20(29)-en-3-ol, acetate, (3 beta)-	Triterpene
30.	24.322	0.23	gamma-Sitostenone	Phytosterol

Phytochemical fingerprinting by Thin Layer Chromatography (TLC)

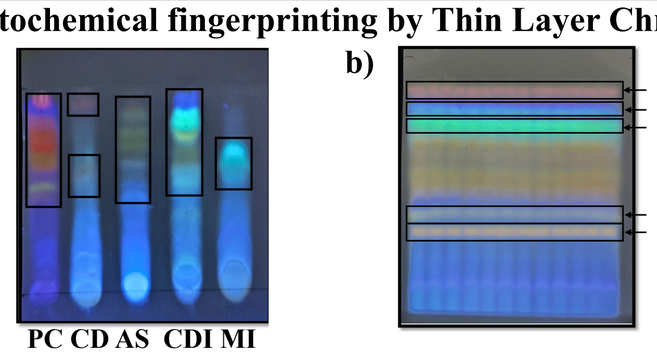


Figure 2: a) TLC of five plants included in *Panchkuta*, and **b)** TLC of phenolics enriched AMF, observed under 365 nm after spraying with Natural Product Reagent (NPR)

Bioactive metabolites in *Panchkuta* identified by LC-MS analysis

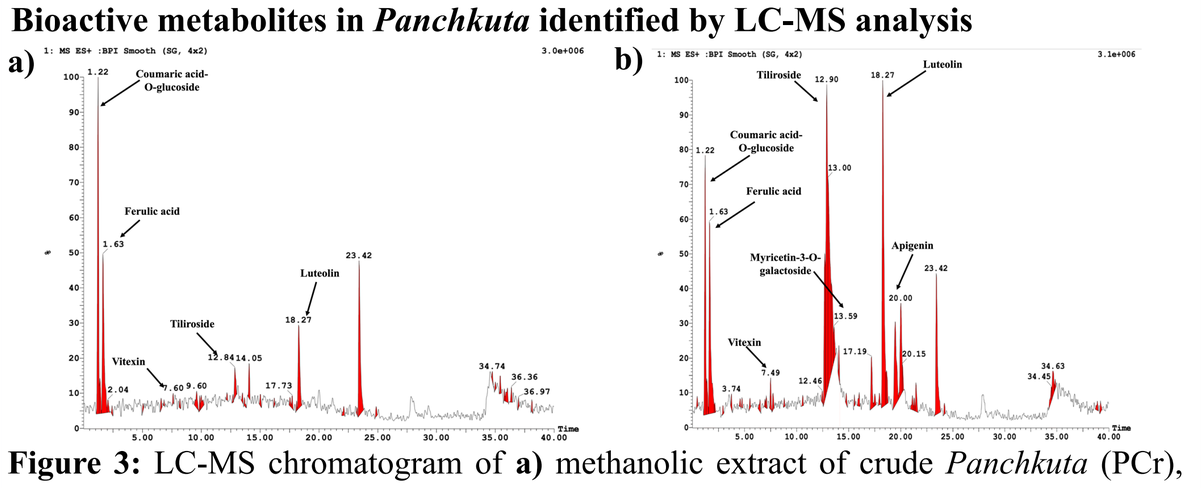


Figure 3: LC-MS chromatogram of **a)** methanolic extract of crude *Panchkuta* (PCr), and **b)** phenolics enriched AMF

CONCLUSIONS/ FUTURE WORK

- The antioxidant activity of the *Panchkuta* could be attributed to the presence and synergistic interactions of phytoconstituents, including gamma-sitosterol, stigmasterol, and dotriacontane in the hexane extract, and coumaric acid, luteolin, apigenin, and tiliroside in the methanolic extract.
- The TLC analysis showed the presence of various classes of phenolics (flavonols, isoflavones, and flavones) when observed under 365 nm.
- This study can contribute to address a few of the Sustainable Development Goals.
- The local communities continue to use their traditional knowledge to ensure food and nutritional security even in these (semi) arid regions.
- Further purification may lead to identifying and validating potential compounds responsible for the bioactivity. Additionally, these results will be validated in *in vitro* cell culture system for anti-lipid peroxidative property and diseases such as diabetes, obesity, and arthritis.

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