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GC-MS PROFILING AND ASSESSMENT OF ANTIOXIDANT PROPERTY OF BEGONIA ALBOCOCCINEA HOOK.

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Abstract
In the present investigation, bioactive compound identification by GCMS and free radicals representing the antioxidant activity of *Begonia albococcinea* Hook. was investigated. In the antioxidant activity study, the ethanolic extract of *B.albococcinea* exhibited significant inhibitory effects on DPPH scavenging activity (P-Value 0.406 > 0.05 α value) and ferrous chelation activity (P-Value 0.362 >0.05 α value) hence significant activity was calculated in total antioxidant property (P-Value0.00016 <0.05 α value). The outcome showed the promising source of better bioactive principles of *B.albococcinea* for addressing most of the drug resistant pathogens and cellular toxifications.
Keywords: Antioxidant acitivity, *Begonia albococcinea* and GCMS.

Introduction

Begonia albococcinea Hook., a member of Begoniaceae family, is used in traditional medicine for treating various ailments. *B. albococcinea* possess traditional medicinal potential and is effectively utilized treating various ailments. In traditional medicinal system of Siddha *B. albococcinea* is used for increasing the vitality and strengthening the body. The dried powder of the plant is given two times with milk to strengthen the body (Mudaliyar, 1988). This study screened whole-plant extracts for phytochemical and bioactive properties, potentially validating its use as traditional medicine. The ethanolic extracts of *B. albococcinea* is reported to possess phenol, tannins, xanthoproteins, steroids, phytosterols, triterpenoids, sapogenins, coumarins, and carbohydrates, besides their primary and secondary metabolites, vitamins, and micro- and macro

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minerals. In the present investigation, the GC-MS chemical profiling and anti-oxidant potential of *B.albococcinea* was investigated.

Materials and Methods

Sample Preparation

Around 50 g of powdered *B.albococcinea* was taken into fresh extract cloth and bagged into extraction apparatus. The system was placed on the heating mantle at 40 °C and the sample with reflux condenser tube was placed over the solvent collector with air tightly. The extraction system was started with 500 ml ethanol as extraction solvent for 24 hours. After extraction the solvent was transferred to fresh 500 ml conical flask, filter the extract and condensed using rotary evaporator then stored at 4 °C for further analysis.

Identification Phytocompounds by GC-MS

This chromatography system identifies the compound as per the molecular weight and their volatile nature. Here inert gas was used as mobile phase to separate the molecules inside the column. The crude ethanolic extract of *B.albococcinea* was analyzed for the phytoconstituents via GC-MS analysis in Agilent Technologies: GC-MS (GC System-7820A) with the parameters of Over Temperature -70 ºC, Injector temperature-280 ºC (10 ºC /min), Flow rate -1ml/min with pressure of 61.3 kPa and helium gas was used as mobile phase for the separation of phytocompounds. The obtained peaks were identified with NIST library and interpret accordingly.

Anti-Oxidant Property

DPPH radical scavenging activity

The free radical scavenging activity of the fractions was measured in vitro by the 2, 2-diphenyl-1-picrylhydrazyl (DPPH) assay according to the standard method (Brand-Williams *et al*., 1995). Ascorbic acid was used as a control. The percentage of DPPH decolorization in the sample was calculated according to the equation. The control was prepared without any sample, and scavenging activity was estimated based on the percentage of DPPH radicals scavenged using the following equation:

$$\% \text{ of inhibition} = [(\text{control OD} - \text{sample OD})/(\text{control OD})] \times 100$$

Total antioxidant activity

The antioxidant potential of *B.albococcinea* ethanolic extract was tested by phosphomolybdenum method in the laboratory (Prieto *et al*., 1999).

Ferrous ion chelating effect

The chelating of ferrous ions was estimated by the method of Puntal *et al.* (2005). The assay was done in triplicate. The lower absorbance at 562 nm indicated a stronger chelating effect. EDTA was used as a positive control. The percentage of ferrous ion chelating ability is expressed by

$$\% \text{ of Activity} = \text{Abs of Blank} - \text{Abs Sample}/\text{Abs of Blank} \times 100$$

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Statistical Analysis

The obtained data were interpreted and calculated as Mean, Standard deviation and ANOVA using IBM SPSS Statistical Software and represented the data in tables as well as graphs.

Results and Discussion

Extraction and Phytocompound Identification by GC-MS

The leaves of *B.albococcinea* were powdered and extracted by soxhlet method using ethanol solvent and the crude leaf extract was collected in 250 mL Erlenmeyer flask for condensation using rotary evaporator. The condensed crude extract was re-suspended with ethanol. The crude ethanolic extract of *B.albococcinea* was later studied for the existence of bioactive phytocompounds through GC-MS. The peak data were analyzed and interpreted and in table: 1 showed the presence of stigmasterol with higher area (%) of 16.85 separated at 50.760 (mins), 24-Norursa-3,12-diene with 15.05 % of area at 51.809 (mins) of separation. Second majorly found compound were campesterol with 8.18 % at the retention time of 50.386 (mins) and neophytadiene with 6.83 % of peak area at 25.808 (mins) of retention time. In table: 1 and Fig 1. described the other possible phytocompounds with their separation characteristics respectively.

Plant extracts rich in stigmasterol showed promising anti-inflammatory and immunomodulatory properties in vivo (Wen S. *et al*., 2021). They also inhibited cyclooxygenase-2 (COX-2) and reduced the release of pro-inflammatory cytokines, nitric oxide (NO), and tumour necrosis factor-α (TNF-α) (Ralf *et al*., 2016 & Sharif *et al*., 2022). 9,19-Cycloergost-24(28)-en-3-ol,4,14-dimethyl- have been reported for its antioxidant and anti-inflammatory properties (Sudaryadi *et al*., 2023) and neophytadiene exhibited excellent analgesic, antipyretic, anti-inflammatory, antibacterial, and antioxidant properties (Raman *et al*., 2012).

Antioxidant activity

An ethanolic extract of different concentration possessed anti-oxidant property over DPPH assay, total anti-oxidant and ferrous chelating assay. The maximum scavenging effect of DPPH was measured at 100 µg/mL exhibiting87.84 ± 0.003 % of reduction with 51.52 µg/mL of IC 50 value and p-value was 0.406 > 0.05 α value showed the insignificance of activity. About 75.89 ± 0.020 % chelation of ferrous was observed at 100 µg/mL with the IC 50 value of 50.46 µg/mL and the property of ferrous chelation was insignificant (p-value was 0.362 >0.05 α value) among the different concentrations. The total anti-oxidant activity of ethanolic extract of *B.albococcinea* was determined by the principle of reducing the phosphate-Mo (VI) into phosphate-Mo (V) with different concentration proven the activity was increased with the act of increasing concentration and the activity of different concentrations showed the significant (p-value was 0.00016 <0.05 α value) at 0.05 level by one-way ANOVA in table: 2.

Kalpanadevi *et* Mohan (2012) reported the total phenolic and flavonoid contents in methanol extracts of whole plants of *Begonia malabarica* and *Begonia floccifera* responsible for potent *in-vitro* antioxidant activities measured by DPPH, hydroxyl, superoxide and ABTS radical scavenging assays. Abriyani *et* Fikayuniar (2020) has extracted the leaves of *Begonia versicolar*

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using n-hexane, ethyl acetate and methanol by maceration method and studied their antioxidant activity using DPPH free radicals. The IC 50 of DPPH scavenging was 69.82µg/ml for ethyl acetate and 8.67µg/ml for methanol extracts. Another report assesses the antimicrobial and antioxidant properties of *Begonia dipetala* extracts. Results reported significant antimicrobial activity in the ethanolic extract, with higher (93.3 %) DPPH radical scavenging activity and related with increased concentration (Indrakumar *et al*., 2014).

Conclusion

According to the investigation of bioactive compound identification by GCMS and free radicals representing the antioxidant activity, *Begonia albococcinea* exhibited excellent antioxidant activity with ethanolic extract. Also, significant inhibitory effects on DPPH scavenging (p-value was 0.406 > 0.05 α value) and ferrous chelation (p-value was 0.362 >0.05 α value) hence significant activity was calculated in total antioxidant property (p-value was 0.00016 <0.05 α value). The outcome showed the promising source of better bioactive principles of *Begonia albococcinea* for addressing most of the drug resistant pathogens and cellular toxifications.

Table: 1. Detection of Phytoconstituents of Ethanolic Extract of *Begonia albococcinea* by GC-MS

Peak#	R. Time (mins)	Similarity	Name	CAS#	Area%	Height
1	13.314	89	Cyclohexasiloxane, dodecamethyl	540-97-6	0.71	92169
2	15.632	93	1-Tetradecene	1120-36-1	0.35	44922
3	17.551	86	3-Isopropoxy-1,1,1,7,7,7-hexamethyl-3,5,5-tris	71579-69-6	1.23	156752
4	20.502	90	1-Heptadecene	6765-39-5	0.31	40368
5	21.390	79	3-Isopropoxy-1,1,1,7,7,7-hexamethyl-3,5,5-tris	71579-69-6	0.86	108668
6	24.721	80	Octasiloxane, 1,1,3,3,5,5,7,7,9,9,11,11,13,13,15	19095-24-0	0.78	97317
7	24.921	89	Trichloroacetic acid, tridecyl ester	74339-51-8	0.24	31229
8	25.808	94	Neophytadiene	504-96-1	6.83	810012
9	25.937	91	2-Hexadecene, 3,7,11,15-tetramethyl-, [R-[R*,R*	14237-73-1	0.69	76500
10	26.307	91	3,7,11,15-Tetramethyl-2-hexadecen-1-ol	102608-53-7	1.18	143847
11	26.678	92	3,7,11,15-Tetramethyl-2-hexadecen-1-ol	102608-53-7	1.86	227359
12	26.854	94	Lidocaine	137-58-6	1.15	114983
13	27.685	84	3-Isopropoxy-1,1,1,7,7,7-hexamethyl-3,5,5-tris	71579-69-6	0.57	74559
14	28.287	92	n-Hexadecanoic acid	57-10-3	2.02	151133
15	30.398	79	Heptasiloxane, hexadecamethyl-	541-1-5	0.58	70025

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16	31.067	95	Phytol	150-86-7	2.41	262927
17	32.920	79	Heptasiloxane, hexadecamethyl-	541-1-5	0.55	62668
18	36.008	78	Heptasiloxane, hexadecamethyl-	541-1-5	0.55	59555
19	38.937	78	Heptasiloxane, hexadecamethyl-	541-1-5	0.50	58730
20	39.137	53	Methyl cis-11-icosenoate	5561-99-9	0.36	28541
21	50.386	88	Campesterol	474-62-4	8.18	618496
22	51.809	86	24-Norursa-3,12-diene	201358-25-0	15.05	1495518
23	50.760	92	Sigmasterol	83-48-7	16.85	1400223

Table: 2. Anti-Oxidant Potential of Ethanolic Extract of *Begonia albococcinea*

Conc. µg/mL	DPPH Assay	Ferrous Chelating Assay	Total Antioxidant
	B. albococcinea	***B. albococcinea***	***B. albococcinea***
20	81.62 ± 0.002	30.02 ± 0.031	0.363 ± 0.031
40	82.65 ± 0.003	47.06 ± 0.035	0.447 ± 0.035
60	83.67 ± 0.004	56.86 ± 0.031	0.543 ± 0.031
80	85.97 ± 0.002	65.13 ± 0.06	0.73 ± 0.026
100	87.84 ± 0.003	75.89 ± 0.020	0.91 ± 0.020
IC 50 Conc. (µg/mL)	51.52	50.46	0.363 ± 0.031
One-WayANOVA	P-Value was 0.406>0.05 α value	P-Value was 0.362>0.05 α value	P-Value was 0.00016<0.05 α value

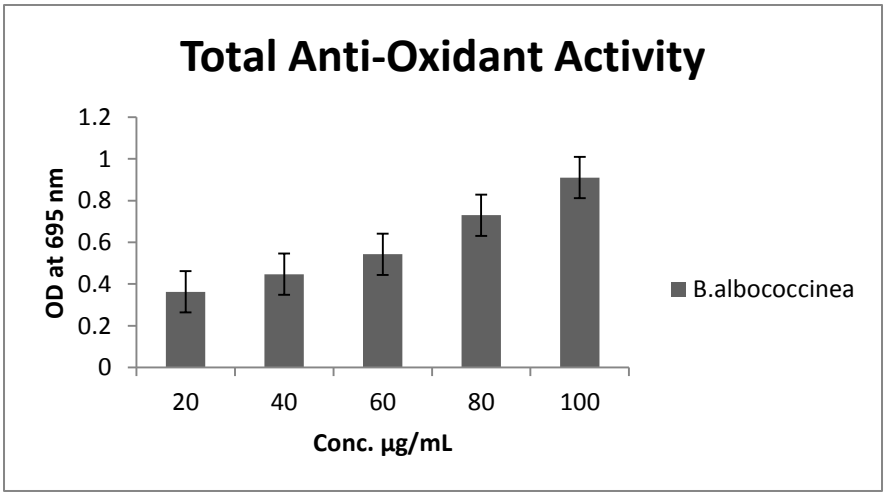

Figure 1. Graph showing the total anti-oxidant activity of *B.albococcinea*

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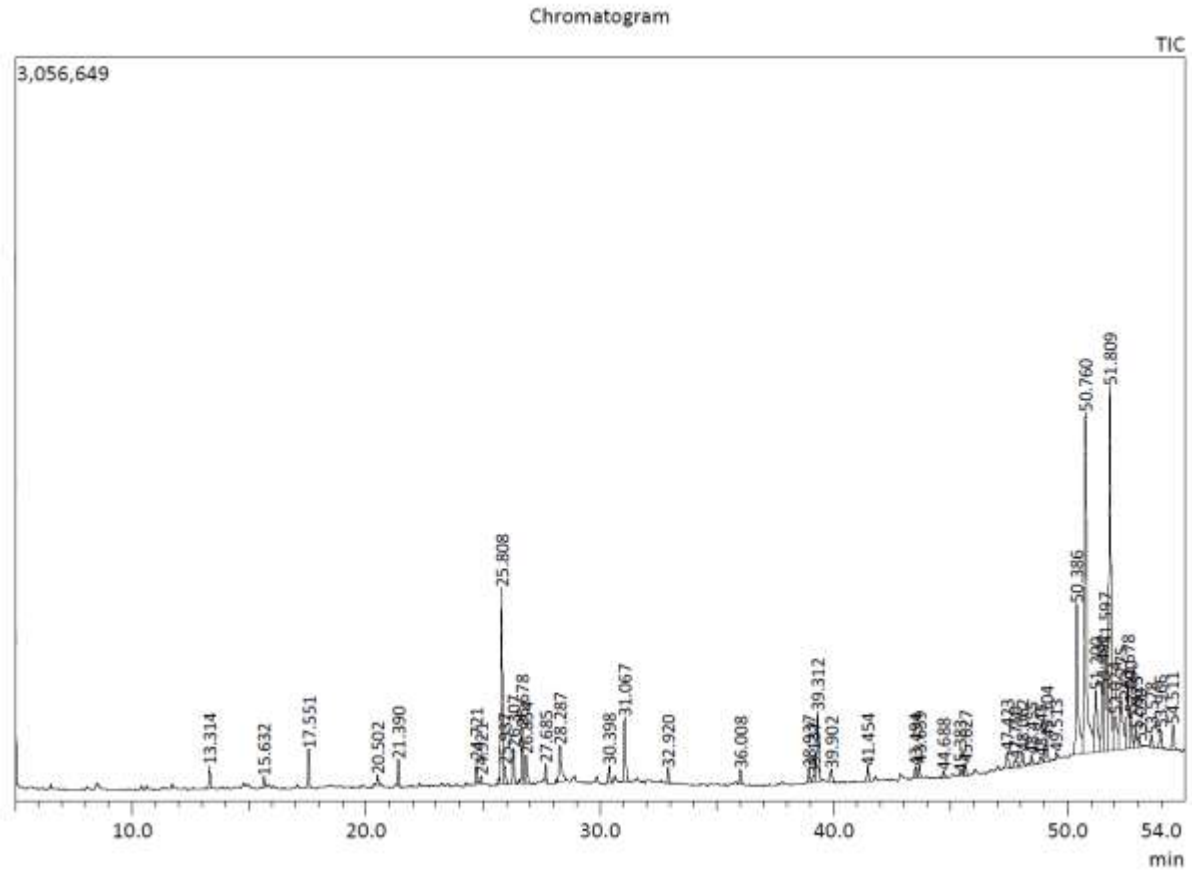

Figure: 2. GC-MS Chromatogram of Ethanolic Extract of *Begonia albococcinea*

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