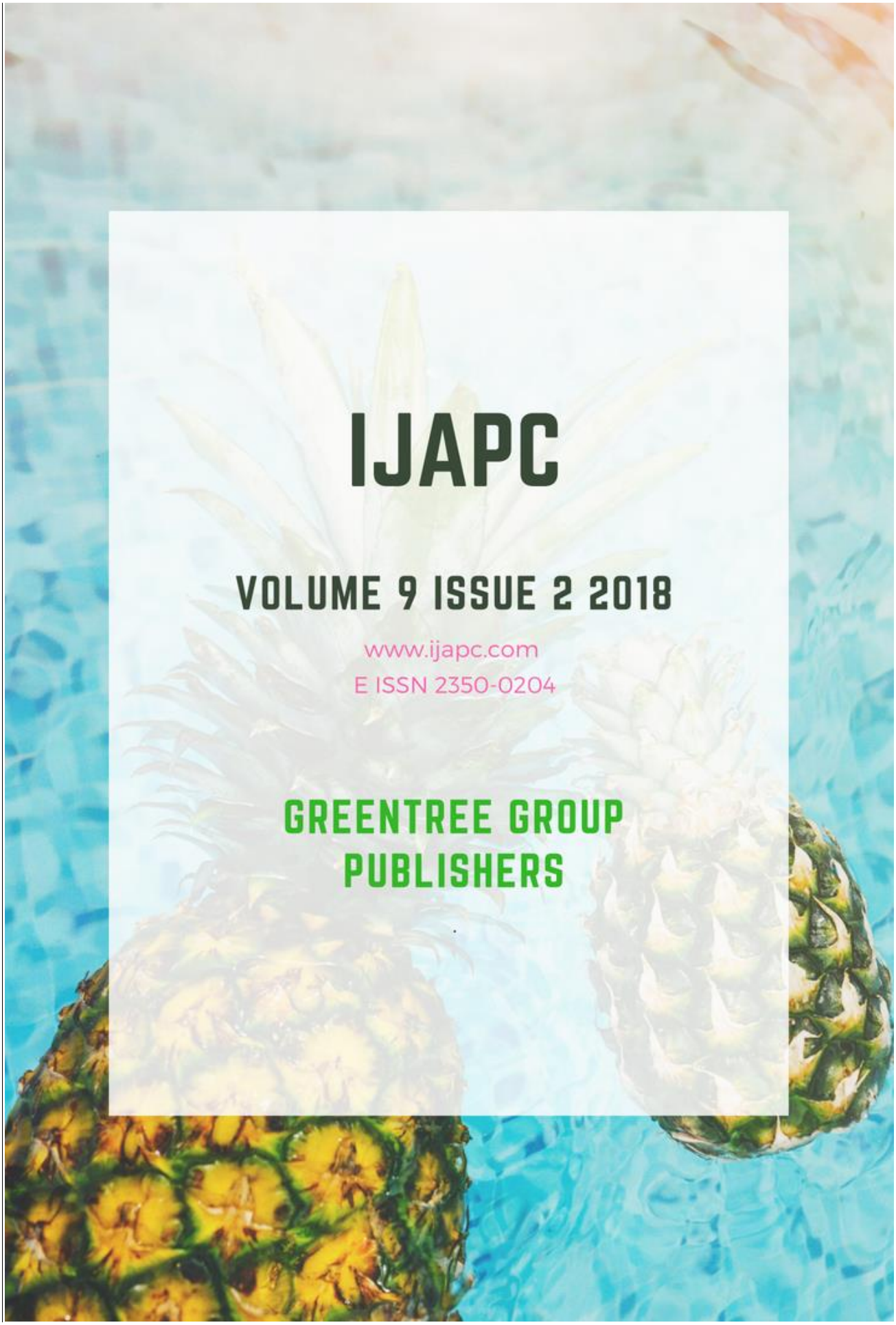

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Phytochemical Evaluation and FT-IR Spectral Analysis of *Begonia floccifera* Bedd. - An Endemic Medicinal Herb

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ABSTRACT

Phytochemical evaluation and FT-IR spectral analysis of *Begonia floccifera* Bedd. an endemic medicinal herb of Southern Western Ghats was carried out. Qualitative phytochemical analysis using hexane, chloroform, benzene, acetone, ethanol and water extracts from *Begonia floccifera* revealed the presence of alkaloids, anthroquinones, carbohydrates, coumarin, flavonoids, phenols, saponins, steroids, tannins, terpenoids, glycosides, sugar and xanthoprotein. The FT-IR spectrum confirmed the presence of N-H, C-H, C-H, C=C, O-H, -C-H, C-F, =C-H, C-Cl groups such as amine, methylene, alkane, phenolic, alkene and halide groups

KEYWORDS

Begonia floccifera, Begoniaceae, *Phytochemical and FT-IR analysis*

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INTRODUCTION

Plants have been crucial in sustaining human health and well-being of mankind and the primary source of therapeutics[1]. The main advantage and benefits associated with the use of medicinal plants are their cost effectiveness and global availability as well as their safety compared to other medicinal products and the lack of major side-effects. Each part of the plant including seeds, root, stem, leaves and fruit potentially contains bioactive components[2].

The family Begoniaceae encompasses more medicinally important species, which help to treat various diseases. Traditionally leaves of *Begonia floccifera* are applied to cure venereal diseases and giving cooling effects to body among the tribal inhabitants of Tirunelveli Hills of Western Ghats[3]. The Kani tribes collect the leaves and rubbed it in cloth to remove the tomentose hairs, chewed and swallow it for shallowness, loss of appetite, to increase the body vigour and fleeting pain in the limbs and joints. The juice of the fresh leaves is given to the young babies for proper development of teeth and bone. The juice of the leaves mixed with honey is taken orally as a revitalizer[4]. To the best of our knowledge, there is no record of study on the phytochemical and FT-IR analysis of *Begonia floccifera*. Hence the present study was carried out to evaluate the phytochemical and FT-IR spectral analysis.

MATERIALS AND METHODS

The whole plant of *Begonia floccifera* was collected from Keeriparai forest range of Kanyakumari district, Tamilnadu, India. The collected specimen was identified with the help of local flora and authentified by Botanical Survey of India, Southern Circle, Coimbatore, Tamilnadu. A voucher specimen was deposited in Department of Botany and Research Centre, Holy Cross College, Nagercoil, Kanyakumari district, Tamilnadu.

Preparation of extracts for phytochemical screening

Freshly collected whole plant of samples of *Begonia floccifera* were dried in shade, and then coarsely powdered separately in a Willy mill. The coarse powder (100g) was extracted successively with hexane, chloroform, benzene, acetone, ethanol and water, each 250 ml in a soxhlet apparatus for 24 hours. All the extracts were filtered through Whatman No.1 filter paper. All the extracts were subjected to qualitative tests for the identification of various phytochemical constituents as per standard procedures[5-7].

FT-IR analysis

Powdered sample of *Begonia floccifera* was mixed with KBr salt, using a mortar and pestle and compressed into thin pellets on a Thermoscientific Nicot iS5 1D1 transmission, between 4000-400cm^{-1}[8]. The pellets were subjected to FT – IR analysis.

RESULTS AND DISSCUSSION

The qualitative phytochemical analysis of the extracts of *B. floccifera* revealed the presence of alkaloids, anthroquinones, carbohydrates, coumarin, flavonoids, phenols, saponins, steroids, tannins, terpenoids, glycosides, sugars and xanthoproteins. The hexane extract showed the presence of alkaloids, flavonoids, phenols, tannins and xanthoproteins. Chloroform extract revealed the presence of alkaloids, coumarin, flavonoids, phenols, steroids, tannins, glycosides and xanthoproteins. The benzene extract showed the presence of alkaloid, carbohydrate, flavonoids, phenols, saponins, glycosides and xanthoproteins. The acetone extract revealed the presence of alkaloids, carbohydrate, flavonoids, phenols, saponins, tannins, terpenoids, glycosides and xanthoproteins. The ethanol extract showed the presence of alkaloids, anthroquinones, carbohydrates, coumarin, flavonoids, phenols, saponins, steroids, tannins, terpenoids, glycosides and xanthoproteins. The aqueous extract showed the presence of flavonoids, phenols, terpenoids and sugar. The maximum phytoconstituents present in ethanolic extract showed the presence of maximum number of (12/15) compounds and minimum phytoconstituents were noticed in water extract (Table 1).

Table 1 Phytochemical screening of *Begonia floccifera*

Bioactive compounds	**Nature of extract**					
	Hexane	**Chloroform**	**Benzene**	**Acetone**	**Ethanol**	**Water**
Alkaloids	+	+	+	+	+	_
Anthroquinones	-	-	-	-	+	-
Carbohydrates	-	-	+	+	+	-
Coumarin	-	+	-	-	+	-
Flavonoids	+	+	+	+	+	+
Phenols	+	+	+	-	+	+
Quinones	-	-	-	-	-	-
Saponins	-	-	+	+	+	-
Steroids	-	+	-	-	+	-
Tannins	+	+	-	+	+	-
Terpenoids	-	-	-	+	+	+
Glycosides	-	+	+	+	+	-
Sugar	-	-	-	-	-	+
Xanthoprotein	+	+	+	+	+	-
Fixed oil	-	-	-	-	-	-

Table 2 FT-IR peak values and functional groups of ethanolic extracts of *B. floccifera*

Peak No	Group frequency (cm^{-1})	Origin	Functional groups
1	3445.25	N-H	Amine stretching
2	2922.14	C-H	Methylene C-H asym/sym. Stretching
3	2852.23	C-H	Alkane stretching
4	2361.09	-	Unknown
5	1648.11	C=C	Alkene stretching
6	1456.25	O-H	Phenol or tertiary alcohol, OH bending
7	1384.45	-C-H	Alkane-C-H bending
8	1032.19	C-F	Halide stretching (fluro compound)
9	874.40	=C-H	Alkene bending
10	669.32	C-Cl	Halide stretching(chloro compound)

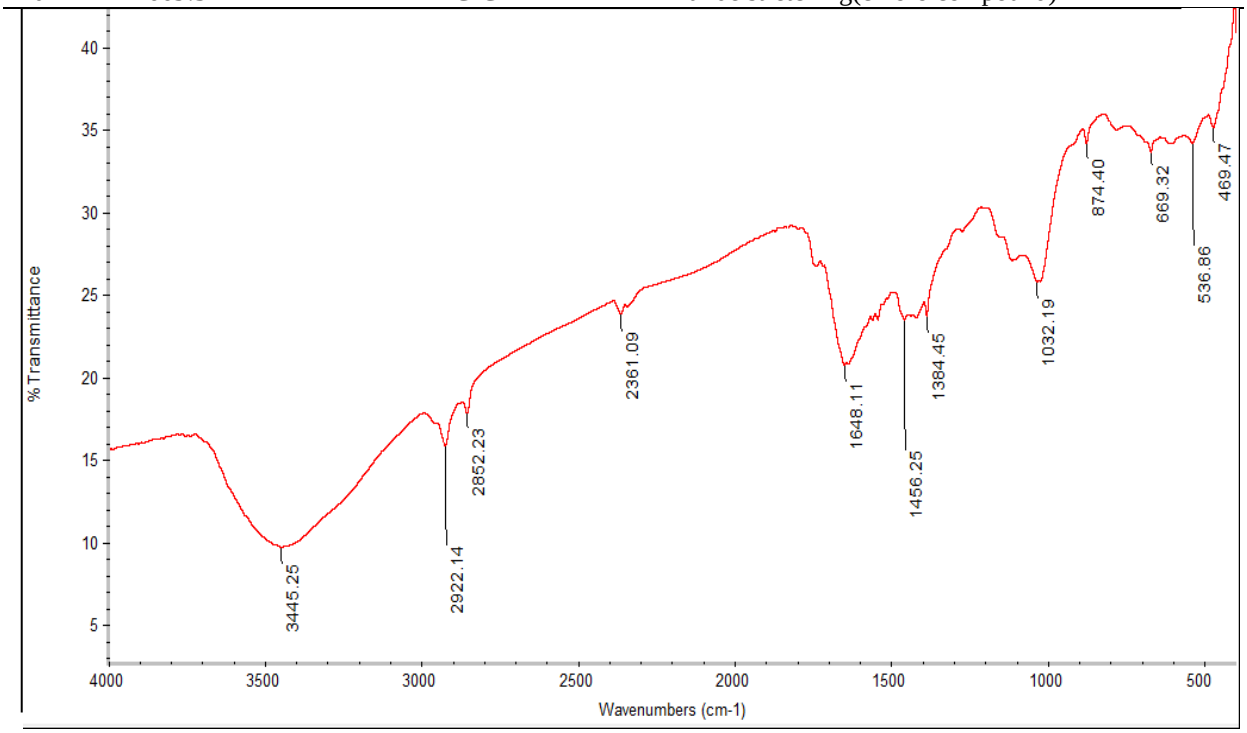

Fig 1 FT-IR spectrum for ethanolic extract of Begonia *floccifera*

FT-IR Spectroscopy studies of *Begonia floccifera* gave the following characteristic absorption peaks as shown in table 2 and fig.1. From the FT-IR spectral data N-H, C-H, C-H, C=C, O-H, -C-H, C-F, =C-H, C-Cl were identified. Among the examined extracts, the ethanolic extract showed the presence of maximum number of (12/15) compounds. This is because of high polarity than other extracts used, hence extracting may of the active ingredients from the plant parts[9]. Flavonoids have been refered to as nature's biological response modifiers because of strong experimental evidence of their inherent ability to modify the body's reaction to allergen, virus and carcinogens. They show antiallergic, antimicrobial and anticancer activity[10,11]. Tannins are known to possess general antimicrobial and antioxidant activities[12]. Recent reports show that tannins may have potential value as cytotoxic and antineoplastic agents[13]. Saponins are a mild detergent used in

intracellular histochemistry staining to allow antibody access to intracellular proteins. In medicine it is used in hypercholesterolemia, hyperglycemia, antioxidant, anticancer, anti-inflammatory and weight loss. It is also known to have anti fungal properties [14]. Saponins have been implicated as bioactive anti bacterial agents of a plant[15, 16]. Plant steroids are known to be important for their cardiotonic activities, possess insecticidal and antimicrobial properties. Plant derived natural products such as flavonoids, terpenoids and steroids etc have received considerable attention in recent years due to their diverse pharmacological properties including antioxidant and antitumor activity. Phenolic phytochemical have antioxidative, antidiabetic, anticarcinogenic, antimicrobial, antiallergic, anti-inflammatory and antimutagenic[17,18]. It suggests that the plants can be used as antimicrobial activity, antioxidant, anti-allergic, anti-inflammatory, antidiabetic, anticarcinogenic, anticancer agents in the future.

The FT-IR spectrum was used to identify the functional group of the active components based on the peak value in the region of infrared radiation. FT-IR analysis of the whole plant powder of *B. floccifera* revealed that the presence of different functional groups ranging from N-H amine stretching (3445.25 cm^{-1}), C-H methylene C-H asym/ sym stretching(2922.14 cm^{-1}), C-H alkane stretching (2852.23 cm^{-1}), C=C alkane stretching (1648.11 cm^{-1}), O-H phenol or tertiary alcohol OH bending (1456.25 cm^{-1}), -C-H alkane bending (1384.45 cm-1), C-F halide stretching (fluro compounds) (1032.19 cm-1), =C-H alkene bending (874.40 cm-1) and C-Cl halide stretching (chloro compound) (669.32 cm-1). Therefore, the FT-IR analysis on *Begonia floccifera* displayed novel phytochemical markers as useful analytical tool to check out not only the quality of the powder but also to identify the medicinally important plant.

CONCLUSION

Based on the results obtained, it is concluded that *B. floccifera* has various bioactive compounds. The present study would direct to the establishment of some novel biologically active compounds that could be used to invent new and more potent drugs of natural origin.

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