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Original Article

Functional Groups Prediction and Elemental Analysis of Ethyl Acetate Leaf Extract of *Alpinia purpurata* (Vieill.) K.Schum

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ABSTRACT
The aim of the present study was to evaluate the functional group and elemental analysis of ethyl acetate leaf extract of Alpinia purpurata. The plant showed the presence of ester carbonyl and unsaturated carbonyl groups in 1730 and 1708 cm^{-1} respectively. There is a strong absorption bands at 2931 and 1458 cm-1 are due to CH and CH_2 groups respectively. Elemental analysis shows the presence of Carbon and oxygen in high concentration with 44.78% and 46.93%. Mean while potassium, chloride and calcium are presented in moderate amount. There is only a trace amount of silicon. The results suggested that the plant extract possess strong functional groups and trace elements.
KEYWORDS: *Alpinia purpurata,* Ethyl acetate, Leaves, Functional groups, Trace elements.

INTRODUCTION

The family Zingiberaceae comprises more than 1200 species that are native to tropical regions, and many of these are valued as ornamentals or employed as raw materials in the production of fibre, paper, dyes, foods, spices and perfumes. Alpinia is the largest genus of the family with more than 200 species [1]. Plants belonging to Zingiberaceae (Ginger family) are known for a number of medicinal properties [2-4]. Spectrums of essential oils are present in the members of Zingiberacae [5]. Rhizome exract of some members of the medicinal Zingiberales are widely used in dietary intake as well as in traditional systems of medicine [6]. *Alpinia* is the largest genus in ginger family in which *A.purpurata* (Vieill.) K .Schum. is a very popular garden plant in India [7]. Rhizome has sharp odour, improves appetite, taste and voice. It is also used for headache, rheumatism, sore throat and renal disease [8]. Phytochemical studies on *A.purpurata* revealed that it possess flavonoids, rutin, kaempferol-3-rutinoside and kaempferol-3-oliucronide [9]. The phytochemical constituents of *A.purpurata* promote antimicrobial activity against certain microorganisms [10]. In addition to the purported anti-inflammatory activity, its phytomedicinal potential to treat tuberculosis is also described [11]. *A.purpurata* may serve as potential antioxidant and anticancer agents against ovarian cancer cell lines [12]. This is the first time to predict the functional group and elemental analysis of this plant.

The main objective of the study is to evaluate the functional groups using FTIR and elemental analysis through EDX analysis.

MATERIALS AND METHODS

Plant material collection and extraction

A. purpurata was collected from Kanyakumari, Tamilnadu, India. The plant specimen was authenticated by Dr. G.V.S. Murthy, Botanical Survey of India, Coimbatore, TNAU campus, India. A voucher specimen has been deposited in the laboratory for future reference (BSI/SC/5/23/10-11/Tech). The voucher specimen was deposited at the herbarium of Karpagam University, Coimbatore. The leaf of *A. purpurata* were washed thoroughly in tap water, shade dried and powdered. The powder (100 g) was exhaustively extracted with ethylacetate in the ratio of 1:5

(*W/V*) for 24 h by using soxhlet apparatus. The extract was completely evaporated to dryness using rotary flash evaporator (Buchi type).

FTIR Spectrum Analysis

The ethyl acetate extract of *A. purpurata* was mixed with KBr salt, using a mortar and pestle, and compressed into a thin pellet. Infrared spectra were recorded on a Shimadzu FTIR Spectrometer 8000 series, between 4,000–400 cm^{-1}.

Energy Dispersive X-Ray Spectroscopy (EDX ANALYSIS)

The ethyl acetate leaf extract derived from plant sample of *A. purpurata* was subjected to the elemental analysis using Scanning Electron Microscope (SEM) with an energy dispersive x-ray spectrometer (EDX).

RESULTS AND DISCUSSION

Medicinal plants have been used to cure disease since antiquity. Plants still constitute one of the major sources of drugs in modern as well as traditional medicine throughout the world [13]. *A. purpurata* is one of the traditional medicinal plants of south pacific region.

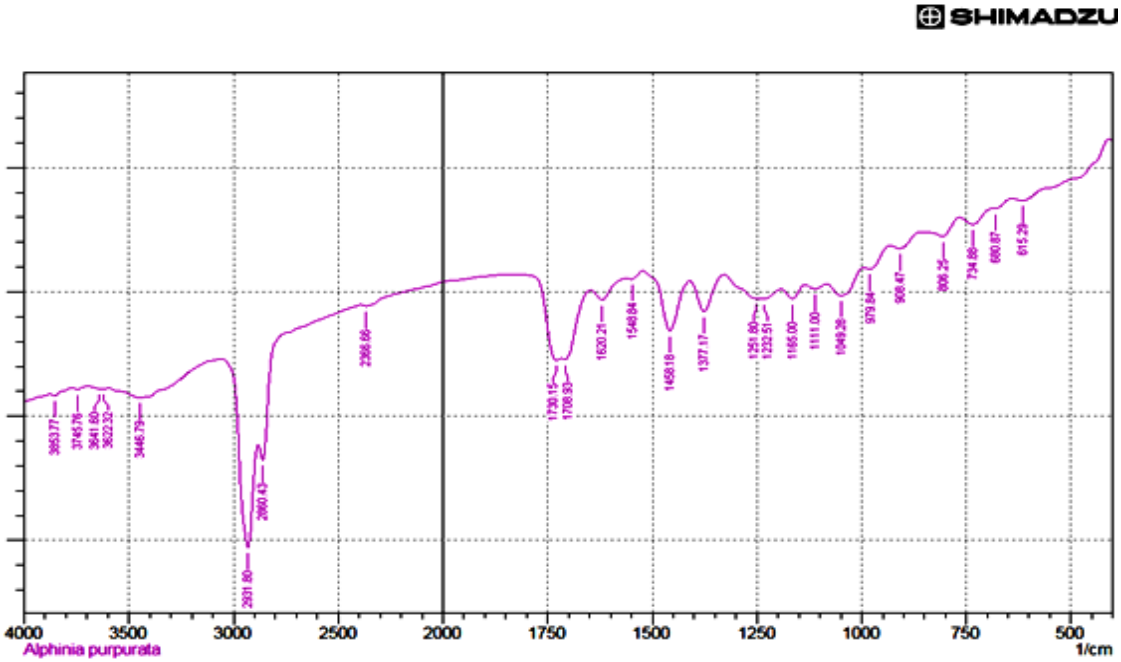

Fig 1: FTIR Spectrum analysis of ethyl acetate leaf extract of *A. purpurata*

The FTIR spectrum of *A. purpurata* is given in fig 1. The C=O absorption bands at 1730 and 1708 cm^{-1} shows the presence of ester carbonyl and unsaturated carbonyl groups respectively. The strong absorption bands at 2931 and 1458 cm-1 are due to CH and CH_2 groups respectively. The amide band are primarily associated with the stretching motion of the C=O group. This C=O band is sensitive to the environments of the peptide linkage and also depends on the rotein's overall secondary structure [14, 15]. The functional group analysis of *Aerva lanata* in one of our previous studies showed the presence of Carboxylic acids, amines, amides, sulphur derivatives, polysaccharides, organic hydrocarbons, halogens [16].

The elemental composition of *A. purpurata* using SEM and EDX technique were showed in table.

The trace elements play a vital role in the medical value of plants as curative and preventive agents in combating disease, nutritive and catalytic disorders [17]. The concentration of mineral and trace elements in plants is so meagre that their importance was ignored for a long time. There is a vast scope to explore the preventive medicinal aspects of various trace elements [18].

Carbon, oxygen, silicon, chloride, potassium and calcium are present in *A. purpurata*. $CaCO_3$, SiO_2, MgO, KCl, K-MAD, Ca-wollastonite are used as the standards. Out of all these elements, Carbon and oxygen are present in high concentration with 44.78% and 46.93%. while potassium, chloride and calcium are presented in moderate amount. There is only a trace amount of silicon.

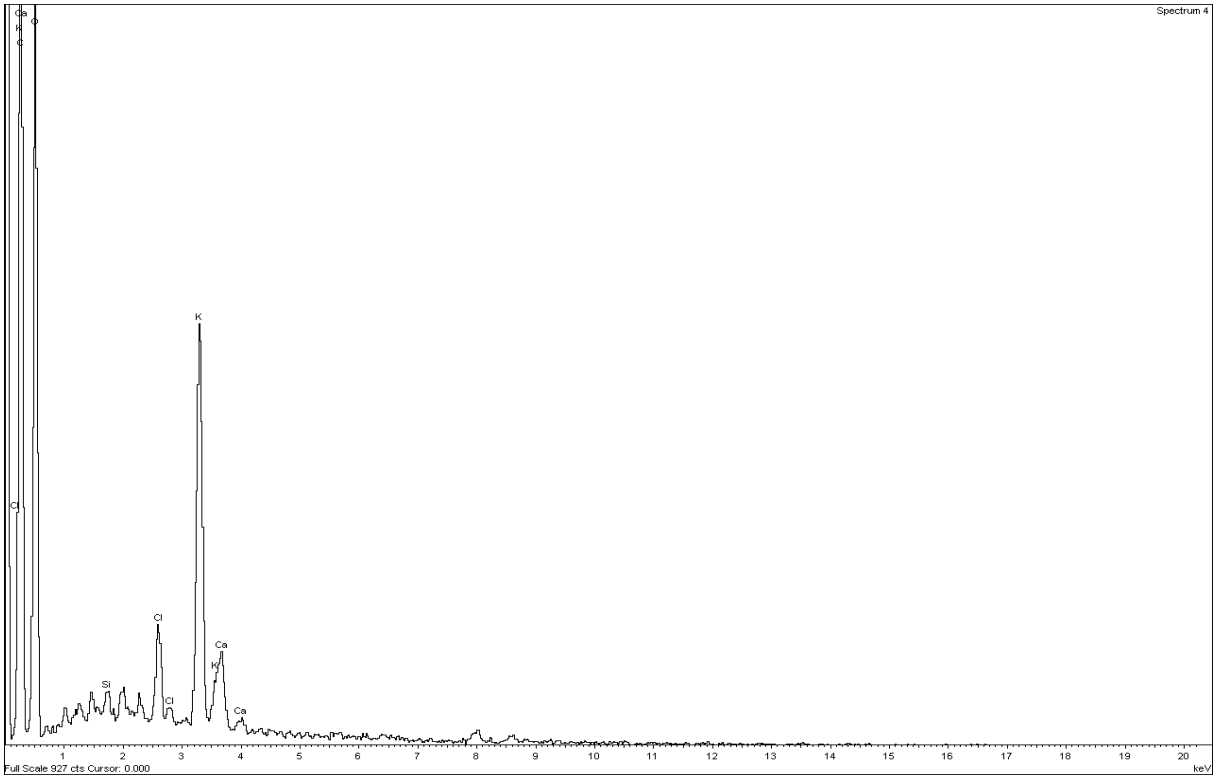

Fig 2: The SEM EDX spectra of ethyl acetate leaf extract of *A. purpurata*

The variation in elemental concentration is mainly attributed to the differences in botanical structure, as well as in the mineral composition of the soil in which the plants are cultivated. Other factors responsible for variation in elemental content are preferential absorbability of the plant, use of fertilizers, irrigation water and climatologically conditions [19]. In *Tylophora pauciflora* the EDAX analysis shows the presence of carbon, magnesium, silicon, chloride, potassium and calcium [20]. A variation in the elements content in plant is due to the nature of the soil and environment.

Table 1 : The percentage of trace elements present in ethylacetate leaf extract of *A. purpurata*

Element	Intensity	Weight%	Weight%	Atomic%
	Corrn.		Sigma	
C	1.0154	44.78	1.38	54.20
O	0.5146	46.93	1.28	42.64
Si	0.9038	0.29	0.08	0.15
Cl	0.8383	1.12	0.11	0.46
K	1.0514	5.84	0.24	2.17
Ca	0.9542	1.04	0.12	0.38
Totals		100.00		

CONCLUSION

The results obtained from the present study showed that the *A. purpurata* has functional groups and trace elements. The intensive study on the out-coming active constituents of *A. purpurata* will lead to the discovery of a novel botanical-drug.

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