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PHYSICOCHEMICAL AND FLUORESCENCE ANALYSIS OF *ARTEMISIA NILAGIRICA* (CLARKE) PAMP

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ABSTRACT

Artemisia nilagirica of Asteraceae family was commonly known as Sage Brush or wormwood and they were grown for its religious importance due to its immense fragrance. In the present investigation, the various plant parts were segregated separately, washed dried and powdered for future analysis. The various parts of the plant (Root, Stem, Leaves and Flower) were subjected to fluorescence analysis with various chemicals and acid such as Conc. HCl, Conc. H_2SO_4, Glacial acetic acid, HNO_3 5% KOH, Picric acid, Ammonia solution, Petroleum ether, Ethanol, 5% NaOH and $FeCl_3$ and their appearance were observed in day light, UV 254 nm and 365 nm. Further the samples were subjected to physicochemical analysis to evaluate the purity and confirm their therapeutic values.

KEYWORDS: **Therapeutic, Fluorescence, Physicochemical, Solvent, Metabolites.**

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INTRODUCTION

Bioactive constituents (Phytochemicals) of plants are of two categories (i.e.) primary and secondary. Chlorophyll, Proteins, Sugars and Amino acids constitute the primary phytochemicals and a phenols, terpenoids, alkaloids, saponins etc. Constitute the secondary metabolites which are highly antifungal, antibacterial, anti-inflammatory[1]. All most all the bioactive constituents are known to have therapeutic activities like anti-inflammatory[2], antibacterial, antifungal[3], anticonstipative[4], spasmolytic[5], antiplasmodial[6], antioxidant[7], insecticidal[8]. Terpenoids exhibit various important pharmacological activities and very important in attracting useful mites and consume the herbivorous insects[9, 10]. Alkaloids (anesthetic agent) of *Momordica charantia* (Curcurbitaceae) is known for its lowering of glucose level in the blood of diabetic patients.[11, 12]. The leaf extract of *Cocculus hirsutus* were useful in eczema, prurigo, impetigo, cough, gonnorhoea, ophthalmia, cephalagia and neuralgia[13, 14]. Phytoscreening and antioxidant activity studies of four routine medicinally important herbs like *Ocimum sanctum* (Tulsi), *Mentha spicata* (Pudina), *Trigonella foenum – graecum* (Fenugreek) were studied and proved to be highly therapeutic[15].In the present investigation, an attempt has been made to excavate the phytochemical and to investigate the physicochemical properties of *Artemisia nilagirica* and prove that the plant has high therapeutic value.

MATERIALS AND METHODS

The Genus *Artemisia* belongs to the Asteraceae family with 200 to 400 species[16]. Most of species have strong aromas bitter tastes and *Artemisia dracunculus* is widely used as culinary herb in French cuisine[17]. The whole plants (disease free) were collected segregated (leaves, flower, root and stem) dried, powdered and stored in air containers for further investigation. In the present study the powdered leaf, stem, flower and root were subjected to physicochemical analysis as per standard methods (Fluorescence and physico chemical analysis)[18,19] to evaluate the quality and purity of the chemical constituents and exposed for fluorescent analysis.

RESULTS AND DISCUSSION

(i) Leaf sample

The dried leaf powder was observed under daylight, UV 254nm, UV 365nm and also exposed to various chemicals and acids and the results are illustrated in the Table 1 and Table 2. The powder remained grey in all the exposures (daylight, UV 254nm, UV 365nm). The leaf powder exhibited black colour with Conc. HCl and yellow to golden yellow (UV 365) in the case of Conc. Nitric acid. On exposure to Conc. Sulphuric acid the powder showed dark brown in daylight, black in UV 254nm, and green in UV365nm.The leaf powder showed similar results with Glacial acetic acid, Petroleum ether, Ethanol as Dark brown and red in UV 254nm and UV365nm, respectively. Surprisingly, the powder showed common result in NaOH, $FeCl_3$ and Ammonia solution (Table 1).

Table 1
Fluorescence analysis results of leaf sample of Artemisia nilagirica

S. No	Reagents	Day light	UV 254nm	UV 365 nm
1	Powder as such	Grey	Grey	Grey
2	Powder + Con.HCl	Black	Black	Black
3	Powder + Con.HNO_3	Yellow	Yellow	Golden yellow
4	Powder + Con. H_2SO_4	Dark brown	Black	Green
5	Powder + Glacial acetic acid	Dark brown	Dark brown	Red
6	Powder + 5% KOH	Dark green	Dark green	Dark brown
7	Powder + Picric acid	Black	Dark brown	Dark brown
8	Powder + Ammonia Solution	Dark green	Dark green	Dark green
9	Powder + Petroleum Ether	Brown	Dark brown	Red
10	Powder + Ethanol	Brown	Dark brown	Red
11	Powder + 5% NaOH	Dark brown	Dark green	Dark green
12	Powder + 5% $FeCl_3$	Dark brown	Dark green	Dark green

(ii) Stem sample

The stem parts of *Artemisia nilagirica* were air dried, powdered and they were subjected to fluorescence various analysis with different chemicals and acids. The powder was directly exposed to direct day light, UV 254 nm and UV 365 nm wherein the sample was grey in daylight and brown in other two exposures. The stem powder was mixed with conc. HCl and the sample turned to dark brown in colour in all the exposures. In the present investigation, the powdered showed black colour in all the exposure with addition of Conc. Sulphuric acid and Picric acid solution (Table 2). Interestingly, the powder showed similar results with the addition of petroleum ether and ethanol with light green colorization in both day light and UV 254nm, whereas it exhibited pink colour at UV 365 nm in both the cases. The stem sample was showed similar results in the case of ammonia solution and sodium hydroxide, where day light and UV 365 nm registered dark green colour. When compared to the exposure to UV 254 nm. When Conc. Nitric acid was added to the stem powder and exposed to day light and UV 254 nm, the sample turned to yellow and in UV 365 nm it had light brown colour. On exposure, with day light and UV 254 nm, in the presence of glacial acetic acid and 5% KoH showed dark green colorization in the day light and had pale green in the case of UV 254 nm and had red colonization in UV 365 nm (Glacial acetic acid) and green with KOH.

Table 2
Fluorescence analysis results of stem sample of Artemisia nilagirica

S. No	Reagents	Day light	UV 254nm	UV 365 nm
1	Powder as such	Grey	Brown	Brown
2	Powder + Con.HCL	Dark brown	Dark brown	Dark brown
3	Powder + Con.HNO_3	Yellow	Yellow	Light brown
4	Powder + Con. H_2SO_4	black	black	Black
5	Powder + Glacial acetic acid	Dark green	Light green	Light red
6	Powder + 5% KOH	Dark green	Light green	Green
7	Powder + Picric acid	Black	Black	Black
8	Powder + Ammonia Solution	Dark green	Green	Dark green
9	Powder + Petroleum Ether	Light green	Light Green	Pink
10	Powder + Ethanol	Light green	Light Green	Pink
11	Powder + 5% NaOH	Dark green	Green	Dark green
12	Powder + 5% $FeCl_3$	Dark green	Dark green	Dark green

(iii) Flower sample of Artemisia nilagirica

During the period of study, the dried flower sample did not show much variation in the colorations with different exposures (Table 3). The powder as such was grey and turned into dark green on addition to Conc. Hydrochloric acid, 5% Sodium hydroxide, 5% KOH, Picric acid, 5% Fecl2 solution in all the cases of exposure. The sample showed dark green coloration with addition of glacial acetic acid in both day and UV 254 nm and registered red colour in UV 365nm. The powder showed grey

colour in day light and UV 254 with petroleum ether and ethanol and white colour in UV 365 nm (Petroleum ether) and pink coloration with ethanol at UV 365 nm.

Table 3
Fluorescence analysis of flower sample of Artemisia nilagirica

S. No	Reagents	Day light	UV 254nm	UV 365nm
1	Powder as such	Grey	Grey	Grey
2	Powder + Con.HCL	Dark green	Dark green	Dark green
3	Powder + Con.HNO_3	Yellow	Yellow	Yellow
4	Powder + Con. H_2SO_4	Black	Black	Green
5	Powder + Glacial acetic acid	Dark green	Dark green	Red
6	Powder + 5% KOH	Dark green	Dark green	Dark green
7	Powder + Picric acid	Dark green	Dark green	Dark green
8	Powder + Ammonia Solution	Dark green	Dark green	Dark green
9	Powder + Petroleum Ether	Grey	Grey	White
10	Powder + Ethanol	Grey	Grey	Pink
11	Powder + 5% NaOH	Dark green	Dark green	Dark green
12	Powder + 5% $FeCl_3$	Dark green	Dark green	Dark green

(iv) Root sample

As like other sample the root powder sample of *Artemisia nilagirica* was subjected to various chemicals and acids and was observed under day light, UV 254nm and UV 365 nm (Table 4). The powder as such was brown in day light and appears grey in UV 254 nm and black in UV365 nm. In the presence of Conc. HCl the powder was dark brown under day light and black under both exposures of UV light. The powder exhibited black coloration in the presence of Conc. Sulphuric acid and Picric acid during the period of study. The powder appeared to be yellow and golden yellow with the addition of Conc. Nitric acid and appeared brown at UV 365 nm which was similar with *Atrocarpus hetrophyllus*[22]. The root sample powder sample on exposure to glacial acetic acid and 5% potassium hydroxide showed dark green and day light and UV 254 nm and white in glacial acetic acid (UV 365nm) and black in 5% Potassium hydroxide. Both petroleum ether and ethanol on addition exhibited brown in day light and light brown on UV 254 nm and appeared white in UV 365 nm, the common observation of dark brown (day light) and dark green (UV 254 nm) has been registered on ammonia solution , 5% Sodium hydroxide and 5% ferric chloride, respectively during the period of study.

Table 4
Fluorescence analysis result of root sample of Artemisia nilagirica

S. No	Reagents	Day light	UV 254nm	UV 365nm
1	Powder as such	Brown	Grey	Black
2	Powder + Con.HCL	Dark brown	Black	Black
3	Powder + Con.HNO_3	Yellow	Golden yellow	Brown
4	Powder + Con. H_2SO_4	Black	Black	Black
5	Powder + Glacial acetic acid	Dark green	Dark green	white
6	Powder + 5% KOH	Dark green	Dark green	Black
7	Powder + Picric acid	Black	Black	Dark brown
8	Powder + Ammonia Solution	Dark brown	Dark green	Green
9	Powder + Petroleum Ether	Brown	Light brown	White
10	Powder + Ethanol	Brown	Light brown	White
11	Powder + 5% NaOH	Dark brown	Dark green	Dark green
12	Powder + 5% $FeCl_3$	Dark brown	Dark green	Brown

Various parts of the plant (Leaf, stem, flower and root) were evaluated for physico chemical properties (Table 5). The dried powdered root sample registered the highest value of total ash of 13.5% followed by leaf (10.4%) and consequently by stem (8.7%) and flower (7.8%). All the samples were subjected to acid insoluble ash content were root sample showed the highest value (3.56w/w) and stem showed the least value (0.94w/w) during the period of

study. The flower sample of *Tagetes erecta* registered 7.44% w/w [20]. Moisture content of the various parts of the *Artemisia nilagirica* during the present investigation were 4.11% w/w (Leaf sample) followed by 3.09% w/w (Flower sample) 2.54%w/w (root sample) and 2.54%w/w (stem sample) which was represented in the Table 5. The maximum moisture content was 4.11% w/w which is lower than the value recorded [21].When the samples were subjected for evaluation of alcohol soluble extract the leaf sample registered the highest value of 1.1g and the least value of 0.37g from flower sample. The plant samples were subjected to petroleum ether and it was found the leaf and stem sample yielded 0.5g and the root sample had 0.4g yield.

Table 5
Physico chemical analysis of Artemisia nilagirica

S.NO	Physico – chemical Parameters	LEAF	STEM	FLOWER	ROOT
1	Total ash content	10.4%	8.7%	7.8%	13.5%
2	Acid insoluble ash	1.33w/w	0.94w/w	2.455w/w	3.56w/w
3	Water soluble ash	80.5w/w	79.5w/w	90.4w/w	78.7w/w
4	Moisture content	4.11w/w	2.54w/w	3.09w/w	2.56w/w
5	Alcohol soluble extract	1.1g	0.9g	0.37g	0.75g
6	Petroleum ether soluble	0.5g	0.5g	0.2g	0.4g
7	Aqueous soluble extract	0.7g	0.5g	0.4g	0.4g

CONCLUSION

The *Artemisia nilagirica* plant was analyzed and found that the leaf predominantly reveals the existence of fluorescence chemical constituents. However, the organic molecules absorb light over a specific range of wavelength and reemit radiations. As a result, the investigation would have a vital role in therapeutic of various diseases.

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