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Pharmacognostic aspect of *Acalypha indica, Vitex negundo* and *Coriandrum sativum*

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ABSTRACT

A study was carried out at Avinashilingam University, Coimbatore to observe the pharmacognostic, phytochemical and biochemical activities of *A. indica*, *V. negundo* and *C. sativum*. The pharmacognostic studies involved organoleptic study, fluorescence analysis, preliminary phytochemical studies and biochemical analysis. Different observation revealed the presence of biologically active compounds. The results of organoleptic study offer a scientific basis for the traditional use. The variation in Colour and taste were observed. Fluorescence analysis gave different colours of powders and treatment with chemicals exhibited changes in reactivity of powders. The biochemical activity also was found to vary significantly among tested plant powders.

Key words: Medicinal plants, *A. indica, V. negundo, C. Satvium* and Pharmacognostic property, phytochemical characters and biochemical activities.

INTRODUCTION

Now-a-days using plants for medical purposes become essential feature of the culture and the tradition. A Major part of the population depends directly on the traditional medicine for the primary health care. The use of higher plants and their extracts to treat infection is the usual practices. The biochemistry of herbs and the pharmacology of their various constituents is an aspect of phytotherapy that initiates many herbalists to do many researches. An investigation has been carried out to evaluate the pharmacognostic, phytochemical and biochemical aspect of *Acalypha indica, Vitex negundo* and *Coriandrum sativum*.

MATERIAL AND METHODS

To assess the activity of selected medicinal plants, pharmacognostic studies like organoleptic study, fluorescences analysis, preliminary phytochemical studies and biochemical analysis were carried out. Organoleptic studies were based on method of Jackson and Snowdown (1968) and fluorescences properties following Kokoski *et al* (1958) and Chore and Pratt (1949). The biochemical parameters like protein (Lowry *et al.,* 1951), carbohydrates (Hedge and Hofreiter, 1962), reducing sugar (Miller, 1972), total soluble sugar (Mahadevan and Sridhar, 1986) phenol (Malick and Singh, 1980) and chlorophylls (Arnon, 1949) were analysed.

RESULTS AND DISCUSSION

Pharmacognostic study

By screening the various leaf extracts of three test plants, the pharmacognostic features were examined through the following parameters.

Organoleptic study

The investigation of organoleptic study of leaf power of *A. indica, V. negundo* and *C. sativum* indicated the characters like colour, odour and taste.

The colour of the leaf powder and the taste were observed and the results are shown in Table 1. The colour varied from dark green to light green in all the three plants with bitter taste and pungent odour. Pandey *et al*. (1984) and Gupta (1986) treated the plant powders with different chemical reagents and observed their behaviors. Here also the above three plant powders were treated with different chemical reagents to find out their diagnostic features.

Fluorescence analysis

All the plant powders treated with various chemicals exhibited various colours in the visible and UV light when compared to control, the three leaf powders revealed colour changes from green to brown in 3rd and 4th treatments. When the powders were treated with aqueous 1N NaOH and ethanol all the plants exhibited varied green colours in visible and UV light and the result are depicted in Table 2.

With the help of fluorescence analysis, we can identify and discriminate *Aloe vera*, *Acorus calamus* and *Symplocos racemosa* from other species. This coincides with the study of Mary *et al*. (1980) who discriminated two species of *Valerina* L. on the basis of morphology, fluorescent analysis and microscopic characters.

Behavior of the leaf powders

It is evident from the results that the leaf powders of three test plants treated with chemicals like $FeCl_3$, NaOH, H_2O, I_2, HCl, $+H_2O$, KOH, ethanol, HNO_3 and H_2SO_4, various shades of green, red and brown colours were obtained. The powder as such

Table 1: Organoleptic study of the powders of *A. indica, V. negundo* and *C. sativum*

S. No	Name of the plant	Colour	Odour	Taste
1.	*A. indica*	Green	Pungent	Litte bitter
2.	*V. negundo*	Light green	Pungent	Bitter
3.	*C. Sativum*	Dark green	Pungent	Litte bitter

Table 2: Fluorescence analysis of the powders of *A. indica V. negundo* and *C. sativum*

S. No	Leaf powder	Treatment with chemical reagent	UV light	Visible light
1.	*A. indica*		Dark green	Greenish yellow
	V. negundo	Powder as such	Pale green	Reddish brown
	C. sativum		Light green	Reddish yellow
2.	*A. indica*		Pale green	Greenish yellow
	V. negundo	Powder + aqueous1 N NaOH	Light green	Yellow green
	C. sativum		Dark green	Reddish green
3.	*A. indica*		Yellowish green	Greenish brown
	V. negundo	Powder +1N HCl	Pale green	Green
	C. sativum		Pale green	Greenish brown
4.	*A. indica*		Green	Green
	V. negundo	Powder + 50 percent H_2O	Pale green	Greenish brown
	C. sativum		Red	Red
5.	*A. indica*		Pale green	Green
	V. negundo	Powder + ethanol	Greenish brown	Yellowish green
	C. sativum		Light brown	Greenish brown

expressed varied green colours and when it was dissolved in water it showed no change in its colour. Various behaviors of powders with different chemical reagents are depicted in Table 3.

During a pharmacognostic study carried out on the flower of *Pterospermum cicerifolium* (L.) by Shome and Mehrotra (1990) greenish purple colour was noted on treatment with 1N HCl and nitro-cellulose.

Table 3: The behaviour of the leaf powders of *A. indica, V. negundo* and *C. sativum* when treated with different chemical reagents

S.NO.	Name of the plant	Treatment with chemical	Observation
1.	*A. indica*	Power as such	Green
	V. negundo		Dark green
	C. sativum		Yellowish green
2.	*A. indica*	Power + 2 % $FeCl_3$	Dark green
	V. negundo		Yellowish green
	C. sativum		Dark green
3.	*A. indica*	Powder + 10 % NaOH	Green
	V. negundo		Yellowish green
	C. sativum		Dark green
4.	*A. indica*	Powder + 5 % KOH	Green
	V. negundo		Orange
	C. sativum		Dark green
5.	*A. indica*	Powder + water shake	No change
	V. negundo		No change
	C. sativum		No change
6	*A. indica*	Powder + Iodine	Green
	V. negundo		Brown
	C. sativum		Dark green
7.	*A. indica*		Dark green
	V. negundo	Powder + HCl	Light green
	C. sativum		Dark green
8.	*A. indica*	Powder + NaOH + H_2O	Light green
	V. negundo		Brown
	C. sativum		Bright green
9.	*A. indica*	Powder + Ethanol	Green
	V. negundo		Bright green
	C. sativum		Green
10.	*A. indica*		Brown
	V. negundo	Powder + Nitric acid	Orange
	C. sativum		Brown
11.	*A. indica*		Bright green
	V. negundo	Powder + H_2SO_4	Deep yellowish green
	C. sativum		Deep green

Phytochemical screening

Phytochemical analysis intends to serve as a major resource for information on analytical and instrumental methodology in plant science (Table 4). A preliminary study was undertaken to assess the active constituents of *A. indica*,

Table 4: Analysis of phytochemicals present in *A. indica V. negundo* and *C. sativum*

S. No.	Reagent	Nature of Colour change	Phytochemicalchanges
1.	Substance + $FeCl_3$		
	A. indica	Blackish brown	Presence of
	V. negundoC. sativum	band is formed	phenol
2.	The powder is put into the test tube and covered with methanol and conc. HCl (4:1) and stoppered. The tube is allowed to stand with occasional shaking for 4- 5 hours		
	A. indica	Green Colour	Presence of
	V. negundo	Greenish yellow	Tannin
	C. sativum.	No change	
3.	Powder + Sudan111*A. indica*	Shining orange	Presence of
	V. negundo	Colour	fixed oil and
	C. sativum.		fat
4.	Substance + 10 % NaOH		
	A. indica	Green dark green	Presence of
	V. negundo		flavonoid
	C. sativum.		
5.	Substance shaken in water		
	A. indica	Frothing absent	Presence of
	V. negundo		saponin
	C. sativum.		
6.	Substance + Chloroform + drop of acetic acid and then heated + conc.H_2SO_4		
	A. indica	Green	Presence of
	V. negundo	Dark green	steroid
	C. sativum.	Deep green	
7.	Powder + conc. HCl		
	A. indica	Deep green	Presence of
	V. negundo	Green	quinone
	C. sativum.	Deep green	
8.	Substance + $FeCl_3$		Presence of
	A. indica	Green	phenols
	V. negundo	Brown	
	C. sativum.	Black band	
9.	Powder + Iodine followed by H_2SO_4		
	A. indica	Black	Presence of cellulose
	V. negundo	Dark black	
	C. sativum.	Dark black	

V. negundo and *C. sativum*. All the phytochemical tests showed positive results in all the test plants. The phytochemicals screened were cellulose, protein, fat and oil, flavonoids, saponin, steroid, phenol, quinone and tannin. No starch was rated from any of the species of *A. indica, V. negundo* and *C. sativum.*

The preliminary phytochemical investigation of selected ethno-medicinal plants of Dindigul district showed the presence of phenolics, flavonoids, terpenoids and alkaloids respectively in 60, 58, 50, and 37 plant species (Karuppusamy *et al*., 2005).

The phytochemical screening of the polyherbal powder showed the presence of alkaloids, carbohydrates, phytosterol and flavonoids. Saponin was absent in all cases. Phytochemicals like alkaloids, carbohydrates, phytosterol, sterols, tannins, proteins, amino acids, saponins, fixed oils, fats and flavonoids were analysed in *Solanum xanthocarpum* by Udayakumar *et al*. (2003).

pH

The pH of the leaf extracts of *A. indica, V. negundo* and *C. sativum* was estimated and found Maximum as 6.5 in *V. negundo*. The pH 6 showed the acidic nature of the extracts of *A. indica* and *C. sativum* (Table 5).

Table 5: pH of plant extracts

S. No.	Name of the plant	pH
1.	*A. indica*	*6*
2.	*V. negundo*	*6.5*
3.	*C. sativum*	6

Biochemical parameters of test plants

Total protein content (table 6)

Biochemical studies on the leaf powders of three plants (*A. indica, V. negundo* and *C. sativum*) revealed that the protein content in *V. negundo* has been found to be maximum of 6.08 g per 100 g powder while in *A. indica*, it has been 3.91 g. In the case of *C. sativum* the protein content was minimum, 5.12 mg per 100 g. Only slight variation was observed in the values of protein in water and powder extract. Udayakumar *et al*. (2003) studied the amount of protein present in *Solanum xanthocarpum*.

Table 6: Estimation of total protein, total carbohydrates and phenol

S. No.	Plant name	Protein (mg/100g)	Carbohyedrats (mg/100g)	Phenol (mg/100g)
1.	*A. indica*	3.91	5.02	3.9
2.	*V. negundo*	6.08	8.32	4.22
3.	*C. sativum*	5.12	7.13	5.61

Table 7: Estimation of chlorophyll

S. No.	Plant Name	Chlorophyll 'a' (mg/100g)	Chlorophyll'b' (mg/100g)	Total Chlorophyll (mg/100g)
1.	*A. indica*	0.09	0.07	0.16
2.	*V. negundo*	0.12	0.10	0.22
3.	*C. sativum*	0.08	0.11	0.19

Total carbohydrates content

The values obtained for the carbohydrates content of three test plants ranged between 5.02 mg/100 as the minimum in *A. indica*, 8.32 mg/100g as the maximum in *V. negundo* and 7.13 mg/100g in *C. sativum* (Table 6).

Naseer Banu *et al*. (2003) estimated carbohydrates contents in *Amaranthus viridis* and *Spinacea oleracea* in which, *A. viridis* showed higher carbohydrate content (3.562 mg/g) than *Spinacea oleracea*. Amount of carbohydrates in polyherbal powder and various extracts was found to be less when compared with *A. viridis*.

Phenol content

There were differences in the values obtained for phenol content of three leaf extracts. A maximum of 5.61mg/100 g phenol was estimated from *C. sativum* and a minimum of 3.9mg/100 g from *A. indica* (Table 6).

Amudhan *et al*. (1999) estimated the total phenol profile in some rice varieties in relation to infestation by Asian rice gall or *Seolia oryzae*. The amount of phenol in the polyherbal powder (6.09) was greater than the other extracts.

Chlorophyll content

Estimation of chlorophyll in the leaf powder of *A. indica* showed 0.09 mg of chlorophyll 'a', 0.07 mg of chlorophyll 'b' and 0.16 mg of 'total' chlorophyll per 100 g. While that of *V. negundo* leaf powder contained 0.12 mg of chlorophyll 'a', 0.10 mg of chlorophyll 'b' and 0.22 mg of 'total' chlorophyll content per 100 g. *C. Sativum* leaf powder contained 0.08 mg, 0.11 mg and 0.19 mg chlorophyll 'a', chlorophyll 'b' and 'total' chlorophyll respectively. (Table 7)

Sims and Gamon (1999) used spectral reflectance for estimation of chlorophyll, anthocyanin, carotenoid concentration, in which the amount of chlorophyll 'a', chlorophyll 'b' and total chlorophyll were calculated. Results of the chlorophyll contents of the above mentioned plants were in accordance with the above findings.

Reducing sugar and total soluble sugar content

The amount of reducing sugar present in all the three plants are shown in Table 8. 100 g of leaf powder of *C. sativum* showed 4.12 g/100 g reducing sugar, while in *V. negundo* the presence of reducing sugar has been 3.14 g/100 g. The content of reducing sugar in *A. indica* has been 1.02 g/100 g.Among the three plants *C. sativum* leaf powder showed higher content of reducing sugar.

The amount of total soluble sugar present in 100 g of *V. negundo* has been 6.9 g while in *A. indica* the presence of total soluble sugar has been 4.2 g/100 g. The content of total soluble sugar in *C. sativum* has been 3.2 g/100 g. Among the three plants *V. negundo* showed higher content of total soluble sugar.

Table 8: Estimation of reducing sugar and total soluble sugar

S. No.	Plant name	Reducing sugar (g/100g)	Total soluble sugar (g/100)
1.	*A. indica*	1.02	4.2
2.	*V. negundo*	3.14	6.9
3.	*C. sativum*	4.02	3.2

The presence of reducing sugar, resins, *etc*. was reported by Wahi *et al*. (1984) in *Aganosma dichotoma* (Roth). Amount of total soluble sugar present sugar present in extracts and dried powders of *A. vera, A. calamus* and *S. racemosa* was observed (Habib *et al*., 2003).

CONCLUSION

The results organoleptic study offer a scientific basis for the traditional use of *A. indica*, *V. negundo* and *C. sativum* which possess characters like varied green, light green, dark green and pungent odour and bitter taste.

The fluorescence studies revealed that the powders of three test plants showed varied degrees of green and brown colours, when it is exposed to visible and UV rays. As the powders were treated with chemicals like $FeCl_3$. NaOH, KOH, I, HCl, NaOH + H_2O, ethanol, HNO_3 and H_2SO_4, the colour changes were noted in the treated powders and colour varied from green, orange and brown.

The phytochemical screening of the test plants may be attributed to the nature of biological active components. The pH of the test plants were found to be acidic and neutral in nature. Of the powders analyzed, *V. negundo* leaf powder showed the maximum protein content, carbohydrates, chlorophylls and total soluble sugars. *C. sativum* exhibited highest phenol and reducing sugar.

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