PHYSICO-CHEMICAL PROFILE OF *CISSUS QUADRANGULARIS* L. VAR-I IN DIFFERENT SOILS

T.SATHISH KUMAR AND M. JEGADEESAN
Department of Environmental and Herbal Sciences
Tamil University, Thanjavur- 613 007, India.

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ABSTRACT :

The aerial parts of *Cissus quadrangularis* L. var-I collected from different soils were chemically analyzed for setting the standard to be of use in Indian Traditional Systems of medicine. Extractive value, ash value, loss on draying, powder analysis, qualitative and quantitative phyto-chemical estimation were estimated.

INTRODUCTION

Cissus quadrangularis L. is a rambling shrub[1] syn. *Vitis quadrangularis* Wall[2], belongs to the family Vitaceae. It is commonly known as "Pirandai" (in Tamil)[3]. Based on morphological characters, three variants of *Cissus quadrangularis* are reported to occur; square-stemmed, round-stemmed and flat-stemmed termed as variant I, II and III respectively [4]. Pharmacognostical studies on var I and II of *Cissus quadrangularis* L. was undertaken by Anoop Austin [5]. Among all variants, variant-I grows almost everywhere in the plains of India [6]. It is one of the valuable medicine in the Indian Traditional System of Medicine.

The aerial parts of the plant are used in asthma, dog bite, insect bite [7], as alterative and stomachic, in scurvy, menorrhagia and digestive disorders[8, 9]. It is used as anti-inflammatory [10], and to promote wound - healing and cardiovascular activity [11], menstrual disorders, in epistaxis [12], and for its helicobactericidal activity [13], and in hypotension[14]. Fracture healing mechanism of the herb was unfolding [15-23].

It contains 0.14% of amyrine delta triterpene, 0.1% of amyrone delta triterpene and of 0.0003% of arborenol iso triterpene in Thailand specimen [24]. It also contains calcium oxalate, carotene, vitamin-C, sitosterols, tetraterpenoide, á, â- amyrins and an anabolic ketosteroid [25, 26], and 3-ketosteroid, acetylcholine [27, 28]. Therapeutic effect of medicinal plants depend upon their chemical

constituents. Chemical constituents of plants may vary depending upon environmental factors like soil, climate, associated flora and methods of cultivation [29,30]. *Cissus quadrangularis* grows in different soil and climate. The present investigation was undertaken with a view to subject the plant samples of *C. quadrangularis* var – I growing in different soil, to physicochemical analysis.

MATERIAL AND METHODS

The aerial parts of *Cissus quadrangularis* Variant-I were collected during flowering period from different places with different types of soil after the plant specimen was identified with the help of local Floras [31–34].

Identity of specimen was further confirmed with the help of Herbarium sheets available in The Rapinat Herbarium, St. Joseph's College, Tiruchirapalli and Botanical Survey of India, Southern Circle, Coimbatore. Voucher specimens are deposited in the department herbarium for future reference (TUH – 68A).

The air dried (shade) plant materials were powdered, which were subjected to determination of total ash, water-soluble ash, acid-insoluble ash, sulphated ash by the methods described in Indian Pharmacopoeia [35-37]. The solubility percentage of powder in water, ethanol, 50% ethanol was also estimated [38].

Powder analysis was carried out as mentioned by Kay [39], Johansen [40]. Qualitative phyto-chemical analysis of the powder was done using procedures of Kokate [38]. Quantitative estimation of total alkaloid, total terpenoid, total glycoside [41], calcium salt and vitamin-C [42] was also determined.

RESULTS AND DISCUSSION

Soil samples A, B, C, and D collected in four localities belong to four types viz. reddish clay loam, clay, clay loam, and sand clay respectively (Table – 1). Among the four soils, soil – B has the highest lime content, soil – C has the lowest and the other two have medium content of lime. pH of the soils also showed variation, soil –B was highly alkaline (pH – 9.2) and the other soils neutral or slightly acidic in nature. Electrical conductivity (EC) of the soil – B has the highest (0.91) and the others in the range of 0.11 to 0.24. In NPK status, soil – C has the highest N content, soil – B has the highest P content and soil – D has the highest K content where as Soil – C has the lowest P content.

Analytical values of the four plant samples collected at different soils remained more or less similar except water-soluble and acid-insoluble ash values (Table – 2) for all the soil samples. Soil – D has the highest water-soluble ash value (8.90%) and soil – B has the least acid-insoluble ash (0.16%). Prakash *et al.* [43] working on *Desmodium gangeticum* also reported that plants

grown in different soil types showed variation in their physicochemical characteristics. Behavior of plant powders to different chemical reagents revealed identical response (Table – 3). Qualitative phytochemical analysis (Table – 4) of 50% EtOH extract revealed that all the biologically active compounds were present in all the samples. Alcoholic (100%) extract of the plant sample also answered positively for most of the compounds except saponins and gum and mucilage. Aqueous extract of the plants showed absence of alkaloids, fixed oil and fats. Quantitative phytochemical analysis (Table – 5) of the four plant samples showed that total alkaloidal Content was (0.022 – 0.024%) and vitamic - C content was almost similar (0.11 – 0.18%). Greatest quantity of total glycosides (2.804%) was found in sample – D. Calcium salts (1.1990%), total terpenoids (2.2520%) were found to be higher in the sample – A. Earlier workers on *C. quadrangularis* [44] reported physicochemical values which are of significant deviation from the values reported here. The difference might be due to the type of from which the specimen was collected.

The present work revealed that *C. quadrangularis* samples collected from different types of soil have variations in their physicochemical profiles. Further pharmacological work is in progress to know their activity profiles.

Table – 1 Soil profile of different locales of plant collection

Sample	Place of collection	Soil Texture	Lime Status	pH	EC	NPK – Value (%)		
						N	P	K
A	Ariyalur in Perambalur Dist.	Reddish Clay Loam	Medium	6.4	0.11	3.72	2.0	5.5
B	A. Mettur in Perambalur Dist.	Clay	Profuse	9.2	0.91	5.64	3.0	5.5
C	Malayalapatti in Perambalut Dist.	Clay Loam	Normal	6.9	0.24	9.48	0.6	4.0
D	Muthupet in Pudukottai Dist.	Sandy Clay Loam	Medium	7.0	0.16	5.64	2.8	6.0

EC = Electrical Conductivity
N = Nitrogen, P - Phosphorus, K - Potassium

Table – 2
Analytical values of *Cissus quadrangularis* samples

Parameters		Sample–A	Sample-B	Sample-C	Sample-D
Total Ash (%)		13.0305	12.4559	12.7945	12.5315
Water-soluble Ash (%)		5.5497	5.4509	5.3306	8.9063
Acid-insoluble Ash (%)		1.0352	0.1608	0.7706	0.5499
Sulphated Ash (%)		22.4691	21.0741	21.9188	18.0807
Loss on Drying (%)		88.42	86.91	86.91	87.20
Solubility (%)	H_2O	12.60	12.62	11.90	12.78
	EtOH	3.40	3.28	3.48	4.14
	50% EtOH	13.82	13.74	13.48	13.44

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Table – 3
Fluorescent behaviour of powder of *Cissus quadrangularis* samples

Chemical	Sample – A		Sample - B		Sample - C		Sample - D	
	Visible light	UV Light	Visible light	UV light	Visible light	UV light	Visible light	UV light
Powder (P)	Light Green	Light Green	Light Green	Light Green	Light Green	Light Green	Light Green	Light Green
P + H_2SO_4	Light Black	Dark Black	Light Black	Dark Black	Light Black	Dark Black	Light Black	Dark Black
P + HNO_3	Brown	Yellow	Brown	Yellow	Brown	Yellow	Brown	Yellow
P + HCl	Light Green	Greenish Yellow	Light Green	Greenish Yellow	Light Green	Greenish Yellow	Light Green	Greenish Yellow
P + NH_4OH	Green	Greenish Yellow	Green	Greenish Yellow	Green	Greenish Yellow	Green	Greenish Yellow
P + Acetic Acid	Light Green	Greenish Yellow	Light Green	Greenish Yellow	Light Green	Greenish Yellow	Light Green	Greenish Yellow
P + Iodine	Light Green	Green	Light Green	Green	Light Green	Green	Light Green	Green
P + $FeCl_3$	Green	Dark Green	Green	Dark Green	Green	Dark Green	Green	Dark Green
P + Piperic Acid	Light Green	Yellowish Green	Light Green	Yellowish Green	Light Green	Yellowish Green	Light Green	Yellowish Green
P + NaOH	Green	Dark Green	Green	Dark Green	Green	Dark Green	Green	Dark Green

Table – 4
Qualitative Phyto-chemical Studies of *Cissus quadrangularis* samples

Compound Tested	Reagent used	Sample - A			Sample - B			Sample - C			Sample - D		
		EtOH	50% EtOH	H_2O	EtOH	50% EtOH	H_2O	EtOH	50% EtOH	H_2O	EtOH	50% EtOH	H_2O
Colour and Physical Nature		Dark green oily semi-solid	Dark green oily semi-solid	Dark Brown Semi-solid	Dark green oily semi-solid	Dark green oily semi-solid	Dark Brown Semi-solid	Dark green oily semi-solid	Dark green oily semi-solid	Dark Brown Semi-solid	Dark green oily semi-solid	Dark green oily semi-solid	Dark Brown Semi-solid
Carbohydrate	Felhing's	-	+++	++	-	+++	++	-	+++	+++	-	+++	+++
	Molish's	+++	++	-	+++	++	-	+++	++	-	++	+=	-
	Benedict's	++	+	+	++	+	+	++	+	+	++	+	+
Alkaloids	Mayer's	+	-	-	+	-	+	++	-	-	+	-	+
	Wagner's	+	-	-	+	-	-	+	-	+	+	-	+
	Hager's	+	+	-	+	+	-	+	+	-	+	+	-
	Dragondroff's	+	+			+			+			+	
Tannis and Phenols	$FeCl_3$ Test	+++	+++	-	+++	+++	-	+++	+++	-	+++	+++	-
	Lead Acetate	++	+++	++	++	+++	++	++	+++	++	++	+++	+++
	Gelatin	+++	++	+	+++	+++	+	+++	++	++	++	++	+
Fixed oil & Fats	Spot Test	+	+	-	+	+	-	+	+	-	+	+	-
Gum & Mucilage	Alcolol Precipitation	-	+	++	-	+	++	-	+	+	-	+	++
Saponins	Foam Test	-	+++	+++	-	+++	+++	-	+++	-	-	+++	+++
Phytosterol	L.B. Test	+	++	+	+	+	+	+	+	+	+	+	+
Flavonides	Shinoda's	+	++	+	+	++	=	+	++	+	+	++	+

Presence of Constituents

+++ = Appreciable amount ++ = Moderate amount
+ = Small amount - = Completely absent

Table – 5
Quantitative phyto-chemical estimation of
***Cissus quadrangularis* samples**

Compound	Colour & Physical Nature	Sample–A	Sample-B	Sample-C	Sample-D
Total Alkaloids (%)	Greenish-yellow oily semi solid	0.024	0.022	0.023	0.024
Total Terpenoids (%)	Dark Green oily semi solid	2.252	2.392	2.056	2.056
Total Glycosides (%)	Dark Brown oily semi solid	2.228	2.276	2.514	2.804
Calcium Salts (%)	-	1.1990	0.5958	0.6336	0.4819
Vitamin–C (%)	-	0.1894	0.1139	0.1176	0.1277

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