



Volatile Compounds in *Pseudocedrela kotschy* (Schweinf.) harms and *Polygonum senegalense* (Meisn.) Sojak Ethanolic Extract and their Potential Biological Properties

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Abstract *Pseudocedrela kotschy* (Schweinf.) Harms and *Polygonum senegalense* (Meisn) Sojak are two plants used in folk medicine. They are known for their various biological properties. These plants are used as decoction, per os but also in bath and by fumigation. In order to determine the active compounds which give to these plants their therapeutic potential when they are used by bath or fumigation; GC/MS analysis is carried out on the hydro ethanolic extracts of *P. kotschy* roots and that of *P. senegalense* leaves. It results that *P. kotschy* content: t-muurolol (1.94%), δ -cadinene (1.40%), α -humulene (1.26%), hexadecanoic acid (11.25%), 9,12- (Z, Z) octadecadienoic acid (26,56%) and *P. senegalense* content: 3-phenyl-2-propenoic acid (2.80%), hexadecanoic acid (5.59%) and E-1- (2,6-dihydroxy-4-methoxyphenyl) -3-phenyl-2-propenone (11.94%)(Cardamonin isomer). These compounds are known for their biological properties.

Keywords *Polygonum senegalense*, *Pseudocedrela kotschy*, GC/MS

Introduction

In African cultural groups, traditional medicine is frequently used in the treatment of several pathologies. *Pseudocedrela kotschy* (Meliaceae) and *Polygonum senegalense* (Polygonaceae) are two of such medicinal plants whose therapeutic value no doubt has a folkloric background, used in rural Bénin. These plants are used as infusions per os but also by bath or fumigation. *Pseudocedrela kotschy* is found abundantly in the moisture of heavy soils; it has been used in the treatment of edema, dermatosis, convulsion [1] and malaria [2,3,4]. Aqueous and ethanol root extract of this plant have been reported to possess gynecological and wound infections it has antiepileptic, analgesic, antipyretic, antimicrobial [5,6] antihyperglycaemic and antihyperlipidaemic properties [7]. *Polygonum senegalense* aqueous ethanol leaves extracts are known for his α -glucosidase inhibitory, antioxidant and antiplasmodial activities [8,9]. The plants were found to contain alkaloids, tannins, terpenoids, glycosides, flavonoids, saponins, anthraquinones and steroids [10,11]. Five limonoids were extracted from *P. kotschy* roots [12]. *Polygonum senegalense* contains flavonoids like: 2',5'-Dihydroxy-3',4',6'-trimethoxychalcone; 2',6'-Dihydroxy-4-methoxydihydrochalcone and 5-Hydroxy-7-methoxy-flavanone[13]; 5,7- dihydroxy-3-(hydroxyphenyl-methyl)-6-methoxy-chroman-4-one [14].



Medicinal plants contain number of biomolecules of therapeutic importance; from the perspective of drug development to the traditional pharmacopoeia, this pharmacological study on volatiles compounds in hydro ethanolic extract of *Pseudoedrela kotschyi* root and *Polygonum senegalense* leaves was undertaken.

Materials and Method

Plant Used

Polygonum senegalense leaves harvested in Adjohoun and the roots of *Pseudoedrela kotschyi* (Schweinf) in Gbegourou-Binassi in the north of Bénin. These species were identified and a voucher was kept at the HNB under the respective numbers: AA6384/HNB and AA6389/HNB.

Plant Extraction

The freeze-dried hydro ethanolic extracts of the two samples are subjected to chloroform extraction with stirring for one hour. The chloroform phase is then recovered for analysis in GC/MS.

GC/MS Analyze

Chromatography analyze were done using gas chromatograph with an electronically controlled pressure type Hewlett Packard (HP 5890, series II, Palo Alto, USA) equipped with a capillary column Tecknokroma TRB-5MS (0.25 mm x 30 meter). Helium is used as carrier gas with a column head pressure of 10 psi. GC was coupled with a mass spectrometer Hewlett Packard (HP 5989 A, Palo Alto, USA). Ionization is carried out as at 70 eV electron impact methods (source temperature: 200 ° C and the quadrupole temperature was 100° C). The volume of solution injected is 1µL. The column temperature is programmed from 50 to 200° C for 10 min at 4° C. min⁻¹. The device is controlled by the ChemStation software.

Results and Discussion

Table 1 summarizes the results from the GC/MS of hydro ethanolic phases of different extracts studied. The two hydro ethanolic phases are rich in saturated acyclic hydrocarbons, acyclic and cyclic unsaturated hydrocarbons like those in essential oils. It is the case of: t-muurolol, δ-cadinene, α-humulene, hexadecanoic acid, hexadecanoic acid ethyl ester, 9,12- octadecadienoic acid (Z, Z)-,9,12- octadecadienoic acid (Z, Z)-2,3-dihydroxypropyl ester, 3β, 22 (E) stigmasta-5,22-dien-3-ol and stigmast-5-en-3β-ol in *P. kotschyi*hydro ethanolic extracts. benzenepropanoic acid, 3-phenyl-2-propenoic acid, docosane, 4-α-methyl-4,4 α-dihydrophenanthren-2-one, hexadecanoic acid, hexadecanoic acid ethyl ester, 3-Eicosene, (E)-, octadecanoic acid, (E)-1-(2,6-dihydroxy-4-méthoxy phényl)-3-phényl-2-propenone (Cardamonin isomer), 5,7-dimethoxyflavanone, 1,5-dihydroxy-4-methoxy anthraquinone in of *P. senegalense* hydro ethanolic phase.

Among these identified compounds, some have therapeutic potentials. α-humulene like trans caryophyllene are sesquiterpeneconstitute a relevant therapeutic alternative for the treatment of inflammatory diseases [15,16]. Many saturated acids are known to have antimicrobial and antifungal properties [17]: hexadecanoic acid (palmitic acid) is known for its anti-inflammatory property [18], lubricant, antiandrogenic, flavor, anti-hemolytic, antioxidant, hypocholesterolemic [19]; 9,12- octadecadienoic acid (Z, Z)-hasanti-inflammatory, antihistaminic, antiacne and antieczemic [20]. Stigmast-5-en-3β-ol (β-Sitosterol) is a phytosterols with anti-Inflammatory and antipyretic activities [21]. It offers protection from colon, prostate, and breast cancer [22]. Products of the plant, phenylpropanoid pathway are abundant in our diet,these include the phenolic acids and compounds such as curcumin which is widely studied for it protective effect against colorectal cancer and anti-inflammatory mechanism of action [23,24,25], 3-phenyl-2-propenoic acid (3-phenylacrylic acid / cinnamic acid) is the first metabolite in this pathway [26]. 5,7- dimethoxyflavanone has anti-inflammatory property [27]. Several biochemical studies have shown that cardamonin has health promoting properties: anti-inflammatory [28], antimutagenic [29], antioxidant, vasorelaxant, hypoglycemic, anti-infectious, antiemetic and inhibit melanogenesis by melanocytes [30]. In addition, Lopez *et al.* [31] found cardamonin in *Polygonum ferrugineum*, and the studies performed lead them to conclude that it has antifungal activity toward *Epidermophyton floccosum*. The presence of cardamonin isomer in *Polygonum senegalense* leaves may confer on them similar biological activities.



Table 1: Phytochemicals identified in hydro ethanolic extracts of *P. kotschy* (Pk) roots and *P. senegalense* (Ps) leaves by GC/MS

RT (min)	MW (m/Z)	Compound name	Peak Area (%)	
			Pk	Ps
7.31	148	4-phenyl-2-butanone		0.53
7.81	212	4-methyl-tétradecane		0.63
8.53	212	Pentadecane		0.43
8.99	150	Benzenepropanoic acid		1.50
9.69	198	Tetradecane	0.24	
10.18	204	Trans- α -caryophyllene	0.34	
10.60	147	3-phenyl-2-propenoic acid		2.80
10.71	204	α - humulene	1.26	
11.17	254	8-methyl heptadecane		0.81
11.30	174	6-phenyl-3-hexen-2-one		0.34
11.70	204	δ - Cadinene	1.40	
11.86	310	Docosane		1.02
12.04	200	1, 2, 3,4-Tetrahydro-2,9-dimethyl- β - Carboline	0.810	
13.61	222	T- Muurolol	1.94	
14.31	219	4-Isopropyl-6-methyl-1, 2, 3, 4 tetrahydronaphtalene	0.58	
14.34	178	1,1'- (1,2- ethenediyl) bis -E- Benzene		0.17
14.45	316	1, 3, 7, 9- tetramethoxy dibenzofuran-4-carbaldehyde	0.32	
15.44	210	4 α - methyl-4, 4 α - dihydrophenanthren- 2- one		2.85
17.64	256	Hexadecanoic acid	11.25	5.59
17.87	284	Hexadecanoic acid ethyl ester	2.92	1.25
18.33	238	1,5-diphenyl-3-pentanone		0.52
19.62	280	3-Eicosene, (E)-		1.60
19.65	280	9,12- octadecadienoic acid (Z, Z)-	26.54	
19.95	284	Octadecanoic acid		2.50
20.14	312	Octadecanoic acid ethyl ester		0.82
22.70	270	E-1-(2,6-dihydroxy-4-methoxyphenyl)-3-phenyl-2-propenone		11.94
24.22	284	5,7- dimethoxyflavanone		2.67
25.14	354	9,12-Octadecadienoic acid (Z, Z)-2,3-dihydroxypropyl ester	2.26	
25.69	270	1,5-dihydroxy-4-methoxy anthraquinone		3.86
30.40	412	3 β , (22E) Stigmasta- 5,22- dien-3-ol	1.25	
30.61	414	3- β ,24 (S)- Stigmast-5-en-3-ol		0.26
31.10	414	Stigmast -5-en-3 β -ol	2.82	

Conclusion

GC/MS studies carried out on hydro ethanolic extract of *Pseudocedrela kotschy* (Schweinf.) Harms roots and *Polygonum senegalense* (Meisn.) Soják leaves, showed presence of bioactive compounds responsible of various medicinal properties. Depending on the active compounds sought, the use of these plants could be defined.

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