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***J. Nat. Prod. Plant Resour.*, 2013, 3 (2):105-109**
(http://scholarsresearchlibrary.com/archive.html)

ISSN : 2231 – 3184
CODEN (USA): JNPPB7

Phytochemical Screening of two Algerian medicinal plants

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ABSTRACT

Some chemical compounds distribution in two plants belonging to the Brassicaceae family were assessed and compared. The medicinal plants investigated were Moricandia arvensis and Pseudocytisus integrifolius were found to contain tannins, coumarins and volatile oils. Saponins and flavonoids were found presente in Moricandia arvensis, but absent in Pseudocytisus integrifolius.

Key words: Medicinal plants, phytochemical constituents, *Moricandia arvensis*, *Pseudocytisus integrifolius*

INTRODUCTION

Chemical compounds that occur naturally in plants, are responsible for color and organoleptic properties. The term is generally used to refer to those chemicals that may have biological significance but are not established as essential nutrients. Scientists estimate that there may be as many different phytochemicals having the potential to affect diseases such as cancer, stroke or metabolic syndrome [1].

For centuries, plant and plant products have been used for treating various illnesses. Today, several medicinal plants and their products are still in use, being employed as home remedies, over the counter drugs as well as raw materials for the pharmaceutical industry and they represent a substantial proportion of the global drug market [2].

The family *Brassicaceae* (=*Cruciferae*) consists of 350 genera and about 3,500 species. *Brassica* crops have been related to the reduction of the risk of chronic diseases including cardiovascular diseases and cancer. *Brassica* foods are very nutritive, providing nutrients and health-promoting phytochemicals such as vitamins, carotenoids, fiber, soluble sugars, minerals, glucosinolates and phenolic compounds [3,4].

The genus Moricandia (Cruciferae) includes five species distributed in North Africa, South Europe, and Western Asia [5]. the leaves of *Moricandia arvensis* (L) are used in traditional cookery, and a decoction of leaves and stems is employed in the treatment of syphilis [6].

Pseudocytisus integrifolius (Salisb.) Rehder subsp. *Glabrescens* (Coss.) Lit. Et Maire, called Quecüdir or El-Kasdir, is endemic to Algeria [7]. This plant is used by local people to nourish the sheep population in this desert region for what they consider to be its antiparasitic properties. This plant is also widely used as an ingredient in numerous local medicines.

The present study was designed to investigate the pharmacognostic and phytochemical properties of leaves and stems of *Moricandia arvensis* and *Pseudocytisus integrifolius.*

MATERIALS AND METHODS

Plants were collected in the region of Ain Sefra –Algéria , during the period of April 2011.The leaves and stems of each plant were separated and dried and finely ground using a coffee grinder to allow a good extraction of plant constituents, then stored in glass vials protected from light.

The researches of organic compounds are performed on different extracts prepared from Different parts of the plant. During the phytochemical examination, three solvents of different polarity (water, diethyl ether, ethanol) are used for the extraction of different families of chemical compounds.

Preparation of ethanolic extract: The ethanolic extract was prepared by a mixture of 50 g dried powdered samples in 300 mL of ethanol under reflux for1h. The extract is filtered by using Whatman filter paper. The filtrate was used for phytochemical screening**.**

Test of flavonoids: Treat 5 mL of alcoholic extract with a few drops of concentrated HCl and 0.5 g of magnesium turnings **[8]**.

Test of tannins: In a test tube,1 mL of ethanolic solution was added to 2 mL of water and 2-3 drops of diluted solution of FeCl3and observed for a green, a blue black or a blue - green coloration, which shows the presence of tannins**[9]**.

Test for alkaloids: 20mL of the extract was added to 5mL of HCl (10%). At this acidic medium heated in a water bath,was added a volume of NH4OH (10%) until obtain a medium of pH= 9which was extracted with diethylic ether and concentrate with a rotary evaporator.The residue will be taken in 0.5 mL of HCl (2%),divide into two equal parts. The first was treated with a few drops of Mayer's reagent and the second with Wagner's reagent. Observation: turbidity or precipitation**[10]**.

Test for sterolicheterosides and triterpenicheterosides: A mixture of 0.5mLof acetic anhydride and 0.5mL of CHCl3 was added to the residue obtained after evaporation of ethanolic solution (10mL). The filtrate was treated with Liebermann's reagent Burchardt. If a solution is blue - green appears, it indicates the presence of sterolichetero sides if it is violet- green, it indicates the presence of triterpenicheterosides**[11].**

Test for reducing compounds:2 mL of aqueous solution was added at 1 mL of the alcoholic solution and 20 drops of Fehling's solution, heat the solution. A brick red precipitate marks the presence of carbohydrates **[9]**.

Test of coumarins:15mL of HCl (10%) was added to 25mL of ethanolic solution, and heated under reflux for 30min and strain the mixture. The residue was extracted with 15 mL of etherin triplicate. Divide the filtrate into three equal parts, evaporate the first in a rotary evaporator, dissolve the residue in 1mL of water and divide the volume into two parts, treat the first with 0.5mLNH4OH (10%), examined under ultra-violet light, fluorescence intensity indicates the presence of coumarins. The second one was used as control **[12]**.

Test of anthracenosides: 8 mL of the ether solution was treated by extractive reagent Bornträger. A positive test is revealed by the appearance of a color ranging from bright orange - red to purple – purple **[12]**.

Test of anthocyanosides: The acidic aqueous solution was treated with NaOH. The presence of anthocyanins was confirmed by a red color at pH under 3 and blue color at a pH between 4 and 6**[12]**.

Preparation of diethyl ether extract: The extract was prepared by a mixture of 50 g dried powdered samples in 300 mL of diethyl ether under reflux for 1h. The extract is filtered by using Whatman filter paper. The filtrate was used for phytochemical screening.

Test of volatile oils: The residue obtained after evaporation of 20 mL of ethereal solution was dissolved in ethanol and concentrated.a residual aroma reveal a positive test **[13]**.

Test of alkaloids bases: The resulting residue obtained was dissolved after evaporation of 10 ml of the ethereal solution in 1.5 mLof HCl 2% and add 1-2 drops of Mayer or Wagner reagent. The appearance of yellowish white precipitate indicates the presence of alkaloid bases**[10]**.

Test of fattyacids: The alkaline aqueous solution was acidified, and then extracted with diethyl ether. The ethereal solution is then concentrated to dryness. A positive test is revealed by obtaining a greasy residue**[13]**.

Preparation of aqueous extract: The extract was prepared by a mixture of 50 g dried powdered samples in 300 mL of diethyl ether under reflux for 1h. The extract is filtered by using Whatman filter paper. The filtrate was used for phytochemical screening.

Test of tannins: 1 mL of the aqueous solution was treated with 1 mL of water and 1-2 drops of dilute solution ofFeCl3. The appearance of a dark green color or blue-green indicates the presence of tannins**[9]**.

Test of saponins: 2 mL of the aqueous solution was added to a little of water and then stir in a strong way[30].Persistent foam confirmed the presence of saponins.

Abandon the mixture for 20 minutes and classify content saponins:

- No foam = Negative test.
- Foam less than 1 cm = weakly positive test.
- Moss 1-2 cm = positive test.
- Foam over 2 cm = very positive test.

Test of starch: 5 mL of solution prepared was treated with the reagent for starch. The appearance of a purplish blue color indicates the presence of starch **[14]**.

RESULTS AND DISCUSSION

Phytochemical tests are performed on different extracts prepared from the dried leaves and ground, using three solvents of different polarities: water, ethanol and diethyl ether. The detection method of the different families of chemicals compounds co-existing is a precipitation reaction or staining reagents. These reactions result in the appearance of turbidity, flocculation or a color change which may, depending on the intensity of the result, the concentration of certain constituents.

Table 1:Phytochemical test results obtained from the leaves of *Moricandia arvensis*

Phytochemical compound		**Resultats**		
		Water	Ethanol	Ether
Phenolic compound	Flavonoïds		++	
	Tannins	+	+	
	Anthocyanosides		-	
	Anthracenosides		++	
	Coumarins		+	
Alkaloids	Alkaloids		-	-
Steroids	Saponins	-		
	Sterols and triterpènes		-	
Fatty acids	Fatty acids			++
Volatile oils	Volatil oils			+
Reducing compounds	Reducing compounds		++	
Starch	Starch	-		

Table 2: Phytochemical test results obtained from the stems of *Moricandia arvensis*

Phytochemical compound		**Resultats**		
		Water	Ethanol	Ether
Phenolic compound	Flavonoïds		+++	
	Tannins	+	+	
	Anthocyanosides		-	
	Anthracenosides		+	
	Coumarins		+	
Alkaloids	Alkaloids		-	-
Steroids	Saponins	-		
	Sterols and triterpènes		-	
Fatty acids	Fatty acids			-
Volatile oils	Volatil oils			+
Reducing compounds	Reducing compounds		+	
Starch	Starch	+		

Qualitative analysis carried out for ethanolic, diethyl ether and aqueousextractsof the leaves and stems of *Moricandia arvensis* and *Pseudocytisus integrifolius* showed the presence of some medicinally active constituents (tables 1,2,3,4).

In the results mentioned in the previous two tables we observed the presence of flavonoïds, tannins, reducing compounds, volatil oils, anthracenosides and coumarins in the two plant parts, in varying quantities. By cons starch is present only in stems and fatty acids are present only in leaves.

We observed too the absence of alkaloids, sterols and saponins in the leaves and stems of *Moricandia arvensis.*

Table 3: Phytochemical test results obtained from the leaves of *Pseudocytisus integrifolius*

Phytochemical compound		Resultats		
		Water	Ethanol	Ether
Phenolic compound	Flavonoïds		-	
	Tannins	++	++	
	Anthocyanosides		-	
	Anthracenosides		+	
	Coumarins		+	
Alkaloids	Alkaloids		-	-
Steroids	Saponins	+		
	Sterols and triterpènes		-	
Fatty acids	Fatty acids			++
Volatile oils	Volatil oils			+
Reducing compounds	Reducing compounds		++	
Starch	Starch	-		

Table 4: Phytochemical test results obtained from the stems of *Pseudocytisus integrifolius*

Phytochemical compound		Resultats		
		Water	Ethanol	Ether
Phenolic compound	Flavonoïds		-	
	Tannins	+	+	
	Anthocyanosides		-	
	Anthracenosides		-	
	Coumarins		+	
Alkaloids	Alkaloids		-	-
Steroids	Saponins	+		
	Sterols and triterpènes		-	
Fatty acids	Fatty acids			-
Volatile oils	Volatil oils			+
Reducing compounds	Reducing compounds		-	
Starch	Starch	+		

The experimental results mentioned in the previous two tables summarizing the phytochemical examination show that tannins, saponins, coumarins, fatty acids and volatile oils are present in all plant parts of *Pseudocytisus integrifolius* in varying quantities.

Table 3: Final results

Phytochemical compound		Results			
		Moricandia arvensis		*Pseudocytisus integrifolius*	
		leaves	stems	leaves	Stems
Phenolic compound	Flavonoïds	++	+++	-	-
	Tannins	+	+	++	+
	Anthocyanosides	-	-	-	-
	Anthracenosides	++	+	+	-
	Coumarins	+	+	+	+
Alkaloids	Alkaloids	-	-	-	-
Steroids	Saponins	-	-	+	+
	Sterols and triterpènes	-	-	-	-
Fatty acids	Fatty acids	++	-	++	-
Volatile oils	Volatil oils	+	+	+	+
Reducing compounds	Reducing compounds	++	+	++	-
Starch	Starch	-	+	-	+

We observed the absolutely absence of flavonoids and alkaloids in the two parts of the plant and the presence of reducing compounds and anthracenosides in leaves only. We observed too the presence of starch in stems only.

In the last table was compiled test results of the Phytochemical Screening of the two plants studied.

CONCLUSION

This phytochemical study based on laboratory tests, which allowed us to characterize the family of chemical compounds that exist in our plants. These plants can be seen as a potential source of useful drugs. Further studies are going in order to isolate, identify, characterize and elucidate the structure of the bioactive compounds. The antimicrobial activity of these plants for the treatments of the diseases as claimed by traditional healers are also being investigated.

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