Research Article

Antioxidant and Antibacterial Activities of Two Algerian Halophytes

*Amina Tabet, Abbes Boukhari
Modeling and Optimization of Chemical Processes (LOMOP), Department of Chemistry Laboratory of Organic Synthesis, University of Badji Mokhtar, B.O. 12, 23000, Annaba, Algeria.
*Corresponding author's E-mail: aminatabet@gmail.com

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ABSTRACT

Because they resist high salinity in soils, Halophyte plants are well adapted to saline habitats, e.g coastal regions, salt marshes, mudflats, and inland deserts. These plants can be useful for new sources of natural antioxidants. In this context, we aimed to study the antioxidant and antibacterial activities of methanolic extracts of the *Tamarix gallica* and *Tamarix articulata* in Southern Algeria (Touggert). The total phenolic and flavonoid contents were measured using colorimetric methods , HPLC analysis for identification of individual polyphenols was identification in different phenolic groups and the quantification are also described, while antioxidant capacities were evaluated using scavenging assays of 1,1-diphenyl-2-picrylhydrazyl radical (DPPH), ferric reducing antioxidant power FRAP, ABTS and total antioxidant capacity of methanolic leaves extract from *Tamarix gallica* and *Tamarix articulata*. The obtained results indicated that Total phenolic contents and flavonoid from extract of Tamarix gallica were founded high against *Tamarix articulata*, 334.19 ± 8.47, 395.62 ± 6.23 mg GAE /g DW for phenolic content and 159.73 ± 6.28, 117.47 ± 4.04 mg CE/g DW respectively and it showed higher antioxidant and antimicrobial activities. The HPLC analysis showed that at least 6 considerable phenolic compounds of leaves extract exist for the two extracts, the major ones being vanillic acid, naringin, and caffeic acid. These naturals plants seed could be a good source of antioxidants and antibacterials for food and pharmaceutical industries.

Keywords: *Tamarix articulate, Tamarix gallica*, HPLC analysis, antioxidants, ABTS, FRAP, DPPH, antibacterial activity.

INTRODUCTION

Halophytes grow in a wide variety of saline habitats, from coastal sand dunes, salt marshes and mudflats to inland deserts, salt flats and steppes [1]. These plants are characterized by a high physiological plasticity not only for their salt tolerance limits, but also for the climatic zone from which they originate.

Among these Halophytes the genus *Tamarix* (Tamaricaceae); this genus includes, according to different authors, between 65 and 90 species [2] that are native to Asia, Africa and Europe. Many *Tamarix* species grow in salty regions like deserts, sand dunes, salt marshes and ravines. Some *Tamarix* species are cultivated as ornamental plants in gardens or as windbreaks or shade trees[3-5]. Halophyte ability to withstand salt-triggered oxidative stress is based on several factors, including the production of antioxidant molecules, such as phenolic acids and flavonoids. In recent years, this interesting feature of halophytes as a potential source of natural antioxidants has aroused the interest of many researchers.

Natural antioxidants occur in all plant parts, and the typical compounds that exhibit antioxidant activities include phenolics, carotenoids and vitamins[6]. Among the various kinds of natural antioxidants, polyphenols constitute the main powerful compound, owing to their multiple applications in food industry, cosmetic, pharmaceutical and medicinal materials[7]. Structurally, phenolics comprise an aromatic ring, bearing one or more hydroxyl substituents, and range from simple phenolic molecules to highly polymerized compounds [8]. In addition to their role as antioxidant, these compounds exhibit a wide spectrum of medicinal properties, such as anti-allergic, anti-arthero-genic, anti-inflammatory, anti-microbial, anti-thrombotic, cardio-protective and vasodilatory effects[9]. Based on these features, the halophytes *Tamarix gallica and Tamarix articulata* were chosen for this study. In the present investigation, we studed total phenolic content, flavonoid, antioxidant and antibacterial activities and HPLC profile of extract from *Tamarix gallica* and *Tamarix articulata* growing in Southeast of Algeria (Touggourt). Therefore, the scavenging activities towards DPPH, ABTS, FRAP, and total antioxidant activity were evaluated of methanolic extracts of *Tamarix gallica and Tamarix articulata*

MATERIALS AND METHODS

Chemical

Methanol (99%) and Folin Ciocalteu reagent were purchased from biochem chemopharma Co (Canada). 1,1-Diphenyl-2-picryl hydrazyl (DPPH) (99%), ascorbic acid (99.7%), gallic acid (99%), sodium carbonate (99%), AlCl3 (99%), rutin (99%) were all purchased from Merck Co, all other reagents used were of analytical grade.

Plant material

All samples were obtained from mature, field-grown plants in the region of Touggourt, Algeria (33.1000°N 6.0666°E arid climate). Green shoots and leaves were collected during the growing season (September 2016).

Samples were collected from two different plants of each species, placed in plastic bags, transported to the laboratory and allowed to air dry. The plant species was identified by Dr. Youcef HALIS, Associate Professor, Scientific and Technical Research Centre for Arid Areas (CRSTRA), Biophysical Station,Touggourt, Algeria.

Preparation of extract

The leaves of T. gallica and T. articulata were rinsed with distilled water, left at room temperature for 5 days in the dark, oven-dried for 1 h at 60° C. The dried leaves of our plants were crushed into small parts and then powdered finely. Extracts were obtained by magnetic stirring of 10 g dry powder in 100 ml pure methanol. Extracts were kept for 24 h at room temperature, filtered through a Whatman no. 4 filter paper. At last, the filtrates were concentrated under vacuum. Then, they were stored at 4 ° C.[10]

Determination of total phenolic content

The total phenolic content was described by Singleton and Rossi (1965) [11], using the Folin-Ciocalteu method with some modifications. It was determined by the ultraviolet and visible spectrometer at 760nm. For this study, differents concentrations (0.3-0.03mg/ mL) of samples were added to 0,5 mL Folin– Ciocalteu phenol reagent (diluted 10 times with distilled water). After 5 min, the melange was mixed with 2mL of saturated sodium carbonate solution (20%). The mixture was stirred after staying 30 min in the dark, the absorbance was read at 760 nm. A standard curve of gallic acid was used .The analysis was performed in triplicate and Total phenolic content of organs was expressed as mg gallic acid equivalents per gram of dry weight (mg GAE/g DW).

Estimation of total flavonoid content

Total flavonoids contents were determined by a colorimetric assay according to Chang CC et al. (2002) method [12] of $AlCl_3$ (2 %) solution was added to 1 ml of methanolic extracts and mixed well during 30 min to give pink color solution. Absorbance of the mixture was determined at 430 nm. Rutin was used to calculate the standard curve (0.1 and 0.02 g/L). Total flavonoid content was expressed as mg of rutin equivalents (REs) per g of extract. All the samples and the standards were analyzed in triplicate.

HPLC analysis

The identification of polyphenols of the extract was achieved using high-performance liquid chromatography (HPLC) according to the method described by Tevfik[13]. The Shimadzu (LC 20, Japan), the system comprised of an LC-10AD pump, a CTO-10A column oven, an SPD-10A UV-DAD detector, a CBM-10A interface and an LC-10 Workstation was utilized. LC-18 column with characteristics (250 mm x 4 mm i.d. x 5 mm) was employed. 20 µl of *Tamarix gallica* and *Tamarix articulata* extract were injected and the components of the mixture were separated by gradient elution at 30 °C. The mobile phases were: A, 98:2 (v/v) acetic acid and B acetonitrile. Acetic acid and the elution gradient was: 0–5 min, 95% B; 10 min, 90% A; 11 min, 80% A; 30 min 60% A; 40 min 50% A; 50 min 20% A. The stream was 0.8 ml/min and the absorbance of detection was 268 nm. Phenolic compound standards were: chlorogenic acid, rutin, gallic acid, caffeic acid, vanillic acid, vanillin, p-coumaric acid, and naringin were dissolved in methanol used for identification of polyphenols present in the two extracts of *Tamarix Gallica* and *Tamarix articulata*. The identification of peak in HPLC was realized by comparison of the retention time of reference standards. The concentration of individual phenolic compounds in the extracts was done using the peak area of reference compounds and reported as mg/g of extract.

Antioxidant assays

Evaluation of total antioxidant capacity

The phosphomolybdenum method was based on the reduction of Mo (VI) to Mo (V) by the extract plant produce the formation of a green phosphate/Mo (V) complex at acid pH (Prieto et al, 1999) [14]. 1 ml of reagent solution (0.6 M sulfuric acid, 0.28 M sodium phosphate and 0.04 mM ammonium molybdate) was mixed by 0.1 ml of methanolic extract. The samples were brooded in a thermal block at 95 _C for 90 min. Thene, the absorbance of each solution was measured at 695 nm after the cooling of mixture at room temperature. All samples were analysed in triplicate.The antioxidant capacity was expressed as mg gallic acid equivalent per gram dry weight (mg GAE/g DW).

DPPH assay

DPPH quenching ability of methanolic extract was measured on the basis to scavenge the 2, 2-diphenyl-1-picrylhydrazil free radical according to the method of Hanato et al. (1988) [15]. 1ml of the extract at known concentrations was added to 0.25 ml of methanol solution DPPH_ methanolic solution. The mixture was allowed to stand at room temperature for 30 min in the dark, the ability of extracts to reduce the stable radical DPPH to the yellow-colored DPPH, before measuring the absorbance at 517 nm, the abilityof extracts to reduce the stable radical DPPH to the yellow-colored DPPH. The ability to scavenge the DPPH radical was calculated using the following equation:

DPPH_scavenging effect % = $[(A0-A1)/A0] \times 100$

Where $\mathbf{A_0}$ is the absorbance of the control at 30 min,

$\mathbf{A_1}$ is the absorbance of the sample at 30 min.

The antioxidant capacity of the extract was expressed as IC50. The IC50 was calculated form the antioxidant activities (%) of pure compound applied at different concentrations. Trolox was used as a standard.All samples were analyzed in triplicate. A lower IC50 value corresponds to a higher antioxidant activity of plant extract

FRAP assay

The ability of the extracts to reduce Fe^{3+} was determined by the method described by Bainsi [16] and Strain with some modification. FRAP reagent contained: 2.5 ml of TPTZ (Tripyridyltriazine, 10 mM) mixed with 10 ml of HCl (40 mM) added to 2.5 ml of 20 mM $FeCl_3$. After, 25 mL of 0.3M acetate buffer (pH 3.6) was mixed with the above reaction. 1.8 ml of freshly prepared added to the volume of 0.2 ml of methanolic extract (concentration of extract 0.9 mg/ml) or standard (Ascorbic acid) was added to 1.8 ml of freshly prepared FRAP reagent. The absorbance of each sample solution was subsequently measured at 595 nm using a spectrophotometer (Shimadzu UV-1800, Japan). The results were expressed as mg AAE/g dry weight, using the equation obtained from the calibration curve: y= 1.9249 x +0.0039.All determinations were performed in triplicate.

ABTS assay

The antioxidant activity of different extracts stem, flower and seed from *Rumex vesicarius* L were evaluated by ABTS scavenging assay radical [17]. ABTS reagent was prepared by 10 mL (7 mM ABTS solution and 178 µL of 140 mM potassium persulfate aqueous), the mixture was incubated at room temperature in darkness for 13 h before use. 2 µL of extracts or standard were added to 1.588 µL diluted ABTS solution to react in the dark at room temperature after 10 min. The absorbance is reader at 732 nm. The percentage inhibition of ABTS radical as calculated following the equation:

ABTS radical scavenging activity = $[(Abs_{control}-Abs_{sample})/ Abs_{control}] \times 100$

Where, $Abs_{control}$: Is the absorbance of ABTS radical + ethanol

Abs_{sample}:Is the absorbance of ABTS radical + ethanol extract or standard.

Antibacterial activity

Antibacterial activity of *Tamarix gallica* and *Tamarix articulate* extract was evaluated, the following bacteria were tested: E. coli (ATCC 35218 P), Micrococcus luteus (NCIMB 8166) and *Staphylococcus aureus* (ATCC 29213). All strains were obtained from the laboratory of pathology, hospital central of El Oued (Algeria). Sensitivity of different bacterial strains to various extracts were measured in terms of zone of inhibition using agar-diffusion assay. The bacterial suspension was adjusted with sterile saline to a concentration of approximately 1.0 10^7 cells.mL^{-1}. The plates containing Mueller–Hinton agar is spread with 0.2 mL of the inoculums. Wells (6 mm diameter) were cut out from agar plates using a sterilized stainless steel borer [18]. In this method, extracts were dissolved in a small quantity of ethanol and were then prepared to the solutions at concentrations of 500 mg/mL with sterile water firstly. These solutions were diluted in sterile water to form different concentrations of samples (50 and 100 mg.mL^{-1}) for leaves of *Tamarix gallica* and *Tamarix articulate* methanolic extracts. Finally, each well was filled with 100 µL of solution and the plates inoculated with different bacteria were incubated at 37°C for 24 h and diameter of resultant zone of inhibition was measured.

Statistical Analysis

Experimental values are given as means ± standard deviation (SD) of three replicates for antioxidant activity and antibacterial activity. Statistical significance was determined by one way variance analysis (ANOVA). Statistical calculations were carried out by OriginPro Version 9.1 software (OriginLab Corporation). Values of $p < 0.05$ were regarded as significant.

RESULTS AND DISCUSSION

Total phenolic and flavonoids contents

Preliminary evaluation of the phytochemical composition of methanolic extracts of *Tamarix gallica* and *Tamarix* gives results represented in the Table 1. From this table, it is found the extracts of the plants studied contain polyphenols and flavonoids.

The total polyphenol content of the methanolic extract of *Tamarix gallica,* and *Tamarix articulata* obtained by maceration method was expressed as gallic acid equivalent per gram of dry weight. The edible leaves of *Tamarix gallica* and *Tamarix articulata* were found to be rich in polyphenols, in addition a high concentration of phenolic content found in *Tamarix gallica* 334.19 ± 8.47 mg of GAE/g of dry weight and we found 395.62 ± 6.23 mg of GAE/g *Tamarix articuluta* of dry weight in *Tamarix articulata* extract. Similar results for the total flavonoid content.

The results showed that extracts from *Tamarix gallica* and *Tamarix articulata* contained 159.73 ± 6.28, 117.47 ± 4.04 mg of catechin/g of dry weight respectively. Presented results are in the agreement with those published earlier indicating *Tamarix Gallica* accessible source of natural phenolic compounds[19,20].

Previous studies have reported on a correlation of phenolic content with antioxidant activities[21, 22]. Some of the most important bioactive of phytochemical constituents such as flavonoids and tannins possess antioxidant[23].

HPLC analysis

The chromatographic profile of methanolic extract of *Tamarix gallica* and *Tamarix articulata* represented in Figure 1-2. The results of quantitative analyzes of phenolic compounds show that in methanolic extrats the standards compound gallic acid, chlorogenic acid, vanillic acid, caffeic acid, vanillin, p-Coumaric acid, rutin, and naringin. The contents of these components in different extracts were determined according to the calibration curves[24].

Table 1: Phenolic content, flavonoids content, Scavenging activity of DPPH and AAT of *Tamarix gallica* and *Tamarix articulata* leaves extracts. Antioxidant activity of DPPH expressed as % inhibition IC_{50} values (mg/ml).

	Tamarix gallica	*Tamarix articulata*
Phenolic content (mg GAE /g DW)	334.19 ± 8.47	395.62 ± 6.23
Total flavonoids (mg CE/g DW)	159.73 ± 6.28	117.47 ± 4.04
ATT (mg GAE/g DW)	298.64 ± 7.72	341.69 ± 8.28
DPPH (IC_{50}= µg/ml)	05.70 ± 0.12	4.070 ± 0.11

Where y was the peak area and x was the concentration of compound (0–80 µg/ml). The quantitative results are specified in Table 2 and Table 3 for *Tamarix gallica* and *Tamarix articulata* respectively. For *Tamarix gallica*, the major peaks eluted at 15.53 min, was identified as vanillic acid. Two other major peaks were eluted at 34.78 and 16.27 min were identified as naringin and caffeic acid respectively, these compounds were identified by using authentic standards and their UV spectral characteristics. Un+fortunately, three components with retention times of 21.46, 23.81 and 28.37 were not identified. For *Tamarix articulata*, four major peaks were observed and eluted at 13.39, 16.27, 23.81 and 45.05 corresponding chlorogenic acids, caffeic acid, p-coumaric acid, and quercetin consequently. One compound with retention times of 28.37 was not identified. There is the first time to investigate the HPLC profile of *Tamarix gallica* and *Tamarix articulata* leaves extract.

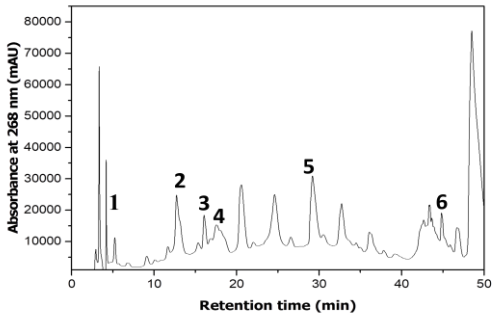

Figure 1: The HPLC chromatogram of methanolic leaves extract from *Tamarix gallica* at 268 nm.

Table 2: Quantification of identified individual phenolic compounds of *Tamarix gallica* extract at 268 nm using HPLC system.

Identified compounds	Retention Time (min)	Equation curve	Area	Area (%) in fraction	Height (uV)	Quantity (mg/g DW)
Gallic acid	5.29	y=54681x	231429	1.019	10908	4.232±0.01
Chlorogenic Acid	13.39	y=21665x	108997	0.480	4856	5.031±0.02
Vanillic Acid	15.53	y=65077x	531407	2.340	8186	8.165±0.03
Caffeic Acid	16.27	y=84066x	525925	2.315	16838	6.256±0.02
Vanillin	21.46	y=58930x	-	-	-	ND
p-Coumaric Acid	23.81	y=49495x	-	-	-	ND
Rutin	28.37	y=28144x	-	-	-	ND
Naringin	34.78	y=19377x	151609	0.667	4539	7.823±0.03
Quercetin	45.05	y=55378x	159174	0.701	6357	3.507±0.01

ND: Not detected

1: Gallic acid; **2**: Chlorogenic Acid; **3**: Vanillic Acid; **4**: Caffeic Acid; **5**: Naringin; **6**: Quercetin.

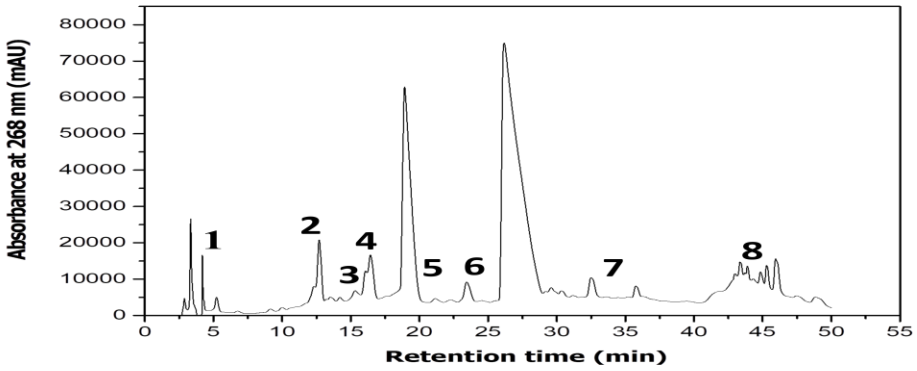

Figure 2: The HPLC chromatogram of leaves extract from *Tamarix articuluta* at 268 nm.

Table 3: Quantification of identified individual phenolic compounds of *Tamarix articuluta* extract at 268 nm using HPLC system.

Identified compounds	Retention Time (min)	Equation curve	Area	Area (%) in fraction	Height (uV)	Quantity (mg/g DW)
Gallic acid	5.29	y=54681x	136852	0.820	5449	2.574±0.01
Chlorogenic Acid	13.39	y=21665x	123706	0.741	3883	5.791±0.02
Vanillic Acid	15.53	y=65077x	266213	1.595	5439	4.090±0.02
Caffeic Acid	16.27	y=84066x	461760	2.767	15150	5.492±0.01
Vanillin	21.46	y=58930x	134417	0.805	2599	2.280±0.01
p-Coumaric Acid	23.81	y=49495x	282983	1.696	6903	5.717±0.02
Rutin	28.37	y=28144x	-	-	-	ND
Naringin	34.78	y=19377x	33723	0.202	1364	1.740±0.01
Quercetin	45.05	y=55378x	254411	1.525	10985	5.606±0.02

ND: Not detected

1: Gallic acid; **2**: Chlorogenic Acid; **3**: Vanillic Acid; **4**: Caffeic Acid; **5**: Vanillin; **6**: p-Coumaric Acid; **7**: Naringin; **8**: Quercetin.

Total antioxidant activity

Several tests and methods have been developed to evaluate the antioxidant capacity of plant extracts. Each assay determines the antioxidant activity of the test material from a different perspective. The best approach to determining the antioxidant activity of a plant extract is using a combination of two or more complementary test systems to gather[25]. The phosphomolybdenum method is based on the reduction of Mo (VI) to Mo (V) by the antioxidant compounds and the formation of green Mo (V) complexes with a maximal absorption at 695 nm. The total antioxidant activity of *Tamarix articulata* showed the highest activity with 341.69 ± 9.28 mg AGE/ g DW and *Tamarix gallica* with 298.64 ± 7.72 mg AGE/ g DW (Table 1). These strong results confirmed high antioxidant activity of leaves extract for the two extracts.

DPPH scavenging radical activity

The inhibitory concentrations of leaves extract required scavenging 50% of the DPPH radical, the IC_{50} values of antioxidant activity of methanolic leaves extract from *Tamarix articuluta* and *Tamarix gallica* was presented in Table 1 and [Figure 3]. It shows that methanolic leaves extract of *Tamarix articulata* exhibited the highest DPPH radicals with IC_{50}= 4.07± 0.012 µg/ml and *Tamarix gallica* also showed the important scavenging of DPPH radicals (IC_{50}=5.64± 0.042 µg/ml). The results showed high polyphenol contents in methanolic extract had the most potent radical scavenging capacity. Moreover, the concentrations of phenolic compounds were higher in the extract which could suggest that the high antioxidant capacity observed might be attributed mainly to the polyphenols, this antioxidant ability to trap the DPPH radical bound to the high amount of polyphenols in our extracts[26].

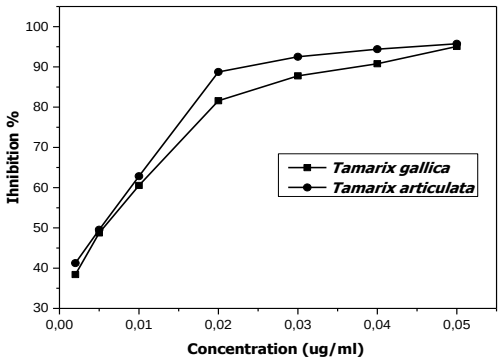

Figure 3: DPPH scavenging activity of methanolic leaves extracts from *Tamarix gallica* and *Tamarix articulata*

FRAP assay

FRAP antioxidant activity of methanolic extract from *Tamarix articulata* and *Tamarix gallica* also showed a wide range, the highest activity observed for *Tamarix articulata* (473.54 ± 7.05 mg/g) and the lowest in *Tamarix gallica* (462.41 ± 7.28 mg/g). The antioxidant scavenging activities of the tow extracts for FRAP assay were shown in Table 4.

ABTS assay

Figure4 showed the dose-response curves of ABTS scavenging activities of methanolic extracts from *Tamarix articulata* and *Tamarix gallica* and reference antioxidant (BHT) on ABTS radicals. As shown in this Figure , the ABTS radical scavenging activity of all extracts started with low values 22.05 ± 0.58 µg/ml and 15.84 ± 0.46 µg/ml at a concentration of 125 $\mu g \cdot mL^{-1}$, respectively. After a rapid growth, reached to stabilization 381.36 ± 5.74 µg/ml and 356.37 ± 4.21 µg/ml at a concentration of 750 $\mu g.mL^{-1}$, respectively. The abilities of scavenging ABTS radicals were in descending order: BHT >*Tamarix articulata*> *Tamarix gallica*.

Table 4: The antioxidant scavenging activities of the tow extracts for FRAP assay and ABTS assay

	Antioxidant activity	
	ABTS 50% (µg/ml)	**FRAP (mg/g)**
Tamarix articulata	381.36 ± 5.74	473.54 ± 7.05
Tamarixgallica	356.37 ± 4.21	462.41 ± 7.28

Values are expressed as means ± SD of triplicate measurements.

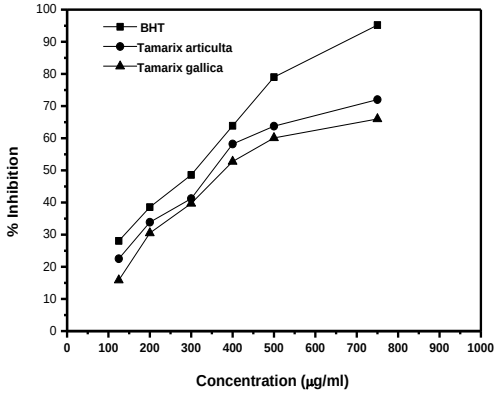

Figure 4: ABTS radical scavenging activity of *Tamarix articulata* and *Tamarix gallica*

Antibacterial activity

The results of antimicrobial activity evaluation of methanolic extracts of *Tamarix articulata* and *Tamarix gallica* measured by the agar diffusion method against selected pathogenic bacteria. Table 5 is included on the one hand the values in (mm) zones or diameters of inhibitions, representing the size of the halo formed by the microorganisms destroyed by the antimicrobial activity of the extracts and the antibiotic. For the extracts, we notice that methanolic extract of *Tamarix articulata* shows a higher activity than the methanolic extracts of *Tamarix gallica*.

The diameter of the area inhibition range for all bacteria treated with *Tamarix gallica* and *Tamarix articulata* extracts increased from 0 to 9 mm and from 0 to 13.5mm respectively, when the concentration increased from 2 to 100 mg/l. The strongest activity of methanolic extract of *Tamarix gallica* and *Tamarix articulata* was recorded against M. luteus and the lowest activity was observed against E. coli. Concerning antifungal tests, both organ extracts failed to show any activity against all Candida excepting the highest extract concentration (100 mg/ml). Several studies attributed the inhibitory effect of plant extracts against bacterial pathogens to their phenolic composition[27, 28].

Table 3: Antibacterial activity of *Tamarisk gallica* leaves *(T.G)* and *Tamarisk articulata (T.A)* extracts at different concentrations (mg/ml). Inhibition zone calculated in diameter around the disc (mm).

Bacterial strains	mg/ml	T.G	T.A	Control (+) gentamycin (10UI)
S.aureus, ATCC25923	100	8.5	9.5	22
	4	7.5	9.00	22
	2	7.00	8.5	22
Micrococcus luteus, NCIMB 8166	100	9.0	9.00	26
	4	7.5	8.00	26
	2	7.00	7.00	26
E. coli, ATCC 35218 P	100	8.0	9.5	27
	4	6.5	7.5	27
	2	6.5	7.00	27

No antimicrobial activity (), inhibition zone <1 mm. Weak antimicrobial activity (w), inhibition zone = 1 mm. Slight antimicrobial activity (+), inhibition zone 2–3 mm. Moderate antimicrobial activity (++), inhibition zone 4–5 mm. High antimicrobial activity (+++), inhibition zone 6–9 mm. Strong antimicrobial activity (++++), inhibition zone >9 mm. Standard deviation ± 0.5 mm. For all bacteria, the inhibition zone of the control (+) gentamycin (10 UI) was higher than 9 mm (++++). The diameter of disc was 6 mm.

CONCLUSION

In this study, phytochemical investigation, HPLC analysis, in vitro antioxidant activities and Antibacterial activity of methanolic leaves extract from *Tamarix Gallica* and *Tamarix articulata* acquired by the maceration technique have been examined. The richness of extracts with the phenolic and flavonoid content is remarkable and maybe a considered source of these compounds. Furthermore, in vitro assays showed high antioxidant activity, sufficient ability to inhibit the DPPH radical and phosphomolybdate. Furthermore, with a powerful analytical HPLC technique, identification and quantification of 6 and 8 phenolic compounds were achieved for *Tamarix Gallica* and *Tamarix articulata* successively can be used as antiradical drugs. In this context, the data presented in this work suggest that *Tamarix Gallica* and *Tamarix articulata* could be a new source of polyphenols, antioxidant and Antibacterial activity, which is a dare for new medicaments.

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