The potential of benefiting variation between the same species of *Artemisia herba-alba* from different Location in Northeast of Libya

ABSTRACT

The medicinal plants (*Artemisia herba-alba*) were subjected to mineral analysis, total protein and the phenolic contents. Couple plants were collected from AL-Gabal AL-Akhder region in Northeast of Libya (Coastal and Desert) *Artemisia herba-alba* 1 *Artemisia herba-alba* 2 respectively during November (2018). Results showed that mineral content found to vary significantly. Appreciable amounts of calcium Ca was recorded 84.930 ppm in *Artemisia herba-alba* 1 while 30 ppm in *Artemisia herba-alba* 2, potassium (K) was 43.3 and 27.6 ppm in *Artemisia herba-alba* 1 and *Artemisia herba-alba* 2 respectively. Meanwhile, Fe was recorded as 0.39, 0.52 ppm in *Artemisia herba-alba1* and 2. Level of total protein was 9.95 and 7.79 (mg/g) in *Artemisia herba-alba* 1 and *Artemisia herba-alba* 2 respectively. Present study found that the phenolic compounds were determined in both plants with high levels. The available data indicate the two plants were found to contain Alkaloids, essential oils, flavonoids, glycosides, phenolic compounds, sterols/triterpenes, and tannins. However, sterols/ triterpenes and coumarins were found in *herba-alba* 1 significantly, while Alkaloids, flavonoids, and Saponins found highest in *herba-alba* 2 compared to *herba-alba* 1 on the other side the quantity of essential oils was higher in the *herba-alba* 2.

Keywords: Artemisia herba-alba, minerals, total protein and phenolic compound.

1. INTRODUCTION

Plant taxonomy is a well-established science that depends on morphological characteristics to separate them into similar groups. It was absorbed into the new science of systematics after the development of more sophisticated microscopes and laboratory chemical analyses. In Libya there are about 1,825 vascular plant species, of which 134 are endemic. About 450 species are reported to be of medicinal value [1]. Some important plant families are Apiaceae, Asteraceae, Lamiaceae, Poaceae, Fabaceae, Brassicaceae and Abiaceae. Medicinal plants are distributed all over the country especially in the Al-Jabel Al-Akhdar, Ghadames, Gharian, Awbari and Tarhona regions. [2][3]. More than 100 species are extensively used by Bedouins and local people in folk medicine drinks, or chewed fresh or dry. Asteraceae very large family comprising of 1100 genera and 25000 species distributed throughout the world; 97 genera and 240 species are reported from Libya.

Artemisia, one of the larger genera in the family Asteraceae and the largest genus in the tribe Anthemideae, comprises from 200 to more than 500 taxa at the specific or sub specific level. The first plant is known as coastal ‘shih’ and the second plant is known as detsert wormwood ‘shih’ [4]. Since ancient times this plant has been used by the natives of many

cultures for the preparations of traditional medicines to treat diabetes and hypertension [5]. Aqueous extracts obtained from aerial parts of the plant possess anti-oxidant and anti-microbial properties [6]. Herbal tea prepared from this species exhibits antibacterial, analgesic and anti-spasmodic properties. This plant is also utilized as a fodder plant for the livestock in plateau regions of Algeria 197 [7].

Many Artemisia species have a high economic value in several fields, as food plants and as antihelminthic and antimalarial in medicine [8]. Thus, the aim of this work was to look into thechemical composition of in *Artemisia herba-alba* that collected from different location (costal and dessert) more depth in order to define thechemodiversity of the plant and the consequent potential value of this naturalresource

2. MATERIAL AND METHODS

2.1 Collection Sites

The plant species used in this investigation were collected from Coastal area (Sosa ,30 Km) is located Northeast of El-Bayda City and Desert area (Tanmlo , 76 Km) is south El-Bayda City. They were all fresh materials at the time of collection, Arial parts of *Artemisia herba-alba* were collected in November 2018and then dried in the shade for 10 days. The identified specimens were compared with already identified Herbarium Sylphum of the Botany Department Faculty of Sciences, Omar EL-Mukhtar University, El-Bayda, Libya.

2.2 Species Description

Habits, duration of life, type of stem, leaves, inflorescence and type of fruit were briefly described. The materials examined were documented with reference to collector names, and their numbers, dates, places of collection.

2.3 Preparation of plant extracts

Shoots of the two plants have been collected from different locution during the vegetative stage. The plant materials were dried in shade then ground in a Wiley Mill to coarse uniform texture and stored in glass jars until use.

2.4 Determination of minerals

The plants were carefully and thoroughly cleaned, blotted dry between absorbing paper and their dry weights were measured after oven drying at 70°C for 72h.Oven dry samples of plants were finely ground and assayed for-mineral ion content by the wet digestion method [8]. Minerals (K, Ca, Na, Ni, Fe, and Cu) were determined using an atomic absorption spectrophotometer (Perkin-Elmer, 2380) and expressed on the basis of dry weight. The extract obtained was subjected for assaying K and Ca concentrations using flame photometer (CORNNG 400).

2.5Estimation of total proteins

The total proteins content were determined by method described by [9]. For estimation of total proteins the following regents were used:

Solution A: 2 percent Na2CO3 in 0.1 N NaOH; Solution B: 0.5 percent CuSO4 . 5H2O in 1 percent sodium potassium tartrate; Solution C: alkaline copper solution; Solution D: folin–cio-calteau reagent was diluted with distilled water in the ratio of 1:1mix 50 ml of reagent (A) with 1 ml of regent (B) at the time of use.

0.3 ml of NaOH treated precipitate extract was taken and to it 3 ml of reagent (C) was added. After10 minutes 0.3 ml of Folin reagent was further added followed by a vigorous shaking immediately. After 30 minutes the optical density of developed blue color was read at 560 nm on a Bausch and LombSpectronic-20. The proteins contents were quantified using the standard curve prepared with bovine serum albumin (BSA).

2.5 Phytochemical analysis of the plant extracts

The extracts were subjected to phytochemical tests for plant secondary metabolites, tannins, saponins, phenolics, and alkaloids in order to know the nature of phyto-constituents present in them according to the methods of [10].

2.6 Statistical Analysis

Statistical analysis was performed using a computer run program (Minitab software). One way ANOVA followed by Turkey's test was performed to show the statistical significance among the means of the groups. Results were expressed as mean ± Standard Division (SD). P-value below 0.05 was considered to be statistically significant,

3. RESULTS AND DISCUSSION

Its specific epithet herba-alba means "white herb" in Latin, as its stems and leaves are white and woolly [11]. Similarly, it is *armoiseherbe-blanche* or*armoiseblanche* in French [12]. *Artemisia herba-alba* aromatic, low growing, much branched from the base, up to 30 cm high shrubby perennial; stems usually patent, at first densely canescent later.

Becoming glabrescent below. Leaves up to 10mm, 1-(-2)-pinnatisect, white pubescent; Basal leaves shortly petiolate; cauline leaves in fascicles; lobes short, oblong, obtuse; uppermost cauline leaves sometimes linear-oblong, entire. Inflorescence A broad panicle; branches spreading at wide angle from the main axis .Capitula Ovoid or elongated-oblon.3-4x 2mm, erect or nodding, homogamous ,(-2) 4-6(-8)- flowered. Receptacle glabrous. Outer in volucralbracts imbricate, herbaceous, with broad scarious margin, orbicular in outline, arachnoid-hairy or glabrous; inner Involucral bracts oblong, glandular, scarious. Florets all hermaphrodite, fertile; corolla reddish, glabrous. Cypsela glabrous or finely hairy, oblong epappose. The plant flowers from November to February [13].

3.1 Nutrient contents

Minerals are most important in the diet, even though they comprise only 4–6% of the human body [14]. Geographical origin of plants belonging to the same species can result in different concentrations of elements and their bioavailability, depending on environmental pollution, soil topographies, genetic factors, geographical variations and analytical procedures [15]. This is quite consistent with by our results that K, Ca, Fe, Na, Cu and Ni have different between the minerals in *A.herba alba1, A.herba alba2.* The mineral element constituents of the studied herbal plants are shown in Tables (1).

Ca contained the highest amount (85.00ppm) in *A.herba alba1in A.herba alba2* Ca (30.00ppm). Fe was presented with lower concentration in A.herba alba1 and A.herbaalba 2 (0.39 and 0.52 ppm) respectively. The higher concentration of the Ni was present in *A.herba alba1* (3.01ppm) but lower in *A.herbaalba 2* (0.51ppm). Statistically analyzed show similar in amount of Na, Cu in *A.herba alba1* and *A.herba alba2* (28.82 and 27.45ppm), (1.00 and 0.40ppm). The highest concentration of macro elements K was found in *A.herba alba1* (43.48ppm) compared to *A.herba alba2* (27.68ppm).

Usually the absorption of K depends on the soil type. It seems that foliage from shrubs that grow in semiarid regions contains K as lower levels from costal and this not accordance with [16] [17] .High levels from K may become a problem because high K concentrations can interfere with Na retention, absorption and Mg utilization This is a clear in *A.herba alba1* this study accordance with [18].

3.2 Total proteins

Table 1 also shows that there is a difference between *A.herba alba1 and A.herba alba2* in total protein level. Note that *A.herba alba1* higher may be due to desert environment, soil topographies and genetic factors. The use of proteins to chemo- taxonomically distinguish cultivars from each other was shown by [19] and [20] who stated that both the biochemistry and function of the proteins are better than morphological differences for distinguishing organisms within the species. [21], gave further support for the use of protein determinations in chemotaxonomy. A similar suggestion was forwarded by [22] who used soluble proteins from semi-woody stem cuttings of Vitis species in chemotaxonomy and described them as advantageous to those of pollen and seed proteins due to the availability of the former throughout the year.

Table 1. Mineral element contents and total protein of A.herbaalba 1 and A.herbaalba2 (ppm) (mean ±SD)

Parameter	*A.herba alba* 1 (mean ±SD)	*A. herba alba 2* (mean ±SD)
Na	28.64±1.9[a]	27.37±1.100[a]
K	43.303± o.838[a]	27.600 ±1.682[b]
Ca	84.930±1.001[a]	30.00±2.00[b]
Fe	0.39±0.0100[a]	0.520±0.0300[b]
Ni	3.033±0.802[a]	0.5133±0.0351[b]
Cu	1.067±0.513[a]	0.4333±0.0577[a]
Total protein	9.623 ± 0.551[a]	7.880 ± 1.467[a]

Data are expressed as mean ± SD of 3 replicate. Within each row, means with different superscript (a, b, c or d) were significantly different at p<0.05. Where means superscripts with the same letters mean that there is no significant difference (P>0.05).

3.3 Phytochemical screening

As for the Phytochemicals demonstrate diverse responses against pathogens, insects, pests and human diseases. Natural compounds are a source of new class of plant based secondary metabolites, as well as ecologically and toxicologically safer molecules than many synthetic chemical compounds. Some secondary metabolites are considered as natural pesticides against antioxidant pathogens, bacteria, fungi, insects, weeds and anti-inflammatory activities [23] [24] [25]. The phytochemical screening of the study plants are presented in Table 2. The data showed that the two study plants species were found to contain flavonoids, phenolic compounds, and tannins. However, alkaloids and saponins were found in both plants.

Through the study of phytochemical screening of *Artemisia herbaalba*, this varies in different between both plants. These differences might be attributed to several factors such as geographical factors (location), climatic effects of the plants, harvest season, nature of the soil, age of the plant parts (young or adult),the state of plant material used (dried or fresh), the part of the plant used, time of collection, the extraction process, genetic variability (chemo type) [26] .Our results are in concordance with other reports that demonstrated how plant growth are affected by genetic and environmental factors, and how these factors contribute to differences in the chemical variation of essential oils of plants with different chemo types [27]. The data clearly demonstrated that the by [28] working on 24 genera from the family Chenopodiaceae, and who reported the presence of flavonoids in Spinaciaand other species of Atriplex. However, differences in flavonoid contents are not unusual since [29], reported differences in flavonoids even of the races of AtriplexcomfertifoliaChenopodiaceae [30] reported that typical tanning materials are obtained from oaks, certain willows, chestnuts, sumac leaves, oak galls canaiger root, birch,alder, hemlock berbeny leaves heather,blood root, alfalfa ,tea, sweet gals and certain fern's. It was also reported that, in general, each of the species is characterized by specific group of flavonoids [31][32], described three of the sub species, used for flavonoid tests, to share a similar flavonoid chemistry; two of them have more in common with the third sub species. [33], reported studies which contrasted with [34], findings and wrote about uniform band patterns within the genus Suaeda (Chenopodiaceae), which were basically classified according to their morphological and physiological differences.

Table 2. Phytochemical screening of the study species in the present study during the year of 2018.

Components	*A.herba alba* 1	*A.herba alba*2
Alkaloids	+	++
Coumarins	+	++
Essential oil	++	+
Flavonoids	+	++
Glycosides	+	+
Phenolic compounds	+	++
Saponins	+	+++
Sterols and / or triterpenes	++	+
Tannins	+	+

4. CONCLUSION

[Based on the results of this research, which indicate a significant difference in some physiological characteristics of these two plants and their importance in folk medicine, we

recommend using plant 1 as a source of mineral nutrients important to humans and also more useful for grazing whereas plant 2 is more medically because it contains a Higher percentages of phenolic compounds compared to plant1.

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