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Phytochemical study of asphodele roots (*Asphodulus microcarpus*) in the area of El Tarf

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Abstract: *Our work focuses on the study of vegetable oil extraction, phytochemical screening and chemical parameters of Asphodelusmicrocarpus from El Tarfwilaya. Asphodelusmicrocarpus is a medicinal and aromatic plant belonging to the lily family. Commonly by the local population "berwag" which is an important capital in herbal medicine and also used in traditional medicine of many countries as an anti-inflammatory. It is spontaneous, widespread in North Africa, particularly in Algeria. The extraction of vegetable oils (fixed) from this plant using the method of Soxhlet gives a good yield of vegetable oil (17.85%).Phytochemical screening has revealed the presence of saponins, alkaloids and flavonoids, and for chemical parameters, the roots of Asphodelusmicrocarpus are very rich in sugars with a value of 499.86mg /100g MS, Polyphenol 304.08EqAG/100gMS and 187.16 mg /100g MS for Proteins.*

Key Words: *Phytochemical Screening;Chemical Parameters;Asphodelusmicrocarpus*

1. INTRODUCTION

The man has always sought in nature what to cure his ills and medicinal plants were his only recourse for long centuries. He is always amazed by the beauty of their colors, the shape of their flowers or their fruits, he considers them as faithful companions towards which he turns because of the benefits they provide and for their great utility **[01].**

Plants produce a large number of secondary metabolites, with a wide range of pharmacological and toxicological properties. At present, about 500 000 plant species are estimated in the world, but a relatively small number has been studied chemically or pharmacologically. This rich biodiversity deserves to be valued because it contains a very important chemical and structural diversity and offers researchers a multitude of research topics, in particular to access molecules with interesting biological properties **[02].**

Asphodel is a medicinal plant named species (*Asphodulusmicrocarpus*), it is a herbaceous plant that grows naturally in the autumn period and blooms in spring, fleshy and bulbous

roots, simple and long leaves, Asphodel is found at forest level and road borders. The objectives of our study are:

- Phytochemical study
- Extraction des vegetable oils
- Chemical parameters

2.METHODS

2.1. Monograph of the plant (Asphodel)

Vernacular name: Berwag
Scientific name: Asphodelusmicrocarpus
Family: Liliaceae

Asphodelus is a genus of about 20 species of the Liliaceae family, the subfamily Asphodelaceae; have a small crown with thick rhizome and fleshy roots, it has a very wide ecological tolerance contributes to its presence in disturbed and weakened ecosystems **[02].** The species *Asphodelusmicrocarpus* is one of the anthropozoic species that greatly trivializes the floristic procession in the region of El Tarf.

2.2. Use:

Pharmacopoeia: it is used in herbal tea, powder and ointment for the treatment of fevers, indigestion and skin lesions.Food: In times of scarcity, boiled leaves were eaten after the water was thrown away. Pastoral interest: it is little grazed by dromedaries and goats **[03].**

2.3. Plant material and harvest site

The plant material consists of the plant: *Asphodelusmicrocarpus* of the family Liliaceae, the harvest was carried out in January 2018, willaya El-Tarf (East Algeria). The drying is done directly by the oven. The roots of *Asphodelusmicrocarpus*are saturated with water, it is difficult to do the natural drying or it is replaced by artificial drying. After harvesting the plant and cleaning the roots, they are put in the oven for 24 hours at 50°C.

2.4. The conservation:

After drying, the best way to preserve the plants is to put them in a paper bag and store them away from light and moisture. Under these conditions of conservation, the plants can keep all their properties until the date of extraction or other tests.

2.5. Phytochemical Screening

➢ **Alkaloids:** 1 g of the powder of the dried and ground plant are mixed with 10 ml of 5% HCl in a container. After half an hour of maceration. The mixture is filtered and some drops of Mayer's reagent added to the filtrate, the appearance of a yellowish-white precipitate indicates the presence of alkaloids **[04].**

➢ **Saponosides (foam test):** 1 g of the dried powder is weighed in a vialin which 10 ml of distilled water is added and boiled for 5 minutes, the mixture is filtered, 2.5 ml of the filtrate are added to 10 ml of distilled water in a test tube. The tube is shaken vigorously for 30s then allowed to rest for half an hour. Alveolar foam reveals the presence of saponins**[05].**

➢ **Flavonoids:** 10 g of the powder are macerated in 150 ml of HCl at 1 ° for 24 hours. After filtering the mixture, the following test is carried out: 10 ml of the filtrate is taken, made basic by the addition of NH4OH, after three hours, the appearance of a light yellow color in the upper part of the test tube indicates the presence of flavonoids **[06].**

➢ **Tannins:** 10 g of the dried powder are placed in 100 ml of 80 ° MeOH. After stirring for 15 minutes, the extract is filtered and put into tubes. The addition of drops of a solution of FeCl3 at 1% makes it possible to detect the presence of non-tannins. The color blue or green indicates the presence of tannins **[05].**

➢ **The coumarines:** 1g of the vegetable matter is placed in a tube, in the presence of a few drops of distilled water. The tube is covered with paper soaked in diluted NaOH and boiled yellow fluorescence indicates the presence of coumarins after UV tests **[04].**

➢ **Volatile oils:** macerate 10g of the powder in 40ml of distilled water with stirring constant 30mn, the extract is filtered. 2 ml of the filtrate are shaken with 0.1 ml of dilute NaOH and a small amount of dilute HCl, a white precipitate is formed with the volatile oils **[05].**

2.6. Extraction of fat by Soxhlet:

The powder obtained by grinding (20 g) was placed in a cellulose cartridge, which was in turn placed in the Soxhlet apparatus and heated to 37 ° C. The latter is mounted on a flask containing 150 ml of petroleum ether, the oil of the asphodel in the first stage is extracted hot for 5 hours (at least 8 cycles are necessary for a total equipment of the powder). At the end of this operation, the crude extract is evaporated using the rotavapor to calculate the yield **[07].**

2.7.The water content

The water content is the difference between the fresh weight and the dry weight of one gram c, it is placed in the oven set at 105 ± 2 ° C for 3 hours; until a constant weight is obtained **[08].** This difference is expressed as a percentage of the fresh matter according to the formula determined by the relation:

TRE en % = (PF –PS) x100 /PF.
TRE : water content (in %)
PF :fresh weight just after harvest (in g)
PS :dry weight after drying in the oven (in g).

2.8. Ash content

2 g of the dried roots of the plant is put in a muffle furnace set at 550 ± 15 ° C for 5 hours until a gray, light or whitish color is obtained **[08].** Expresses the organic matter by the following formula **[09]:**

MO %= [(M1 -M2)/P] x100.
MO is the organic matter in (%)
M1is the mass of capsules + test sample
M2is the mass of capsules + ashes
Pis the mass of the test sample

The ash content (Cd) is calculated as follows:
Cd = 100 - MO %, **[10].**

2.9. Determination of soluble Sugars

The total soluble sugars (sucrose, glucose, fructose, their methyl derivatives and polysaccharides) are determined by the method of **[01]** .100mg of the roots of the crushed plant is mixed with 3ml of 80% ethanol. The whole is left at room temperature for 48 hours, then the ethanol is evaporated using a water bath at 100 ° C., then 20 ml of distilled water are added to the dry residue. In a test tube containing 2 ml of the obtained extract, 4 ml of enthrone reagent is then placed, it is placed in a water bath at 62 ° C. for 8 min (the solution turns slightly green blue) after cooling in an ice bath on tube is rested in the dark for 30min, the reading is made spectrophotometer at 585 nm **[11].**
Quantification is based on the equation of the following calibration curve : Y=ax+b (µg/g de MS). Which makes glucose a standard and the contents of soluble sugars are finally expressed in g/100g MS**[12].**

2.10. Dosage of Protein

The soluble total protein assay of plant root extracts was performed according to the Bradford method, a colorimetric method that allows the determination of protein solution concentrations from the staining variation of Coomassie blue. when it binds to proteins. Take 1g of powder from the leaves of the plant to which 5ml of distilled water is added; for the assay, 200 .mu.l of the extract is added to 2 ml of Bradford's reagent, the tube is stirred and allowed to stand for 5 minutes until staining is stabilized.
The reading is done by spectrophotometry at 595nm after calibration of the apparatus with a control solution containing 200µl of BSA (Bovine Serum Albumin) and 2ml of Bradford reagent. The results are expressed in g of protein per 100 g of dry product **[13].**

2.11. Determination of polyphenols

➢ Extraction of des polyphenols

This is a solid-liquid extraction. The solvent used in this study is pure methanol (99%), **[14,15].** This has the advantage of being easily removed under vacuum. In addition, it gives a better extraction yield than water **[16,17].**The extraction yield of polyphenols also increases with the contact time.
1 g of the roots of the plant are introduced into a mortar, with 50 ml of methanol-water mixture (60/40), after maceration for about 15 minutes, the resulting mixture is filtered with a

Whatman filter paper, the aqueous phase recovered is concentrated in Rota steam at 45 ° C. A viscous extract is thus obtained which is recovered in 3 ml of methanol.

➢ **Determination of total polyphenol content**

The total polyphenol content of the roots of the plant is determined according to the method of FolinCiocalteu**[18].**

0.5 ml of the extract obtained and 0.5 ml of FolinCiocalteu reagent are introduced into a glass tube, the mixture is mixed correctly for 5 minutes, 5 ml of aqueous 7% sodium carbonate solution and 12.5 ml of distilled water are added. The mixture is vortexed and stored at room temperature in the dark for one hour, absorbance measured at 750 nm. White is represented by distilled water. The concentration of total phenolic compounds is determined by reference to the calibration curve obtained using gallic acid as standard**[18].**

3. RESULTS AND DISCUSSION:

The result of the extraction of the vegetable oil from the roots of Asphodelusmicrocarpus is the production of a yellow oil, the yield is 3.57g for 20g of the dried roots, ie 17.85% of the dried plant.Lipids (vegetable oil) are nutritionally important biological constituents from a caloric point of view and supply of essential fatty acids. These are organic materials insoluble in water but soluble in organic solvents.

3.1. Phytochemical Screening:

Phytochemical screening consists in detecting the different families of existing compounds in the root powder of the plant through qualitative characterization reactions. These reactions are based on precipitation or staining phenomena by specific reagents.

The results of this phytochemical screen are reported in Table 1, showing the presence or absence of a group of secondary metabolites.

Table 01: Results of Phytochemical Screening.

Chemicalcomponent	Presence / absence
Alkaloids	++
Saponins	+++
Flavonoids	+
Tannins	+
Coumarins	-
Volatile oil	-

(+++)Abundantly present;(++) Present by a significant percentage; (+) Present; (-) Absent

3.2. The contents Water, Ash and Organic matter

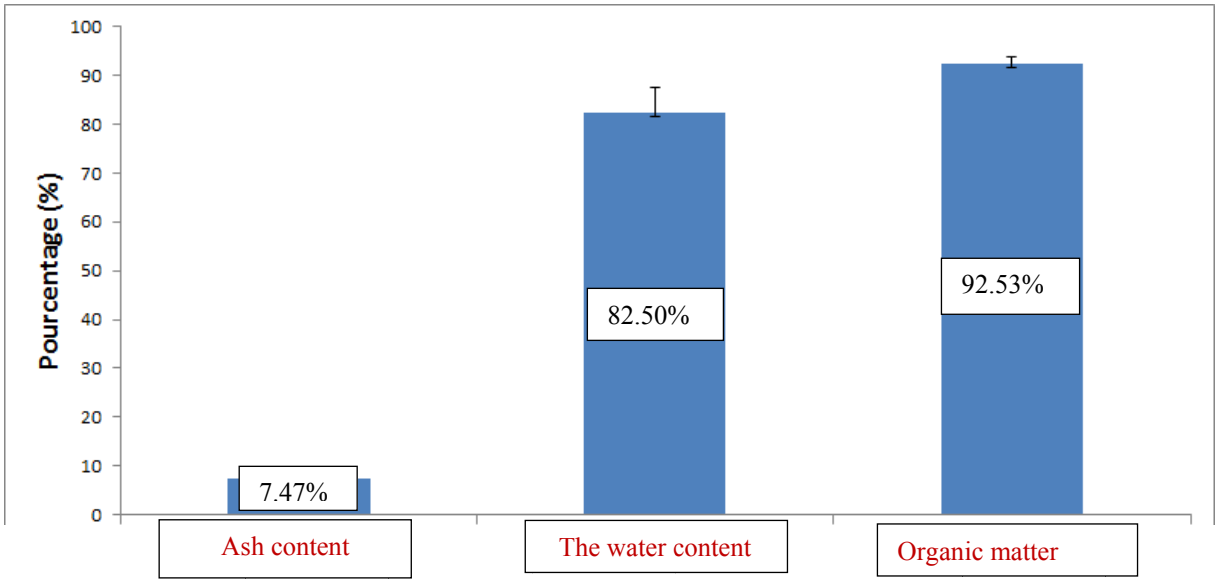

Figure 01: Histogram that presents the contents (Water, Ash, Organic matter).

The contents of water, ash content and organic matter in the roots of *Asphodelusmicrocarpus*. It is observed that the root of *Asphodelusmicrocarpus* is rich in organic matter with a very high percentage (92.53%) and the same thing for the water content they are rich in water (82.50%) by cons the ash content is very low (7.47%) therefore a low concentration of mineral matter.

3.3. Determination of sugars, proteins and polyphenols

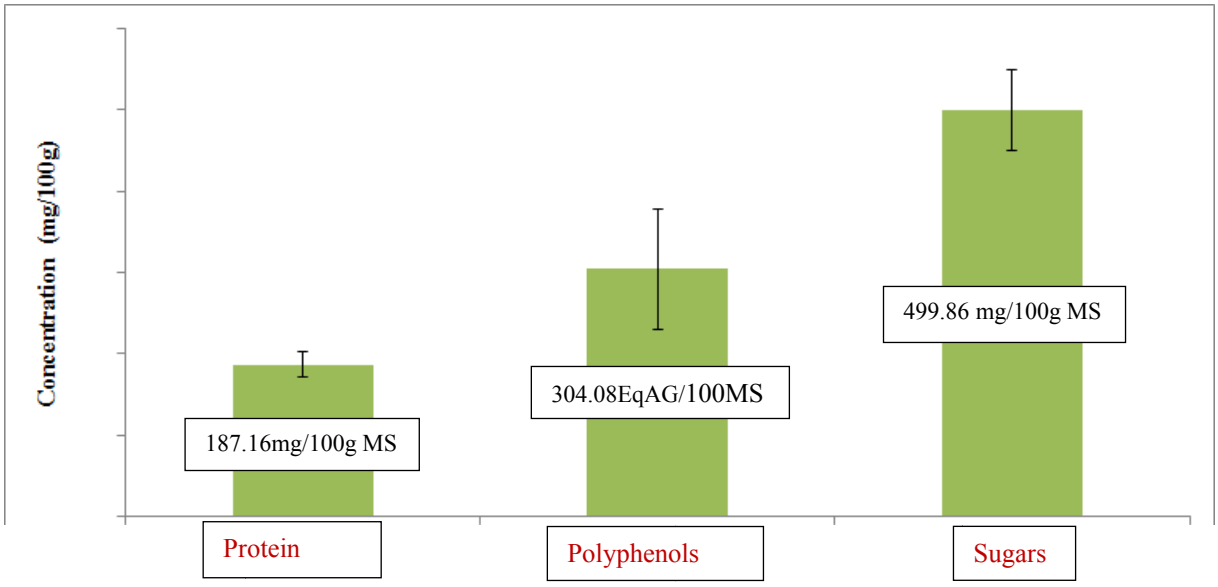

Figure 02: Determination of sugars, proteins and polyphenols.

The quantitative analysis of the total sugars carried out for the species of *Asphodelusmicrocarpus* shows rather considerable values, it contains a quantity of total soluble sugars which is given by an average concentration of 499.86 mg /100 mg MS. This result found in our sample would favor the use of the *Asphodelusmicrocarpus*species.
The roots of *Asphodelusmicrocarpus* have a content of 187.16 mg / 100g MS, the value obtained is modest. The losses in protein contents would be due to the storage period and the drying mode.The determination of total polyphenols gives us an overall estimate of the content in different classes of phenolic compounds contained in the roots of *Asphodelusmicrocarpus* powder.The quantification of total polyphenols using the Folin-Ciocalteu method indicates the richness of the roots in phenolic compounds, with considerable values.According to our results, the maximum value of the polyphenol concentration is a value of 304,08EqAG/100g MS, it is a value which confirms the richness of our plant by this important class of compounds (secondary metabolites).

4. CONCLUSIONS:

This work represents a contribution to the phytochemical study of the plant of Algerian flora *Asphodelusmicrocarpus* of the Liliaceae family. Our interest was much oriented towards the presentation of some methods of the spectrophotometric and tube reactions most used for the current work of the university laboratories. The results of phytochemical tests show a strong presence of:saponins, alkaloids, flavonoids, and tannins. The presence of these compounds gives this species several therapeutic and pharmacological characteristics. Extraction by Soxhlet, from the roots of the plant allowed us to evaluate the percentage of fat, the results indicated a fairly large value of 17.85%. Which implies the richness of the roots in lipids.Which concludes that this plant has a therapeutic effect by its richness in natural compounds. The results of our work are very encouraging to explore the plant and prepare extractsthat go into the manufacture of drugs.

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