The distribution of some mineral and phytochemical contents in leaves and roots of *Arum cyrenaicum*in growing at AL-Gabal AL-AKhdar area.

Aisha. A. MOHAMED[*1]; Rania. F·Ali[*2] and Jibreel. Aldaekh Asbee[*3],
[1*2]Botany Dept, Faculty of science, Omar El-Mukther university, libya.

[3]Chemistry Dept, Faculty of science, Omar El-Mukther university, libya.

Abstract:-

Arum cyrenaicum belonging to family Araceae, it's a perennial herb native to Europe, northern Africa, and western Asia, with the highest species diversity in the Mediterranean region. The main objective of the paper is Phytochemical screening of leaves and roots of Arum cyrenaicum and determination of minerals and total proteins in this plant .The results of phytochemical screening of roots showed the presence of tannins, alkaloids, terpenes and carbohydrates while the leaves showed the presence of tnnins, flavonoids, alkaloids, carbohydrates and sterols saponins are not present in the leaves and root.

The results of determination of minerals showed highest contents of potassium recorded in the leaves compared to the root(190.33,69) and sodium had a low concentration in the root compared to the other minerals, their quantities were similar.

Kay words:- AL-Gabal AL-AKhdar, Araceae *; Arum cyrenaicum*; Libya*;* Phytochemical screening

Introduction:

The Libyan plant Arum cyreniacum belongs to the Araceae family and has avariety of therapeutic properties **(Abdelshafeek. 2018).**The genus Arum is an important genus in the family Araceae. This genus is composed of 28 species, it is represented in Libya by only one endemic species known as Arum cyreniacum**(Modallal,2008 and Ferdağ *et al*., 2009).** Arum is native to Europe, northern Africa, and western and central Asia, Mediterranean region has the most species variety**(Govaerts and Frodin,2002).** Arum have been used traditionally for centuries**(El-Darier and El-Mogaspi,2009).**This genus is divided into two sub-genera Arumwhich contains all the species except *Arum pictum*which belongs to the sub-genera Gymnomesium.

The toxicity of Arum species is well known and most traditional uses concentrate on the anticancer potential of these species. *Arum cyrenaicum*is a perennial herb in the sub-family Aroideae of the family Araceae. The plant reaches 13-27 cm in height. It's herb in Aljabal Al-Akhdar (Libya), is very scarce. Hence it was planned to investigate the flavonoids of this species which is used in traditional medicine against some human disorders(**Abdel Karim *et al.*, 2018**).

Based on a review of the literature on the chemical constituents and biological activity of the Arum genus, it was discovered that the plants of this genus have a variety of biological activities, including

treatment of rheumatic pain, diaphoretic, diuretic, expectorant, strongly purgative and vermifuge, effect on immune system cells, antioxidant activity, anti-cancer activity (against hepato carcinoma, breast carcinoma cells, and lymphoplastic leukemia), and have antimicrobial activity [**Afifi and Khalil** 1999) as well as (Diaz and Kite.,2002). In the Arum genus, phytochemicals such as volatile oil, terpenes, flavonoids, lectins, and alkaloids were examined. El-Desouky *et al.,* (2007) and Kite *et al.* (1998) investigated the odors of a variety of Arum species and discovered 36 chemicals, including butanoc acid esters, 1-decene, terpenes (citronellene and its derivatives), p-cresol, methyl salicylate, indole, and 2-heptanone. Phytochemical screening of the complete plant (Arum cyrinaicumwas) demonstrated the presence of flavonoids, alkaloids, terpenes, carbohydrates, and sterols (Abdel Karimet al.,2018).The butanol fraction was fractionated over a polyamide column, yielding three flavones: compounds I, II, and III.

--

Materials and Methods:

Plant material: *Arum cyrinaicum*was collected from Aljabal Al-akhdar region - Libya. The plant was identified and authenticated as *Arum cyrinaicum* by Botanists in (Silphium Herbarium) Department of Botany, Faculty Science, Omar Al-Mukhtar University, Al Bayda – Libya.

Samples preparation: Leaves and roots of *Arum cyrinaicum* were separated and washed with distilled water several times, then dried in open air.

All the Phytochemical screening tests were carried out according to : Phytochemical screening (Libermann-Burchad's test):Test for sterols and/or triterpines. standard method

One ml of the chloroform extract of each sample, 0.3 ml of acetic anhydride was added then followed by few drops of concentrated sulphuric acid along the side of the dry test tube. Reddish-violet colour is produced at junction of the two layers and chloroformic solution acquire green colour in case of presence of sterols and/or triterpenes**(El Hifnawy *et al.*, 1992)**

Test for flavonoids:

The extracts (alcohol and aqueous) of the tested herbal plants were furthery extracted with 1% hydrochloric acid; each extract was subjected to the following test, 10 ml of each extract is rendered alkline where faint yellow colour is producted in case of presence of flavonoids **(Balbaa *et al.*, 1981).**

Test for alkaloids:

The extracts of the tested herbal plants were furthery extracted with 20 ml of dilute hydrochloric acid (15%) cooled and rindered alkaline with dilute ammonium hydroxide solution, then extracted with chloroform.The chloroform extract is subjected to the following test :

Dragendorff's test:

The preparation of the reagent:

-Solution a: 0.85 g of basic bismuth nitrate is dissolved in mixture of 10 ml acetic acid and 40 ml water.

-Solution b: 8 g potassium iodide in 20 ml water.

-Stock solution: Equal volumes (10ml) of solution a and b are mixed.

Few drops of chloroformic extract was applied to filter paper, allowed to dry and sprayed with the reagent. Orange colour is observed in cases of the presence of alkaloids **(Stahl , 1964)**

Test for tannins:

The extracts (alcohol and aqueous) of the tested herbal plants were furthery extracted with ethanol 50%, filter, the hydro-alcoholic clear solution is subjected to the following test:

Ferric chloride test:

One ml of the reagent (1% $Fecl_3$) is added to the hydro-alcoholic solution. Blue colour develops in cases of the presence of pyrogallol tannins **(Clauss, 1961** and **Egyptian Pharmacopoia, 1984).**

Test for carbohydrates and /or glycosides:

The extracts of the tested herbal plants were furthery extracted with water; the producted aqueous extact is subjected to Molish test as following:

Two ml of the extract is mixed with 0.2 ml ethanolic -naphthol (20%) and 2ml of concentrated sulphuric acid is added on the side of the dry test tube. Violet ring is observed at the junction of the two layers cases of the presence of carbohydrates and/or glycosides **(Clauss, 1961).**

Test for anthraquinones:

a) Bornträger's test:

One ml of each extract of the successive extracts aqueous ammonia or caustic soda is added and shake. Rose-red colour in the aqueous layer develops as presence of anthraquinone glycosides.

b) Modified-Bornträger's test:

One ml of each extract of the successive extracts of the tested herbal preparations is hydrolyzed with alcoholic potassium hydroxide, the acidified and continues as Bornträger's test. Rose-Red developes in the aqeous layer in cases of the presence of anthraquinones**(Egyptian Pharmacopoia, 1984).**

Test for saponins:

Froth test:

Five ml of tape water is added to 1 ml of each extract, then shaken vigerously for five minutes, froth develop having 1cm hight and persists for 15 minutes indicates the presence of saponins**(Clauss, 1961)**.

Statistical Analysis

Statistical analysis was performed using acomputer run program (Minitab software). By 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

Results and Discussions:

Chemical studies:

Determination of minerals:

Table (1) : Mineral element (ppm) and total protein (---) contents of leaves and root (ppm)

Parameters	Leaves	Root
Na	0.076667±0.003333	0.06333±0.00333
K	190.33±1.4529	69±1.5275
Fe	0.64±0.011547	0.65666±0.008819
Cu	2.4±0.05773	2.2333±0.08819
N	0.69233±0.01398	0.612±0.001155
Total protein	6.4±0.057735	5.3±0.11547

The mineral element constituents of the studied herbal plants are shown in Tables (1).

The results showed that the highest contents of potassium recorded in leaves (190.33ppm) respectively

comparing with other elements, The concentration of N in the leaves was higher than its concentration in the leaves compared to the root (0.692, 0.612ppm). Sodium had a low concentration in the root and leaves,(0.07, 0.06) the lowest concentration of the element. The rest of the elements were close in concentration in the leaves and roots.In a previous study the minerals in the seeds were measured**(Ahlam *et al* 2021)**

which provides a measure of the total amount of minerals within a food. Analytical techniques for providing information about the total mineral content are based on the fact that the minerals can be distinguished from all the other components within a food in some measurable way**(Jain*et al* 1992, Nielsen,1998).**

it contributes to iron and energy metabolism. Similarly molybdenum is a key component in many biochemical processes and acts as a cofactor in many enzymes that catalyze the conversion of one compound into another one within the cell and is involved in detoxifying sulfites which would be a great treatment for people who suffer of asthma attacks due to reactions to sulfites3 **(Kisker *et al* 1999).**

Determination of total proteins:

proteins in leaves (6.4) and in root (5.3) this since the plant has not been subjected to many studies before, these results are recorded for the first time.

phytochemical studies:

The results of our study of chemical qualitative tests for the presence of some secondary metabolites was shown in Table 2 Levels of alkaloids, flavonoids, saponins, sterols (triterpens) tannins, and total
carbohydrates .The quantities of compounds in the leaves and roots were few in the roots and leaves. Saponins are not present in the leaves and root, while flavonoids are present in the leaves and not present in the roots.
These data were disagree with that reported by Abdel et al. in 2018 where they screened for major secondary metabolites whole plant of *Arum cyrenaicum.*
Phytochemical screening was carried out to detect the phytochemicals in the methanol and aqueous extracts of leaf and petiole mixture and rhizome. The methanolic and aqueous extract were used for qualitative phytochemical screening to detect the presence of alkaloids, tannins, saponins, cardiac glycosides, sterols, flavonoids, phenolic compounds, quinones, proteins, fixed oils, starch, coumarins, gum and mucilages, phlobatannins, terpenoids which were performed accepting the standard procedures**(Harborne,1973 and Sofowora,1993).**
Phytochemical analysis for qualitative detection of alkaloids, flavonoids, reducing sugars glycosides, tannins, saponins, anthraquinones, volatile oils, resins, deoxysugars and steroids was performed on the extract as described**(Sofowora,1993 and Trease and Evan,1992)**

Table (2):Phytochemical in leaves and roots

Components	Leaves	Roots
Saponins	-	-
Tannins	+	+
carbohydrates	+	+
Flavonoids	+	-
Alkaloids	+	+

Sterols or triterpenes	sterol	triterpans

Presence (+) absence(-)

Conclusion

In this study, minerals were found in the leaves in a greater amount than the roots, so the leaves are of greater benefit in *Arum cyrenicum.*

References :

Abdel Karim M., Khaled A. Abdelshafeek, Fatima A. Saada and Salma M. M. Attafa. ISOLATION AND CHARACTERIZATION OF SOME FLAVONES FROM *ARUM CYRENAICUM (*ARACEAE*)* , World Journal of Pharmaceutical and Life SciencesWJPLS (2018): ""*Vol. 4, Issue 2, 27-33*

Afifi FU, Khalil E, Abdalla S. Effect of isoorientin isolated from Arum palaestinum on uterine smooth muscle of rats and guinea pigs. J. Ethnopharmacol. 1999;65 (2):173-177. https://doi.org/10.1016/S0378-8741(98)00147-0

Balbaa, S.I.; Hilal, S.H. and Zaki, A.Y. (1981): "Medicinal plant constituents" 3rd Ed. General Organization for University and School books**.**

Clauss, E.P. (1961): "Pharmacognosy", 4th Ed., 111HeneryKimpton, London, pp:3.

Diaz A, Kite GC. A comparison of the pollination ecology of Arum maculatum and A. italicumin England. Watsonia. 2002;24:171–181.

Egyptian Pharmacopeia (1984): General Organization for Governmental Printing Affairs, Cairo

El-Darier S., El-MogaspiF., Ethnobotany andrelative importance of some endemic plant species at El-Jabal El-Akhdar Region (Libya),World Journal of Agricultural Sciences 5(3) (2009) 353-360

El-Desouky SK, Kim KH, Ryu SY, Eweas AF, Gamal–Eldeen AM, Kim YK. A new pyrrolalkaloide isolated from Arumpalaestinum. and its biological activities, Arch. Pharm. Res. 2007;30:927-931. https://doi.org/10.1007/BF02993958 PMid:17879743

El Hifnawy, S. M.; Selim, M. A.; Seida, A.A. and Mohmoud, M.I. [Eds] (1992):"Topics in Applied Pharmacognosy", Faculty of pharmacy, Cairo University,66-69**.**

Ferdağ Ç, Filiz S, Semra İ. Antibacterial and Antifungal Activities of Arum maculatum L. Leaves Extracts J. Appl. Biol. Sci. 2009;3(3):13-16.

KhaledAbdelshafeek , Mohammed Abdelkareem **,** FatamAlsharifSaad(2018):"GC/MS Analysis of the Volatile Constituents from Arum Cyreniacum Flowers", Eurasian Journal of Analytical Chemistry, 13(4), em37 ISSN:1306-3057.

Kisker, C., Schindelin, H., Baas, D., Retey, J., Meckenstock, R.U. and Kroneck. P.M.H. (1999). Structural comparison of molybdenum cofactor-containing enzymes. FEMS Microbiol Rev 1999; 22 (5): 503-521

Kite GC, Hetterrscheid WLA, Lewis MJ, Boyce PC, Ollerton J, Cocklin E, Diaz A, Simmonds MSJ. Inflorescence odours and pollinators of Arum and Amorphophallus (Araceae). 1998, pp. 295–315. In: Reproductive Biology. Owens S.J. and Rudall P.J. (eds.). Royal Botanic Gardens, Kew.

Jain , N., R.K. Shahid and S.M. Sondhi. Analysis for mineral elements of some medicinal plants.Indian Drugs 1992; 29: 187-190.

Govaerts, R. &Frodin, D.G. (2002). World Checklist and Bibliography of Araceae (and Acoraceae): 1-560. The Board of Trustees of the Royal Botanic Gardens, Kew.Harborne JB, Phytochemical Methods, Chapman and Hall Ltd, London, 1973, 49-188.

Modallal N, Salim A, Alessio P. Cytogenetic Effect of Arum maculatum. Extract on the Bone Marrow Cells of Mice, Caryologia 2008;61(4):383-387. https://doi.org/10.1080/00087114.2008.10589650

Nafea E., Floristic Composition of the PlantCover at Surt Region in Libya, Catrina: The International Journal of EnvironmentalSciences 12(1) (2015) 63-71.Nielsen, S.S., 1998. Introduction to Food Analysis techniques. Text Book. Aspen Publishers, USA

Sofowora A, African Medicinal Plants, University of Ife Press, ILe-Ife, Nigeria, 1993, 104.

Sofowora A. Medicinal plant and traditional medicine in Africa. 2nd Ed. Published by John Wesley and Son. Ibadan. 1993; 141-5.

Stahl, E. (1964):"Thin layer chromatogaphy"2nd Ed.SpringerVerlag., Berlin, Heidlberg, New York.

Sunderhaus S., KlodmannJ., LenzC., BraunH.-P., Supramolecular structure of the OXPHOS system in highly thermogenictissueof Arum maculatum, Plant Physiology andBiochemistry 48(4) (2010) 265-272.

Trease and Evan. General Methods associated with the phytochemical investigation of herbal product. Pharmacognosy, 15th Edition, Macmillan Publishers. BrailliarTrindel Can. 1992; 137-149.