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Determination of Macro and Microelements in Medicinal Plant *Purslane* (*Portulaca Oleracea L.*) By Atomic Absorption Spectrophotometric (AAS) and Flame Photometric Techniques.

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Abstract:

This research was carried out to assess the mineral components of the selected vegetable Portulaca Oleracea which is commonly used as food; Ca, Mg, and Fe analyzed by Atomic Absorption Spectrophotometric (AAS) and Na, and K Flame photometric spectrophotometer. The results of macro-elements obtained having values of Ca (138.75, 140.4 ppm) for Iraqi and Lebanon origin respectively, Mg (214.53, 211.71 ppm) for Iraqi and Lebanon origin respectively, Fe is found to be (8.9, 7.03 ppm) for Iraqi and Lebanon origin respectively, Na (4, 38ppm) for Iraqi and Lebanon origin respectively, and K (18, 16 ppm) for Iraqi and Lebanon origin respectively; The indication results of this vegetable has the potential to provide essential nutrients to the human beings and it is found to be a good source of minerals particularly Ca, Mg, Fe, Na and K.

Key words: Portulaca Oleracea L., macro and microelements, Atomic Absorption spectrophotometry, Flame photometry.

تقدير العناصر بالماكرو والمايكرو لنبتة البربين الطبية بأستخدام تقنيات مطياف الامتصاص الذري ومطياف اللهب

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الخلاصة:

تمت في هذه الدراسة تقدير العناصر الداخلة في تركيب نبات البربين المعروف استخدامه الغذائي . حيث تم تحديد عناصر الكالسيوم والمغنيسيوم والصوديوم والبوتاسيوم بالماكرو وعنصر الحديد بالمايكرو باستخدام اجهزة التحليل طيف اللهب والامتصاص الذري حيث ان عنصر الحديد (Fe) بالمايكرو كان تركيزه (8.9,7.03ppm) في عينة العراق ولبنان على التوالي . وكانت نتائج الماكرو لتركيز الكالسيوم (Ca) (140.4,138.75 ppm) في عينة لبنان والعراق على التوالي. والمغنيسيوم (Mg) (214.53 ,211.71 ppm) في عينة لبنان والعراق على التوالي. والصوديوم (Na)(38, 4 ppm) في عينة لبنان والعراق على التوالي. والبوتاسيوم (K) (16, 18 PPM) في عينة لبنان والعراق على التوالي. وأشارت النتائج التي تم الحصول عليها لهذه النبتة انها تحتوي على العناصر الغذائية المهمة (الكالسيوم والمغنيسيوم) واعتبارها مصدر غذائي غني من هذه العناصر وبنسب عالية .

الكلمات المفتاحية : بورسيلا اولراسيا،ماكرو ومايكرو للعناصر،الامتصاص الذري،الامتصاص الذري اللهبي.

Introduction:

Purslane (*Portulaca Oleracea L*) from the family *Portulacaceae* [1]. The name *Portulaca* is thought to be derived from the Latin (Porto) to carry and (lac) meaning milk, since the plant contains a milky juice [2] and has been reported officially in the French, Mexican, Spanish, and New Zealand pharmacopoeias [3].

It can found growing in almost any unshaded area including flower beds, corn fields and waste places; Purslane is found all over the world in the temperature countries of Europe, America, New Zealand, Australia, and India [4]; Purslane is listed by the world health organization as one of the most used medicinal plants and has been given the term (global panacea) [5]; It has been described as a (power food) of the future because of its high nutritive and high antioxidant properties , from the point of view of traditional medicine , the nature of purslane is cold and wet , astringent and diuretic , bile anodyne that relieves temperature of blood, liver and stomach[6]; Recent research has shown that *Portulaca Oleracea* is a rich source of omega-3 which is important in preventing heart attacks and strengthening the immune system[7]; It was reported to contain gallotannins[8], quercetin, kaempferol, and apigenin[9]. The water extract of *Portulaca Oleracea* show no cytotoxicity or genotoxicity and have been certified safe for daily consumption as a vegetable [10]. This plant was reported to have Neuropharmacological actions, wound healing activities and bronchodilator effects [11]; Dietary glutathione, normally occurring in high amount in fresh meat and in *Portulaca Oleracea* [7]; It contains several types of vitamins and minerals especially Calcium, Magnesium, Iron, Potassium and Sodium [12]; Potassium (K) is the major contain found inside of cell. The proper level of Potassium is essential for normal cell function. An abnormal increase of potassium (hyperkalemia) or decrease of Potassium (hypokalemia) can profoundly affect the nervous system and heart. And when extreme, can be fatal; The normal blood Potassium level is 3.5-5 millimol/liter (mM). Sodium is the major extracellular cation and it plays a role in body fluid distribution. Concentration of Sodium ions inside the plasma (extracellular) is (130-145 mM). Higher and lower concentrations are referred to as hypernatremia and hyponatremia respectively [13], In the present investigation we will determine the concentration of macro and microelements found in *Portulaca Oleracea* using (AAS) and Flame photometric techniques.

Materials and Method:

Plant collection: the vegetable species *Portulaca Oleracea* was collected from a local market of Lebanon –Beirut and from a local market of Iraq-Baghdad. The details of vegetable species, family, status and parts used are elaborated in Table 1.

Table1: Vegetable collected for the study and pattern of local use

Species name	Family name	Part used	Status
P.oleracea	Portulacaceae	Leaves	Wild

Sample treatment:

The plant part (leaves) was air dried at room temperature for four weeks after manually washed with distilled water and crushed with sterilized motor and pestle. Hammer mill was used to grind the plant into powder and sieved with a muslin

cloth. The powdered samples were stored in an air tight container until use.

Chemicals and Instrumentals:

The determinate was performed on type model NOV AA 350 Germany Atomic Absorption Spectrophotometer (AAS), JENWAY PFP7 Flame Photometer (FP) designed and manufactured in the UK by Bibby Scientific Ltd, data were acquired and processed. Hydrochloric acid was supplied by Merck (Germany), Calcium, Magnesium, Iron, Potassium, Sodium were supplied from sigma.

Elemental analysis:

0.5 gram of the dried plant is accurately weighed in 250 ml beaker then 25 mL of 6 M HCl was added to the sample in the beaker and boiled for about 30 min. till the volume of the solution drops to about 5 mL; About 5 mL of hot deionized water was added to the sample and boiled. The content of the beaker is very carefully filtered in a calibration 50 ml volumetric flask and made to the volume by addition of deionized water [14]. The solution was analyzed for Mg, Ca and Fe by using AAS, K and Na by using flame photometer.

Selection of parameters:

The wavelength for Calcium 422 nm, Magnesium 285 nm and Iron 248 nm were found to be appropriate for the sensitive of those elements (Table 2).

Table 2: Atomic Absorption Spectrophotometer parameters used for the analysis of the studied metals

Parameters	Calcium	Magnesium	Iron
Instrument	AAS	AAS	AAS
Mode No.	Nov AA 350 Germany Atomic absorption spectrophotometer (AAS)		
Lamb	Calcium EDL	Magnesium EDL	Iron EDL
Wavelength	422 nm	285 nm	248 nm
Fuel gas	Acetylene + Nitrous	Acetylene	Acetylene
Support gas	Air	Air	Air

Results and Discussion:

Optimization of the AA spectra:

Atomic absorption spectrometric sensitive was working on NOV AA 350 (Germany) since this mode gave sharp and delicate signs. It was streamlined by utilizing a standard direct calibration curve for different ppm of Ca, Mg and Fe.

Calibration curves were built by plotting the Absorption against concentration (ppm) of elements. A direct relationship was gotten for Ca, Mg and Fe Fig.1, Fig.2 and Fig.3

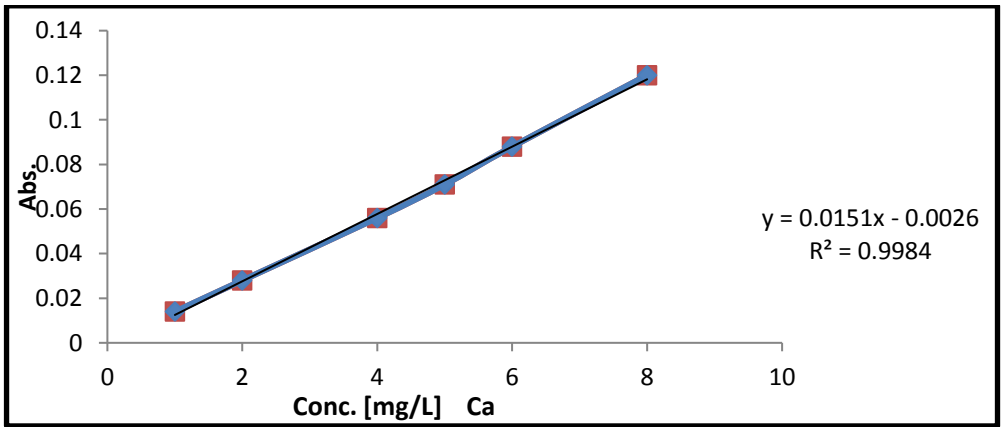

Fig.1 Calibration curve for studied Calcium

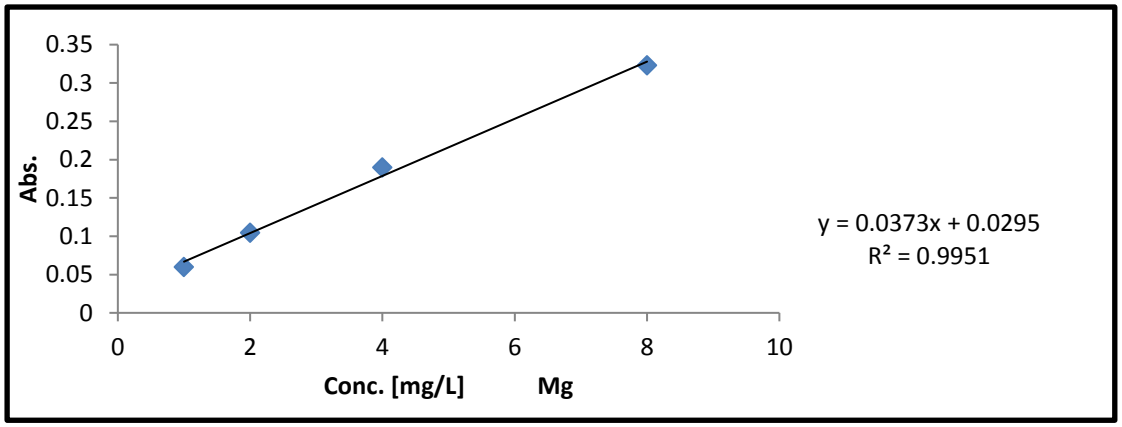

Fig.2 Calibration curve for studied Magnesium

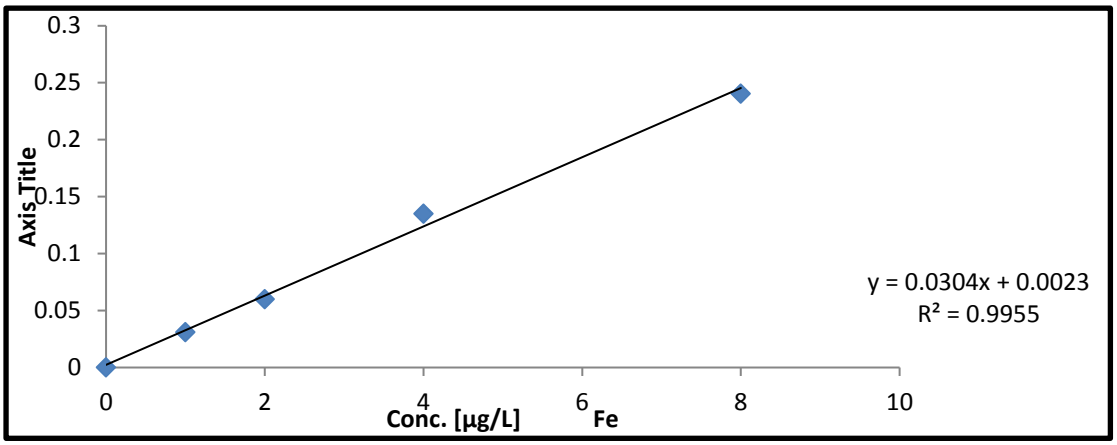

Fig.3 Calibration curve for studied Iron

Optimization of the flame photometer:
Flame photometer detection was carried out on JENWAY PFP7 Flame Photometer designed (UK) by Bibby Scientific Ltd by utilizing a standard direct calibration curve for different ppm of K and Na.

Calibration curve were developed by plotting emission against concentration (ppm) of elements. A straight relationship was acquired for K and Na Fig.4 and Fig.5 respectively.

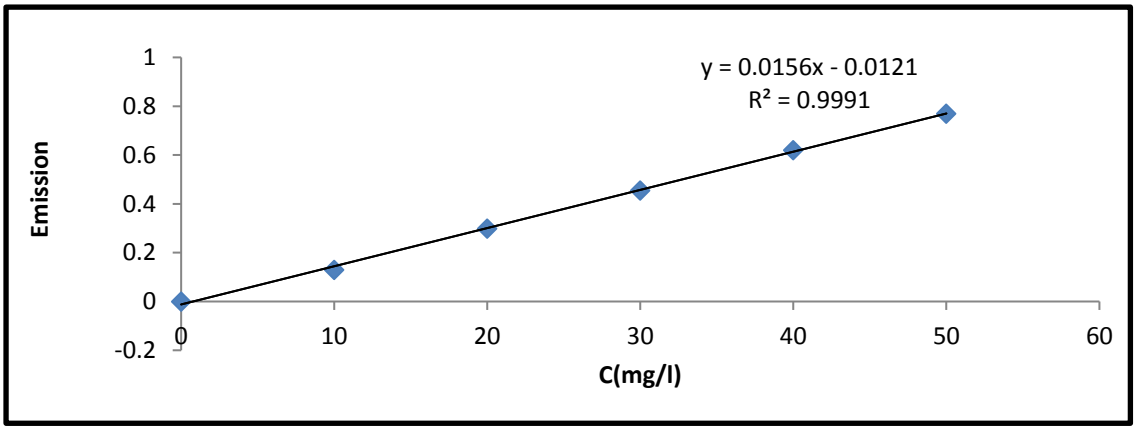

Fig.4 Calibration curve for studied Potassium

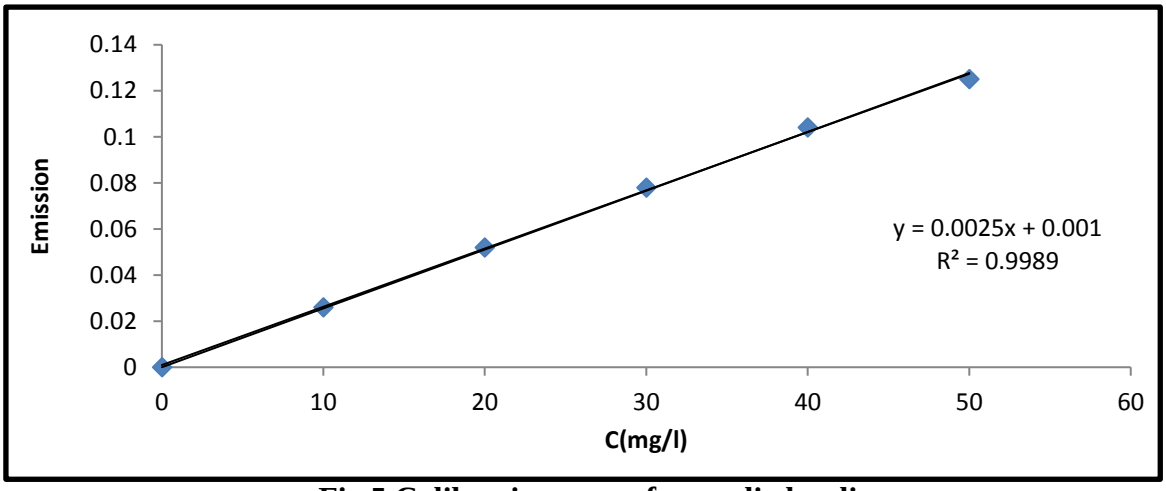

Fig.5 Calibration curve for studied sodium

The precision and accuracy calibration curve for studied Metals given in Table 3

Table.3: Precision and accuracy Calibration curve for studied Metals

Metal	Concentration (ppm) Found*	Recovery * %	SD	R.S.D * %	Error * %	LOD	LOQ
Ca	4.362252	100.0364	0.072671	1.63321	0.03637	15.88169	48.1264
Mg	3.829454	99.97543	1.428919	37.33448	0.024566	121.6217	383.0881
Fe	3.717796	99.94232	0.160068	5.090092	0.230706	17.35780	52.65391
K	29.91795	99.98193	7.435633	29.85945	0.018073	1572.9223	4766.43
Na	30.26413	100.01615	0.333561	1.090599	-0.01615	146.7668	444.748

*(five reading for each metals in standard solutions)

Elemental composition:

The composition of elements for sample after drying (0.5gm) and concentration (ppm) in extraction solution (50mL) is given in Table 4 and Table 5

Table.4 Composition of Macro and Micro elements of the selected vegetable species (ppm) in Lebanon origin

Species	Macro elements (ppm)				
	Ca	**Mg**	**K**	**Na**	**Fe***
P. Oleracea	140.4ppm	211.71ppm	16ppm	38ppm	8.9ppm
	7.02mg	10.5855mg	0.8mg	1.9mg	0.445mg

*Micro element

Table.5 Composition of Macro and Micro elements of the selected vegetable species (ppm) in Iraq origin

Species	Macro elements (ppm)				
	Ca	Mg	K	Na	Fe*
P. Oleracea	138.75	214.53	18	4	7.026
	6.9375mg	10.7265mg	0.9mg	0.2mg	0.3513mg

*Micro element

The different element content which observed in tables 4 and 5 for different samples is due to the different climatic and soil types, which differ from country to others, climatic condition, especially atmosphere (temperature and light), have a particularly high impact on the dietary nature of products of vegetable and fruits, also the root stock utilized for products of the vegetable trees and fruits, mulching, water system, preparation, and other social practices impact the water and supplement supply to the plants, which can influence the piece and quality properties of the harvested plants parts; The results demonstrated that this vegetable can possibly give fundamental supplements to beings of human and (in 0.5g) it is found to be a good source of minerals particularly Ca, Mg, Fe, K and Na as show in tables 4 and 5.

Fruits and vegetables are important sources of supplements and offer points of interest over dietary advantage, on account of minimal effort and wide availability; In day by day eating routine foods grown from the ground have been unequivocally connected with lessened hazard for element deficient.

Conclusion:

The indication of results of P. Oleracea can possibly give basic supplement to the beings of human as it was discovered essentially valuable as far as natural assets especially Ca, Mg, Fe, K, and Na. P. Oleracea is essential nourishment supplement and is exceedingly advantageous for the upkeep of wellbeing and counteractive action of infections; It is containing profitable sustenance fixing which can be effectively used to develop and repair the body organs**.**

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