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## Determination the level of some minerals in frozen peas (*Pisum sativum* L.)

### ABSTRACT

The Study focused many commercial brands of **split peas** (*Pisum sativum* L) imparted frozen Peas selected from Various origins available in the local markets of Tikrit city in Salah Addin province to be investigated , which are (Mersin peas , super fresh peas , Farm peas and Montana peas). They were researched in the laboratories of the Department of Food Sciences in the College of Agriculture - Tikrit University), which were studied in laboratories Food Science, College of Agriculture, Tikrit University. The levels of several mineral elements were determined as the calcium content ranged in peas Mersin, Super, Montana and Pharm (4.59, 4.13, 4.27, 4.40) mg/kg, while the amount of potassium was (1086.2) mg / kg in Peas Pharm at a minimum. The highest concentration was in Peas Montana (1095.4) mg / kg. The maximum amount of iron, copper and chromium was less than (0.1) mg / kg in all peas samples. Super, Pharm and Montana (0.11, 0.1, 0.3, 0.7) mg / kg, the concentrations of cadmium, cobalt, nickel and lead were less than (0.1) mg / kg while zinc concentrations were less than (0.05) mg / kg in all brands Thoughtful, the study indicates the high level of all metals in the brand of Montana Peas.

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## INTRODUCTION:

Peas are rich with vitamins (E, C, A) and proteins, carbohydrates , little of lipids , Contains a several minerals elements ( Fe, Ca, K, Na, I) as well as, it has low calories and never contain a cholesterol so that it considering an important food , Peas are a main components of human nutrition and diet , they are an evidence of a healthy nutrition that correlated with consumption of fresh Peas ( Abadias *et.al*, 2008). Its provide a vital to body and contributing in physical fitness , it's a balanced food that reduces a risk of many diseases ( Kalia *et.al*, 2006). A several studies have reported that peas contain many mineral elements ( P. Ca, Mg , Fe, Cu, Zn, Mn , Riboflavin , Niacin , Thiamine , Vitamin A, Ascorbic acid ) , also, it's rich in proteins and carbohydrates ( Hassan , 2002).

The freezing process characterized out of other preserving process by keeping the natural properties of food stored in term of taste , smell, flavor and nutritional value. The freezing process leading to reduce the activity of rot factors ( microbial, chemical) and the enzymatic activity and the oxidation reaction may continue very slow (Hassan , 2001). The level of minerals in Peas vary according to the type and environment of production and its transport , circulation and manufacture. The level of some minerals vary in Peas as a result to the industrial and agricultural pollution through fertilizers and petrochemical plants , in addition to the excessive using of chemical fertilizers , pesticides, fungicides and industrials detergents wastes. As well as, water used in washing and preparing these Peas . The current study aimed to investigate the level of some essential mineral

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elements and other contaminated elements because the lack of healthy is due to abundance of many control abundance many imported food materials and Peas ( Hassan , 2002).

## MATERIALS AND METHODS:

### Preparing of Sampling :

Several frozen peas samples were collected from local markets in Tikrit city that labeled as trade mark (Mersin , super fresh , Montana , and farm ) , they were transferred to lab and stored in cleaned and closed containers , After That samples were dried at 105°C , then, ash at 625°C (A.O.A.C , 2004).

### Minerals estimation in frozen peas :

The type and ratio of the following minerals (Cd, Zn, Cu, Co, Mn, Fe, Cr, Na, K, Ca, Mg, ) are estimated by added 5ml from 5% nitric acid to 5 gm from ash that obtained , mixed well , then, filtered by using filter paper and estimated by [Atomic Absorption Spectrophotometer](#) 210VGP, European, device for each mineral and measured it by placed samples as liquid in a device and estimated directly according to (A.O.A.C, 2004) .

## RESULTS AND DISCUSSION:

The lowest calcium level was 4.13 mg/kg in super pea , while the highest level was 4.59 mg/kg in Mersin pea. The lowest level of potassium was recorded in farm pea ( 1086.2 mg/kg) and the highest was 1095.4 mg/kg in Montana pea . The lowest sodium level was 321.8 mg/kg in super pea while the highest was 435.1mg/kg in Montana pea. The lowest level of magnesium (316mg/kg) in Mersin pea and a highest was 363mg/kg in Montana pea. The results were not agreed with (Ismail *et.al.* 2011) which reported that the level of calcium ranged between (0.3-3.35 mg/kg) in Peas , this decrease due to the Peas was planted in soil has low calcium content. While , the results varied with , which reported that the calcium level was 678 mg/kg , the reason of calcium increased may due to the cultivated in soil which a rich with calcium. Also, (Adeyeye 2005) reported that increased level of potassium in Peas was 1079mg/kg due to spraying Peas with potassium fertilizers or the cultivate soil was a rich with potassium, that agreed with our results. While , reported the levels of potassium decreased in Peas ranged between 12.58 – 158 mg/gm may due to the Peas were cultivated in soil that had low ratio of potassium or didn't use the potassium fertilizer. (Jean *et.al* 2012) reported that the level of sodium in Peas was 88-79 mg/kg which agreed with results of study. While the results varied with (adeyeye,2005 ) that reported that there was increase in level of magnesium reached to 2734 mg/kg due to cultivated soil which was a rich with magnesium.

**Table (1)** Concentration of macro-elements in frozen peas

Concentration of macro-elements (mg/kg)					
Food \ Elements		Ca	K	Na	Mg
1	Mersin pea	4.59	1191.5	424.5	316
2	Super pea	4.13	1092.5	321.8	348.84
3	Farm pea	4.27	1086.2	365.3	329.9
4	Montana pea	4.40	1095.4	435.1	363

The level in table (2) of iron was <0.1 mg/kg in all pea samples , these results varied with reported that the iron concentration ranged between 2.4- 7.5 mg/100gm in pea , those concentrations were less than limits of WHO/FAO, 2011 which reported the level of iron must be 2.5mg/kg in Peas. Also, the copper concentration was <0.1 mg/kg , these results agreed with Al-subaie , *et.al.* (2014) Who reported that the increase of copper level ranged between 0.41- 0.73 mg/kg in pea due to the ecological pollution with high concentration of copper in industrial regions or sprayed the crops with

pesticides , fungicides and fertilizer such as copper sulphate , then this element transferred to the agricultural crops. These level of copper in pea samples was congruence with standard parameters of WHO/FAO , (2011) that recorded the copper concentration 0.1mg/kg. so , from all above . we conclude there isn't any copper contamination in Peas. The table (2) also must be less than show Manganese concentration was (0.11 ,0.1 , 0.3 , 0.7 mg/kg) in pea samples (mersin , super, farm , Montana) respectively , this not agreed with Mona, *et.al* , (2008) that reported the Mn level ranged between 12-69 mg/kg in Irrigated Peas with different sources of water , the results are congruence with Al-subaie , *et.al*, (2014) that reported the level of Mn ranged between 0.41-0.73 mg/kg in pea , so all Mn concentrations were congruence with standard parameters of WHO/FAO (2011) , which reported the level of Mnt Can be ranged between 2-3 mg/kg in Peas. Adefila , *et.al*. (2010) reported a level of Chromium ranged between 0.64-4.45 mg/kg in Peas nearby the Poultry fields, these results varied with current results that recorded the Cr level <0.1 mg/kg in all pea samples , this increase due to the planting Peas nearby industrial regions or irrigated with underground water which contain a high Cr concentration. The level of Cr in all pea samples was congruence to standard parameters of WHO/FAO (2011) , that refers to the level of Cr must be 0,2mg/kg in Peas.

**Table (2)** Concentration of microelements in frozen peas

Concentration of microelements (mg/kg)					
Food \ Elements		Fe	Cu	Mn	Cr
1	Mersin pea	< 0.1	< 0.1	0.11	< 0.1
2	Super pea	< 0.1	< 0.1	0.1	< 0.1
3	Farm pea	< 0.1	< 0.1	0.3	< 0.1
4	Montana pea	< 0.1	< 0.1	0.7	< 0.1

The cadmium level was <0.1 mg/kg in all pea samples as shown in table (3), these results equivalent with agree Olabenji , *et.al* (2013) they reported that levels of Cd ranged between 0.018-0.12 mg/kg in Peas. while the results non congruence with standard parameters of WHO/FAO (2011) (Cd must be 0.007 mg/kg) , we can conclude from that the Peas was polluted with Cd , and these increasing in Cd concentration in Peas due to the high concentration of it in water and soil and it can be reach to the water sources and transfer to Peas. Also , we notice from table (3) the level of Cobalt was <0.1 mg/kg in all pea samples , this was congruence with Al-subaie , *et.al* , (2014) Who found that the Co level was ranged between 0.41-0.73 mg/kg in pea.

Al-subaie , *et.al* , (2014) confirmed that the level of Zinc ranged between 0.4-0.7 mg/kg in pea, these results not agreed with our results which recorded <0.05 mg/kg in all pea samples , the increase of Zn concentration may due to the high concentration of it in soils as well as the ability to transferring through waste discharge in rivers. While the results do not agree with Adefila , *et.al*. (2010) who recorded that Zn level was 50.67-102.98 mg/kg in cultivated Peas nearby the poultry fields. The concentration of Zn was similar to the standard parameters for WHO/FAO (2011), ( Zn concentration must be ranged between 0.3- 1 mg/kg) , so we concluded that there isn't any contamination with Zn in Peas.

The level of Nickel was <0.1 mg/kg table (3) Which agreed with Sobukola , *et.al*. (2009) Who reported that nickel level ranged between 0.014-0.026 mg/kg in Peas , the increase in Ni concentration due to planting Peas in rich soil with Ni or irrigated it by contaminated ground water , table (3) shows also all pea samples were Within permissible limits and consistent to standard parameters of WHO/FAO (2011) that reported the concentration must be 0-7 mg/kg. we conclude that there isn't any Ni contamination in Peas .

The current study recorded the level of lead which was  $<0.1$  mg/kg in all samples, this not agreed with Al-subaie, *et.al.* (2014) who reported the level of lead ranged between 0.41- 0.73 mg/kg in pea. while, the results of current study varied with Adefila *et.al* (2010) that recorded 0.27-7.21 mg/kg in Peas. This increase in Pb concentration due to the limited absorption of Pb from soil which contain a high level of Pb or its precipitate from air on soil surface and may be from the exhaust gases from vehicles in industrial regions. The Pb level was within permissible limits and consistent to standard parameters of WHO/FAO (2011) that reported the concentration must be 0.3mg/kg, so we conclude that there isn't any contamination in Peas by Lead.

**Table (3)** Concentration of heavy metals in frozen peas

Concentration of heavy metals (mg/kg)						
Food \ Elements		Cd	Co	Zn	Ni	Pb
1	Mersin pea	$< 0.1$	$< 0.1$	$< 0.05$	$< 0.1$	$< 0.1$
2	Super pea	$< 0.1$	$< 0.1$	$< 0.05$	$< 0.1$	$< 0.1$
3	Farm pea	$< 0.1$	$< 0.1$	$< 0.05$	$< 0.1$	$< 0.1$
4	Montana pea	$< 0.1$	$< 0.1$	$< 0.05$	$< 0.1$	$< 0.1$

## CONCLUSIONS:

- 1- The standards of micro and rare elements (Ca, K, Na, Mg, Ca, Mn, Cr) were reached within permissible limits according to WHO and FAO in all pea samples except Iron that was less than a limited values.
- 2- The levels of heavy metals (Co, Zn, Ni, Pb) reached within permissible limits according to WHO and FAO in all pea samples except Cd that was high than limited values and its not matching to standard parameters of WHO and FAO.

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### تحديد مستوى بعض المعادن في البازاليا المجمدة (*Pisum sativum* L.)

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#### المستخلص

درست العديد من العلامات التجارية لبازاليا (*Pisum sativum* L) Split peas المستوردة من منشآت مختلفة والمجمدة والمتوفرة في الأسواق المحلية لمدينة تكريت في محافظة صلاح الدين وهي (بازاليا مرسين ، بازاليا سوبر فريش ، بازاليا مونتانا وبازاليا فارم ) ، والتي جرت دراستها في مختبرات قسم علوم الأغذية في كلية الزراعة - جامعة تكريت. حيث تم تحديد مستويات العديد من العناصر المعدنية أذ تراوحت نسبة الكالسيوم في بازاليا مرسين ، سوبر ، مونتانا و فارم (4.59 ، 4.13 ، 4.27 ، 4.40) ملغم/كغم، أما كمية البوتاسيوم فقد بلغت (1086.2) ملغم/كغم في بازاليا فارم كحد ادنى واعلى تركيز في بازاليا مونتانا (1095.4) ملغم/كغم ، وتراوحت كمية الصوديوم بين (321.8 ، 435.1) ملغم/كغم في كل من بازاليا سوبر ومونتانا أما المغنيسيوم فقد تراوح بين (316) ملغم/كغم في بازاليا مرسين كحد ادنى و(363) ملغم/كغم في بازاليا مونتانا كحد اعلى ، في حين بلغت كمية الحديد والنحاس والكروم اقل من (0.1) ملغم/كغم في جميع عينات البازاليا وكانت كمية المنغنيز لبازاليا مرسين ، سوبر ، فارم و مونتانا (0.11 ، 0.1 ، 0.3) ، (0.7) ملغم/كغم ، وبلغت تراكيز الكاديوم والكوبلت والنيكل والرصاص اقل من (0.1) ملغم/كغم في حين كانت تراكيز الزنك اقل من (0.05) ملغم/كغم في جميع الماركات التجارية المدروسة ، وتشير الدراسة إلى ارتفاع مستوى المعادن جميعها في العلامة التجارية لبازاليا مونتانا.

الكلمات المفتاحية: معادن ثقيلة ، عناصر كبرى ، عناصر صغرى ، بازاليا مجمدة.