SINAI Journal of Applied Sciences (ISSN: 2314-6079) Vol. (6) Is. (2), Aug. 2017 171-180

SINAI Journal of Applied Sciences

ARU-EGYPT SJAS Trust Science | It Creates

SELENIUM STATUS IN SOME NORTH SINAI SOILS 1. COASTAL AREA

Reda M.A. El-Said[1*], E.R. Marzouk[2], W.K. Mohamed[3] and M.A. Hassan[2]

1. Inst. Heliopolis Military Sec., Cairo, Minist. Edu., Egypt.
2. Dept. Soil and Water, Fac. Environ. Agric., Sci., Arish Univ., Egypt.
3. Inst. Soil Water and Environ., A.R.C., Egypt.

ABSTRACT

The present study was conducted during the two seasons of 2013/2014 and 2014/2015 in North Sinai Governorate to investigate the spatial variations of (se) concentrations in coastal regions using two indicator range plants (atriblex and acacia). Total Selenium, and available seleniums were determined in the soils of the studied area of the Governorate including (Rafh, El-Sheikh Zoid, El-Arish and Bir El-Abd). Soil samples were taken from (0-30, 30-60, 60-90 and 90-120 cm) layers. The soil samples were taken from three sites from which both atriblex and acacia range plants were naturally grown. Leaves samples from two studied range plants were taken in April during the two studied seasons, while selenium concentrations were determined in such plant samples. The obtained results indicated that total selenium concentration in studied soils ranged from 0.20 ppm to 0.97 ppm in the whole coastal area studied soils compared to global crucial concentrations of 0.083 ppm. The high content of the total selenium concentration under such condition may be due to the effect of marine water *via* volatilization under relatively high rain fall precipitation. Such effect could be caused an enrichment factor of the upper soil layers with such rare element. Hence geographical aspects, specially the distance from sea could not be complete ignored with respect to the selenium status under coastal area conditions. With respect to extractable Se from the studied soils, obtained data reveal that the Se extractable using DTPA ranged from 0.022 ppm to 0.052 ppm compared to those extracted with water and $CaCl_2$ which ranged from 0.01 to 0.029 ppm and from 0.0 21 ppm to 0.037 ppm, respectively .It is worth to mention that Se extracted with DTPA was higher than that extracted using other two extracting agents. At all cases, using all studied extracting agents few quantities which ranged from 2.16 % to 18.50 % of total Se in the all studied soils. Such obtained results revealed that most total Se in the studied soils found in forms not extracted with the studied extracting agents and hence, not available for plant. The average selenium concentrations in the two studied range plants varied from 3.25 to 3.60 ppm in atriplex compared to 0.23 and 0.29 ppm in acacia plant. Such results clear that the potential differences between range plants used by animals with respect to selenium concentration (animal require mints 0.1 ppm).

Key word: Selenium, North SINAI, soils, coastal area.

INTRODUCTION

The chemistry of selenium has been reviewed by **Kabata-Pendias, (2001).** It is a group VIA metalloid with an atom weight of 78.96. Selenium shares many similar properties with sulfur (S), although the Se atom is slightly larger, the radius of Se^{+2} is 0.5 A^{O}, where the radius of the S^{+2} is 0.37 A^{o}, like S, Se can exist in five valence states, selenide (2^{-}), elemental Se (0), thioselenate (2^{+}), selenite (4^{+}) and selenate (6^{+}) **(Lauchli, 1993).**

*** Corresponding author: Tel.:** +201066693069
E-mail address: reda.mohamed99@yahoo.com

The speciation of Se depends on redox conditions and pH. Selenate to be the major species in the aerobic and neutral to alkaline environments, where's selenide and elemental Se dominate in anaerobic environments. Selenium also exists in volatile forms other DM Se*, e.g.* dimethyl diselenide (DMD Se). As far as is known, the first indication that the seas or oceans night be a source of Se to the terrestrial environment come from an investigation by **Lag and Steinnes (1974 and 1978).** In the study of the geographical distribution of trace elements in the surface soil layer they found that the Se concentration near the coast was as much as 5 times higher (1.0 versus 0.2 ppm) than an areas shielded from sea influences by high mountains **Lag and Steinnes (1974)** put forward the hypothec is that the excess Se observed in the coastal surface soil may have been supplied *via* precipitation, with the marine environment as a source.

It is advantageous however to have adequate concentrations of selenium in feeds as a basis for meeting the nutritional needs of animals. When forages having less than 0.05 ppm selenium are the only feed provided to animals they will usually show signs of lower that element. Forages having greater than 0.1 ppm Se are generally considered as having adequate levels roomette the nutritional need of animals. Soil is found amounted importance in deterring the Se status of plants grown and hence in grazing animals.

The world mean value of total Se in soils is 0.4 (general range 0.01) mg/kg **(Fordyce, 2005).** In most cases there is a strong correlation between the concentration of Se in geological parent material and the soils derived from than while the geological source of Se is a primary control on soil Se concentration, there are a number of biological and physicochemical properties that central Se bio availability (*i.e.* the mobility and the uptake by plants. These factors include the prevailing pH and redox conditions, the form or speciation of Se, soil texture and minor organic matter content and the presence of competitive ions **(Fordyce, 2005)**.

It is known **(Haygrath, 1994)** that soils in coastal areas or close to emission source are richer in season sample and areas and this may account for the phenomenon. However some coastal sandy soils also had low Se (**Mc Grath and Mc Cormack, 1999). Abdel Razik (2014)** found that the soils in northern or coastal areas of Egypt have the total Se content of (0.64, 0.46), (0.34, 0.18) and (0.15, 0.11) mg Se kg^{-1} soil and (0.56, 0.44), (0.39, 0.37) and (0.26, 0.22) mg Se kg^{-1} soil at Matrouh and El-Arish with soil depths (0- 30, 30-60, 60-90 and 90-120 cm, respectively.

The aim of the current study was to evaluate selenium status in the soils of coastal area of North Sinai Governorate as well as the selenium content of some range plants grown in that soils.

MATERIALS AND METHODS

Status of selenium in coastal soils of North Sinai Governorate was studied. Soil samples were taken from three sites in every location which two indicator range plants (*i.e.* atriblex and acacia) are naturally grown. The study locations were Rafah, El-Sheikh Zoid, El-Arish and Bir El-Abd which represent the coastal area of the Governorate during two seasons of 2013/2014 and 2014/2015. Plant samples (leaves) were collected from the same locations of soil samples during April.

In each location were sampled at different depths, 0-30, soil 30-60,60-90 and 90-120 cm. Soil samples were air dried, crushed finely ground using wood rod then sieved through 2 mm sieve and stored in clean glass bottles.

Soil physical and chemical analyses

Partical size distribution was carried out using pipit methods of **Gee and Bander (1986) and Dan (1957).**

Calcium carbonate content, pH, organic matter and EC were determined using standard methods outland by **Dewis and Freites (1970), Black *et al.* (1965) and Jackson (1973).** Cation exchange capacity (CEC) was determined using the method described by **Hesse (1971).**

Analysis of Soil Selenium

Total selenium contents in the soils were determined using the method described by **Elsokkary and Oien, (1977).**

- Extractable selenium in the soil was determined as follows:
- Water soluble Se was extracted using 100g soil with 500 ml of distilled water **(Gissel–Nelson, 1976).**
- Calcium chloride extractable Se was determined according to the method of **(Giessel-Nelson, 1973).**
- DTPA extractable Se was determined using the method of **(Lindsay and Norvell (1978).**

Analysis of Plant Selenium

Both two studied plant samples (leaves) from the three studied sites of every location during the two succive seasons were washed with tap water then rinsed three times in redistilled water. In order to diminish selenium volatilization, samples were oven dried at 50^{o}c for 48 hours.

Dried samples were hand crushed then stored in glass clean bottles. One gram was digested using concentrated HNO_3 and $HClO_4$ acids while spectrophotometric method was used to determine selenium content in the plant material **(Olson, 1973).**

Statistical analysis

Correlation (Pearson) analysis was used to determine relations between some soil parameters and both extractable Se in the soil and that in both studied plants **(SPSS, 2010).**

Table (1): Main physical and chemical properties of both atriplex and acacia growing soils in the coastal area of North Sinai Governorate.

Parameter	Atriplex growing soil	Acacia growing soil
	Rang value	**Rang value**
Coarse sand (%)	7.00 – 61.80	10.10 – 60.70
Fine sand (%)	13.oo – 44.10	21.00 – 58.10
Silt (%)	9.30 – 33.75	9.00 – 28.20
Clay (%)	4.20 – 19.29	4.90 – 16.49
PH	7.43 – 7.92	7.50 – 7.91
EC, dsm^{-1}	1.10 – 3.20	1.39 – 3.95
Calcium carbonate (%)	1.10 – 3.20	1.39 – 3.95
Organic matter (%)	0.0211 – 0.0833	0.030 – 0.092
Cation exchange capacity, $cmolkg^{-1}$	7.65 – 15.20	7.52 – 22.30
Total selenium $mgkg^{-1}$	0.21 – 0.55	0.20 – 0.52
Water extractable Se, $mgkg^{-1}$	0.015 – 0.029	0.010 – 0.027
$CaCl_2$ extractable Se, $mgkg^{-1}$	0.021 – 0.036	0.021 – 0.037
DTPA extractable Se, $mgkg^{-1}$	0.022 – 0.051	0.0 26 – 0.05

RESULTS AND DISCUSSION

Total selenium

Obtained results in Table 2 show that the atriblex growing soil selenium content varied from 0.21ppm to o.55 ppm which depending on site location and soil layer depth, the corresponding values for acacia growing soils which ranged from 0.20 ppm to 0.97 ppm.

The highest value of total Se was found in the soil of El-Arish. Such effects of the highest concentration of surface soil layers could be due to the effect of marine water aerosols effects and precipitation as cited by **Mosher *et al.* (1987).**

The medium values were found in the soils while the lowest values were found in soil such effects could be due to different rain of all precipitation from location to another. The precipitation difference from location to another along the coastal line which extend about 180 km from Rafah in the east to Baloza in the west. The annual rain fall quantities varied from 300, 250, 100 and 50 mm in Rafah, El-Sheikhzoid, El-Arish and Bir El-Abd, respectively **(Annual Report, 2015).** Such obtained results are in agreement with those obtained by Lag and **Steinnes (1978), Elsokkary (1980), El-Awag (1989) and Ismail (2009).**

Extractable selenium

Water extractable selenium contents and the percent of total which extracted using water extractor are present in Table 3. Obtained results reveal that the highest levels of water soluble selenium are present in the upper soil layers. Such findings were found true in all studied soils locations. For all studied soil, water soluble selenium accounted for a lower percentages of total selenium. The water soluble selenium content in the atriplex growing soils ranged from 0.015 to 0.029 ppm compared to acacia growing soils which ranged from 0.01 ppm to 0.027 ppm in all different studied soils. The water soluble selenium accounted for a low percentage of total selenium which varied from 2.75 ppm to 9.04 ppm in atriplex growing soils compared to 2.16 to 10.50 ppm in acacia growing soils.

The obtained amounts of water soluble selenium are relatively higher than those obtained by **Abdellah (1983)** in his study of some Egyptian soils 0.005 to 0.018 ppm). Similar results were obtained by **Soliman, (1981)** in Egyptian soils (0.008-0.0039) while **El-Awag (1989)** found that water soluble selenium content in some Egyptian soils were ranged from 0.01 to 0.046 ppm. The low content of water soluble selenium in Egyptian soil could be due to the high retention of the element with soil constituents **(Abdellah, 1983).**

Calcium chloride extractable selenium

The concentrations of extracted selenium from the studied soils using $CaCl_2$ 0.01M are presented in Table 4. The concentrations varied from 0.021 to 0.036 ppm in Atriplex growing soils. The corresponding values for acacia growing soils were varied between 0.021 ppm and 0.037 ppm. The Se concentration of extractable using $CaCl_2$ were higher than that obtained using water. Such increases were found true in both atriplex and acacia growing soils in all studied coastal area in all locations of the North Sinai Governorate.

The percent extractable Se using $CaCl_2$ represent about 3.09% and 13.63% of total Se in soils. Such obtained values are close to that obtained by **El-Awag (1989) and Soliman (1981)** in their studies on some Egyptian soils using the previous Se extracting agent. On the other hand, obtained results are higher than that obtained by **Abdellah (1983)** who found that Se concentrations using $CaCl_2$ were varied between 0.009 and 0.018 ppm with an average extracted concentrations which represent 0.67% of the total content of selenium in alluvial the soil.

Table (2): Total selenium concentration (ppm) in the studied soils of coastal area of North Sinai Governorate.

Selenium concentration (ppm)				
	Location			
Soil depth cm	El-Arish	Rafh	El-Sheikh Zoid	Bir El-Abd
Atriplex growing soil				
0-30	0.55	0.43	0.49	0.41
30-60	0.43	0.41	0.40	0.32
60-90	0.40	0.33	0.31	0.30
90-120	0.32	0.21	0.26	0.26
Acacia growing soil				
0-30	0.51	0.52	0.45	0.49
30-60	0.97	0.33	0.38	0.41
60-90	0.41	0.29	0.31	0.30
90-120	0.36	0.20	0.22	0.26

Table (3): Water soluble extractable Se concentrations, ppm in the studied.

Selenium concentration (ppm) and (%) of total								
	Location							
Soil depth cm	El-Arish	(%) of total	Rafah	(%) of total	El-Sheikh Zoid	(%) of total	Bir El-Abd	(%) of total
Atriplex growing soil								
0-30	0.022	4.00	0.024	5.58	0.027	2.75	0.029	7.07
30-60	0.020	4.65	0.022	5.36	0.026	6.50	0.027	8.43
60-90	0.018	4.50	0.021	6.36	0.025	3.06	0.022	7.33
90-120	0.015	4.68	0.019	9.04	0.022	8.46	0.018	6.92
Acacia growing soil								
0-30	0.023	4.50	0.027	5.19	0.025	5.55	0.027	5.51
30-60	0.021	2.16	0.025	7.57	0.024	6.31	0.025	6.09
60-90	0.011	2.63	0.025	8.62	0.021	6.77	0.021	7.00
90-120	0.010	2.77	0.021	10.50	0.020	9.09	0.011	4.23

Table (4): $CaCl_2$ extricated Se concentrations, ppm in the studied soils of coastal area of North Sinai Governorate.

Selenium concentration (ppm) and (%) of total								
Location								
Soil depth cm	El-Arish	(%) of total	Rafah	(%) of total	ElSheikh Zoid	(%) of total	Bir El-Abd	(%) of total
Atriplex growing soil								
0-30	0.030	5.45	0.033	7.67	0.036	7.34	0.033	8.04
30-60	0.028	6.51	0.031	7.56	0.030	7.50	0.030	9.37
60-90	0.022	5.50	0.030	9.09	0.030	9.67	0.028	9.33
90-120	0.021	6.56	0.022	10.47	0.027	10.38	0.022	8.46
Acacia growing soil								
0-30	0.033	6.47	0.036	6.92	0.037	8.22	0.032	6.53
30-60	0.030	3.09	0.030	9.09	0.033	8.68	0.031	7.56
60-90	0.027	6.58	0.027	9.31	0.031	10.00	0.027	9.00
90-120	0.021	5.83	0.025	12.50	0.030	13.63	0.021	8.09

DTPA exec tractable selenium

Obtained results of selenium extractable from the studied soils are present in Table 5. The concentrations of selenium extractable with DTPA in **Atriblex** growing soils ranged between 0.022 and 0.048 ppm. The corresponding values for acacia growing soils ranged between 0.026 and 0.055 ppm. The percent DTPA extractable Se from total Se in the soil ranged between 6.87% and 18.09% for **Atriblex** growing soils. The corresponding values for acacia growing soils ranged between 3.91 % and 18.50%. **El-Awag, (1989)** found that DTPA extractable Se ranged between 0.018 and 0.09 ppm and represent average about 7.09% of total Se in the soil. **Soliman, (1981)** found that Se extractable with DTPA ranged between 0.012 and 0.098 ppm.

The previous obtained results cleared that the amount of extractable Se using the three studied extracting agents represent a small percentages only of the total Se in the studied soils. Based on the obtained results most of Se in studied soils exists in forms not easily to extract using the three studied and hence, such forms are may be less available for plant absorption. It is worth to mention that the three studied fractions of Se using the three extracting agents were higher in the upper layers of the studied soils in such coastal area of North Sinai Governorate which may due to the nearest this area from marine water effect via aerosols or precipitation.

On the other hand, the relative concentrations of selenium extracted from the soil using the studied three extracting agents were in the following order: DTPA > $CaCl_2$ > water.

Selenium concentration in the studied two plants

Obtained results in Table 6 reveal that the average selenium concentration in **Atriblex** plant ranged between 3.24 and 3.60 ppm in all studied coastal area in North Sinai Governorate. The corresponding values for acacia range plant ranged between 0.22 and 0.29 ppm.

Table (5): DTPA extractable Se concentrations (ppm) in the studied soils of coastal area of North Sinai Governorate.

Selenium concentration (ppm) and (%) of total								
	Location							
Soil depth cm	El-Arish	(%) of total	Rafah	(%) of total	ElSheikh Zoid	(%) of total	Bir El-Abd	(%) of total
30	0.041	7.45	0.051	11.86	0.049	10.00	0.051	12.43
Atriplex growing soil								
30-60	0.037	9.25	0.048	11.70	0.041	10.25	0.048	15.00
60-90	0.031	9.68	0.042	12.72	0.040	12.90	0.041	13.66
90-120	0.022	6.87	0.038	18.09	0.036	13.84	0.031	11.92
Acacia growing soil								
0-30	0.046	9.01	0.052	10.00	0.050	11.11	0.055	11.22
30-60	0.038	3.91	0.046	13.93	0.042	11.05	0.048	11.70
60-90	0.032	7.80	0.041	14.13	0.038	12.25	0.042	14.00
90-120	0.026	7.22	0.037	18.50	0.038	17.27	0.037	14.23

Table (6): Selenium concentration (ppm) in the two studied range plants during the two seasons in coastal area of North Sinai Governorate.

	El-Arish				Rafah				El-Sheikh Zoid				Bir El-Abd			
Selenium concentration (ppm) and (%) of total																
	Average				Average				Average				Average			
Atriblex																
1st season	3.41	3.40	3.42	3.40	3.61	3.60	3.59	3.60	3.26	3.24	3.26	3.25	3.45	3.47	3.46	3.46
2nd season	3.40	3.42	3.40		3.59	3.58	3.60		3.26	3.25	3.24		3.46	3.45	3.49	
Acacia																
1st season	0.30	0.28	0.29	0.29	0.27	0.28	0.26	0.26	0.22	0.24	0.23	0.23	0.26	0.25	0.24	0.25
2nd season	0.29	0.27	0.29		0.25	0.28	0.26		0.23	0.21	0.22		0.27	0.24	0.25	

The obtained results cleared that the concentrations of two studied range plants are higher than that recommended to grazing animals (0.1 ppm).

Abdellah (1983) in the study of wild grasses grown under grazing regions, North Western part of Egypt, contain higher selenium content. Consequently, the animals in these regions are not subjected to Se deficiency since their diets consist of different range plant.

REFERENCES

Abdel-Razik, E.M. (2014). Selenium Distribution and Behavior in Some Soils of Egypt. Ph.D. Thesis, Fac. Agric., Cairo Univ.

Abdellah, A.A. (1983). Selenium Status in Plant and Soil. Ph.D. Thesis, Ain Shams Univ., Fac. Agric., Egypt.

Annual Report (2015). Information Center, North Sinai Governorate.

Black, C.A.; Envans, D.D.; Ensominger, L.E.; White, J.L. and Calak, F.E. (1965). Methods of Soil Analysis. Part (1) and Part (2). Ame. Soc. Agron. Inc. Pub. Madison, Wisconson, USA.

Dan, H.W. (1957). Problems of soil testing on calcareous soils. Plant and Soil, 3 (3): 275-288.

Dewis, J. and Freites, R. (1970). Physical and chemical methods of soil and water analysis.

El-Sokkary, I.H. (1980). Selenium distribution, chemical fractionation and adsorptions in some Egyption alluvial and lacustrine soils. z.pF lanzenerniehr. Bodenk., 143: 74 – 83.

El-Sokkary, I.H. and Oien, A. (1977). Determination of Se in the soil. Acta Agric. Scan., 27 (4): 285-288.

FAO. Rome. Soil Bull. No. 10.

El-Awage, T.F. (1989). Selenium Status in some Egyptian Soils. Ph.D. Thesis, Mansoura univ., Fac. Agric.

Fordyce, F.M. (2005). Selenium deficiency and toxicity in environment.

Gee, G.W. and Bander, J.W. (1986). Partical size analysis. In Methods of Soil Analysis in part 1. Klute. A. (Ed.) Agron., No. 9.

Gissel-Nelsen, G. (1976). Selenium in soils and plants. Agriculture report from Agric. Res., Dept. Res. Establishment Riso Roskilde, Denmark.

Gissel-Nielsen, G. (1973). Uptake and distribution of added selenite and selenite by barley and red clover as influenced by sulfur. J. Sci. Food. Agric., 24: 649-655.

Haygrth, P.M. (1994). Selenium in the Environment Ed. W.T. Frankenberger and S. Benson, Marcel Dekker, 1-27.

Hesse, P.R. (1971). A Text Book of Soil Chemical Analysis. John Murray (puplish.), London, Great Britain.

Ismil, H.I.G. (2009). A study on Selenium status in some pasture regions soils of the Northern Western coast of Egypt. M.Sc. Thesis, Fac. Agric. (Saba Basha), Alex. Univ., Egypt.

Jackson, M.L. (1973). Soil Chemical Analy. Prentice-Hall of India private

Lag, J. and Steinnes, E. (1974). Soil selenium in relation to precipitation. AMBIO A.J. Human Environ., 3 (6): 237-238.

Lag, J. and steinnes, E. (1978). Regional distribution of selenium and arsenic in humus Layers of Worwegian forest soils. Geoderma, 20: 3 – 14.

Lindsay, W.L. and W.A. Norvell (1978). Development of DTPA Soil test for Zinc, Iron Manganese and Copper, 421-428.

Mc Grath, D. and Mc Cormack, R.J. (1999). The significant of heavy metal and organic Microllutants in soils, 1-34.

Mosher, B.W; Duce, R.A.; Prospero, J.M. and Savoie, D.L. (1987). Atmospheric selenium: geographical distribution and Ocean to atmosphere flux in the pacific. J. Geophys. Res., 92: 13277- 13287.

Olson, O.E. (1973). Simplified spectrophotometric analysis of plants for Selenium. J.A.O.C., 56: 1073-1077.

Selinus, O. (Ed.) (2013). Essentials of medical Geology: 373-415. Soil 3(3): 275-288.

Soliman, S.M. (1981). The Fate of Added Selenium to some Soils of Egypt. M.Sc. Thesis, Fac. Agric. Ain shams univ. Reseroir, Ca lifornia, USA, Appl. Geochem., 4: 543-563.

الملخص العربي

موقف عنصر السيلينيوم في بعض الأراضي بشمال سيناء

١. المنطقة الساحلية

رضا محمد علي السيد[١]، عزت رشاد مرزوق[٢]، وجيه قدري محمد[٣]، مصطفي علي محمد حسن[٢]

١- معهد مصر الجديدة الثانوى العسكرى بالقاهرة، وزارة التربية والتعليم، مصر.
٢- قسم الأراضي والمياه، كلية العلوم الزراعية البيئية، جامعة العريش، مصر.
٣- معهد بحوث الأراضي والمياه والبيئة، القاهرة، مصر.

يعتبر السيلينيوم من العناصر الضرورية للحيوان والإنسان بالرغم من أنه لا يعتبر من العناصر المغذية للنبات. يعتمد الحيوان في الحصول علي السيلينيوم من النباتات الرعوية خاصة في مناطق الرعي المفتوح، تم تنفيذ هذا البحث في المنطقة الساحلية من محافظة شمال سيناء والتي تشمل مراكز رفح، الشيخ زويد، العريش، بئر العبد، حيث أظهرت العديد من الأبحاث أن تركيز السيلينيوم في أراضي المناطق الساحلية القريبة من البحار يكون أعلي نسبياً من تركيزه في أراضي المناطق الداخلية البعيدة عن البحار خاصة في الطبقات السطحية، تمت هذه الدراسة باختيار ٣ مواقع بكل مركز من مراكز المحافظة الأربعة سابقة الذكر حيث ينمو كل من نباتي الأتربلكس والأكاسيا الرعويين (كنباتي دليل) طبيعياً حيث أخذت عينات التربة من تلك المواقع حيث ينمو هذين النباتين. من أعماق صفر، ٣٠، ٣٠، ٦٠، ٦٠، ٩٠، ٩٠، ١٢٠ سم، بينما أخذت عينات من أوراق النباتين خلال شهر إبريل من موسمي عام ٢٠١٣-٢٠١٤ وعام ٢٠١٤-٢٠١٥. تم تحليل عينات التربة طبيعيا وكيميائياً كذلك تم تقدير السيلينيوم الكلي والمستخلص بواسطة الماء، كلوريد الكالسيوم، DTPA. تم تقدير تركيز السيلينيوم في العينات النباتية وذلك خلال الموسمين سابقي الذكر. وكانت أهم النتائج كما يلي: تراوح تركيز السيلينيوم الكلي في التربة بين ٠,٢ ppm، ٠,٩٧ ppm، اختلفت تركيزات السيلينيوم من موقع إلي آخر في المراكز الأربعة، أظهرت النتائج أن الطبقة السطحية من التربة تحتوي علي أعلي التركيزات من السيلينيوم الكلي مما قد يشير إلي أن مصدر هذا السيلينيوم هو مياه البحر القريبة من خلال الترسيب precipitation وكذلك لـ Aerosols، بالنسبة للسيلينيوم المستخلص بواسطة المستخلصات الثلاث تحت الدراسة أظهرت النتائج اختلاف تلك المستخلصات في قدرتها علي الاستخلاص وكذلك النسبة المئوية للاستخلاص في كل حالة ويشير ذلك إلي أن السيلينيوم الكلي الموجود في التربة يوجد معظمة في صورة صعبة الذوبان وقليلة الصلاحية للنبات مما يشير الي عدم الاعتماد علي تقدير الصورة الكلية للسيلينيوم في التربة والاعتماد فقط علي السيلينيوم المستخلص بالمستخلصات المختلفة في تحديد مدي قدرة النبات علي امتصاص العنصر. أظهرت النتائج وجود علاقة ارتباط موجبة بين كل صور السيلينيوم المستخلص بواسطة المستخلصات الثلاثة والسيلينيوم الموجودة في النبات. أظهرت النتائج أن محتوي السيلينيوم في نباتي الاتربلكس أعلي من محتوي الأكاسيا حيث تراوح تركيز السيلينيوم في نبات الاتربلكس بين ٣,٢٥ ppm و٣,٦٠ ppm، بينما كان نبات الأكاسيا بين ppm ٠,٢٣، ٠,٢٩ ppm حيث يعتبر نبات الاتربلكس من النباتات متوسطة التراكم للعنصر. كانت تركيزات السيلينيوم في كلا النباتين أعلي من ٠,١ جزء في المليون وهو الحد الأدنى للتركيز المطلوب لسد حاجة الحيوان من ذلك العنصر. وقد أظهرت هذه الدراسة أهمية وضع العامل الجغرافي في الاعتبار عند دراسة موقف السيلينيوم في الأراضي من حيث قرب أو بعد موقع التربة من البحار والتي تعتبر أحد أهم العوامل في إثراء الطبقة السطحية من التربة بذلك العنصر في تلك المناطق.

الكلمات الإسترشادية: عنصر السيلينيوم، الأراضي بشمال سيناء، المنطقة الساحلية.

المحكمـــون:
١- أ.د. عطيه عبدالوهـاب السبـسى أستاذ الأراضي والمياه، كلية العلوم الزراعية البيئية، جامعة العريش، مصر.
٢- أ.د. عاطـف محمـد المليـجى أستاذ الأراضي والمياه، مركز البحوث الزراعية، العريش، مصر.