EFFECT OF DIFFERENT RADIATION LEVELS ON THE BIOCHEMICAL CONSTITUENTS OF SOME WILD PLANTS IN SOUTH SINAI

By

Osama Mohamed Abd El-hamed El-Kady
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A Thesis Submitted in Partial Fulfillment
of
The Requirements for the Master Degree
in
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Department of Agricultural Sciences
Institute of Environmental Studies & Research
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ABSTRACT

Many forms of radiation are encountered in the natural environment.One of the primary toxic metals is uranium, which may get in food through plant, during its absorption by plant roots and accumulates in edible portions. This study deals with the plants that have the ability of uptake uranium and clean up the contaminated soil from radioactive elements.

Artemisia judaica and *Cleome droserifolia* two wild plants collected from Wadi Nasib area, southwestern Sinai with their attached soil. Some wells samples around plants were also examined. This study is completed in order to understand the effect of radiation exposures. The uranium content in both plants was determined as well as the plants biochemical constituents (carbohydrates, lipids, and proteins) of the plants.

The obtained data indicated that, uranium was not related to feldspar and or clay minerals but was mostly associated with iron. All wells water has low uranium content, so all wells are suitable for drinking. (100ppb is the permissible limited for drinking). Both plants uptake uranium but with different amounts. The radiation effect on the total soluble sugars was negative on both species while, no clear trend was observed for reducing and non reducing sugars in *A. judaica and C. droserifolia* species with uranium increase, which there was a passive effect on the total free proteins. No clear effect on the total lipids with no trends observed for the fatty acids concentration in both species.

Key words: Radiation, Native plants, *Artemisia judaica, Cleome droserifolia*, Total lipids, Total protein, Total soluble sugars.

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INTRODUCTION

Twenty–one century, highlights are focused now upon the environmental concerns. One of the important concerns is studying the impact of radioactive element as uranium on the biochemical constituents of wild plant, and their environment of water and soil.

An extensive exploration program conducted by the Nuclear Materials Authority for radioactive and nuclear raw materials in Egypt has led to the discovery of several uranium mineralizations in different environments.

There are four locations of uranium occurrence in Eastern Desert. The first major occurrences of uranium are materials discovered in Central Eastern Desert (EL-Atshan area) also, there are three other uranium occurrences in the Eastern Desert, Namely; G. Gatter in North, Um Ara in the South and the East of Abu Zenema at West Central Sinai **(Ibrahim, 1993).** Fig. (1) Shows the location of the studied Wadi Nasib area, which is located in west central Sinai, bounded by Longitudes 33˚ 00' and 33˚ 33'E and latitudes 28˚ 47' and 29˚ 08' **(Morsy2003).**

Wadi Nasib has desert weather. In summer, the temperature sometimes reaches 50ºC, while in winter reaches 10ºC. In spring season and sometimes in autumn, a sandstorms blow. The area is also a rain-fall of only 25mm/y and evaporation reaches more than 3000 mm/y.

The topography of Wadi Nasib is mild, which is represented by numerous mountain hills, ridge. It has also a several wadis of various trends.

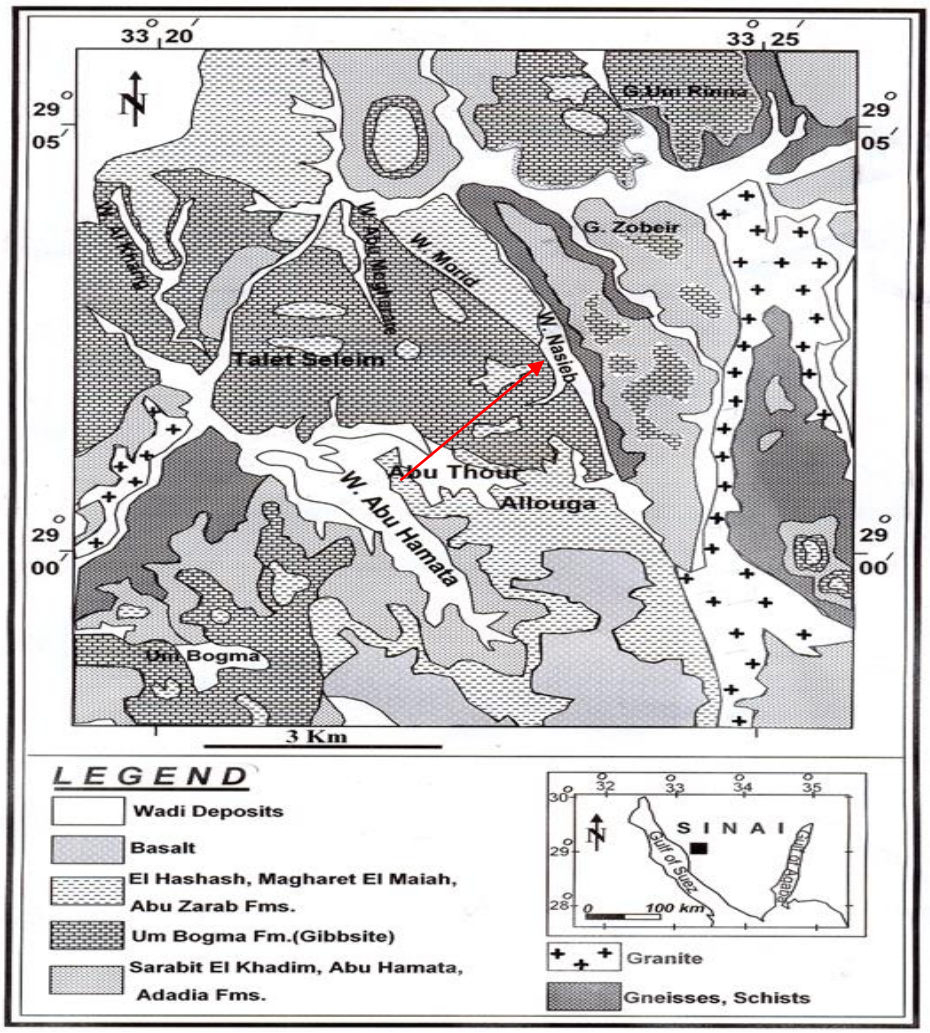

Fig. (1): Wadi Nasib area, South Western Sinai, Egypt. After, El-Aassy et al, (1986)

1.2. Aim of study:

The aim of this work is studying the absorption of uranium by native plant and also studying the effect of different radiation levels on biochemical constituents such as carbohydrates, proteins and lipids and effective materials of some wild plants in South Sinai.

REVIEW OF LITERATURE

The review of Literature was indeed directed towards two main topics:

Study the absorbance of radioactive elements especially uranium by wild plants and also effect of radioactive on biochemical constituents.

2.1. General characterization of uranium:

It is steel-grey metal and readily combines with oxygen, halogens, sulphur and nitrogen. The element and all its compounds are radioactive with m.p.1132º C.

Natural uranium contains three isotopes of uranium U^{234}, $U^{235}$and U^{238}.Uranium^{234} is a member of the U^{238} decay chain and usually found in equilibrium with its U^{238} parent. The amount of U^{238}in natural uranium 99%. Uranium^{238} has a half-life of 4.7×10^{9} years. This radio-nuclide is decayes by alpha particle emission to Th^{234}. A series of 14-alpha and beta transitions result in the stable Pb^{206}. Uranium is very reactive and combined with many other elements such as halides, oxygen and hydrogen. The ability of soils to absorb uranium out of the ground water depends on a number of factors including pH. Uranium is very soluble and tends to remain in the ground water than being absorbed by the soil **(Morsy, 2003).**

Uranium is an excessively mobile metal that precipitates under reducing conditions. Uranium ore bodies are found in many environments. However, they can be roughly classified into the following two categories:

a- "Sedimentary ore bodies", present as sub horizontal layers with a variables thickness varying from several ten of centimeters to several ten of meters.

b- "Vein-type" ore bodies, with a variable thickness from several tens of centimeters to several tens of meters-often-sub vertical (**Lucas *et al.*, 1984)**

2.2. Uranium studying in located area and Sinai:

El-Aassy *et al.* (1986) reported some radioactive anomalies at different location of Wadi Nasib area such as Allouga, Abu Thor, etc.

Mahdy *et al.* (1989) concluded that the extraction of uranium and copper from Wadi Nasib area had been done in efficiency by using both alkalinie and acidic leaching processes**.**

Afifi (1991) studied the geochemistry of some radioactive anomalies recorded in the Paleozoic rocks of Wadi Nasib area. He concluded that the origin of uranium in the studied rocks belongs to a sandstone type.

El-kammar *et al.* (1997) referred to the high uranium content in Um Hamd (W. El-Sahu area) and Ramlet Hemiyir (Located to North Eastern of Wadi Nasib area) are confined to xenotime deposits and some to the ferromanganese mineralization, such amount of uranium in Um Hamd location was 1.28% and was determined as U_3O_8 (yellow cake) .

Sherief (1992) related the radioactive anomalies in Wadi Nasib area to the muscovite granite and the stream sediments.

Anwar and El-Sokkary (1972) proved that the Mn-Fe ores of Abu Zenima area contain uranium with trace amounts of thorium.

El-Reedy *et al.* (1980) concluded that uranium in west central Sinai was deposited from an alkaline solution at pH ranged from 7.5 to 8.5 by evaporation process where oxidizing conditions were prevailed.

The radioactivity studies of uranium bearing sediments in west central Sinai were started by **Abdel Halim (1959)** who reached to the conclusion of the presence of two small lenses of radioactive black