The Phytoperification of Saline Water in the El-Oued Region Using the Grains of *Atriplex Halimus* and *Moringa Oliefera*

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Abstract
Some regions of Algeria are characterized by water salinity, particularly arid and semi-arid regions, These areas are characterized by the growth of halophytic plants, which exhibit different responses in the degree of resistance to salinity to during their growth stages. In this context, we will study the effect of seeds on reducing the salinity of tap water for certain areas of the city of El-oued (Guemar; Teghzoute; El oued center; Rabah; Bayadha) which were treated with the following grains: Atriplex. Halimus and Moringa.Oleifera Which were collected from different regions, through which we determine the percentage of reduction in salinity, conductivity and ph within 15 days And it is by phyto-purification technology .After conducting laboratory experiments and through the results obtained comparing the *Atriplex Halimus* and the *Moringa. Oleifera* We concluded that the *A. Halimus* is more effective and more effective in reducing water salinity due to the type of seeds, their ability to absorb salts and their osmotic pressure property.

Key words: Phyto-purification - osmotic pressure - salinity – Atriplex Halimus – Moringa Oleifera.

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Introduction:

The quality of water has experienced a great deterioration in recent years throughout the world, due to discharges from urban areas, as well as those from factories which discharge directly into rivers. This phenomenon is especially observed in the least developed countries, where the cost of prior treatment of waste is prohibitive (Bougherira and Aoun-Sebaiti, 2012).

When we talk about wastewater treatment, the first image that comes to mind is that of a wastewater treatment plant. These traditional and intensive systems are not always adapted to the economic and technical constraints of small and medium-sized industries, small communities, farms and individuals. So-called “extensive” systems, such as phytopurification, characterized by low operating constraints have thus been developed.

Salinization is the major process of land degradation, it is linked to climatic conditions and human activities. 10 to 15% of irrigated areas (20 to 30 million hectares) suffer, to varying degrees, from salinization problems (Mermoud, 2006)

Halophytes are plants naturally tolerant to soluble salts and grow just as well in a saline environment as in normal conditions. They represent the upper limit of the adaptive capacities of vascular plants to salinity (Maalem S et al, 2011)

Atriplex are halophytic plants endowed with a series of ecological and physiological characters allowing growth and reproduction in a saline environment. Hopkins, W.G. (2003) There are a few important ways of classifying halophytes; the origin of the evolution of halophytes as well as their global distributions, which are strongly debated. (Rozema, 19%).

It is in this context that we undertook this study whose aim is to define and confirm the effects of these grains on water. In this work we propose an experimental study, under controlled laboratory conditions, the effect of grains on water purification.

The final goal is to compare the two genera Atriplex Halimus and Moringa Oleifera: under saline stress and to study the effect of salinity on water purification.

A- Materiel:

1- Situation :

The El-Oued region is located in the northeast of the Algerian Sahara (Lower Sahara), on the northern borders of the Grand Erg Oriental, between the parallels: (33° and 34°) North, and (6° and 8°).) East. This immense sandy expanse is located, on the one hand, halfway between the Mediterranean Sea to the North and the southern limit of the Grand-Erg Oriental to the South, and on the other hand, at equal distances between the Gulf of Gabès to the East and the Saharan Atlas to the West. The area is delimited by: The Algerian-Tunisian border (El-Djerid chotts: Tozeur region) to the East the Melghir and Merouane chotts to the North (Biskra region) The Oued-Righ (Touggourt region) to the West The extension of the Erg Oriental to the South. (Fig.1).

Fig. 1 Geographical location of the Souf region

El-Oued forms a dune massif which is located approximately 700 km south-east of Algiers and 350 km west of Gabes (Tunisia) with a width of approximately 160 km. The average altitude of El-Oued is 80 m, while that of the Chotts, located to the North, goes down to minus 40 m (topographic surface) below sea level. It covers an area of 80,000 km2. After the administrative division of 1984, the City of El-Oued was delimited for

– The City of Biskra, Khenchela and Tébéssa, in the North
– The Algerian-Tunisian border in the East
– The City of Biskra, Djelfa and Ouargla, in the West
– The City a of Ouargla in the South. (Katerjl N.1995).

2- Hydrographic network:

The hydrographic network is weak and can only be represented on the scale of the entire Sahara. Flow from all wadis converges towards the lowest areas (chott zone). These wadis have a temporary and episodic character. (Fig.2).

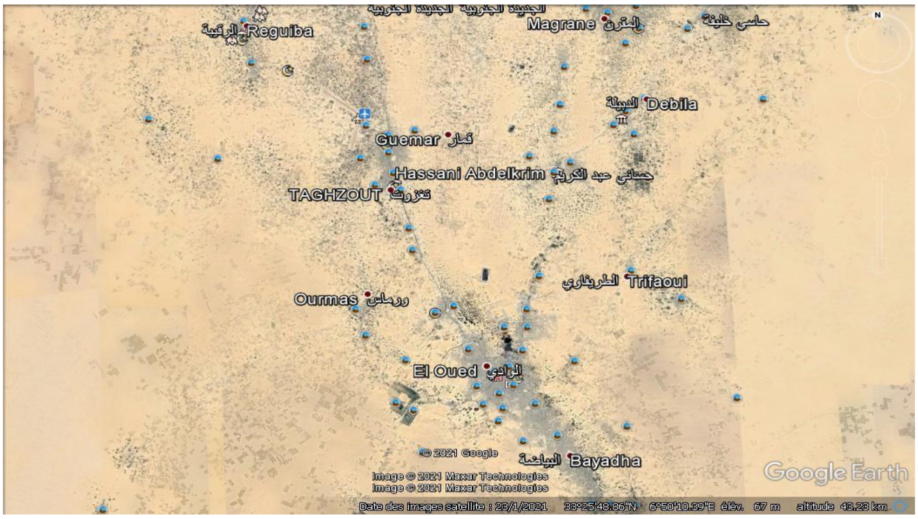

Fig. 2 Geographical location of the study area (Google Earth 20)

The directions of the endorheic flows of the wadis are illustrated on the map (Fig 3). (Khaled BOULIFA, 2012)

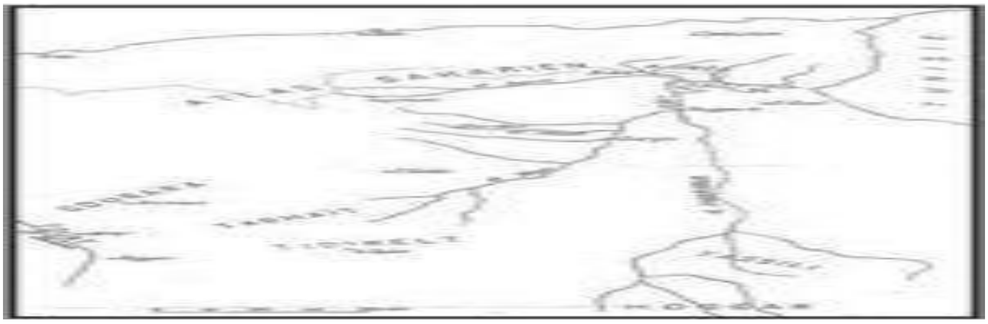

Fig.03 Map of the hydrographic network of the Sahara Algeria (Khaled BOULIFA, 2012)

B- Method:

The objective of our work is initially to highlight the salinization of water in the arid region: robin water and mineral water. In the second stage, our objective aims to contribute to limiting or mitigating the effect of salinity on this water through phyto-purification technology (using plants for water purification) for experimentation on the effect water regime and fertilization

1- Sample collection:

As part of a study on how to treat salt water through plant seeds, we sampled various municipalities in Valle State: Guemar, Ghamra, Taghzoute, Reghiba, Hoba, Erabah and downtown where we found variable results in pH and EC compared to mineral water as a control before placing seeds as a preliminary measure of water.

2- Plant materials Material and method

We Used in this work, two species of halophyte, *Atriplex Halimus*, Moringa Oleifera. The reason for this choice is on the one hand, the agro-economic importance of this plant and on the other hand the tolerance of salinity. *Atriplex Halimus* grains come from the H.C.D.S in Tébessa. *M.Oleifera* grains were taken from the Tamanrasset region and stored at room temperature.

3- Study method:

The study was carried out in the laboratory with the aim of reducing the salinity level in the water taken from the samples by the seeds of the following plants: *Moringa Oleifera, Atriplex Halimus.* This plant is characterized by salinity tolerance. 4- Parameter used: The multi parameter is a device allowing the measurement of different chemical parameters such as the measurement of pH or EC. The device changes mode depending on the probe connected to it. Compact and portable, this device allows rapid and reliable measurements, in the laboratory and outside

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5- Materials used:

✓ Plastic boxes.

✓ Cotton.

✓ Seeds: Atriplex Halimus, Moringa Oleifera.

✓ tap water from different regions of the wilayat of el oued.

✓ beaker.

✓ mineral water.

6- Preparation of the pots:

The cups used are plastic 4 cm in diameter and 8.5 cm in height, Some of the plastic cups have been perforated and placed inside unperforated cups for filtering

The plastic cups were punctured and cotton and seeds were placed inside. Then the perforated plastic cups were placed inside the non-perforated plastic cups and 25 ml of water was poured into them with the aim of filtering the water in them, and labels with the symbol of the water in each cup were placed on top

7- The parameters studied:

7-1- EC measurement of Control water:

In the preliminary study, After sampling the water, we measured the EC of grain-free water, the result explained in the following table:

Table.1 Control water measurements

Regions	D1	D2	D3	D4	D5	D6	D7	D8
EC (ms/cm)	0.774	3.12	3.49	3.68	4.00	4.05	4.07	4.50

7-2- Preparation of grains:

We put the seeds in a special cotton in a plastic cup pierced from below, then placed in another cup without holes to filter this water, after measured conductivity were measured for samples two hours after placing the seeds where It was measured several times within 2 weeks daily until the measurements were proven.

8- The experimental Schema

The experiments were carried out in a greenhouse under semi-controlled conditions, on the 8 water samples were treated with the two genus *Atriplex Halimus* and genus *Moringa (Moringa* Oleifera). Where the grains were placed in the water samples .Then measured the EC during four days (Fig. 4)

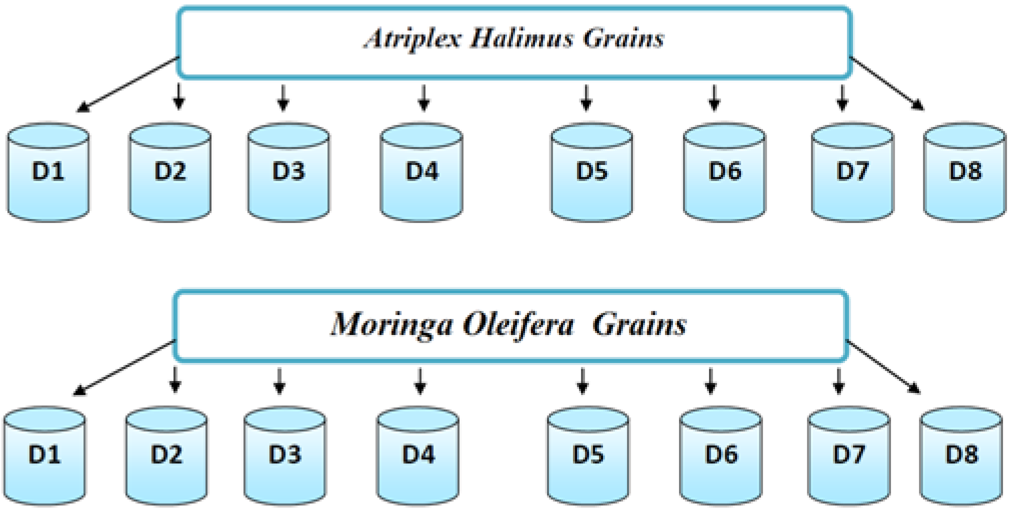

Fig.4. Experimental Schema

Results and discussions

The results with regard to the effect of seeds on water salinity compared to the control recorded in D8 (4.5), indicated that *Moringa* Oleifera recorded a decrease in EC (4.24). *Atriplex Halimus* also recorded a decrease(4.35), but less than *Moringa* Oleifera (Fig.5).

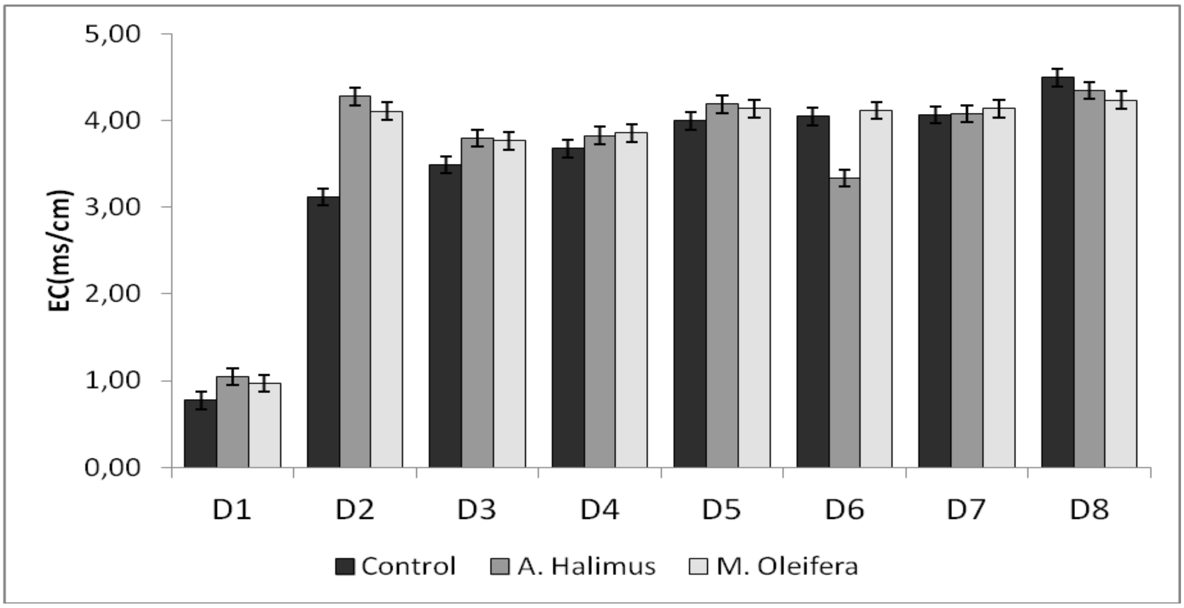

Fig.5 The effect of the grains of two genus *Atriplex halimus* and *Moringa oliefera* on salt water after 24 hours

As for 48 hour Most of the samples are private (D1.D2.D4) It has a positive effect on water salinity, such as for the local harvest, then *Moringa* Oleifera, respectively, and is estimated at (0.931, 4.27, 3.87) (Fig.6)

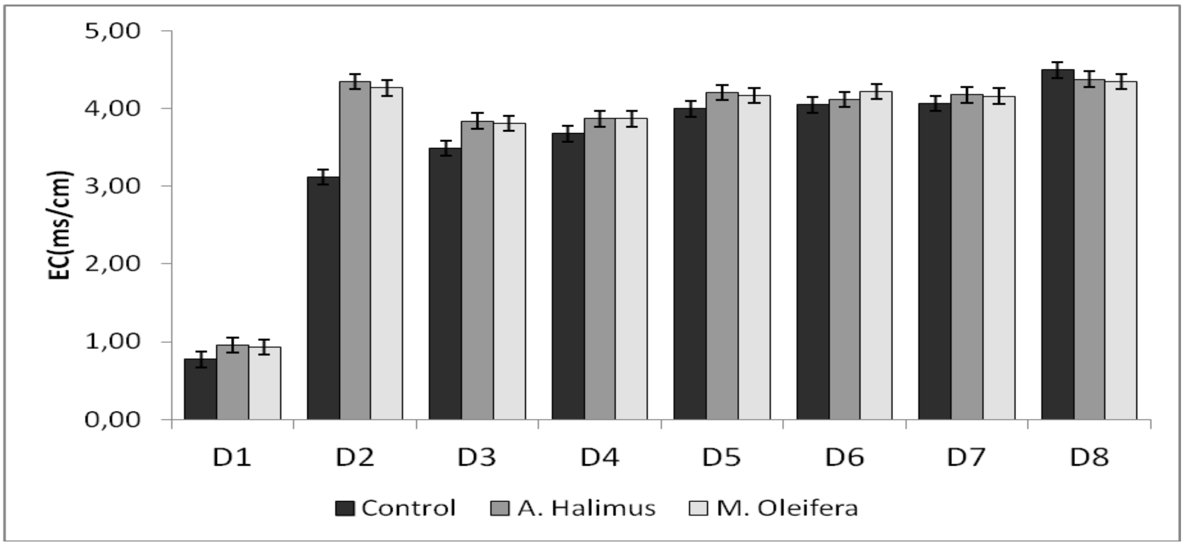

Fig.6 The effect of the grains of two genus *Atriplex halimus* and *Moringa oliefera* on salt water after 48 hours

The high EC as well as the salinity of the water, then the water contains a lot of dissolved salt.

-The increase in EC in the first day which explains by type of salts which the grains i.e. increase in the salinity of the water, according to (Denden, M.et al 2005). the tissues of the halophytes are rich in salts. The majority of these salts are dissolved in the vacuolar juice. (Ashraf & Foolad, 2007) halophytes are forced to store electrolytes in their vacuoles to avoid any intoxication. In return, the increase in vacuolar osmotic pressure risks. Halophytes (but also occasionally glycophytes) are able to fight against this phenomenon by producing so-called osmoprotective compounds (or compatible solutes). These compounds, by their concentration, ensure the osmotic adjustment between the cytosol and the vacuole.

-The results for A.Halimus which obtained after 72 hours the increase in (D1, D2, D3, D4, D6, D7) but in (D5, D8) compared to the control. For M.*Oleifera* recorded the same results. (Fig.7).

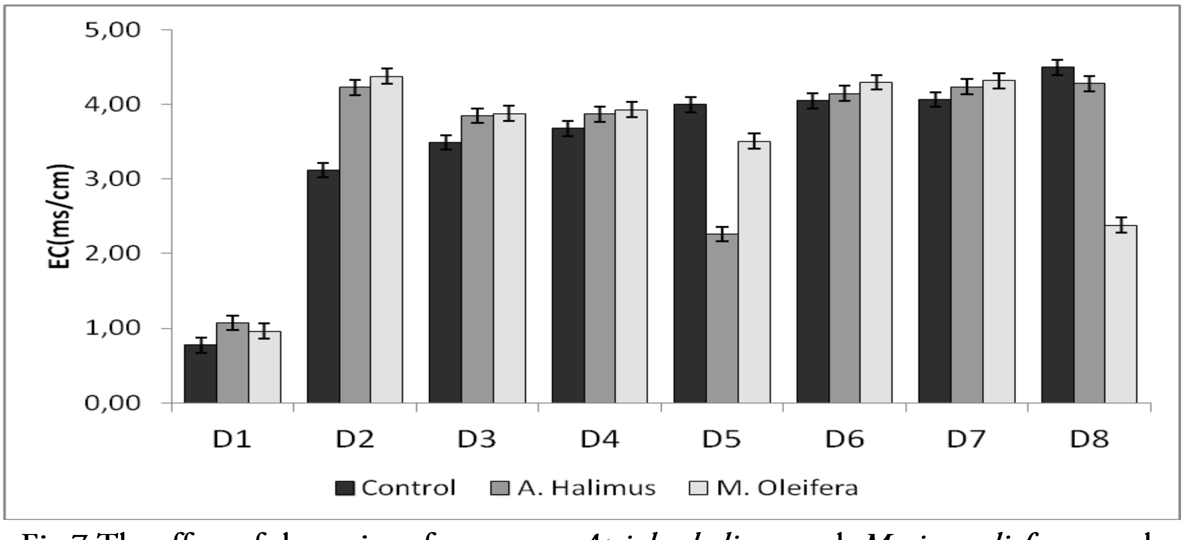

Fig.7 The effect of the grains of two genus *Atriplex halimus* and *Moringa oliefera* on salt water after 72 hours

-The decrease in EC in the water samples after 24 and 48 and 27 hours of grain placement explains the entry of salts into the grains through the membrane according to (Slama, 2004). The ions of soluble salts retain water and are the cause of the osmotic pressure which rises when their concentration increases.
From the results, we noticed increased conductivity in A.Halimus and M.Oleifera Starting from the fourth day (Fig.8).

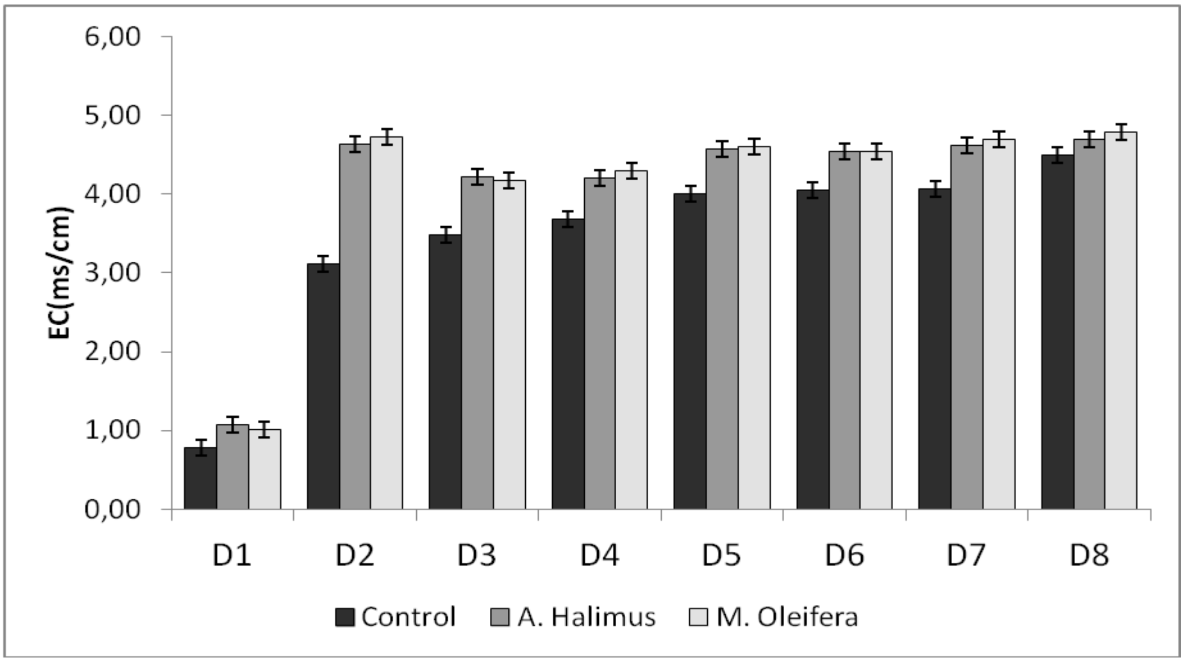

Fig.8 The effect of the grains of two genus *Atriplex halimus* and *Moringa oliefera* on salt water after 72 hours

- The results of the registration in A. *Halumus* during the experimental period that extends the *Atriplex Halumus* exist in the profiles or the electrical conductivity is average or available, variable between 5.5 and 7.3 ds/m. It's one of the things that will help you save money or work.
The results in the grains of Moringa Oleifera are used as a water treatment, a disease and to eliminate the harmful odors in the potable water treatment (Louni, 2009). It also uses a signal as a coagulant / flocculant agent for the clarification of potable water in the soil of its teneur and hydrosoluble cationic protein (Vilaseca et al., 2014).

Conclusion:
Much research focuses on finding new, natural and inexpensive ways to purify water, which is how the plant-based method of water purification was discovered. It is an inexpensive and effective method, which has proven its effectiveness against organic molecules on a large scale. As such, the aim of this work was to study the effect of the seeds of certain halophytic plants on the treatment of 'water.
From the results of the effect of sowing dose on the effectiveness of phytoremediation we found that the results of water content, showed The presence of plants reduced the salt content for a

short time, then the salt content of the water increased according to the reverse osmosis of the seeds.

The result of a comparison between *Atriplex halimus* and *Moringa oleifera*, the results showed that the effectiveness of phytopurification by the grains of *Atriplex halimus* more response compared to *Moringa oleifera.*

Based on the results obtained by the present study the experimental during the first week recorded a good spread compared to the second week because in the 1st week the salinity decreased but in the second week was increased they are caused by the osmolarity for the decreased and the opposite of bone molarity for the increase and because also the low osmolarity on the movement between the external environment and the interior of saline grain.

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