

*Full Length Research Paper*

# Contribution to the study of the vegetation of the Oran's Great Sabkha basin (west Algeria); Characterization and Cartography

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After the publication of the geomorphological and the geological maps of the Oran's Great Sebkh basin (MOUSSA, 2006; MOUSSA, 2011), it was necessary to write a note, highlighting the phytological aspects of the geographical entity. So this work consists to map the main plant's groups of this basin. The data of high areas are taken from the cartographic work of ALCAZAR (1977), for the rest, the data come from of field researches (sampling) and laboratory one (determination). The mapping and the positioning of plant's groups were made by using of different tools and exploitation and georeferenced documents such as satellite's pictures, aerial photos and the GPS (Global System Positioning). At the end, different relations between the plant's groups and the environment will be elucidated for this purpose. The situations of phytological associations are highlighted according to the geological, pedological and elevation aspects of the land on where species grow. Among other results of this study, a plant gradient was observed from the upstream catchment (Murdjadjo and Tessala) downstream where is located the Great Sebkh of Oran. Multiple factors drive this evolution of geology, pedology, climate and salinity. Plant density differentiation was observed between the high parts of Murdjadjo (North), denser, comparing to those of the Tessala (South), which are less important.

**Key-words:** The Great Sebkh of Oran, Western Algeria, cartography, phytology, salinity.

## INTRODUCTION

The region of Oran considered (figure. 1) as a wide geographical area, is occupied largely by fertile agricultural lands, giving the specific diversification of plants in the basin of the Great Sebkh of Oran. We thought it useful to map the vegetation in this area of large scale (50 km long and 30 km wide) showing their geographic location and their spatial arrangement. So this allowed us to recognize the plants species categories in the region.

Apart from the higher parts (Tessala and Murdjadjo), the other parts of the basin of the Great Sebkh of Oran are occupied by tolerant salt species. The plain of M'léta

and the Sebkh itself are entirely blank. In the West (Hassi El Ghellah, El Amria and Bou Tlelis), the vines are growing on Quaternary alluvium. In the East, at the sector of El Kerma, vegetables and vines take shape. At the plain of Misserghin – Bou Tlelis – Bredeah, rather, they are fruit trees grow relatively well enough.

### Location of the basin of the great Basin-Sebkh Oran

The Murdjadjo is part of the Oran coast. It is designated by Gourinard (1952) as a territory between the marsh Macta east and depressions in the North and West (Figure. 2). Great Sebkh Oran and Arzew saline extend south. Its maximum altitude is 589 m and several cities such Misserghin, Bou Tlelis and El Amria are located, at its southern piedmont, the northern foothills is limited by

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Figure.1: Location map of the study area

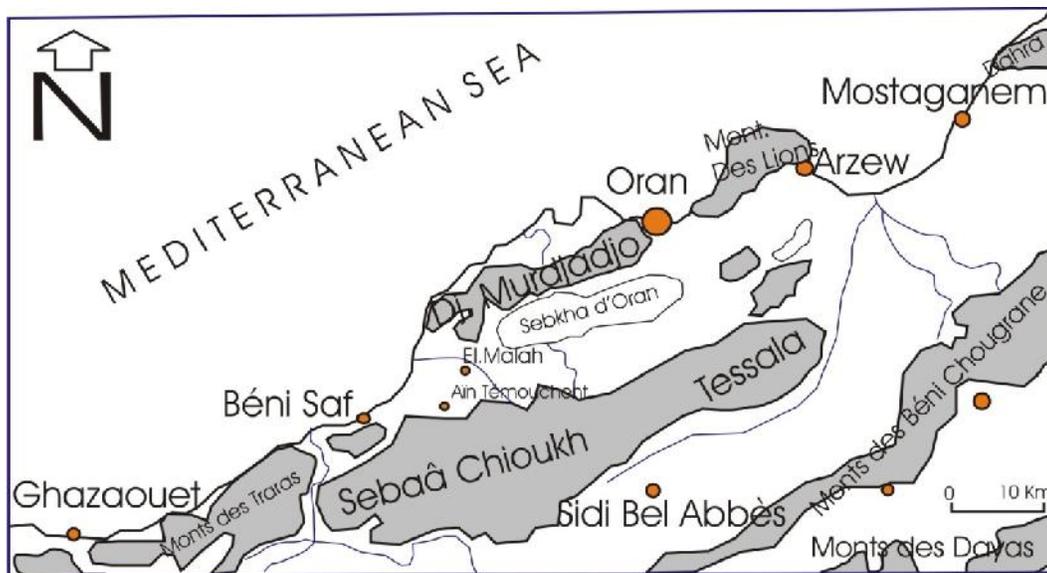


Figure. 2: Location map of the region of Oran and Murdjadjo (Moussa, 2007)

the port and the city of Oran.

#### GEOLOGY AND SOIL SURVEY

The distribution and the establishment of plants depends, among other factors of climate, substratum (soil science),

which itself depends on the lithology (geology). In terms of geology, from upstream to downstream of Murdjadjo to the Basin Great Sebka Oran, we distinguish more tender and more recent rocks. Shale and calcschists (Cretaceous) which occupied the plateau of Murdjadjo, alteration occupied by offering a diversity of brown soil

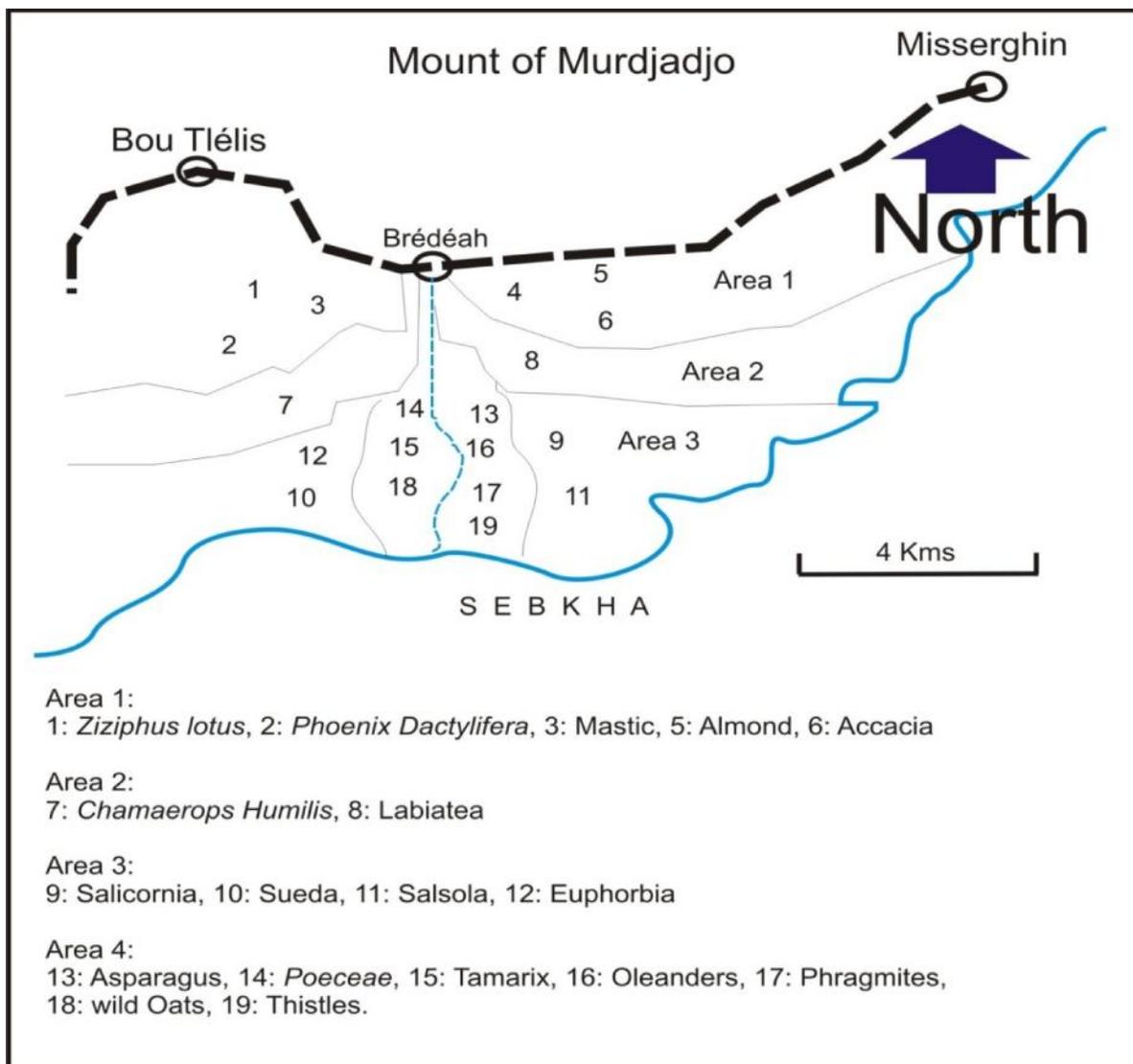


Figure.3: Vegetation map of the area Bredeah – Bou Tlelis – Misserghin (MOUSSA, 2007)

spontaneous species.

-Limestone (Miocene) occupying the steep slope where no soil is allowed to grow as trees and plants calcifuges.

-Sandstones and sands (Plio-Quaternary) occupying the glaze average slope alteration gives ground fersialitique kind where cereals (Ain El Beida - Misserghin) and fruit trees (Misserghin - Brédéah) grow in places where water layer is shallow.

-Silt (clay and marl) Recent (Rharbiens) offering salinosol soil type (or Vertisol) which, in places, spreading large wheat fields on the outskirts of the Great Sebkhah Oran.

For plant science, from upstream to downstream, plant communities are taken from the map Alcazar (1977), only the most immediate of which were determined Sabkha and localized by our effort.

## RESULTS

### Map of vegetation in the basin of the Great Sebkhah Oran

Due to the absence of evidence (banding or bedding end) showing the presence of algae, we could study the lower salt-tolerant species. In addition to numerous field trips conducted for the study of higher plants, we relied on some previous work (Alcazar, 1977) and on the records of Oran geological maps, Arbal, El Amria and great Sebkhah Oran.

We recognized major groups plant species proliferating in the peripheral Sabkha areas (Annex). Apart from the high parts and Murdjadjo Tessala, other parts of the basin sebkhah Oran are occupied by salt-tolerant species. The plain of M'léta and Sabkha itself are completely bare.

**Table 1:** Distribution of plant of high zones between northern and southern margin's basin.

northern margin (Murdjadjo)	southern margin (Tessala)
Dense forest and clear	X
High and medium matorrals	High and medium matorrals
Matorrals Thyas and sumac leaves 5	X
Clear forest	X
Matorrals	X
Forests and Matorral	X
Matorrals moyens et bas	X

In the West (Hassi El Ghellah El Amria and Bou Tlelis), we an area where vines grow on the Plio- Quaternary alluvium. To the east of the Sabkha and beyond the town of El Kerma, we meet vegetable crops and vines on the Plio-Quaternary formations. In the northern part of the Sabkha (Bou-Tlelis Brédéah-Misserghin sector) develops the cultivation of fruit trees on recent Quaternary sediments. Vegetation Murdjadjo is quite extensive and dense than the mountains of Tessala. This is due to the presence of limestone and shale facies dominant in the Murdjadjo, promoting the proliferation of plants, whereas in Tessala where marl abound, fixing plant becomes binding (Moussa, 2011c). We meet in the Murdjadjo, dense woodland, high Matorral and means and Matorrals Thuyas (*Tetraclinis articulata*) and Sumac 5 sheets (Cypress terebenthaceae type) which are a more open typical Mediterranean vegetation formation. In Tessala dominate the medium and low and high Matorrals (Alcazar, 1977).

### Vegetation Map of Bou Tlelis-Brédéah-Misserghin sector

At the North of the Sabkha and the southern foothills of Mount Murdjadjo, grows a dense culture sector of BouTlelis Brédéah - Misserghin. Field observations and identification of species have allowed the realization of a plant zonation map. We distinguish the foothills of the Sabkha Murdjadjo four key areas. The fourth area is quite special; it borders the stream that has its source in Murdjadjo and leads to the Sabkha, through the city of Brédéah (Figure.3). This creates the dissolution of accumulated silt from around the Sabkha salts. This plant zonation reflects the evolution of species depending on the salinity of the less salty the saltiest of Sabkha land:

zone 1, we recognize species that tolerate low salinity, are olive trees, almond trees, mastic, acacia species (family Mimosaceae), *Ziziphus lotus* and *Phoenix dactylifera* (date palm of the Sahara) growing on the brown silt of Quaternary.

Zone 2 species such as *Chamaerops humilus* (Palmetto),

*Labiatae* and *Arecaceae* ensure the transition between species does not tolerate salinity and salt-tolerant species.

Zone 3, dominated by samphire (*Salicornia maritima*), species of the family *Chenopodiaceae*, Articulated thick, fleshy and edible stems, growing in salt marshes. In addition, other species such *Sueda*, *Salsola Serrata* and *Euphorbia* are present.

Zone 4: these are usually the same species as those in zones 3 identified in wadis that feed Sabkha in the northern part only.

South of the Sabkha, wadis are completely bare. It distinguishes *Asparagus* (*Asparagus*: perennial vegetable plants of the lily family), *Poaceae*, Tamarisk (tree or shrub deciduous family of tamaricacées Mediterranean areas), oleander, *Phragmites* (reeds), wild oats (*Avena fatuea*) and Thistles. Those plants that do not support salt arrive to push through the dissolution thereof by the waters of the river in question.

### Comparisons between Phytological North and South of the margins of Sebkh

In this regard, it appears that the high places (plateaus and slopes) of Murdjadjo are much more covered than southern plants. We also note some diversity at the Murdjadjo compared to Tessala.

This plant differentiation between the two margins of the watershed of the Great Sebkh Oran may be due to considerations of geological and soil order of soils in these areas. Thus, in the North there are carbonate formations (limestone reef), while in the South (Tessala) formations are dominated by clay (blue marl).

The soil map of Northern Sabkha (Murdjadjo) land is covered with red soil, due to the alteration of limestone, while in the South (Tessala), the land is almost entirely bare, which would benefit little fixing plants.

Morphological aspects of land also explain a bit this plant differentiation. In this sense, we have much more steep reliefs on the south than to the north side where the side slopes are softened, which promote runoff rather than

infiltration.

For low places (glaze and pediplaine), plain Misserghin - BouTlelis sees the proliferation of natural and artificial species, while the South (the plain of M'léta) is characterized by seasonal species such as cereals. The differences between components of soils of North and South promote this plant differentiation in the lower parts of the watershed.

## CONCLUSION

The relationship between plants and environments allow notes from upstream to downstream plant gradient which depends on several parameters including;

1. The substratum on which the plant grows, some species grow on shale, others on the limestones, clays or silts. Schist, quartzite covered with debris, is on the high part of the massive (Murdjado and Tessala). Rather they promote the cork oak: Mediterranean tree of the family Fagaceae whose soft bark is used for making jams and coatings cork. This species is still meeting lowest, in Pliocene sands where samphire *Halimus halimifolium*) covers a large area.

The Diss *Ampelodesmos mauritanicus*, Mediterranean plant tolerates drought and is present in the high zones of Cretaceous shales and also in peripheral areas of the Sabkha in association mainly with *Tamarix* and *Asparagus* (*Asparagus*). Mastic, palmetto and alfa (*Stipa tenacissima* in particular), the plant fiber is used in paper and plaiting materials are common in the upper parts of the basin.

The vegetation of grasses (*Poaceae*) located in the sandy shallows of the Pliocene trays allows seasonal breeding sheep and oxen.

Good fit for the cultivation of grain lands are found only in the valleys occupied by the Miocene marl formations upstream, and the relatively high hills like those of Al Djazira and Hamoul at the Sabkha. Sandstones and sand tray M'sila cover themselves rich vineyards. Detrital parts around the volcano are Tifaraouine wine prime land, however small areas. At the edge of slope - glaze, shrubby vegetation is rare, represented by this cedar on Messinian limestone (Bou Tlelis to Brédéah).

\* Junipers (*Juniperus oxycedrus*) are shrubs or bushes. The scales of the female cones become more or less fleshy and fuse together, so that the result looks like a bay. The leaves are evergreen, narrow, acute or reduced to scales, holm oak (*Quercus ilex*) and *Phoenicia* (*Juniperus Phoenicia*) establish the coastal dunes.

\* The oxycèdres (holm oak, Fagaceae) and *Phoenicia* (palm, *Juniperus phoenicea*) establish the coastal dunes.

\* The mastic tree (*Pistacia lentiscus* L.) and dwarf palm (*Chamaerops humilis*) are well in all rocky parts.

\* Alfa (*Stipa tenacissima*) is abundant in plots.

\* Rosemary (garden plant cultivated for its aromatic leaves which oil used in medicine and perfumery is extracted)

\* *Cistus* (shrubs or sub-evergreen shrub living in dry and very sunny areas) whose species *ladanifer* (*Cistus ladaniferus*) Montpellier and Munby,

\* The phyllerens, strawberry trees (evergreen shrubs to the heath family, sometimes called strawberry tree because of its red fruit) growing on the sandstone plateaus.

\* The retam Bove or *Retama retam*, broom of the family papilionacées to stiff stems sometimes spiny, with yellow flowers) and *Periploca* grow on the dunes.

\* The samphire (*Suaeda* and *Salicornia*) growing on the gray silt that lie at the edges of the Sabkha.

Agrarian perspective,

a- Cretaceous shales are grown in vineyards (Tamekrouda and Dechra around Jebel El Amria). The Messinian trays offer little cultures only depressions levelled by decalcification clays or sands are suitable for cultivation of cereals; same clays from decomposition of Tifaraouine andesites. Ancient Quaternary deposits of Northern Sabkha are excellent for growing vines, Those of M'léta (unsalted) are rich farmland for cereals but require repeated rains.

b- According Doumergue (1922), silts of the western basin of the Sabkha could be desalted on the periphery and cultivated. Land area Hassi El Ghellah are planted with vineyards and cultivated cereal when silt.

2. The altitude is also a factor, we note:

\* High in part, upstream climate cooling and circulation of air currents promote wetland species

\* Whereas for lower parts (swallow), desiccation is felt and the proximity of the Sabkha, it is more salt-tolerant species that grow.

From top to bottom, we find:

\* Over 400m, dense forest,

\* Between 200 and 350m high Matorral and means

\* Between 100 and 200 open forest,

\* Between 90 and 100m Matorral to Thuyas 5 and Sumac leaves,

\* Between 85 and 90m of Jujube *Ziziphus jujuba* Mill or,

\* Between 80 and 85m crops (vines, cereals, citrus, fruit trees),

\* At the Sabkha (80m) plant rug made *Suaeda halimus*.

Note that the northern part of the Sabkha (Mount Murdjado) is covered in plants than in the South. Water bodies reports - plants affect the level of the surface. Thus, at the level of the water to salt water, halophytes are proliferating, whereas the groundwater freshwater are rather non-tolerant plants salts which are put in place

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APPENDIX

Vegetation map of the Great Basin of Oran Sebkhia

