PEDOCHEMICAL CHARACTERISTICS OF BAHARIYA OASIS SOIL

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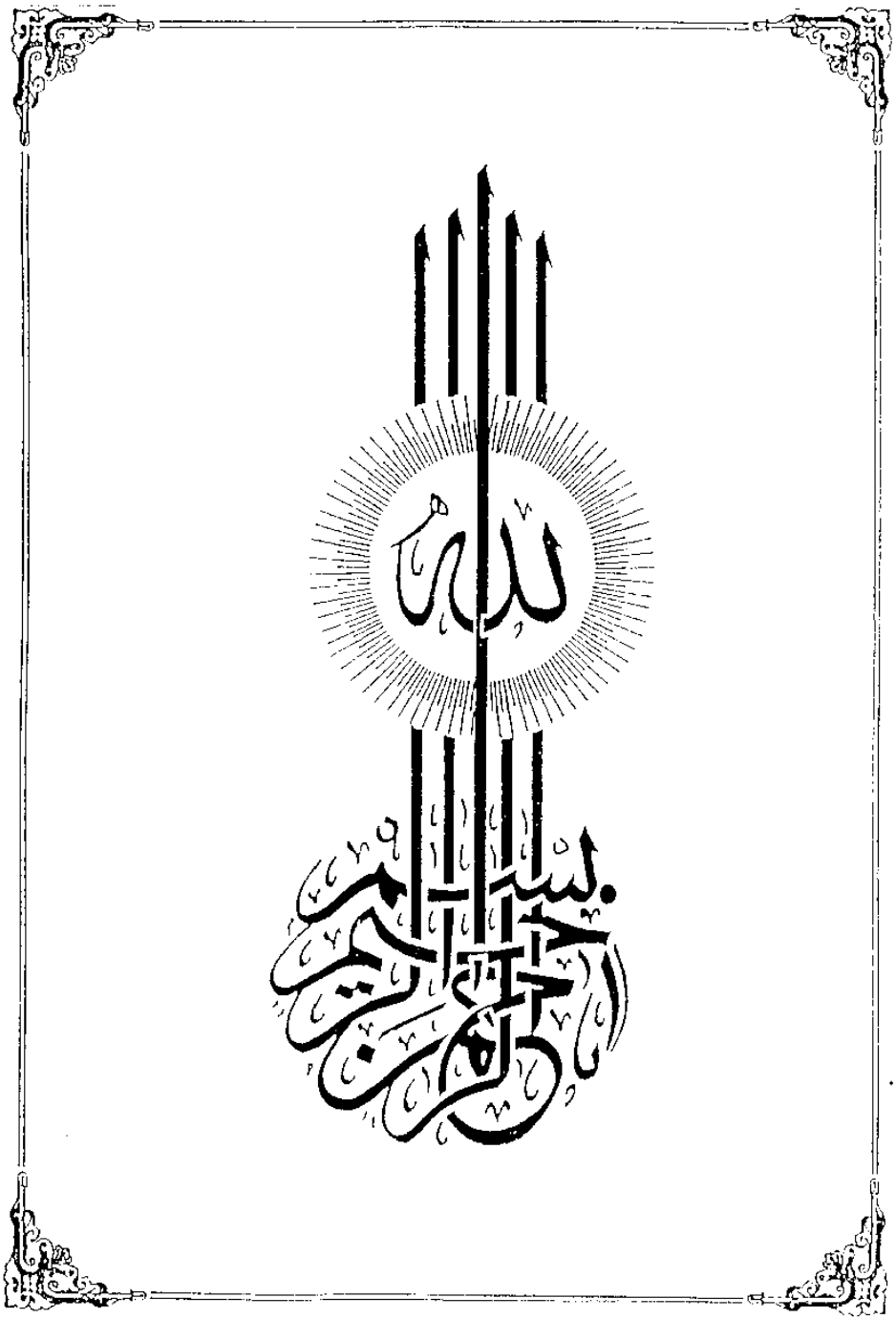

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CONTENTS

INTRODUCTION

Today Egypt has an ever- increasing need for food to maintain demands of the ever- increasing population. Consequently, a search for soil and water resources , which are the main elements for agriculture production, is a must.

In this accord, Egypt has directed major efforts to increase agriculture production through a series of projects to develop new lands in the desert. Oases in the western desert are of main concern. Pedological study of the soils of those Oasis would be of great benefit to evaluate soil resources and bring new lands into use.

Soil survey is the most important phase of any pedological study. Remote sensing techniques especially aerial photographs are used now in considerable volume in agricultural research.

In this investigation, soils north Bahariya Oasis were surveyed using aerial photographs. Then a semi - detailed soil map was made after studying the physical, chemical and mineralogical characteristics of the different soil mapping unit in a trial to explore new land for the horizontal agriculture expansion .

Results of this investigation revealed presence of some acid soils, which are considered very abnormal under such extremely arid environment. Therefore, their formation and mineralogical characteristics were studied in details.

REVIEW OF LITERATURE

1. Physiographic features :

The Western Desert may be divided into three principal physiographic provinces (Map 1), as follows:

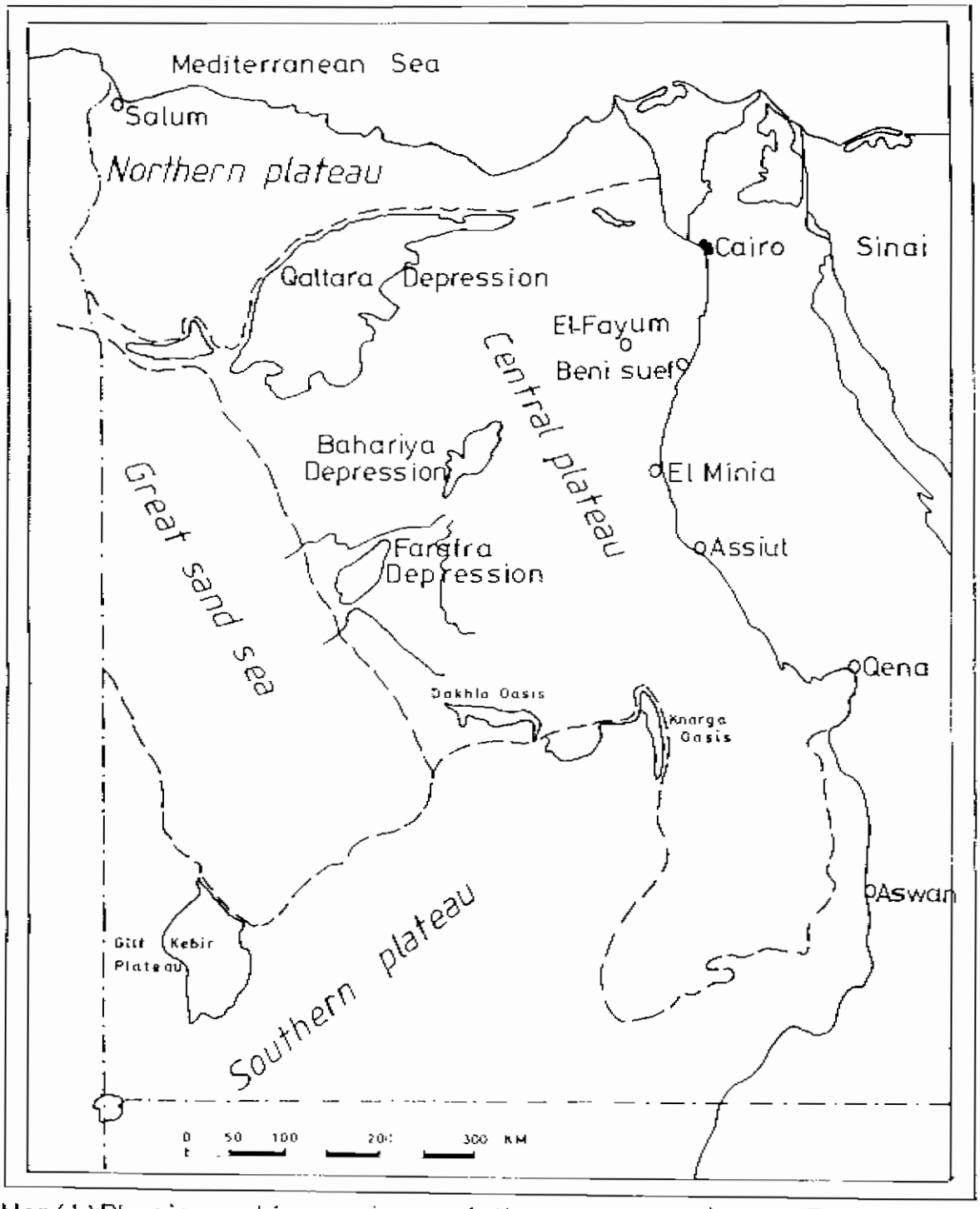
1- The southern plateau: This extensive plateau consists mainly of the Nubian sandstone series of Paleozoic and Mesozoic age and islands of Precambrian crystaline rocks developed mostly in the south.

2- The central plateau: It is a plateau consisting mainly of compact Eocene and Cretaceous limestone, underlain by softer sediments of Mesozoic and Paleozic age. The Great Sand Sea, one of the largest sand areas in the world, lies in the extreme Western Frontier between Egypt and Libya, and is usually considered a part of the central plateau.

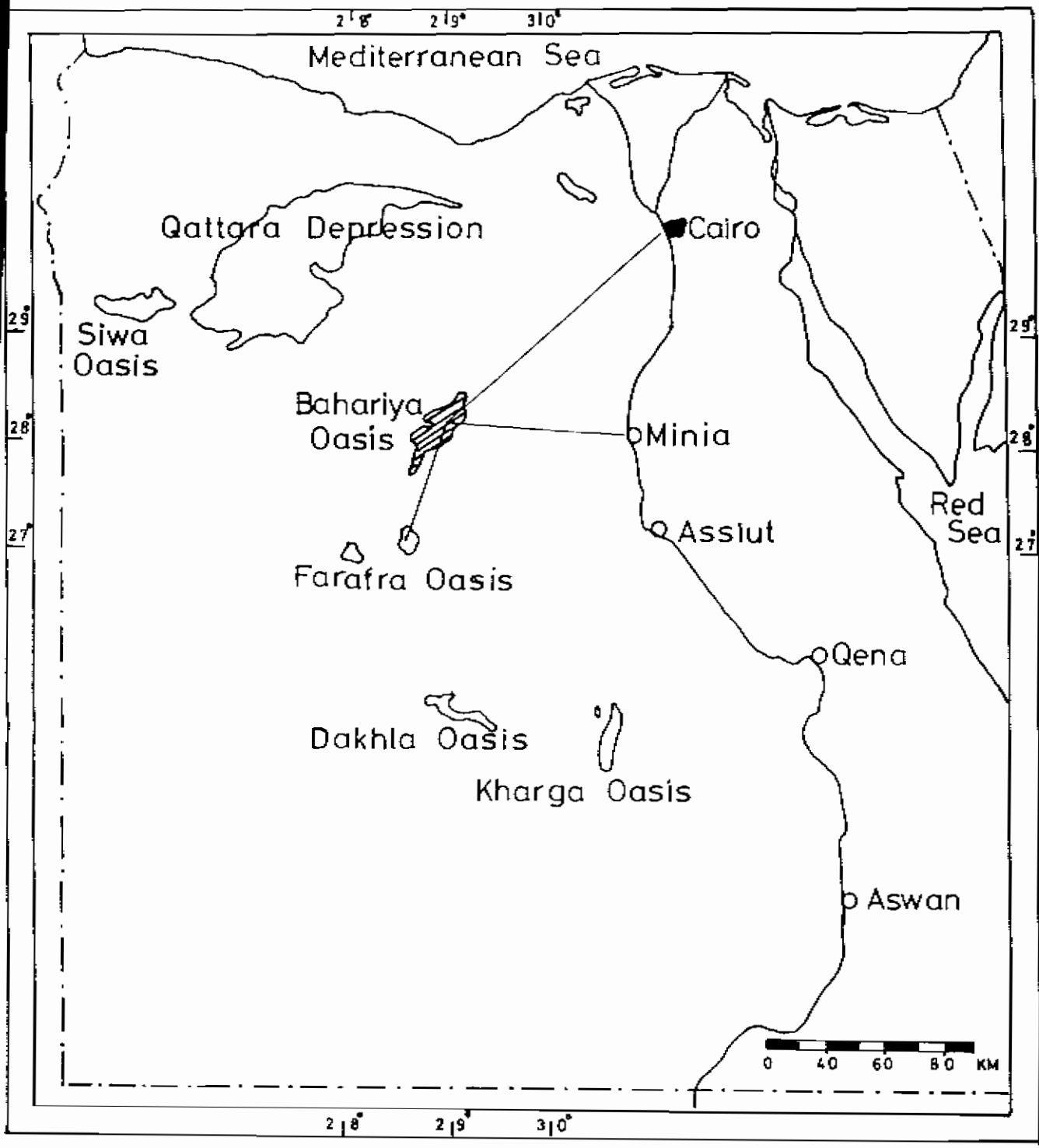
3- The Northern plateau: The underlying rocks of this plateau are limestones and sandstones of Miocene age.

1.1. Location :

The covered area, in Bahariya Oasis depression , is located nearly in the Middle of the Western Desert of Egypt (Map 2). The Bahariya depression is somewhat



Map(1):Physiographic provinces of the western desert, Egypt (after Parsons, 1962)



Map(2): Location of Bahariya Oasis (after Rushdi Said, 1962).

ellipitical in shape, with its long axis towards a north-east- southwest direction. It lies essentially between longitudes 28° 29`, and 29 ° 08` E, and latitudes of 28° 30` and 28° 15` N. The Bahariya Depression is entirely surrounded by escarpments and its total area is about 2250 km².

Population of Bahariya is about 8000 inhabitants. Bawiti, El- Qasr, Mandisha, Zabu, El- Harra, and El-Heiz are considered the large villages in Bahariya. It is worth to mention that in Bawiti and Mandisha- Zabu, the cultivated areas are larger than the other previously mentioned villages.

1.2. Climate :

In order to identify the climatic zone of Bahariya Oasis, the concepts developed by previous workers were applied.

Migahid and Abd El- Rahman (1953), applied the concept developed for Mediterranean sea conditions which was introduced by Emberger (1939). They expressed the degrees of aridity (Q) as equal to $\frac{R}{(M-m)} 2 \times 100$, where (R) is the annual rainfall (mm.), (M) and (m) are the mean maximum and minimum temperatures respectively . When they estimated the value of (Q) for Bahariya Oasis it was found 1-4, such value corresponds to arid conditions.

Hudson (1971), classified the climate according to annual rainfall as follows :

Arid	Semiarid	Humid
0- 400	400 - 1000	1000 mm/ year

According to Hudson's classification the area under investigation falls under the arid condition as the total rainfall is 3- 6 mm per year.

Parsons (1962), recorded climatological data for Bahariya Oasis and mentioned that the monthly mean maximum temperature ranged from 19.9°C to 36.8°C with a yearly average of 29.6°C, and monthly mean minimum temperature ranged from 4.7°C to 20.7°C with an annual average of 13.6°C, table (1). Absolute maximum temperature ranged from 32.3°C to 48.6°C, and absolute minimum temperature ranged from -3.5°C to 15°C. Frost was recorded only during three months, namely December, January and February. The hotest months are June, July and August. Monthly mean relative humidity ranged from 42 % to 65 %. The highest values were recorded during December and the lowest during April, May, June and August.

Daily evaporation per day ranged from 5.1 to 14.10 millimeters, the low means were recorded in December and January,and the highest in June. The former data show that the climate of Bahariya Oasis is arid and the temperature is very high, Table (1).

Table (1): Climatological summary (1931- 1950) .

Elevation 128 m.

Latitude 28° 20` N.
Longitude 28° 54` E.

Months	Temperature					Rain fall		Relative humidity	Evaporation(Piche
	Monthly mean			Absolute		Total mm.	Max. in one day mm.	mean monthly percent	per day m m.
	Max.	Min.	Ave.	Max.	Min.				
January	19.9	4.7	12.3	32.3	-3.5	0.0	trace	62	5.4
February	22.2	6.3	14.3	36.3	-2.5	1.3	14.0	58	6.7
March	25.4	8.9	17.2	39.8	0.0	0.0	1.0	52	8.6
April	30.4	12.7	21.6	45.0	4.0	0.6	16.0	46	11.1
May	34.5	17.3	25.9	47.5	9.0	0.1	2.0	42	13.5
June	36.3	19.2	27.8	48.6	13.0	0.2	6.4	44	14.0
July	36.8	20.4	28.6	45.5	13.0	0.0	0.0	46	13.2
August	36.8	20.7	28.8	44.5	15.0	0.0	0.0	50	12.5
September	34.0	18.7	26.4	43.0	12.0	0.0	trace	56	10.5
October	31.0	15.9	23.5	40.5	8.6	0.2	6.0	58	8.6
November	26.2	11.3	18.8	39.8	2.8	0.7	14.0	62	6.3
December	21.5	6.8	14.2	35.8	-2.6	0.5	13.0	65	5.1
Mean	29.58	13.575	19.23			3.6			

. Data obtained from the Meterogological Dept. Ministry of War, U.A.R.

. After (Parsons). 1962.

Fig. (1) shows that dryness is prevailling most of the year and the wet periods are comparatively short, consequently it may be concluded that the climate of the area is extremely arid. According to the soil taxonomy system (1975), the climate of the studied area falls into the hyper-thermic temperature regime and torric moisture regime.

1.3. Geology :

The regional geology of Bahariya Oasis was described by Ball and Beadnell (1903), Stromer(1914), and Lebling (1919), Recently some workers made an intensive study on the geology and paleontology of this Oasis.

Considering the stratigraphic rock units of the Oasis, have been identified from top to bottom as follows:

5- Dolerite intrusions.

4- Plateau limestone,

3- Chalk,

2- El- Hufhuf formation,

1- Bahariya sandstones and variegated shales.

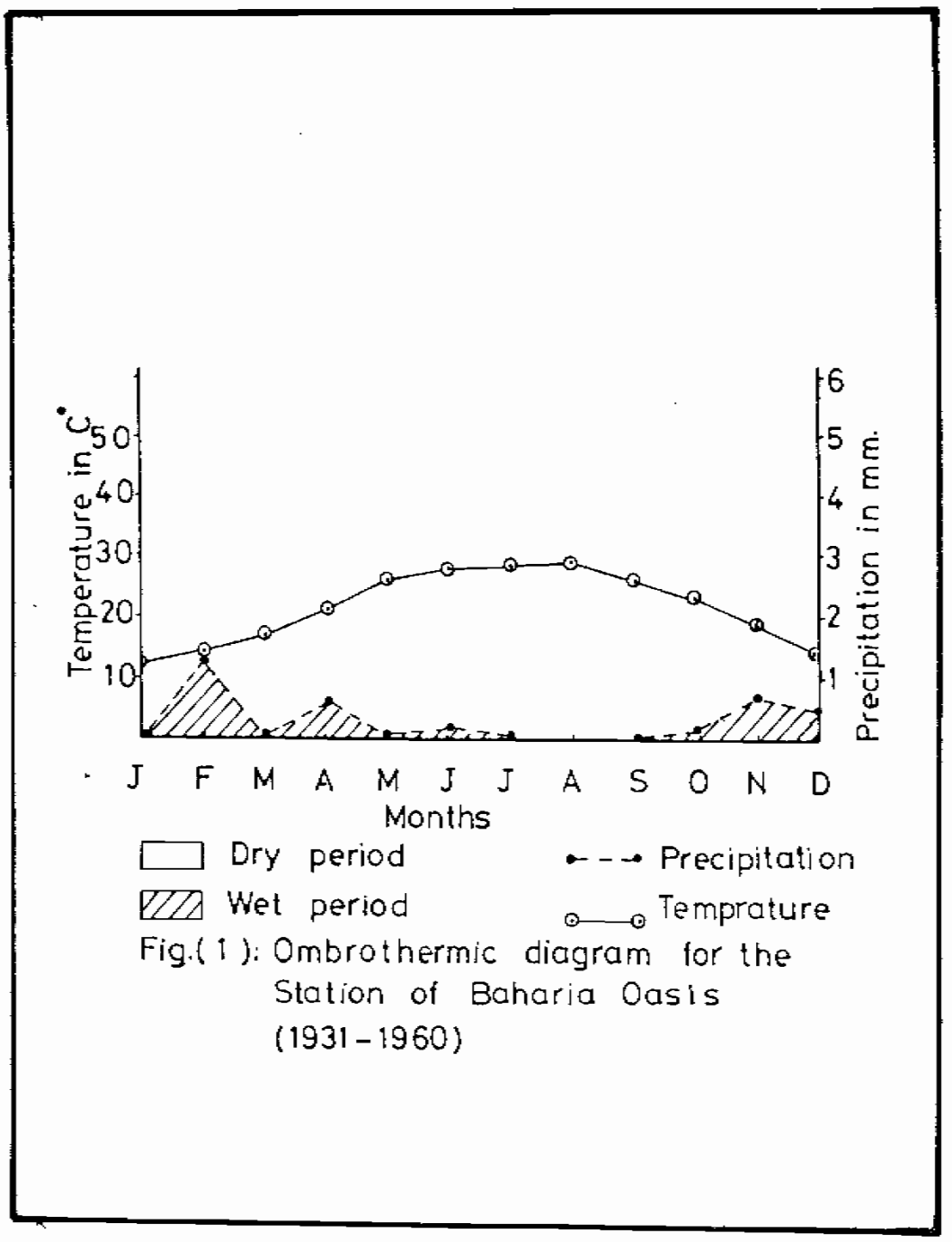


Fig.(1): Ombrothermic diagram for the Station of Baharia Oasis (1931 – 1960)