

## Travel Report Summary

- i. **Submitted by:** Keith Cressman, AGPP **Date:** 15 November 2000
- ii. **Programme code & registry file code:** RP
- iii. **Visit to:** Cairo and Western Desert, Egypt
- iv. **Tasks undertaken for other FAO units:** none
- v. **Inclusive travel dates:** 5-12.11.2000
- vi. **Co-travellers:** none
- vii. **Reason for travel:**  
To assess the potential for Desert Locust populations in the Western Desert of Egypt and provide advice on improved monitoring methodologies
- viii. **Recommendations / action to be taken:**
1. With the recent establishment of the agricultural schemes at Sharq Oweinat and Tushka, a greater emphasis on locust and grasshopper monitoring is required in the Western Desert.
  2. Regular surveys should be carried out in Sharq Oweinat by Locust staff using the latest version of the *FAO Desert Locust Survey & Control Form*. This should be completed and sent to FAO°Rome within five days of the end of each survey. It should be clearly indicated if Desert Locust, grasshoppers or a mixture of the two were seen.
  3. During control operations, results should be sent on a weekly basis to FAO°Rome. Mention should be made when the same area has been treated more than once.
  4. Basic training on locust biology and behaviour should be provided to the farmers in Sharq Oweinat, including the correct identification of Desert Locust and other locust and grasshopper species as well as differentiating between solitary, transients and gregarious populations.
  5. Refresher training on locust biology, identification, survey, control and reporting should be provided to locust and agricultural officers in the oases.
- ix. **Future attendance:** n/a
- x. **Summary:**  
The last significant infestations of Desert Locust in the Western Desert of Egypt were in the spring of 1995 when bands and swarms were controlled. Since then, there has been an increase in the number of reports of locusts from newly established agricultural schemes near the Sudanese border at Sharq Oweinat and Tushka. Some of these indicated that Desert Locust bands and swarms were present. It was decided that the author should undertake a mission to clarify the situation and to assess the potential for Desert Locust in the Western Desert in view of the recently developed schemes.  
The reporter, accompanied by two Egyptian locust officers, carried out a survey in the Western Desert from Cairo to Abu Simbel. The survey covered 2,235 km in five days, visiting the oases of Bahariya, Farafra, and Dakhla and the new agricultural schemes of Sharq Oweinat near the Sudanese border and Tushka near Lake Nasser and Abu Simbel.  
The Western Desert is one of the driest areas of the Sahara. The last significant rain fell six years ago which caused natural vegetation to remain green for two years. Desert Locust appeared and were controlled three months after the rains. The irrigated oases and agricultural schemes are good breeding areas for grasshoppers and, perhaps to a lesser extent, the African Migratory Locust. They are less suitable for the Desert Locust which generally prefer natural vegetation in the desert. Nevertheless, they may play an important role in view of the scarcity of rainfall and the lack of natural vegetation by providing suitable shelter and favourable breeding conditions for any Desert Locust adults that arrive into the area. This is most likely to occur in the spring after exceptionally good breeding on the Red Sea coastal plains or in the autumn after heavy breeding in the summer breeding areas in the interior of Sudan. Migration into the Western Desert is likely to occur only when the prevailing

northerly winds are interrupted for a day or two by easterly winds in the spring or by southerly or south-westerly winds in the autumn. This may explain the appearance of Desert Locusts in 1995.

With the continued development of the agricultural schemes in Oweinat and Tushka in which at least 200,000 ha are expected to come under cultivation in places that were previously barren, the ecology of the area may be significantly altered. The schemes could present new habitats for grasshopper populations and, to a lesser extent, Desert Locust. These areas require regular monitoring for the early detection and control of any significant infestations.

x. **Detailed report to be submitted? Yes (hard copy and Internet)**

xi. **Distribution:**

Fresco, AGD

Duwayri, AGPD

van der Graaff, AGPP

Hafraoui, AGPP

Elliott, AGPP

Cressman, AGPP

Monard, AGPP

Pantenius, EMPRES

Bahakim, EMPRES

Boutrous, EMPRES

Doumandji, FAOR Egypt

Zaki, RNEA

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**Back to Office Report**  
**Desert Locust survey in the Western Desert, Egypt**  
**5-12 November 2000**

*Keith Cressman*  
*FAO Locust Forecasting Officer*

**Summary of findings and recommendations**

1. A ground survey was undertaken by the author and two Locust Officers from the General Department for Locusts and Agro-Aviation Affairs (GDLAAA) on 7-11 November 2000 in the Western Desert of Egypt from south of Cairo to the Sudanese border and Lake Nasser. A total of 2,225 km was covered.
2. The Western Desert is one of the driest regions of the Sahara Desert and is nearly devoid of natural vegetation. The last significant rainfall occurred six years ago. Widespread Desert Locust infestations were last controlled in 1995 (14,000 ha) following these rains which allowed vegetation to remain green for two years.
3. In recent years, grasshoppers and Desert Locust have become more prevalent in the Western Desert due to the establishment of agricultural schemes near the Sudanese border. Control was required in 1999 (4,500 ha) and in 2000 (7,640 ha).
4. In the absence of rainfall and natural vegetation, the recently established agricultural schemes represent a potentially new habitat primarily for grasshoppers and, to a lesser extent, Desert Locust. Consequently, a greater emphasis on locust and grasshopper monitoring is required in the Western Desert.
5. Regular surveys should be carried out in Sharq Oweinat and Tushka by GD-LAAA staff using the latest version of the *FAO Desert Locust Survey & Control Form*. This should be completed and sent to FAO Rome within five days of the end of each survey. It should be clearly indicated if Desert Locust, grasshoppers or a mixture of the two were seen.
6. During control operations, results should be sent on a weekly basis to FAO Rome. Mention should be made when the same area has been treated more than once.
7. Basic training on locust biology and behaviour should be provided to the farmers in Sharq Oweinat, including the correct identification of Desert Locust, African Migratory Locust and grasshoppers as well as differentiating between solitary, transiens and gregarious populations.
8. Refresher training on locust biology, identification, survey, control and reporting should be provided to locust and agricultural officers in the oases.

## Introduction

In recent years, there has been an increase in the number of reports of locusts in the Western Desert of Egypt. Many of these were from areas that had not been previously visited by FAO locust staff. Some of these places were in new agricultural schemes. Furthermore, It was not entirely clear if the locusts were Desert Locust, other locust species, grasshoppers, or some combination of these. The origin of the populations was uncertain as well. Given these questions and the author's unfamiliarity of the area, a mission was organized to assess the potential for Desert Locust populations in the Western Desert. The results and first-hand knowledge gained from the visit will help the author to better assess future reports and provide more accurate forecasts and advice to Egypt as well as to other affected countries.

The author was accompanied by two Locust Officers from the General Department for Locusts and Agro-Aviation Affairs (GDLAAA). The survey was undertaken on 7-11 November 2000 and covered 2,225 km by ground using two 4WD LandCruisers. Using standard locust survey methodologies as recommended by FAO, the team first checked the main oases in the Western Desert, Bahariya, Farafra and Dakhla, and then the two new agricultural schemes in the south, Sharq Oweinat near the Sudanese border and Tushka near Lake Nasser and Abu Simbel. In the oases and agricultural schemes, stops were made in cropping areas and farmers were interviewed. In the desert areas in between, stops were made whenever vegetation was seen as well as in areas where control operations had been previously conducted. Local locust and agricultural officers joined the team at various points during the survey. The survey itinerary is presented in Appendix 1.

## Findings and observations

### Locusts and grasshoppers

During the past two decades, Desert Locust populations in the Western Desert were primarily confined to the small agricultural plots near the Lake Nasser shoreline and Tushka. Prior to this year, the last control operations were carried out in 1995. To a lesser extent, Desert Locust have been reported near the oases (Dakhla, 1995) and occasionally in the desert (Bir Tarfawi, 1988 and 1995). They are rarely seen on crops in the oases.

In the past five years, there has been a progressive increase in locust reports near the Sudanese border at Sharq Oweinat, 400 km south of the oases and 350 km west of Tushka, where new areas have recently come under cultivation. In fact, this area now accounts for the majority of locusts reported in the Western Desert. During this period, control operations were carried out in cropping areas against bands and swarms in 1995 and 1999. The 1999 infestations were confined to Sharq Oweinat whereas those in 1995 were more widely distributed and were present near Dakhla and Tushka in addition to Sharq Oweinat. See Appendix 2.

This year, Desert Locust infestations were reported from the Western Desert during the summer. In June, solitary and transiens mature adults were treated by local officers at one farm near El Heiz in Bahariya Oasis. From July to October, 7,640 ha of adults and hoppers of Desert Locust mixed with African Migratory Locust and grasshoppers were treated in cultivations at Sharq Oweinat by GDLAAA. Although the majority of the infestations contained more grasshoppers than Desert Locust, infestations at one farm, Sharq Oweinat Company, were composed of 80% Desert Locust and 20% grasshoppers. The Desert Locust populations consisted of solitary and gregarious hoppers of all instars and immature adults. In the Tushka area, local staff treated 21 ha twice of grasshoppers mixed with Desert Locust on one farm, Saudi Arabia Farm, in August. Crop damage was limited in both areas but there were localized exceptions where heavy damage occurred, for example, 40% of the crops were lost at the Sharq Oweinat Company farm. See Appendix 3.

During the survey, no Desert Locusts were seen except for a few scattered solitary maturing adults mixed with African Migratory Locust and grasshoppers at Sharq Oweinat Company farm (see Appendix 4). Grasshoppers were present in maize at the Ministry of Agriculture farm. It was learned from farmers that low numbers of locusts and grasshoppers first appeared this year in the Sharq Oweinat Company farm during March and numbers increased during July and August. In Tushka, grasshoppers and locusts first appeared in April, subsequently increased in number and laid eggs in late July with hoppers appearing by mid-August. This information was not reported to the GDLAAA nor to FAO Rome.

### Ecology

The Western Desert covers about 700,000 square kilometres and accounts for about two-thirds of Egypt's land area. The desert spans from the Mediterranean Sea south to the Sudanese border and from the Nile River Valley west to the Libyan border. There are seven important depressions within this area and all of

these are considered oases except the largest, Qattara. There are also two large agricultural schemes in the south. It became evident during the survey that the ecology is different in the oases, the agricultural schemes and in the desert areas. This may have an impact on locusts and grasshoppers in the Western Desert.

#### **(a) the oases**

A series of six oases are found west of the Nile River. Four of these are oriented roughly in a C-shape from west of El Faiyum to west of Luxor, lying between 25-29°N and 28-31°E. Starting from southwest of Cairo, these are Bahariya, Farafra (including Abu Mingar), Dakhla and Kharga. The fifth oasis, Siwa, lies apart from the others in the north-west near the Mediterranean coast. El Faiyum, south of Cairo, is the sixth oasis. The oases lie in deep depressions at elevations of 20-150 metres ASL, surrounded by extremely arid desert. They are bordered by several escarpments and ridges beyond which extend sandy desertic plains. Mixed cropping is the prevalent agricultural system in the oases with small plots of alfalfa, wheat, maize, and vegetables. Date palms are mainly present in Bahariya Oasis and, to a lesser extent, Dakhla. The oases are irrigated by a series of canals fed by wells as deep as 1000 metres. Production is for local and national consumption. See Appendix 5a for more details.

#### **(b) the agricultural schemes**

The agricultural scheme at Sharq Oweinat is 400 km south of Dakhla, about 50 km north of the Sudanese border, 350 km east of the Libyan border, and 350 km west of Lake Nasser. At present, the scheme consists of six large farms, five of which are privately owned and were established in 1999. The sixth farm is owned and operated by the Ministry of Agriculture. It is the oldest, where water was first discovered in 1992 and cropping commenced in 1997. Today, it serves as a demonstration and experimental farm for the private growers. The farms in Sharq Oweinat vary in size from 240 ha to 3,200 ha. Wheat and maize are irrigated by pivots or sprinklers, and fruits and vegetables are irrigated by drip. Wells in these areas are from 70 to 300 metres deep. Eventual production is destined for export to Europe which is expected to start in the next year or two.

The Tushka agricultural scheme, some 350 km east of Oweinat and near Lake Nasser, is being financed by Saudi Arabia and was established in 1997. At present, different fruit and vegetable varieties are being tested on a 60 ha farm to determine which can be grown in the area for export. The farm is located north of the 70 km Sheikh Zayed Canal which is under construction and will eventually bring some 50,000 ha or more under cultivation, one of the largest planned agricultural developments in the world. In the Abu-Simbel area, at least 600 ha are under cultivation in a few farms where mainly fruit and vegetable crops are grown by drip irrigation. Smaller plots are present in some places along the shores of Lake Nasser where Desert Locust have traditionally been reported. See Appendix 5b for more details.

These two schemes fall under the umbrella of the South Valley Project, a plan to ultimately irrigate 200,000-500,000 ha of undeveloped desert land by the Sheikh Zayed Canal and its four spurs (a total of 168 km) as well as by ground-water.

#### **(c) desert areas**

Desertic plains, dunes and hills occupy nearly 99% of the Western Desert. A portion of this area is easily accessible by relatively new asphalt roads that connect the oases and the agricultural schemes. The desert outside of the oases and schemes is one of the most arid regions of the Sahara. It is characterized by ridges (scarps) and seven deep depressions (basins). No rivers or streams drain into or out of the area.

The last significant rainfall was in the winter of 1994-95. During the survey, there was a complete absence of natural vegetation outside of the oases and the agricultural schemes. The only exception to this is Tarfa mounds which first start to appear about 300 km south of Dakhla near Bir Tarfawi. Tarfa mounds are a series of small sandy hillocks of up to 20 metres in height clustered together and partially covered by Tamarisk (*Tamarix sp.*) bushes. The extent of the series of mounds at each of location varies from 0.5-2.0 km in length. Other mounds were seen east and north-east of Sharq Oweinat near Bir Dibis and Bir Takhilis. These are likely to provide shelter for Desert Locusts that may be in transit over the Western Desert. There have been reports of Desert Locusts in Tarfa mounds near Bir Tarfawi in 1988 and 1995.

After the rains in the winter of 1994-95, vegetation remained green for two years in some places. Solitary Desert Locust adults appeared in one wadi between Farafra and Dakhla three months later and laid eggs. Control operations were undertaken against the resulting hoppers in the spring along about 5 km of the wadi. Operations were also conducted in other areas near Dakhla, Oweinat and Tushka.

Photos taken during the survey in the oases, agricultural schemes and in the desert are presented in Appendix 6.

## Desert Locust potential

Due to the scarcity of rainfall and lack of natural vegetation in the Western Desert, the oases and agricultural schemes may provide suitable shelter and favourable breeding conditions for any Desert Locust adults that arrive into the area. This is most likely to occur if locust numbers build up during the winter and spring on the Red Sea coastal plains and in the Arabian interior. During the brief spells of easterly winds that occasionally interrupt the prevailing northerly and north-easterly winds, adults could move into the Western Desert. This may explain the appearance of Desert Locust in the Western Desert in early 1995 which required control. Adults could also arrive from summer breeding areas in the interior of Sudan from September to November. While the majority of these adults usually move to the Red Sea coastal plains, there is a possibility that some could move northwards into the Western Desert in years when breeding is exceptionally heavy. This would occur during periods of southerly and south-westerly winds. Perhaps this may explain the appearance of locusts in the autumn of 1999.

The agricultural schemes in Sharq Oweinat and Tushka are in areas that were previously barren and devoid of agriculture. These may represent new habitats for primarily grasshoppers and perhaps the African Migratory Locust and, to a much lesser extent, the Desert Locust. At present, more than 20,000 ha are under cultivation in Sharq Oweinat and at least 700 ha in Tushka-Abu Simbel. The total area is expected to reach at least 200,000 ha in the next few years. This is likely to have a significant effect on insect populations in general, and on grasshopper and locusts specifically, within the large desert area that stretches from the Libyan border to Lake Nasser.

## Recommendations

With the recent establishment of the agricultural schemes, a greater emphasis on locust and grasshopper monitoring is required in the Western Desert. In order to achieve this, several suggestions follow:

- Regular surveys should be carried out in Sharq Oweinat and Tushka by GDLAAA staff.
- The latest version of the *FAO Desert Locust Survey & Control Form* should be completed and sent to FAO Rome within five days of the end of each survey. It should be clearly indicated if Desert Locust, grasshoppers or a mixture of the two were seen.
- During periods of control operations, results should be sent on a weekly basis to FAO Rome, again making use of the form. Mention should be made when the same area has been treated more than once.
- Basic training on locust biology and behaviour should be provided to the farmers in Sharq Oweinat. Emphasis is required on the correct identification of Desert Locust, African Migratory Locust and the various grasshopper species as well as differentiating between solitarious, transiens and gregarious populations.
- Refresher training on locust biology, identification, survey, control and reporting should be provided to locust and agricultural officers in the oases.

## Acknowledgements

The author would like to express his sincere gratitude to the Director of the General Department for Locusts and Agro-Aviation Affairs, Mr. Mahmoud Mohamed Sayed, and to the FAO Representative, Mr. Nadir Doumandji, for the excellent arrangements, organization and support provided for the survey. Thanks are also due to Mr. Motaz Hassan El-Molla who accompanied the author as well as to Mr. Gerges Bedarous Kaldas, the drivers and the local experts.

## Appendix 1. Survey itinerary

Date	Route	Hours	Distance
6.11.00	Cairo		
7.11.00	Cairo - Bahariya <i>survey of Bahariya Oasis</i>	12 hr	550 km
8.11.00	Bahariya - Farafra - Dakhla <i>survey of Farafra &amp; Abu Mingar oases, desert, Maghub oasis</i>	12 hr	575 km
9.11.00	Dakhla - Tarfawi - Sharq Oweinat <i>survey of Tarfawi, desert, Sharq Oweinat farms</i>	11 hr	500 km
10.11.00	Sharq Oweinat - Bir Dibis - Dar Al-Arba'in - Tushka - Abu Simbel <i>survey of Bir Dibis and Tushka</i>	11 hr	600 km
11.11.00	Abu Simbel <i>survey of Abu Simbel farms</i>	1 hr	10 km
12.11.00	Cairo		
<b>Totals</b>			<b>2235 km</b>



## Appendix 2. Desert Locusts reported in the Western Desert, 1993-2000

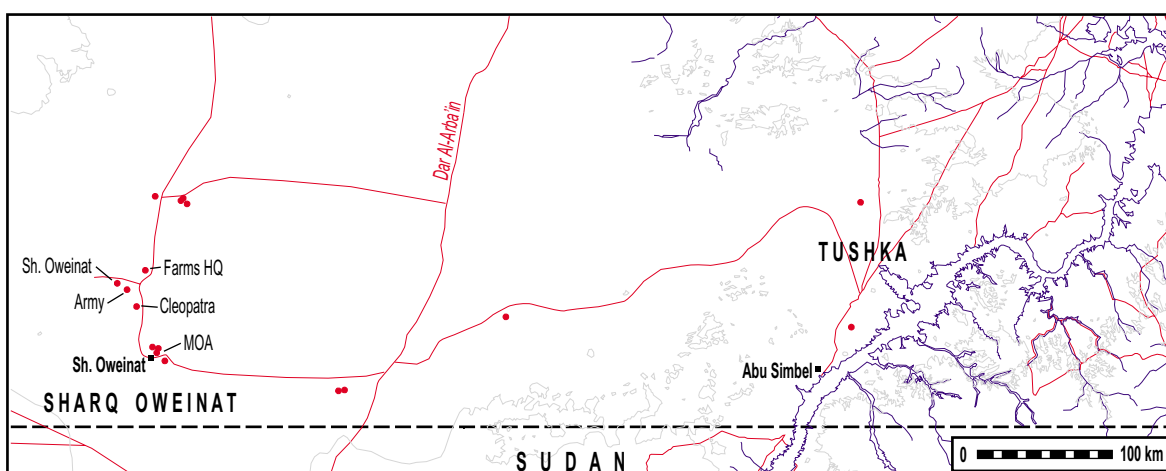
Location	Date	Populations	Area treated (ha)																														
<b>(a) Oases</b>																																	
Dakhla	Feb 1995	solitarious and groups of mature adults	2000																														
	Mar 1995	high density gregarious mature adults	200																														
	May 1995	low density hopper bands	0																														
Bahariya	Jun 2000	transiens adults	unk																														
<b>(b) Agricultural schemes</b>																																	
Oweinat	Jan 1995	adult groups	5700																														
	Feb 1995	gregarious adults	1400																														
	Mar 1995	gregarious adults	300																														
	May 1995	hopper bands	2100																														
	Oct 1995	adults	0																														
	May 1998	adults and hoppers	unk																														
	Feb 1999	solitarious mature adults	0																														
	Aug 1999	adults	0																														
	Sep 1999	hoppers	4400																														
	Oct 1999	adults	0																														
	Nov 1999	adults and hoppers	110																														
		<i>Jul-Oct 2000 (see Appendix 3 for details)</i>		7640																													
Tushka	Jul 1993	immature adults	400																														
	Jan 1995	transiens adults	700																														
	Apr 1995	hopper bands	1400																														
	May 1995	adults	0																														
	Jun 1995	hopper bands	40																														
	Jul 1995	adult groups	140																														
	Sep 1996	solitarious adults	0																														
	Sep 1997	solitarious adults	0																														
	Sep 2000	hoppers and adults	42																														
<table border="1"> <thead> <tr> <th>Totals</th> <th>1993</th> <th>1995</th> <th>1999</th> <th>2000</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>Oases</td> <td></td> <td>2200</td> <td></td> <td></td> <td>2200</td> </tr> <tr> <td>Oweinat</td> <td></td> <td>9500</td> <td>4510</td> <td>7640</td> <td>21650</td> </tr> <tr> <td>Tushka</td> <td>400</td> <td>2280</td> <td></td> <td>42</td> <td>2722</td> </tr> <tr> <td><b>Total</b></td> <td><b>400</b></td> <td><b>13980</b></td> <td><b>4510</b></td> <td><b>7682</b></td> <td><b>26572</b></td> </tr> </tbody> </table>				Totals	1993	1995	1999	2000	Total	Oases		2200			2200	Oweinat		9500	4510	7640	21650	Tushka	400	2280		42	2722	<b>Total</b>	<b>400</b>	<b>13980</b>	<b>4510</b>	<b>7682</b>	<b>26572</b>
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<p><i>N.B. This data is from reports received at FAO, Rome and may include grasshoppers as well as Desert Locust.</i></p>																																	



### Appendix 3. Desert Locusts reported in Sharq Oweinat, 2000

Date		Farms					Total
(from)	(to)	Sh. Oweinat	Cleopatra	Farms HQ	Army	MOA	
10/07	16/07	125	0	0	333	83	542
17/07	23/07	0	0	0	1167	0	1167
24/07	25/07	167	0	0	208	0	375
01/08	07/08	167	0	0	417	208	792
08/08	12/08	229	0	0	250	167	646
13/08	16/08	0	0	0	0	125	125
23/08	26/08	0	146	0	217	31	394
27/08	28/08	75	29	0	0	0	104
29/08		50	0	0	42	0	92
02/09		42	0	0	0	0	42
05/09		100	0	0	0	0	100
07/09	09/09	63	0	0	0	229	292
10/09	11/09	213	0	0	0	67	279
12/09	15/09	229	0	83	58	292	663
16/09		21	0	0	0	42	63
17/09		117	0	0	42	146	304
18/09		0	0	0	83	208	292
19/09		83	0	0	0	113	196
21/09		146	0	33	0	104	283
23/09		0	0	0	0	83	83
24/09		104	0	0	0	83	188
25/09		0	0	0	0	167	167
26/09	27/09	0	0	0	21	292	313
28/09		0	0	0	0	50	50
08/10		92	0	0	0	0	92
<b>Total</b>		<b>2021</b>	<b>175</b>	<b>117</b>	<b>2838</b>	<b>2490</b>	<b>7640</b>

*N.B. Some of these areas consist of mixed infestations of grasshoppers and Desert Locust and were treated more than once.*



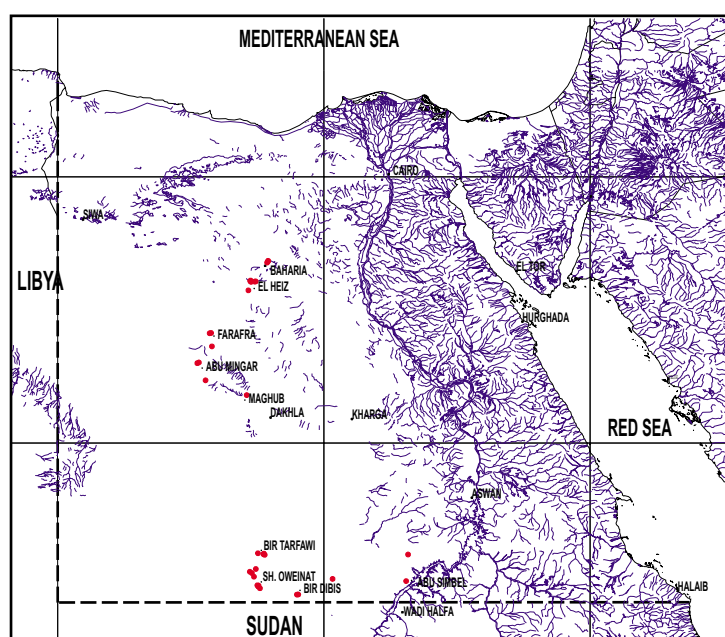
Sharq Oweinat agricultural scheme. Survey stops are indicated as dots.

## Appendix 4. Results of survey in the Western Desert, Egypt

Date	Location	Latitude	Longitude	Ha	Habitat	Vegetation	Density	Soil	Locusts
07/11/00	Kham An	27°52'01"	28°35'17"		Crops	Green	Low	Wet	Absent
07/11/00	Ain El Eiza (El Heiz)	28°01'33"	28°38'20"		Crops	Drying	Medium	Wet	Absent
07/11/00	Gharbiya (El Heiz)	28°02'28"	28°37'22"		Crops	Green	Medium	Wet	Absent
07/11/00	Ain Dris (El Heiz)	28°03'06"	28°37'46"		Crops	Green	Medium	Wet	Absent
07/11/00	Tablamoon (Rees)	28°01'52"	28°42'18"		Crops	Green	Medium	Wet	Absent
07/11/00	Tablamoon E. (Rees)	28°02'07"	28°43'37"		Crops	Green	Low	Wet	Absent
07/11/00	El Zabi	28°23'21"	28°56'24"		Crops	Green	Medium	Wet	Absent
07/11/00	El Zabi area	28°24'28"	28°57'18"		Crops	Green	Medium	Wet	Absent
07/11/00	Qasr3 (Buwati)	28°25'17"	28°57'36"		Crops	Green	Medium	Wet	Absent
08/11/00	Farfara area	27°03'59"	27°53'18"		Crops	Green	Medium	Wet	Absent
08/11/00	Farafra area	27°03'41"	27°51'37"		Crops	Green	Medium	Wet	Absent
08/11/00	El Kiffah	26°48'53"	27°54'10"		Crops	Green	Medium	Wet	Absent
08/11/00	Abu Mingar area	26°30'45"	27°39'29"		Crops	Green	Medium	Wet	Absent
08/11/00	Abu Mingar area	26°29'56"	27°37'43"		Crops	Green	Medium	Wet	Absent
08/11/00	35km south Abu Mingar	26°10'38"	27°46'59"	1000	Wadi	Dry	Low	Dry	Absent
08/11/00	Maghub West	25°53'57"	28°33'24"		Crops	Green	Medium	Wet	Absent
09/11/00	near Tarfawi	22°55'44"	28°46'02"		Dunes	Drying	Medium	Dry	Absent
09/11/00	Tarfawi area	22°54'42"	28°52'12"		Dunes	Drying	Dense	Dry	Absent
09/11/00	Tarfawi area	22°55'17"	28°52'46"		Dunes	Drying	Medium	Dry	Absent
09/11/00	Tarfawi area	22°53'55"	28°53'41"		Dunes	Drying	Medium	Dry	Absent
09/11/00	Sh. Oweinat (north)	22°37'59"	28°43'40"		Crops	Dry	Low	Dry	Absent
09/11/00	Sh. Oweinat farm	22°34'52"	28°36'56"		Crops	Dry	Low	Dry	Absent
09/11/00	Sh. Oweinat farm	22°34'38"	28°34'53"		Crops	Drying	Low	Dry	Present (1)
09/11/00	Army farm	22°33'21"	28°39'17"	3200	Crops	Green	Medium	Wet	Absent
09/11/00	Cleopatra farm	22°29'18"	28°41'34"	800	Crops	Green	Medium	Wet	Absent
09/11/00	MOA farm	22°16'16"	28°48'21"	50	Crops	Drying	Dense	Dry	Absent
09/11/00	MOA farm	22°18'12"	28°46'24"		Crops	Drying	Dense	Dry	Absent
09/11/00	MOA farm	22°19'16"	28°46'47"		Crops	Drying	Low	Dry	Absent
09/11/00	MOA farm	22°19'35"	28°45'23"		Crops	Dry	Low	Dry	Absent
10/11/00	Bir Dibis	22°09'17"	29°31'28"		Dunes	Drying	Low	Dry	Absent
10/11/00	Bir Dibis West	22°09'05"	29°30'00"		Dunes	Drying	Medium	Dry	Absent
10/11/00	Bir Takhlis	22°26'50"	30°10'10"		Dunes	Drying	Medium	Dry	Absent
10/11/00	Saudi Experimental Farm	22°54'18"	31°35'16"	60	Crops	Green	Medium	Wet	Absent
11/11/00	Farm behind Abu Simbel	22°24'22"	31°33'03"	500	Crops	Green	Low	Wet	Absent

Notes:

(1) an estimated 5 isolated immature solitary adults were seen in a 100x3m foot transect in harvest fields



## Appendix 5. Agriculture in the Western Desert

### (a) the oases

Name	Location	Town	Crops	Area (ha)
Bahariya	2805-2830N 2840-2900E	Bawiti	dates, alfalfa, maize, wheat, vegetables, fruits	13,000
Farafra	2640-2715N 2745-2805E	Farafra	rice, wheat, maize, vegetables, fruits	33,000
Dakhla	2525-2555N 2830-2930E	Mut	rice, alfalfa, wheat, maize, vegetables, fruits	15,000+ <sup>1</sup>

*N.B. The other Western Desert oases of Siwa, Faiyum and Kharga were not visited by the author as their relevance to the Desert Locust is minor.*

*1. cultivated area of Maghub sector of Dakhla.*

### (b) the agricultural schemes

Farm	Location	Crops	Area (ha)
<b>1. Sharq Oweinat</b>			
Farm HQ	2238N/2843E	maize, wheat, vegetables, fruits	40
Sh. Oweinat	2234N/2836E	maize, wheat, vegetables, melons	240
Army	2233N/2839E	maize, wheat, vegetables, fruits	3,200
Cleopatra	2229N/2841E	maize, wheat, grapes, vegetables, kerkeday	800
Min. of Agriculture	2216-2200N 2845-2849E	maize, wheat, sorghum, millet, vegetables, fruits	1,800
<b>Total</b>			<b>6,080</b>
<b>2. Tushka</b>			
Saudi Farm	2254N/3135E	grapes, vegetables, fruits	60

## Appendix 6. Photos



1. Olive, eggplant, melon cultivations under drip irrigation in new farm at south end of Bahariya oasis, Kham An (275201N/283517E). Locusts and grasshoppers were treated here in June 2000. 7.11.00.



2. Road from Bahariya to Farafra oasis, 7.11.00.



3. Mixed cultivations south of Farafra oasis at El Kiffa (264853N/275410E), 8.11.00.



4. 1000m natural flowing well, Abu Mingar (262955N/273743E), 8.11.00.



5. Survey team with local staff at Abu Mingar (262952N/274014E), 8.11.00.



6. Sand sea (261838N/274503E) south of Abu Mingar, 8.11.00.



7. Dry vegetation in wadi (261038N/274659E) where adults and hoppers were last controlled, February-March 1995. 8.11.00.



8. Maghub West (255148N/283314E) in Dakhla oasis, 8.11.00.



9. Sand sea (244107N/290630E) south of Dakhla oasis, 9.11.00.



10. Tarfa mound near Bir Tarfawi with Tamarisk (*Tamarix sp.*) shrubs, looking north (225444N/284601E), 9.11.00.



11. Tarfa mound near Bir Tarfawi with *Tamarix sp.* shrubs, looking south (225444N/284601E), 9.11.00.



12. Tarfa mound near Bir Tarfawi, looking north (225444N/284601E), 9.11.00.



13. Cleopatra farm (222917N/284134E), Sharq Oweinat, 9.11.00.



14. MOA farm (221616N/284820E), sorghum, Sharq Oweinat. Locusts and grasshoppers were treated here in September 2000. 9.11.00.



15. MOA farm (221811N/284824E), Sharq Oweinat. Locusts and grasshoppers were treated here in August and September 2000. 9.11.00.



16. Looking south (221143N/283156E) to Bir Dibis and Sudan border, 10.11.00.



17. Bir Dibis (220917N/293127E) with *Tamarix gallica*, 10.11.00.



18. Saudi Arabian experimental farm (225418N/313516E), 60 ha. Locust and grasshoppers were treated here in August 2000. 10.11.00.