A REPORT ON THE PRESENT SITUATION OF IRRIGATION AND AGRICULTURE IN THE OASIS OF DAMASCUS 1981-1983

Part 1. Northern District of the Oasis

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Contents

INTRODUCTION

Objective of Study

The objective of this report is to arrange and present fundamental information on the present situation of irrigation and agriculture in the Oasis of Damascus. Several studies were already published in different journals, NAITO (1985A, 1985B, 1986), with the aim of analyzing the factors of recent environmental deterioration in agriculture in the study area. This report was prepared for the basis of these studies, and consists of oral tradition for irrigation and statistical data on agriculture with specific reference to the recent socio-eonomic changes in the Oasis villages.

Need for Study

Damascus city, the capital of Syrian Arab Republic, is one of the oldest cities in the world and has been located at the crossroads of Oriental and

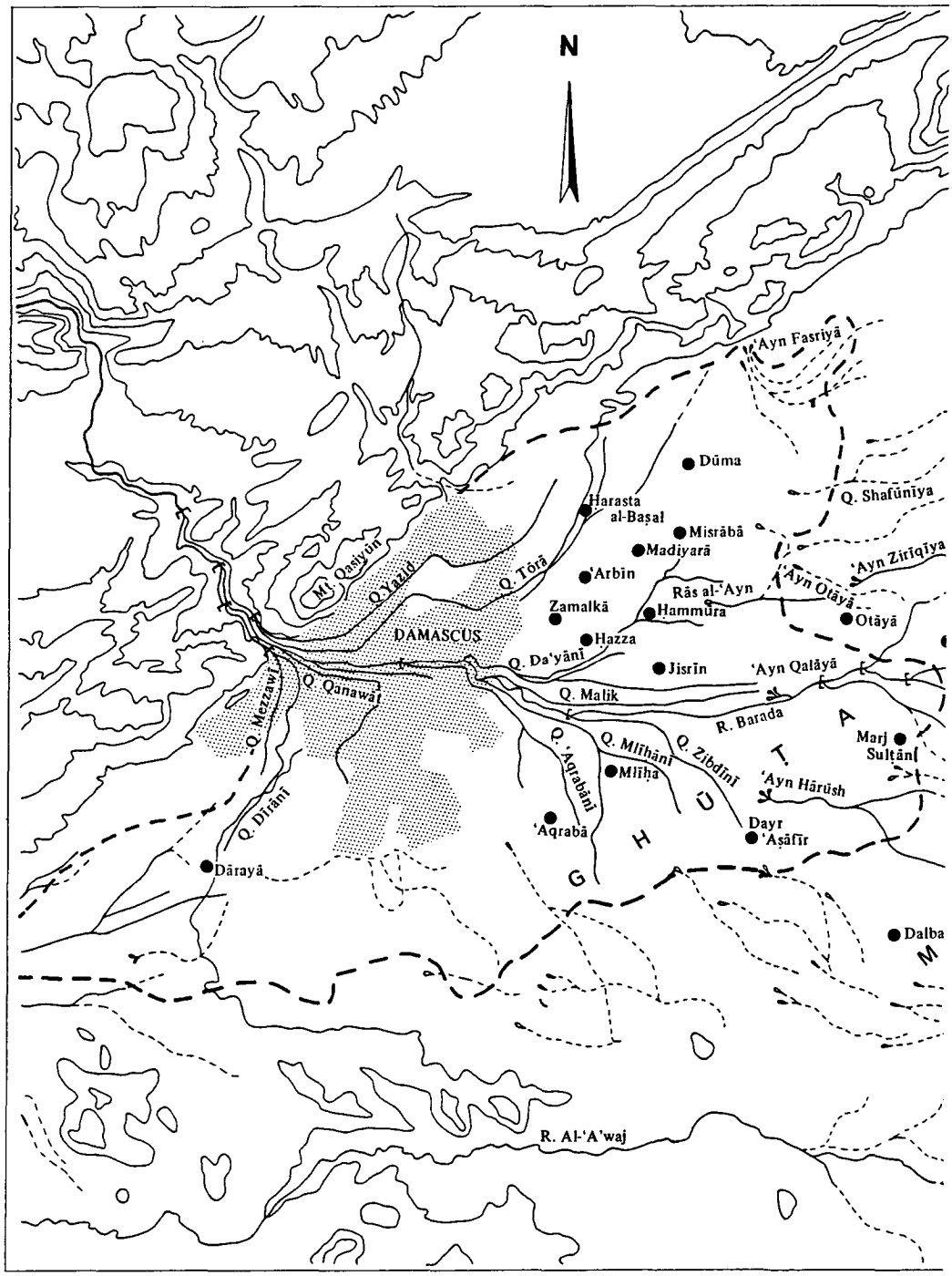
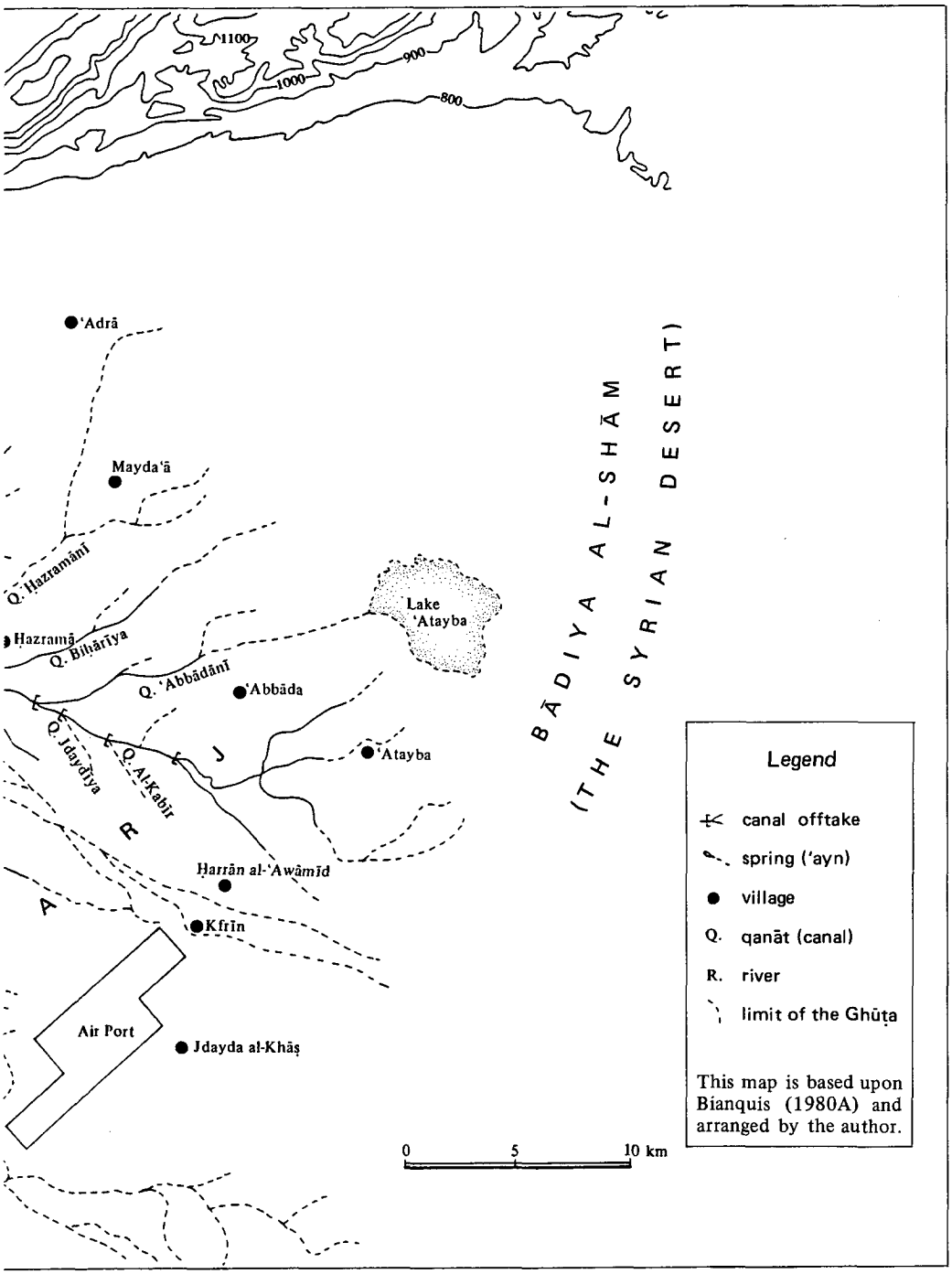


Fig. 1 The Oasis of Damascus



(The Barada River and Its Derivative Canals)

Occidental civilization. The surrounding oasis, known as the Ghūṭa, has been irrigated by the River Barada and its derivative canal networks which have been developed over the centuries. The city dwellers have been dependent upon agricultural products in this fertile oasis, some of which such as dried fruits and dairy products were important commodities for caravan trading.

Since the independence in 1946, the city of Damascus has been developed remarkably, as rural-urban migration and the number of refugees increased. With the expansion of the urban area in the eastward direction, the surrounding oasis villages now form contiguous urban settlements. Consequently, considerable areas of agricultural lands have been changed into residential sites, and many of the surface canals have been destroyed. (see Fig. 3) Rapid increase of water requirements for domestic use has reduced the annual discharge of the Barada River, and simultaneously, untreated waste water from industries has caused serious deterioration in the quality of natural flow.

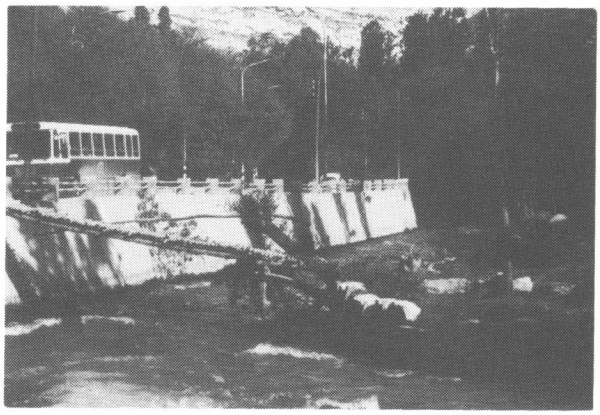


Fig. 2 The Barada River (at Dummar, 2 km west of Damascus)

Fig. 3 Destruction of Canal in the City of Damascus

Consequently, the surface water irrigation all over the oasis must now be supplemented by pumping-up underground water. According to the Village Statistical Report (Al-sijr al-iḥṣā'ī lil qariya) for all the villages, the number of wells is 8,000 in 1982, but the Ministry of Irrigation estimates the amount to be 12,000 including unauthorized wells.

Although the Ministry of Public Works and Water Resources, the predecessor of the present Ministry of Irrigation, prohibited further digging throughout the oasis by Law No. 208 in 1959, illegal installations of tubewells with engines are still continuing.

As a result of such haphazard pumping, the ground water level has been dropping more than 20 m in the Marj steppe area, the outskirts of the Ghūṭa, in the past twenty years. Especially in the eastern end of the Marj, the irrigation water is not available now even by motor-pumping. In this area, the Syrian Desert has encroached on the agricultural lands, and a considerable area of farmland has been neglected.

As to the Marj area, the socio-economic changes after the Land Reform in 1958 should be indicated as essential factors which have entailed the present inactive situation in agriculture. The distributed land for each peasant or share cropper is roughly estimated at an average of 4 to 5 hectares which was very insufficient for extensive wheat farming as had been done by the big landowners. Therefore, small independent farmers have been obliged to change their farming system into an intensive one with commercial crops like cotton and sugar beet. But for commercial crops cultivation, more fertilizers, irrigation water and labour are required. With increasing expenses, the peasants have no alternative but to depend upon non-agricultural income.

As is mentioned above, it is only in the past twenty years that the Oasis of Damascus has been menaced with encroachment by urban settlements from the west, and has been facing the crisis of desertification from the east. Compared with its long history of irrigation agriculture over the centuries, twenty years is extremely short, that is to say, the recent environmental deterioration in agriculture is very rapid and drastic. Accordingly, the data and information in this report are indicative of a historical phase in such remarkable environmental changes.

CONTENTS OF DATA AND THEIR SOURCES

I. Population

The population of the villages in 1980 and 1954 were indicated. The population in 1980 was quoted from the Population Census Report 1983 ('Adad al-sukkān wa al-usra wa al-masākin, ḥasab al-taqsīmāt al-ʾidārīya). The population in 1954 was quoted from Al-rīf al-sūrī (The Countryside of Syria) written by ZAKARIYĀ, A. in 1955 and 1957.

II. Surface Canals

The main surface canals which irrigate each village were as shown. In the Ghūṭ, the Barada River and its derivative canals are utilized for irrigation. In the Marj steppe, lots of canals are flowing from springs of which sources are at the fringes on the alluvial fan. For these canals, the names of the springs were also noted.

III. Oral Custom for Irrigation

The oral tradition of surface irrigation in the oasis usually consists of two basic oral customs, *'addān* and *qīrāṭ*.

'Addān: The arabic word *'addān* means interval or period of irrigation. There has been two different usages of this term in the study area. In the majority of the villages, peasants express their *'addān* as, "our *'addān* is every ten days." In some villages, the peasants say, "We have 24 *'addān* in a year." The latter custom is used, for instance in Dūma, the north-eastern suburbs of Damascus. In this case, 24 irrigation periods per annum are alloted for Dūma, city, and each duration is fixed for eight days. The usages are shown in detail in Section 9. Peasants open and close small sluice gates in pursuance of their own *'addān* regulations. (see Fig. 4)

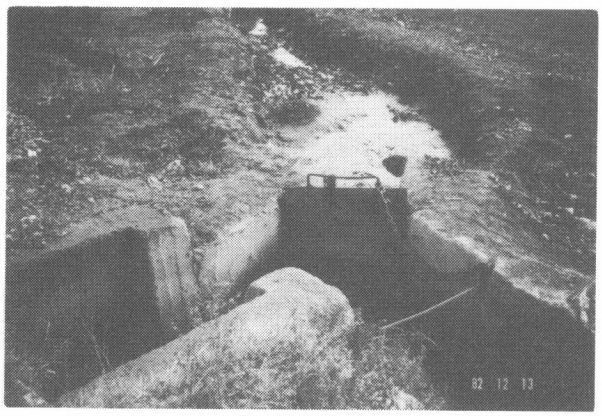


Fig. 4 Sluice Gate for Farm Land

Qīrāṭ: This term has etymologically the same meaning as "karat". Every surface canal has 24 *qīrāṭ*, and all its derivative flows share 24 *qīrāṭ*. The apportionment of *qīrāṭ* is realized by the period of conducting water, or the widths of canals at the distribution point. As shown in Fig. 5, several stone blocks are placed at regular intervals at the main distribution points, these block arrangement being known as *mezzāz* in arabic.

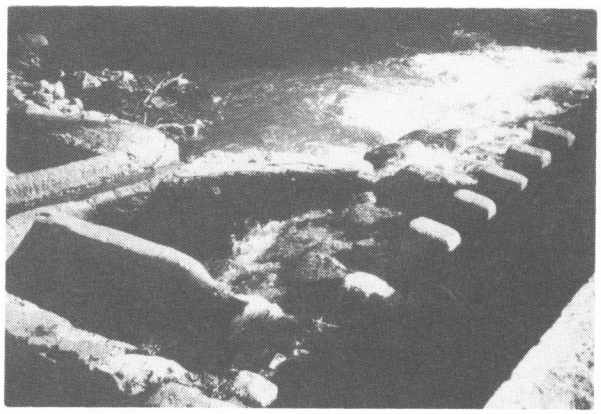


Fig. 5 Mezzāz

Besides these regulations, in several villages, a custom of *feddān al-mā'* (feddan of water) has been used. *Feddān* usually means a unit of area as *feddān al-'arḍ* at approximately 0.42 ha, but in the study area, sometimes it has also been used as a unit of period for irrigation provided to irrigate 1 *feddān al-'arḍ*. In the Ghūṭa, 1 *feddān al-mā'* is usually equivalent to 30 minutes irrigation period.

The information on these oral customs were collected from interviews with *mukhtar* (village headman), *ra'īs al-jamā'īya al-fallāḥīn* (Chief of the Farmers' Union in each village) and aged peasants with extensive knowledge in the traditional irrigation systems. Even through interviews with many of villagers, however, reliable information was not available in several developed villages on the immediate urban fringes.

In such cases, historical documents such as ZAKARIYĀ (1955, 1957) and TRESSE (1929) were used as supplements.

IV. Ground Water Irrigation

Various types of wells have been constructed in the oasis, from simple and shallow draw wells with buckets to large diameter tubewells with pumping motors. The commonly used well is the tubewell using motor-pumping with a diameter of 4 to 6 inches. (see Fig. 6)

Fig. 6 Pumping Station in the Ghuta Orchards (at Duma)

The depths of well are also varied, ranging from less than 20 m in the Ghūṭa to more than 120 m in the eastern end of the Marj steppe.

1. Number of wells
   The figures indicated in this report were usually quoted from the Village Statistical Report (Al-sijr al-iḥṣā 'ī lil qariya). Although further digging of wells has been prohibited since 1959, injurious installation has been remarkably increasing. Accordingly, the official figures estimated in the Village Statistical Reports are often unreliably small. In such cases, the information was supplemented by interviews with peasants.
2. Scale of pumps
   As to depths of wells, diameters of well tubes, and the power of pump-up engines, commonly used types were noted based upon the field survey.

3. Period of digging
   This information was also acquired from field survey through interviews peasants. The period when the irrigation sources changes from the surface canals to ground water is the turning point of environmental changes in the study area.
4. Ground water level
   In the oasis of Damascus, the ground water level fluctuates in accordance with seasonal fluctuations of precipitation. That is to say, in the winter-spring rainy season from November to February, the ground water table rises close to the ground surface, dropping in summer. In the Marj. with the recent declining of ground water level, the summer crops cultivation has been suffering from serious water shortage, so that this figure is suggestive for agricultural conditions particularly in the Marj.
   The figures were based upon field survey.

V. **Land Use**

The proportions of land utilization were quoted from the Village Statistical Report. Comparing the proportion of cultivated fields in 1978 with that of 1982, it is ascertained that a considerable area of farmlands has been taken over or neglected merely in five years, in the immediate suburbs of the City and the eastern end of the Marj. The area was shown in hectares.

VI. **Production and Cultivated Area of Main Crops**

The sources of the information on production and the cultivated area is the Village Statistical Report in 1982. Cropping patterns are varied between the Ghūṭa orchards and the Marj steppe. The productions were shown in tons, and the cultivated areas were shown in *donum*, a local unit of area, which is equivalent to approximately 930 m^2.

VII. **Some Remarks on The Present Situation of Agriculture**

Supplementary comments on the recent agricultural conditions were added for each village with field survey.

GENERAL DESCRIPTION OF THE STUDY AREA

The City of Damascus is located on the south-eastern end of the Syrian Desert, at a latitude of 33°31′ N and a longitude of 36°17′ E. Through the City and its surrounding oasis, the Barada River flows perennially eastwards before disappearing into the desert. By the end of 1950', however, the flood flows from the Barada had drained into Lake 'Atayba, slme 40 km from the City.

The Barada River has been supplying domestic and industrial water for the City, and also has been providing irrigation water for the outlying oasis with its subdivided canal networks. The area, from the immediate fringes of the City eastwards towards the end of the alluvial fan, is known as the Ghūṭa where orchard crops are mainly cultivated. In the Ghūṭa, vegetables and pastures are grown beneath orchard canopies. The east- and southwards expansion of the Ghūṭa is refered to as the Marj steppe, which has been irrigated by the surface canals from springs erupted at the end of the fan, as well as by the minor channels from the Barada. The main crops in the Marj are cereals, vegetables and several commercial crops such as cotton and sugar beet. The crop calendars in the study area are shown in the Appendix.

The annual precipitation at Damascus city center is slightly in excess of 200 mm in average, and the larger proportion of rainfall occurs in the winter from December to February. But the precipitation declines immediately eastwards in the Oasis. According to the meteological report, for instance, from 158 mm at Kharabū on the fringes of the Ghūṭa, to 105 mm at Jdayda al-khāṣ in the eastern end of the Marj steppe. Accordingly, all over the oasis, irrigation is indispensable for cultivation especially in the summer drier season.

The study areas in the Chapter I and Charpter II are located at the northern part of the Oasis. Qanāt Yazīd flows through the southern foot of several mountains such as Mts. Qassiyūn, Ṣālihīya and Barza, and its siting is the highest in elevation among the subdivided canals from the Barada.

On the slope of the mountains, with the insufficiency of irrigation water, grapes and olives have been cultivated on behalf of vegetables which require plentiful water for growing.

Since a motorway for Aleppo has been constructed in an eastward direction along the Qanāt Yazīd, outlying suburbs of the City have been changed into urban settlements, and simultaneously, a considerable area has been occupied to industrial and military use. Therefore, agriculture in this area has been recently inactive.

In the area fed by the Qanāt Tōrā, olive cultivation is predominant in consideration of agricultural landscape, even though vegetables and pastures are more important for production. In the immediate environs of the City along the Qanāt Tōrā, farming has also been suffering from environmental deterioration. For instance, throughout the Oasis, any further construction in the agricultural land has been prohibited by the Prime Minister's Decree issued on 19th February, 1977, but unauthorized building is still continuring in the surrounding suburbs like Jōbar and Zamalkā.

'Adrā village is located at the eastern border between the Marj and the Syrian Desert, and irrigation water has been very insufficient. At the present time, the water rights for surface irrigation of 'Adrā lost its meaning complete-

ly. The irrigation water is pumped up from under ground, but with the declining of the ground water level, it is hopeless to get enough water. As a result, in the eastern district of 'Adrā, most of the farmlands have been neglected and changed into a semi-arid desert.

NOTES ON DESCRIPTION

1. The villages were arranged in order of their location, from the upper stream to the down stream region.
2. In case that a village has been irrigated by several canals, such a village was noted in a chapter which deals with the main canal for this village.
3. Concerning to canal name, an arabic word *qanāt* is commonly used. This term often means an under ground canal in the Middle East, but in the study area, it is used for a surface canal. The under ground canal is usually called as *qanāt rōmānī* (The Roman Canal) in the Oasis of Damascus.
4. Names of the villages noted in this report were based upon The Population Census Report, but for several villages, they are different from the historical names. In such cases, the historical names quoted from KURD 'ALĪ (1949) and ZAKARIYĀ (1955, 1957), were also shown in the brakets [ ].

PHONETIC TRANSCRIPTION OF ARABIC TERMS AND PLACE NAMES

The principles of phonetic transcription in this report are as follows;

Character	Name of Character	Transcription
ا	'alif	'
ب	bā'	b
ت	tā'	t
ث	thā'	th
ج	jīm	j
ح	ḥā'	ḥ
خ	khā'	kh
د	dāl	d
ذ	dhāl	dh
ر	rā'	r
ز	zāy	z
س	sīn	s
ش	shīn	sh
ص	ṣād	ṣ
ض	ḍād	ḍ

ط	ṭā'	ṭ
ظ	ẓā'	ẓ
ع	'ayn	'
غ	ghayn	gh
ف	fā'	f
ق	qāf	q
ك	kāf	k
ل	lām	l
م	mīm	m
ن	nūn	n
ه	hā'	h
و	wāw	w
ى	yā'	y
ء	hamza	'

Annotations:

1. In case that pronunciation of the place names is different from that of *al-fuṣḥā* (classical written arabic), the phonetic transcription was according to the colloquial usage. Accordingly, some place names contain the vowels of "e" or "o", although these vowels were not existed originally in *al-fuṣḥā* pronunciation.
2. The diacritic mark of "–" on indicates long vowels.
3. Damascus should be transcribed as Dimashq in arabic, however, in this report, the author did not adopt the arabic transcription.

ACKNOWLEDGEMENTS

In relation to my study on geography and field survey in the Oasis of Damascus, no one was more helpful and encouraging than Professor Dr. 'Ādel 'ABDULSALĀM of Damascus University, without his guidance, the villagers would not respond my interviews in a friendly way. Naturally, I express my warmest thanks to many villagers in the Ghūṭa and the Marj.

For the publication of my study, I am much obliged to Miss Keiko SATOH, who offered her precious time for painstaking drafting maps.

CHAPTER I. VILLAGES IRRIGATED BY QANĀT YAZĪD

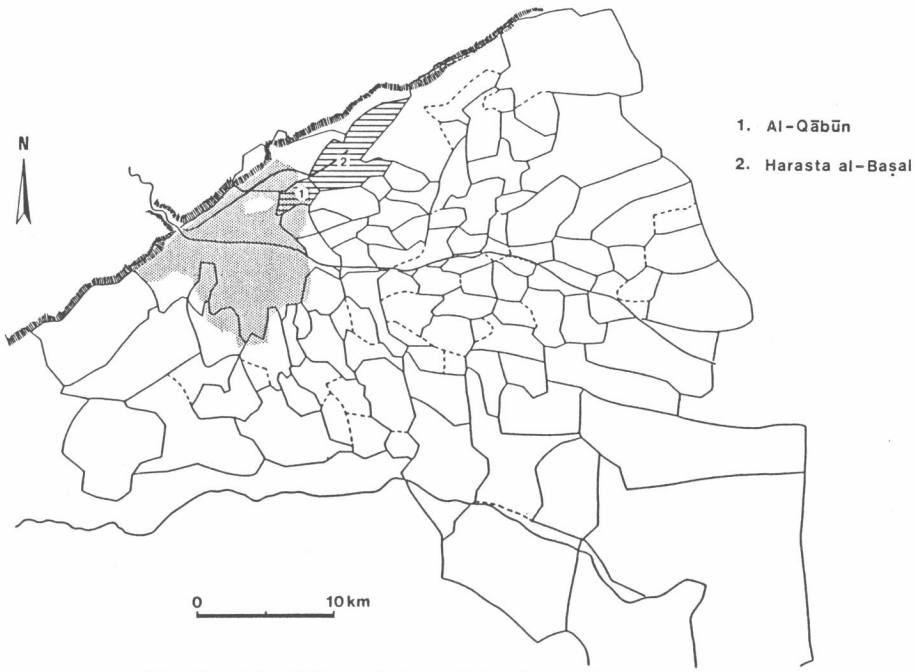


Fig. 7 The Villages Irrigated by Qanāt Yazīd

The beneficiary villages irrigated by Qanāt Yazīd are Al-Qābūn and Ḥarasta al-Baṣal. (see Fig. 7)
The apportionment of *qīrāṭ* number is;

11 *qīrāṭ* : Al-Qābūn
13 *qīrāṭ* : Ḥarasta al-Baṣal
24 *qīrāṭ*

1. Al-Qābūn

I. Population

1980 : 29921 1954 : 5016

II. Surface Canals

Three canals from Qanāt Yazīd.

(A) Qanāt
(B) Qanāt Bayt Ḥassan (private canal only for Al-Qābūn)
(C) Qanāt Maskar al-Ḥammām (private canal only for Al-Qābūn)

III. Oral Custom for Irrigation

'Addān: 22 days in one month, the canal (A) is available. The other to private canals can be used without interval.

Qīrāṭ: For the canal (A), 11 *qīrāṭ* is allotted for Al-Qābūn.

In Al-Qābūn the regulation of *feddām al-mā'* (feddān for water) is used. 1 *feddān al-mā'* is equivalent to one hour of irrigation period, and 1 *feddān al-'arḍ* (feddan for area) could be irrigated with 1 *feddān al-mā'*.

IV. Ground Water Irrigation

[Number of Wells]

1978	5
1982	23

[Scale of Pumps]

Depths of Wells	30-60 m.
Diameters of Well Tubes	4-5 inches.
Horse Powers of Pumping Engines	15-25 h.p.

[Period of Digging]

According to the responses of the villagers, after the Land Reform, tubewells with pumping engines have been dug.

[Ground Water Level]

Not available

V. Land Use

	Total	Cultivated Area	Building	Pond	Desert (Waste Land)	Steppe	Bush	(ha)
1978	330	118.7 (36.0%)	211.3	–	–	–	–	
1982	330	150 (45.5%)	148	2	30	–	–	

VI. Production and Cultivated Area of Main Crops

Crops		Production (t)	Cultivated Area (donum)
Lettuce	1978	2000	130
	1982	2000	150
Vetch (pasture) (Bayqīya)	1978	231	77
	1982	2000 (?)	150
Millet (pasture)	1978	423	141
	1982	600	130
Eggplant	1978	n.a.	100
	1982	400	200
Zucchini	1978	n.a.	n.a.
	1982	260	130
Olive	1978	n.a.	525
	1982	250	525
Pomegranate	1978	100	400
	1982	178	375

VII. Some Remarks on the Present Situation of Agriculture

Agriculture in this village is not active. A lot of factories and workshops are constructed along the motorway for Aleppo which runs through Al-Qābūn. Irrigation water of the surface canals is seriously polluted by discharge from these factories and domestic sewage. Construction apartments has been continued, and most of the village area is now joined to the urban settlements of Damascus city.

2. Ḥarasta al-Baṣal

I. Population

1980 : 25657 1954 : 7374

II. Surface Canals

(A) Qanāt Yazīd

(B) Nahr 'Alīta [a branch of Qanat Ḥarastānī] (from Qanāt Tōrā)
(C) Qanāt al-Dūmānī (from Qanāt Tōrā)

III. Oral Custom for Irrigation

'Addān: (A) 4 days in a week (In each day, water is available for 24 hours.)
(B) 15 days in one month (Every two weeks, the sluice is open only for Ḥarasta al-Baṣal, and the other every two weeks, Misrābā and Dūma have the water rights.)
(C) 15 days in one month (The regulation of distribution is exactly same as (B).

Qīrāṭ: Concerning to Qanāt Yazīd, 13 qirat is apportioned for Ḥarasta al-Baṣal. (TRESSE (1929) mentioned that four *qīrāṭ* from Qanāt Tōrā is also allotted, but it was not ascertained by field survey.

In this village, peasants were using the word of *qīrāṭ* in distinct meaning. That is, one *qīrāṭ* is equivalent to the area of 240 m^2, and it means one *qīrāṭ* of water is enough to irrigate field of 240 m^2. And the peasants also said, before twenty five years, it was possible to irrigate one *donum* (c.a. 930 m^2) of field for about ten minutes.

IV. Ground Water Irrigation

[Number of Wells]

1978	37
1982	116

[Scale of Pumps]

Depths of Wells	Northern district: 50-150 m. Southern district: 30 m
Diameters of Well Tubes	3-4 inches
Horse Powers of Pumping Engines	10-35 h.p.

[Period of Digging]
Since the biginning of 1960'.

[Ground Water Level]
Not available

V. Land Use

	Total	Cultivated Area	Building	Pond	Desert (Waste Land)	Steppe	Bush	(ha)
1978	1500	1200 (80%)	300	–	–	–	–	
1982	1500	1200 (80%)	300	–	–	–	–	

VI. Production and Cultivated Area of Main Crops

Crops		Production (t)	Cultivated Area (donum)
Alfalfa	1978	4000 (?)	1000
	1982	2050 (?)	410
Vetch (Bayqīya)	1978	1500	750
	1982	960	400
Broad Bean	1978	625	500
	1982	625	500
Eggplant	1978	600	300
	1982	600	300
Zucchini	1978	360	180
	1982	540	270
Olive	1978	585	7249
	1982	181	7334
Apricot	1978	92	269
	1982	108	364
Wheat	1978	225	950
	1982	245	950

VII. Some Remarks on the Present Situation of Agriculture

The three canals for Ḥarasta al-Baṣal have been polluted and destroyed in the upper stream region, mainly entailed by the construction of apartments and factories. Therefore, peasants have to pump-up ground water for irriga-

tion, even in the past five years, the number of wells has increased about three times as that of 1978. In the western district of Ḥarasta al-Baṣal, considerable farm fields have been changed into residential sites. Along the road for Dūma city, there are many small auto repair shops. And with untreated waste from them, deterioration in the quality of surface water is now serious problem. In this area, olive trees have been grown, but the production has definitively reduced during the past five years.

CHAPTER II. VILLAGES IRRIGATED BY QANĀT TŌRĀ

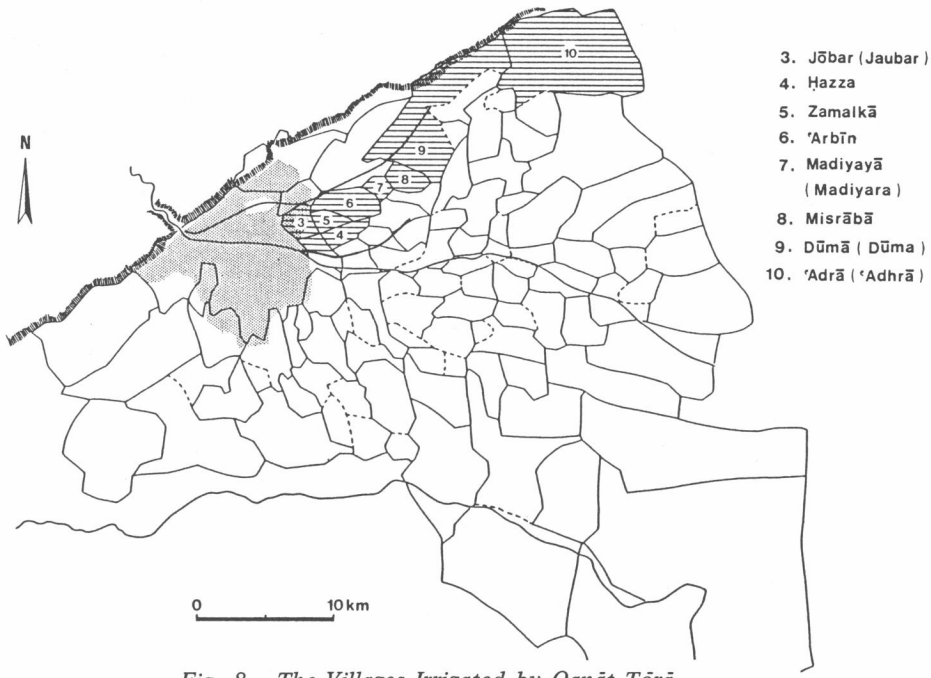


Fig. 8 The Villages Irrigated by Qanāt Tōrā

The beneficiary villages which have been irrigated by Qanāt Tōrā are; Jōbar, Zamalkā, 'Arbīn, Ḥazza, Madiyarā, Misrābā, Dūma, 'Ayn Tarmā, Ḥarasta al-Baṣal and 'Adrā. (see Fig. 8)

Among the listed villages, 'Ayn Tarmā has also the water rights in Qanāt Dā'yānī, Ḥarasta al-Baṣal has the water rights in Qanāt Yazīd, and for 'Adrā, a canal from 'Ayn Fasriyā has also been conducted. TRESSE (1929) mentioned the *qīrāṭ* number of each village which has water rights on Qanāt Tōrā. These are as follows;

At the first distribution point (*maqsam*), Qanāt Tōrā divides into two main canals, one is the Tōrā main flow and the other is canal for adjacent

villages. Both canals have twelve *qīrāṭ* evently, and each one shares 24 *qīrāṭ* again. The Tōrā main flow is distributed among five villages.

2.5	*qīrāṭ*	: Orchards of Ṣāliḥīya (northern district of Damascus city)
2.5	*qīrāṭ*	: Muhājrīn (north western district of Damascus city)
3	*qīrāṭ*	: ʻArḍ Masal ʻArab
3	*qīrāṭ*	: Jōbar
4	*qīrāṭ*	: Ḥarasta al-Baṣal
4	*qīrāṭ*	: Madiyarā, Misrābā
5	*qīrāṭ*	: Dūma
24	*qīrāṭ*	

The other canal is subdivided into three flows at the first *maqsam*, and is distributed among five villages. (see Fig. 9)

3	*qīrāṭ*		: ʻArbīn
9	*qīrāṭ*	6 *qīrāṭ*	: Zamalkā
		3 *qīrāṭ*	: Ḥazza
6	*qīrāṭ*	4 *qīrāṭ*	: ʻAyn Tarmā
		2 *qīrāṭ*	: Jōbar
6	*qīrāṭ*		: Jōbar
24	*qīrāṭ*		

3. Jōbar

I. Population

1980 : 47453 1954 : 11051

II. Surface Canals

Several Canals from Qanāt Tōrā.

III. Oral Custom for Irrigation

ʻAddān: One day in a week (24 hours)

Qīrāṭ: 8 *qīrāṭ* in all. (One canal is exclusively used by Jobar, and *qīrāṭ* number of this canal is 6. The other canal is possessed by village of ʻAyn Tarmā and Jōbar, the apportionment for Jobar is two *qīrāṭ*.)

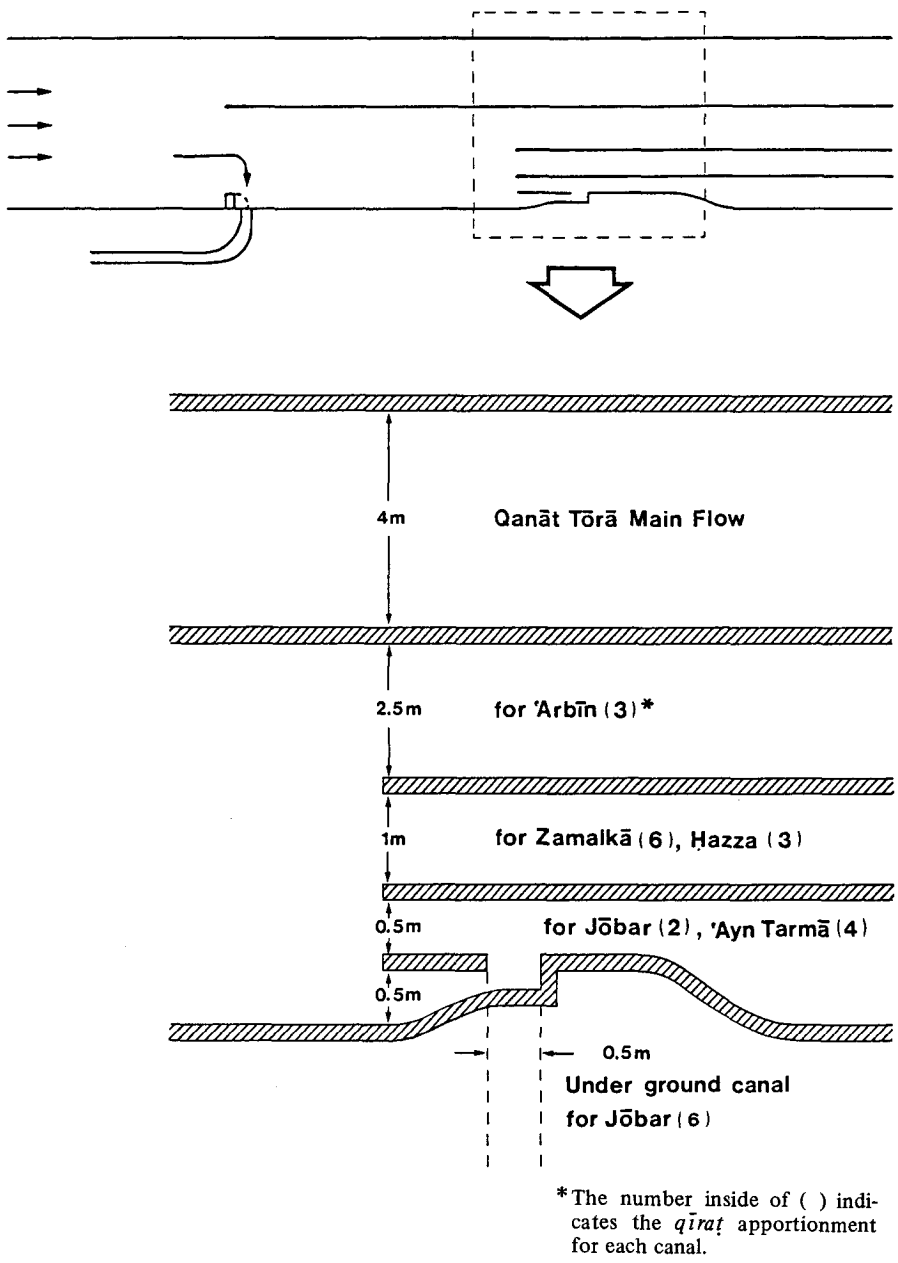


Fig. 9 The First Distribution Point of Qanāt Tōrā in Jōbar

IV. Ground Water Irrigation

[Number of Wells]

1978	0
1982	8

[Scale of Pumps]
Not available

[Period of Digging]
Not available

[Ground Water Level]
Not available

V. Land Use

	Total	Cultivated Area	Building	Pond	Desert (Waste Land)	Steppe	Bush	(ha)
1978	246	180 (73.2%)	56	–	–	–	–	
1982	237	170 (71.7%)	61	–	–	–	–	

VI. Production and Cultivated Area of Main Crops

Crops		Production (t)	Cultivated Area (donum)
Alfalfa	1978	400	100
	1982	3000 (?)	600
Brad Bean	1978	600	400
	1982	990	550
Green Onion (Basal akhdar)	1978	80	80
	1982	700	350
Lettuce	1978	40	80
	1982	465	388
Squash	1978	–	–
	1982	424	530
Walnut	1978	310	180
	1982	241	250

VII. Some Remarks on the Present Situation of Agriculture

In Jōbar, cultivated field is seen only in the north eastern district, several species of vegetables and fruits are gown. With the eastwards expansion of urban area of the City, a considerable area of farmlands has been changed into the residential sites since the beginning of 1960'.

There are few tube wells with motor-pumps in Jobar, because Qanāt Tōrā has plentiful discharge here. But furthermore, with the rapid urbanization, the peasants in Jōbar are not interested in continuing their farming with installation of tubewells.

4. Ḥazza

I. Population

1980 : 4148 1954 : 1234

II. Surface Canals

Qanāt Tōrā

III. Oral Custom for Irrigation

'Addān: One day (24 hours) in ten days (when Qanāt Tōrā had plentiful water, the *'addān* regulation was not provided.)

Qīrāṭ: 3 *qīrāṭ* (The canal for Ḥazza is owned jointly with villagers of Zamalkā.)

In the spring of 1982, from the beginning of March to the end of April, it took about two or three hours to irrigate one *donum* of farmland. And in the summer dry season, surface canals can be used until the end of June, then, irrigation water must be pumped up from under ground. Before twenty years, in the spring, for only one hour, it was enough to irrigate one *donum* of field, and even in the summer, it was possible to irrigate with surface canals.

IV. Ground Water Irrigation

[Number of Wells]

1978	8
1982	8 *

*Through the interviews with several peasants, there are at least fifteen wells in Ḥazza.

[Scale of Pumps]

Depths of Wells	20-30 m *
Diameters of Well Tubes	5-6 inches
Horse Powers of Pumping Engines	16-25 h.p.

*Several peasants said, nowadays, they are tapping water from depth down to 40-50 m to get sufficient water.

[Period of Digging]
Since the beginning of 1960'.

[Ground Water Level]
In the spring, the ground water level is approximately 15 m deep.

V. Land Use

	Total	Cultivated Area	Building	Pond	Desert (Waste Land)	Steppe	Bush	(ha)
1978	193	140 (72.5%)	53	–	–	–	–	
1982	193	140 (72.5%)	53	–	–	–	–	

VI. Production and Cultivated Area of Main Crops

Crops		Production (t)	Cultivated Area (donum)
Apricot	1978	90	300
	1982	550	600
Peach	1978	4.5	20
	1982	240	250
Alfalfa	1978	1250 (?)	250
	1982	n.a.	n.a.
Eggplant	1978	60	40
	1982	240	120
Plum (Jānarek)	1978	5	60
	1982	111	125
Tomato	1978	200	100
	1982	n.a.	n.a.

VII. Some Remarks on the Present Situation of Agriculture

In Ḥazza, fruits and vegetables are mainly cultivated, but agriculture is not active. The younger people are working in the city of Damascus, and only aged peasants are engaged in farming. The peasants are not interested in agriculture, they cut trees down, and sell them for construction materials. There are a lot of small lumber mills in the orchards and white poplar is processed into building materials and fuels.

5. Zamalkā

I. Population

1980 : 11612 1954 : 2001

II. Surface Canals

(A) Qanāt Tōrā

(B) A canal from Qanāt Tōrā (This canal is branched off in Jōbar.)

III. Oral Custom for Irrigation

'Addān: Once a week (approximately two hours for one irrigation period)
Qīrāṭ: 6 *qīrāṭ* from Qanāt Tōrā. (Village of Ḥazza shares the water rights from the same canal.)
In Zamalkā, the discharge of Qanāt Tōrā supplied sufficient water and the discharge did not fluctuate seasonally till the end of 1950'. Accordingly, the *'addān* regulation was not provided rigidly.

IV. Ground Water Irrigation

[Number of Wells]

1978	6
1982	11

[Scale of Pumps]

Depths of Wells	40-50 m
Diameters of Well Tubes	4-5 inches
Horse Powers of Pumpting Engines	15-20 h.p.

[Period of Digging]

Since the beginning of 1960'.

[Ground Water Level]

Early in the 1960', the water table was 10 m deep, but for the past twenty five years, it has been declining more than 10 m.

V. Land Use

	Total	Cultivated Area	Building	Pond	Desert (Waste Land)	Steppe	Bush	(ha)
1978	202	132 (65.3%)	70	–	–	–	–	
1982	202	127 (62.9%)	66	–	–	–	–	

VI. Production and Cultivated Area of Main Crops

Crops		Production (t)	Cultivated Area (donum)
Apricot	1978	36	96
	1982	550	600
Peach	1978	8	20
	1982	200	200
Walnut	1978	50	125
	1982	125	250
Tomato	1978	75	30
	1982	112	34
Vetch (Bayqīya)	1978	240	60
	1982	150	50
Apple	1978	6	15
	1982	100	100

VII. Some Remarks on the Present Situation of Agriculture

As is mentioned above, water supply from the surface canals used to be sufficient, but with urban development of the City in the past two decades, the discharge has been reduced. And canals were polluted by domestic sewage from the apartments which were constructed along both sides of the main street of the village. Peasants did not choose to continue farming with

ground water irrigation, but changed their fields into apartments or small workshops for building materials. Although timber felling has been prohibited since 1977, construction of apartments and workshops are still continuing in the orchards. The average scale of farmland used to approximately 40 *donum* before being urbanized. and recently it is below 6 *donum*.

6. 'Arbīn

I. Population

1980 : 7592 1954 : 7041

II. Surface Canals

Two canals from Qanāt Tōrā.

III. Oral Custom for Irrigation

'Addān: 155 hours in two weeks for all the peasants of 'Arbīn.
Qīrāṭ: 3 *qīrāṭ* from Qanāt Tōrā.
The allotment for each peasant is one hour and a quarter per one *donum* in two weeks. Accordingly, one peasant whose farmland is ten *donum*, he can irrigate for 12.5 hours (10 x 1.25) in two weeks.

IV. Ground Water Irrigation

[Number of Wells]

1978	151
1982	62

[Scale of Pumps]

Depths of Wells	30-50 m
Diameters of Well Tubes	4-6 inches
Horse Powers of Pumping Engines	20-30 h.p.

[Period of Digging]
After the Land Reform in 1958.

[Ground Water Level]
Approximately 20 m.
From the beginning of October to the end of June, surface canals can be

used. But surface water irrigation must be supplemented by pumping from under ground in the summer when the water table is dropping more than 10 m.

V. Land Use

	Total	Cultivated Area	Building	Pond	Desert (Waste Land)	Steppe	Bush	(ha)
1978	636	556 (87.4%)	80	–	–	–	–	
1982	636	540 (84.9%)	85	4	–	–	7	

VI. Production and Cultivated Area of Main Crops

Crops		Production (t)	Cultivated Area (donum)
Apricot	1978	75	300
	1982	850	1100
Plum (Jānarek)	1978	750	300
	1982	550	350
Walnut	1978	900	700
	1982	500	900
Apple	1978	n.a.	n.a.
	1982	500	500
Peach	1978	n.a.	n.a.
	1982	450	400
Olive	1978	1400	700
	1982	220	900
Alfalfa	1978	n.a.	n.a.
	1982	375	150
Vetch (Bayqīya)	1978	n.a.	n.a.
	1982	300	150
Eggplant	1978	n.a.	n.a.
	1982	200	100

VII. Some Remarks on the Present Situation of Agriculture

Among the Qanāt Tōrā, in an eastward direcion from Damascus, 'Arbīn is located at the first village in which agriculture is still extensively carried on. Main crops are fruits such as apricots, peaches, and plums, and beneath the fruits trees, several kinds of forages, for instance, alfalfa and vethches are grown.

But with rapid increase of the population in Damascus city, the discharge of Qanāt Tōrā has been reduced. Therefore the surface water irrigation in 'Arbīn must be supplemented to a considerable extent by pumping-up ground water.

7. Madiyarā [madiyara]

I. Population

1980 : 2617 1954 : 641

II. Surface Canals

Canals from Qanāt Tōrā.

III. Oral Custom for Irrigation

'Addān: Four days in fifteen days (In each day, for one hour and a half, the sluice to Madiyarā is open.)

Qīrāṭ: The *qīrāṭ* apportionment for this village was not available.

Here in Madiyarā, the word of *qīrāṭ* has a distinct meaning. One *qīrāṭ* correspond to 24 *feddān al-'arḍ* (feddān for area); i.e. one *qīrāṭ* of water was equivalent to the amount of water which could irrigate the area of 24 *feddān*. And in proportion to the area of farmland, each peasant has fixed *qīrāṭ* number of his own.

IV. Ground Water Irrigation

[Number of Wells]

1978	20
1982	40

[Scale of Pumps]

Depths of Wells	15-40 m
Diameters of Well Tubes	3-4 inches
Horse Powers of Pumping Engines	16-24 h.p.

[Period of Digging]
After the Land reform in 1958.

[Ground Water Level]
In the winter and the spring, from November to March, the surface level of ground water is approximately 15 m deep, and in the summer, it is 35 m deep. Beside the seasonal fluctuations, the ground water level has not changed during the past twenty years.

V. Land Use

	Total	Cultivated Area	Building	Pond	Desert (Waste Land)	Steppe	Bush	(ha)
1978	168	150 (89.3%)	12	6	–	–	–	
1982	168	150 (89.2%)	12	6	–	–	–	

VI. Production and Cultivated Area of Main Crops

Crops		Production (t)	Cultivated Area (donum)
Alfalfa	1978	400	100
	1982	550	110
Walnut	1978	136	444
	1982	177	486
Apricot	1978	86	304
	1982	172	544
Plum (Janarek)	1978	41	77
	1982	120	117
Peach	1978	28	64
	1982	102	130
Vetch (pasture) (Bayqīya)	1978	100	50
	1982	84	35
Olive	1978	196	590
	1982	74	20
Zucchini	1978	40	20
	1982	70	35
Eggplant	1978	80	40
	1982	70	35

VII. Some Remarks on the Present Situation of Agriculture

As shown in Table V., main crops are several species of fruits and forages grown beneath the orchard canopies. In this village, only aged peasants are engaged in farming, and the orchards are not taken care well.

8. Misrābā

I. Population

1980 : 4125 1954 : 1052

II. Surface Canals

Four canals from Qanāt Tōrā.

(A) Qanāt al-Ḥalqa
(B) Qanāt al-Qablī
(C) Qanāt al-Shmālī
(D) Qanāt al-Majnūn

III. Oral Custom for Irrigation

'Addān: One day (24 hours) in two weeks
Qīrāṭ: Not available
In the spring season of 1982, it took about half an hour to irrigate one *donum* of field.

IV. Ground Water Irrigation

[Number of Wells]

1978	50
1982	58

[Scale of Pumps]

Depths of Wells	30-40 m
Diameters of Well Tubes	4-6 inches
Horse Powers of Pumping Engines	18-24 h.p.

[Period of Digging]

The first tubewell with motor-pump was dug in 1948. And the number of wells has been increased since 1955.

[Ground Water Level]

The ground water table was approximately 20 m deep in 1982.

V. Land Use

	Total	Cultivated Area	Building	Pond	Desert (Waste Land)	Steppe	Bush	(ha)
1978	312	270 (86.5%)	32	10	–	–	–	
1982	312	270 (86.5%)	32	10	–	–	–	

VI. Production and Cultivated Area of Main Crops

Crops		Production (t)	Cultivated Area (donum)
Grape	1978	147	307
	1982	1108	310
Alfalfa	1978	160	300
	1982	750	150
Broad Bean	1978	150	100
	1982	210	140
Potato	1978	150	100
	1982	200	100
Olive	1978	474	1190
	1982	169	1190
Plum (Jānarek)	1978	121	119
	1982	168	131

VII. Some Remarks on the Present Situation of Agriculture

The village of Misrābā is located on the fringe of the Ghūṭa orchards. In a considerable area, olive and grape cultivation is carried on. These fruits are grown in the northern district of the village, where it is insufficiently irrigated.

9. Dūma

I. Population

1980 : 51337 1954 : 23494

II. Surface Canals

Qanāt Tōrā

III. Oral Custom for Irrigation

The *'addān* and *qīrāṭ* system in Dūma is distinctive and much more complicated than those of other villages.

'Addān: For the whole village of Dūma, 24 *'addān* is allocated in a year. And one *'addān* corresponds to one irrigation duration for 8 days. Consequently, for the first eight days, the intake gate for Dūma is open, and then, for the next eight days, the gate is closed. But during one irrigation duration, only for the first 3 days, Dūma can derive water exclusively. And for the other five days, villages of Ḥarasta al-Baṣal, Madiyarā, 'Arbīn and Misrābā have the priority for canal use, therefore, only the surplus water flows into Dūma.

Qīrāṭ: In one irrigation duration for 8 days, Dūma has 961 *qīrāṭ*. Approximately 0.2 hours of irrigation period is the allotment for 1 *qīrāṭ*.

Accordingly, if a peasant has 10 *qīrāṭ* allotment, his duration of irrigation is;

$$\frac{8 \text{ days} \times 24 \text{ hours}}{961 \; qīrāṭ} \times 10 \; qīrāṭ = 2 \text{ hours}$$

And the standard land size per 1 *qīrāṭ* is different in three districts; i.e. there are three categories according to the condition of the land and distance from the canal;

1) *'Arḍ al-Ṣaḥīḥ* (highly productive land):
   9 *donum* is equivalent to 1 *qīrāṭ* of irrigation.
2) *'Arḍ al-Maksūr* (inferior land):
   18 *donum* is equivalent to 1 *qīrāṭ* of irrigation.
3) *'Arḍ al-Mathlūth* (third-class land):
   27 *donum* is equivalent to 1 *qīrāṭ* of irrigation.

'Arḍ al-Ṣaḥīḥ was usually located close to the canal, and the land can be highly productive due to irrigation. Consequently, it was thought that sufficient water should be supplied. But the lands in other classes were located away from the canals, and satisfactory water rights has not been granted to the landowners.

The regulations date from several centuries back, they might be fixed in the early Ottoman Period. And in the past twenty years, with the great demand of domestic water in Damascus and Dūma city, the discharge of

the canal has been reduced, and these classification has lost the signification. In 1982, as for the allotted area per one *qīrāṭ*, there were slight differences among the three categories. Actually, 4 to 5 *donum* of land is equivalent to 1 *qīrāṭ* of water supply.

It is quite difficult to specify where each category of land is located, but about half of the total area in Dūma is included into *'Arḍ al-Ṣaḥīḥ*, and both *'Arḍ al-Maksūr* and *'Arḍ al-Mathlūth* are accounted for a quater severally.

IV. Ground Water Irrigation

[Number of Wells]

1978	270
1982	291

[Scale of Pumps]

Depths of Wells	40-70 m * 60-90 m **
Diameters of Well Tubes	3-5 inches
Horse Powers of Pumping Engines	6-24 h.p. * 24-35 h.p. **

* in the sourthern basin.

** in the northern piedmont district.

[Period of Digging]

In Dūma, the peasants had been dug simple borehold without motor before the French Mandate time. And since the beginning of 1960', the tubewells with motor-pumps have been increasing remarkably.

[Ground Water Level]

The ground water table was approximately 20 m deep in 1982, but it had been 10 to 15 m deep before twenty years.

The government has a plan for development of ground water usage in Dūma. According to the plan, around 'Ayn Fasriyā (springs flow at the northern piedmont of Mt. Ma'bīr al-Ḥelwa), a public pumping station with eleven tubewells in 15 inches diameter. Each well taps water from depth down to 130-140 m.

V. Land Use

	Total	Cultivated Area	Building	Pond	Desert (Waste Land)	Steppe	Bush	(ha)
1978	3271	2863 (87.5%)	300	30	–	–	78	
1982	3271	2863 (87.5%)	300	30	–	–	78	

VI. Production and Cultivated Area of Main Crops

Crops		Production (t)	Cultivated Area (donum)
Alfalfa	1978	10000	2500
	1982	18500	3700
Tomato	1978	1875	750
	1982	11250	4500
Cabbage	1978	4800	4000
	1982	7500	2500
Cauliflower	1978	5200	4000
	1982	7500	2500
Potato	1978	2400	1600
	1982	4400	2200
Vetch (pasture) (Bayqīya)	1978	1400	700
	1982	3360	1400
Millet (pasture)	1978	1600	800
	1982	2200	1100
Cucumber	1978	480	300
	1982	2100	1400
Egyptian Clover (Barsīm)	1978	700	200
	1982	2100	600
Eggplant	1978	1600	800
	1982	1600	800

Crops		Production (t)	Cultivated Area (donum)
Zucchini	1978	1100	550
	1982	1200	600
Green Pepper	1978	300	150
	1982	1200	800
Grape	1978	82	561
	1982	1146	1531
Apricot	1978	572	1814
	1982	1121	2058
Barley	1978	1500	500
	1982	n.a.	n.a.
Green Haricot	1978	180	1200
	1982	600	400
Olive	1978	735	2099
	1982	315	2224

VII. Some Remarks on the Present Situation of Agriculture

As shown in Table V., in Dūma, agriculture is still active. Peasants in Dūma are called Dūmānī, and are known for their hard-working.

Recently, although the population of Dūma has remarkably increased by suburbanization, the expansion of residential area is strictly restricted legally with "Green Line". Outside the Green Line, it is prohibited to cut down the orchard trees, or to turn the farmland into housing sites. But with this great increase of the water demands for domestic usage, satisfactory water supply for irrigation is facing many difficulties.

10. 'Adrā ['Adhrā]

I. Population

1980 : 5320 1954 : 579

II. Surface Canals

(A) Qanāt Tōrā

(B) A canal derived from 'Ayn Fasriyā

III. Oral Custom for Irrigation

'Addān: For Qanāt Tōrā, 12 *'addān* is allotted for the whole village in a year. The *'addān* in 'Adrā is regulated in the same way as that of Dūma. For the canal from 'Ayn Fasriyā, *'addān* was not provided, because this canal is utilized in 'Adrā exclusively.

Qīrāṭ: Not available

From the two sources of surface canals, required water has not been supplied since twenty years before. Qanāt Tōrā has not reached the area of 'Adrā. As to the canal from 'Ayn Fasriyā, the spring itself has been burried under the landslide, and an under ground canal from it has been destroyed by cave-in at several points. For the enormous cost to restore, the canal has been abondoned in this decade.

IV. Ground Water Irrigation

[Number of Wells]

1978	240
1982	255

[Scale of Pumps]

Depths of Wells	50-70 m * 70-100 m**
Diameters of Well Tubes	3-4 inches
Horse Powers of Pumping Engines	12-24 h.p. * 24-35 h.p. **

*in the southern basin.

**in the northern piedmont district.

[Period of Digging]

Simple borehole without motor had been dug since the French Mandate time, and tubewells with motor-pumps have been dug since thirty years before.

[Ground Water Level]

The ground water table has been declined considerably in the past twenty years. The ground water table and its seasonal fluctuation betwen

summer and winter are as follows;

	1960	1980
Summer	7-10 m	25 m
Winter	2-3 m	35 m

The source of irrigation water is completely dependent upon ground water. But the ground water has been salined particularly in the eastern district of 'Adrā, and there, salt has also been accumulating on the surface soil.

V. Land Use

	Total	Cultivated Area	Building	Pond	Desert (Waste Land)	Steppe	Bush	(ha)
1978	4809	1200 (25.0%)	720	30	814	2009	36	
1982	4809	1200 (25.0%)	720	30	814	2009	36	

VI. Production and Cultivated Area of Main Crops

Crops		Production (t)	Cultivated Area (donum)
Alfalfa	1978	2800	700
	1982	3250	650
Cauliflower	1978	520	400
	1982	1500	500
Vetch (pasture) (Bayqīya)	1978	1700	850
	1982	1440	600
Tomato	1978	750	300
	1982	1000	140
Eggplant	1978	600	300
	1982	900	55 (?)
Wheat	1978	900	4500
	1982	760	3800

VII. Some Remarks on the Present Situation of Agriculture

Salinity hazard in the eastern district is serious for wheat cultivation in particular, the yield of wheat roughly estimated by the peasants were as follows;

Yield (mud/donum)

1960	1982	
	Normal land	Salined land
12-15	0-8	0-5

1 *mud* : c.a. 20 kg. 1 *donum* : c.a. 930 m^2

The peasants in 'Adrā are now unwilling to continue farming, and the considerable area of land has been neglected. Recently, industries such as detergents, steel fabrication and grinding mills have been located at 'Adrā, away from the urban area of Damascus city. And the peasants in 'Adrā offer their labour for these new industries.

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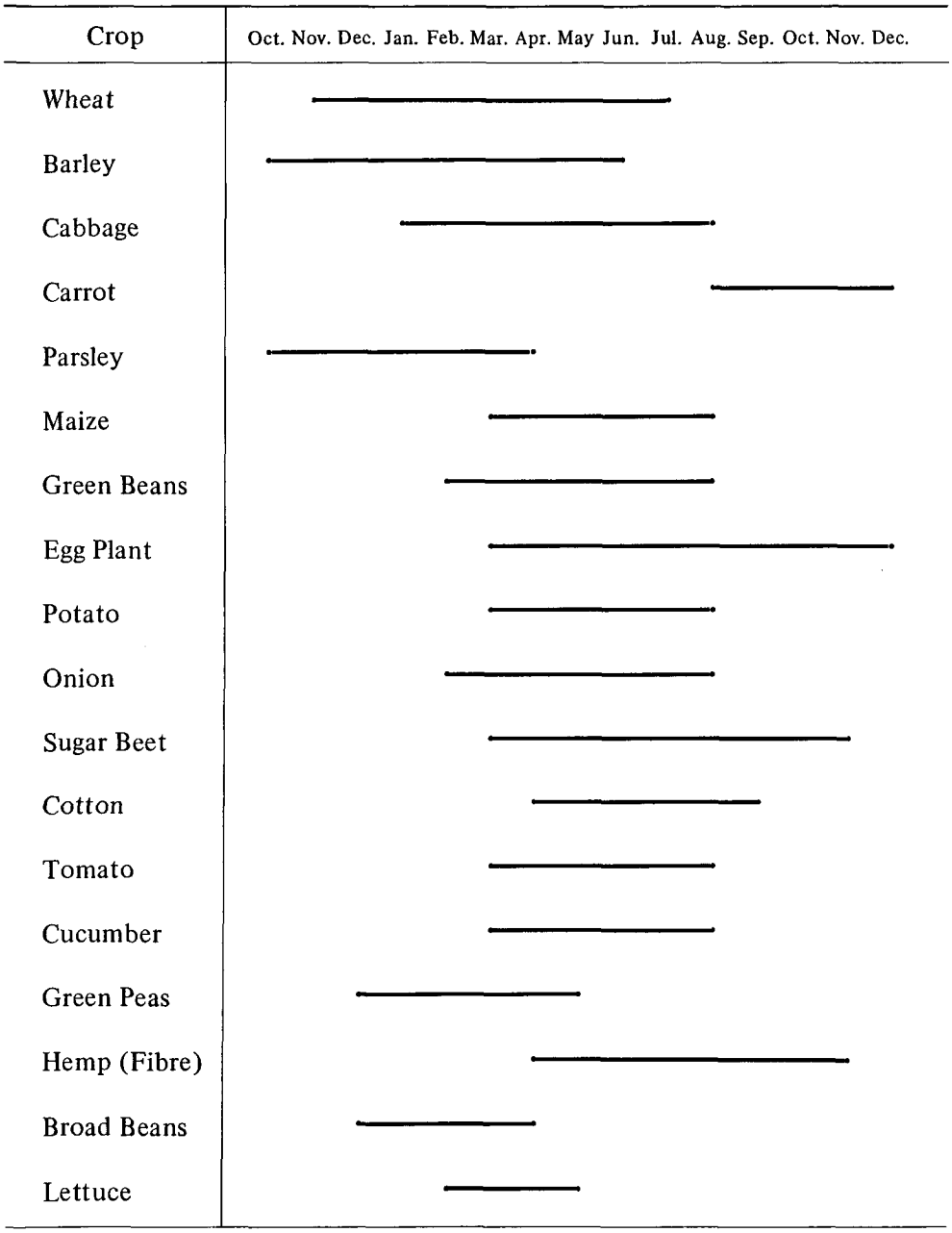
Appendix

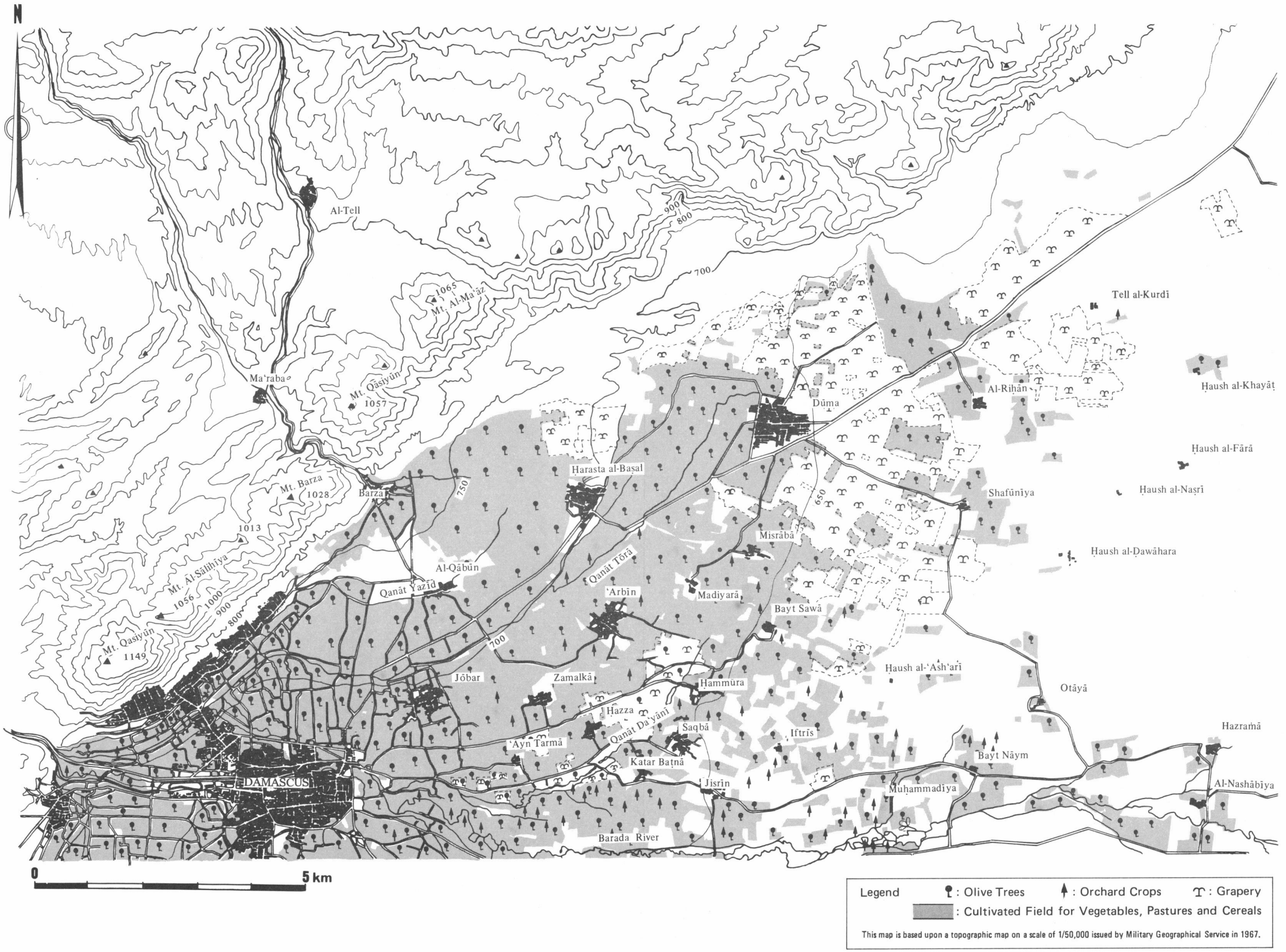
Crop Calendars in The Study Area



Source: UNSF Project 101 Damascus Research Station Report by Kunert and 'Alī Jabrī, 1965.

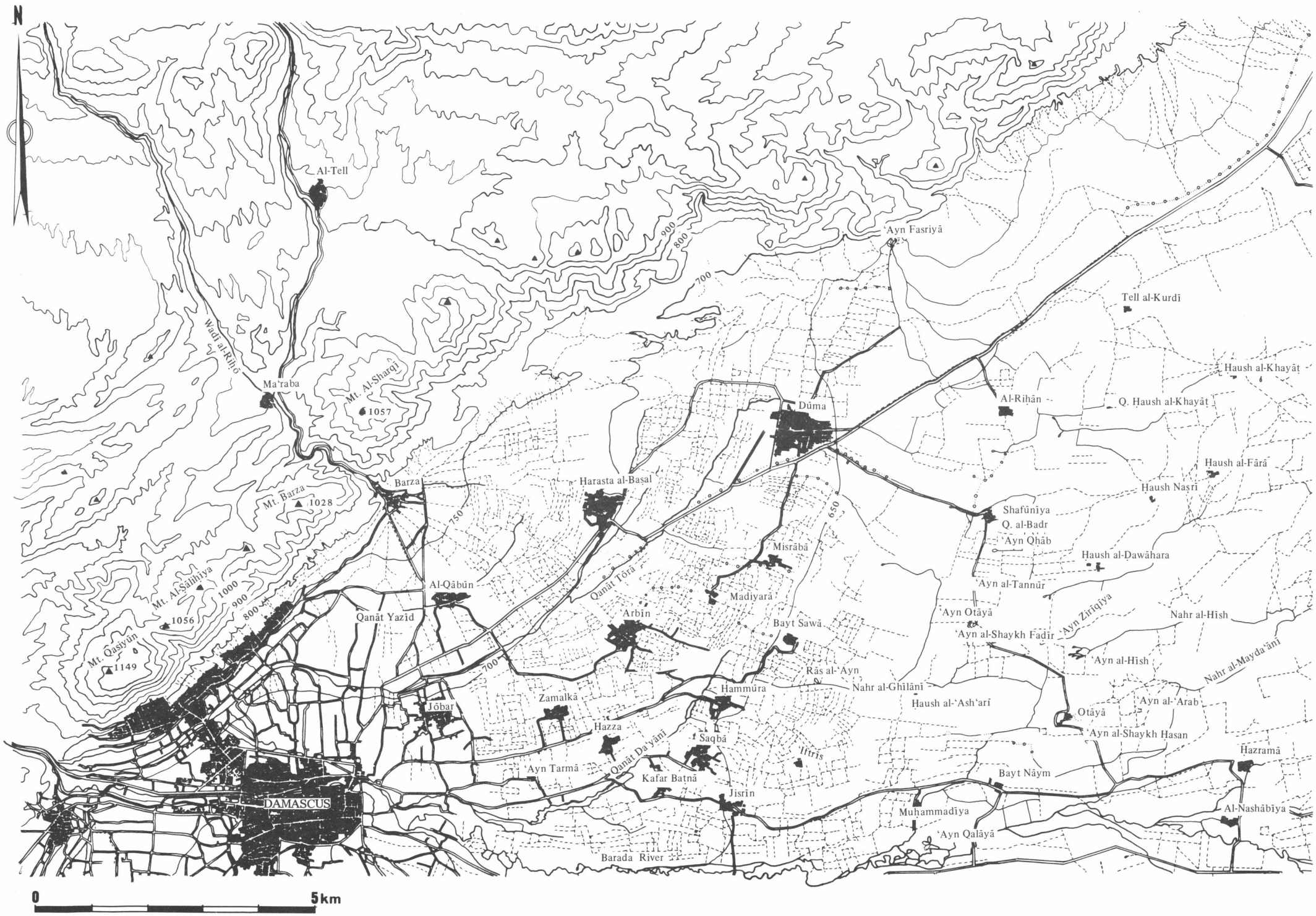
Appendix Map 1

Agricultural Land Use in the Northern Part of the Ghūṭa



Appendix Map 2

Surface Canal Network in the Northern Part of the Ghūṭa



≪要旨≫

ダマスカス・オアシス全村における灌漑および農業の現状に関する調査資料 1981 年－1983 年

Part I. バラダ川以北地域

Chapter 1. ヤズィード水路に水利権を有する諸村
Chapter 2. トーラー水路に水利権を有する諸村

内 藤 正 典

I. 序

本稿は，1981 年から 1983 年にかけて筆者が行った，ダマスカス・オアシスにおける灌漑体系および農業構造の変容に関する現地調査の際，収集した資料を整理したものである。ダマスカスは現存する最古の都市の一つに数えられ，バラダ川によって涵養されるオアシスにおける灌漑農業も，同様に 4000 年以上におよぶ歴史をもっている。しかしながら，バラダ川及びそこから分流する灌漑用水路，そしてダマスカス扇状地の扇端に湧出する多くの泉を水源とする表流水灌漑の体系は，わずかこの 25 年あまりの間に急速に崩壊へと向かっている。代わって出現したモーター・ポンピングを伴った地下水灌漑は，オアシスの全域に普及しているが，無秩序な地下水の利用は，オアシス外縁部の諸村で灌漑用水を枯渇させ，シリア沙漠の侵入を招来した。

表流水灌漑が消滅し，地下水灌漑へと移行していく過程については，すでにいくつかの小論にまとめた（内藤 1985 A，1985 B，1986，）。ここに記載するのは，これらの小論の基になった村落単位の諸資料である。記載にあたっては，代表的な表流水路に水利権を共有する諸村を上流から下流にむけて並べることによって，利水の便が良い村から悪い地域へと，扇状地内部の灌漑農業が直面する問題点を，基礎的資料の中にあとづけていくことを試みた。

ダマスカス・オアシスに関する年代記的著作あるいは，伝統的スタイルによる地誌的著作は，過去にいくつかの例をあげることができる。（Tresse 1929，Tower 1935，Kurd ʻAlī 1949，ʻAbdulsālam 1955，Khayr 1966）これらの文献はおおむね，この 25 年間に起きた灌漑体系変化を経験する以前の状況を記述したものである。一方，上に述べた近年の問題点については，Bianquis による一連の研究がある。（Bianquis 1977，1980 A，1980 B）両者を総合することによって，今日の問題の所在を明らかにすることができるが，オアシスの全域を視野に収めつつ，個々の村の現状を具体的に把握するための資料は，これまで提示されることがなかった。

世界最古の灌漑農業の伝統を有するダマスカス・オアシスは，その数千年の歴史に比べれば，わずか一瞬の間というべき 20 年あまりの間に，急速に崩壊の危機に直面している。本資

料はもとより断片的ではあるが，1981年から1983年にかけて，まさにこの急激な変化のさなかにあった個々の村における灌漑と農業の状態を歴史の一断面として記録することを意図している。

資料の前半は水利権に関するものであるが，これらは紛争がない限り原則として，農民の間で口頭伝承されている。従って，灌漑の形態が地下水の利用へと移行しつつある現在，これらの慣行を記憶している農民は少なく，年齢層もおおむね50代以上に限られている。村によっては，すでにほとんどの農民が記憶していない，あるいは記憶があいまいとなっている例もみられるため，可能な範囲で文献史料，例えばTRESSE（1929），ZAKARIYĀ（1955，1957）を併用して補うことを試みた。しかしながら，水利権の中で取水量および取水期間は歴史的に変化しており，必ずしも慣行が消滅する直前の状態を，文献によって復元しうるとは限らない点を付記しておきたい。なお，聴き取り調査の対象は村長にあたるmukhtār，各村の農民組合長（ra'īs al-jamā 'iya al-fallāḥīn），もしくは水利についての知識が豊富であると複数の農民が指摘した古老である。

資料の後半は，「村落統計帳」（al-sijr al-iḥṣā'ī lil qariya）と呼ばれる村落単位の統計資料に，農民への聴き取りによるデータを加味したものを中心としている。「村落統計帳」は，村単位の農民組合で集計した数値を，オアシス内を管轄する2カ所の支部（Rabita），東グータ支部（Rabiṭa Ghūṭa sharqīya）と西グータ支部（Rabiṭa Ghūṭa gharbīya）の台帳に記載したものであるが公刊されていない。筆者は農民総同盟（al-ittiḥād al-'āma al-fallāḥīn）の許可を得てこれらの台帳を閲覧したので，そのデータをここに転載する。

Ⅱ．本稿での対象地域の概要

シリアの首都ダマスカスとそのオアシスは，シリア沙漠の西南端に位置し，アンティ・レバノン山脈の東麓から東流するバラダ川によって涵養されている。紀元前20世紀頃に成立したとされるダマスカスは，当初から周辺に広がるオアシスにおける農業生産に支えられてきた。オアシスの農業は，バラダ川とそこから分流する大小様々の水路による灌漑農業を中心としている。バラダ川は，オアシスを横断しダマスカス市から約40㎞のアタイバ湖に注いでいたが，この20年あまりの間，多雨年を除いて川は湖に到達していない。ダマスカス市の人口が1946年の独立以降急速に増大し，都市用水の需要が飛躍的に高まったこと，首都周辺に繊維・化学・食品などの工業が立地し，工業用水として利用されていることが，流量の減少をもたらした主な要因である。この結果，同じくこの20年の間に，地下水灌漑への依存度は急速に高まっている。

バラダ川扇状地に展開するこのオアシスは，扇端部までの半径15㎞の扇形をなす樹園地帯のグータ（Ghūṭa）と，扇端から東に向かってアタイバ湖まで，普通畑およびステップ地帯のマルジ（Marj）から成り立っている。景観のうえでは樹園地の限界が2つの地域の境界とされているが，農業水利の観点からすればバラダ川とその支流から灌漑用水を引いている

地域をグータ，扇端に湧出する泉（'ayn）から導水する水路によって灌漑される地域をマルジと呼ぶこともある。ただし，バラダ川本流に近い諸村では，オアシスの東端にあたるアタイバ湖の付近にいたるまで，バラダ川に水利権を有しているが，この地域の現地での呼称はマルジである。アラビア語のMarjは，牧草地，ステップを意味しており，扇端部の湿地に卓越していた草地から，シリア沙漠に近いステップまでを含んで慣用的に用いられる呼称といえよう。

上述の地域区分からも推測できるように，グータの主要農作物は経年的に栽培される様々な種類の果樹（アンズ，モモ，各種のプラム，クルミ，オリーブ，ブドウ，洋ナシ）であるが，これらの樹下にはアルファルファ，クローバーに代表される牧草やナス，キュウリ，ズッキーニ，ソラマメなどの蔬菜類が栽培されるのが普通である。一方，マルジでは小麦，大麦や各種のメイズ，ミレットなど穀類が中心となるが，麦類を冬作とする場合，夏季には各種の蔬菜を栽培する。またマルジの東端部では，1年生の綿花が盛んに栽培されている。グータとマルジの境界部は，かつて湿地であったが，グータ内部で地下水灌漑が行われるにおよんで湧泉が枯渇し，現在は乾燥している。湿地帯では絶えずマラリアが発生していたためこの地域に村落は発達しにくく，大地主やスルタンの私有の牧草地，ホーシュ（ḥaush）が多く見られた。現在では蔬菜を中心に，村によっては乳牛の飼育を伴った有畜農業が行われている。

さて，本稿ではオアシスの北部地域を扱っている。バラダ川から分かれる幹線水路のうち，最も北を流れるヤズィード水路（Qanāt Yazīd）およびその南を流れるトーラー水路（Qanāt Tōrā）に水利権を共有する10カ村が対象である。

ヤズィード水路は，扇状地の北側をさえぎるカシオン，サーリヒーヤ，バルゼ各山の南麓を東流している。最も高い位置を流れる水路であり，周辺には他に水源が少ないため，灌漑用水を充分に供給することは困難であった。従って，山麓の耕地ではブドウ，オリーブなど灌漑量が少なくとも生育しうる作物が栽培されてきた。また，この水路に並行してシリア北部への幹線自動車道が走っているため，住宅，工場の建設が進んでおり，農業は衰退しつつある。

トーラー水路の流域でも，農業景観のうえではオリーブの栽培が卓越している。しかしながら，流域諸村の行政中心であるドゥーマ市の人口増加が著しく，また西からはダマスカスの市街地がオアシスを侵食しつつあるため，農業は西部を中心に不振である。オリーブ栽培は，ほとんど手間がかからない反面，蔬菜に比べて多くの耕地を要し，生産が低いこともあって生産量の点では重要とはいえない。他の水路の流域にも共通していることではあるが，グータ西部では農地の宅地転用は，法的規制（1977年以降オアシスの樹木の伐採は全面的に禁止）にもかかわらず続いており，樹木は建材として利用されている。トーラー水路に水利権を持つ諸村のうち，最も東に位置するアドラー村は，シリア沙漠に境を接しており，歴史的に灌漑用水の不足がたえず問題となってきた。上流地域での都市化の進行によって水路の流量が減少した現在，この村の水利権はすでに有名無実のものとなっている。灌漑は地下

水に依存しているが，水位は低く 70－100 m程度の鑿井が必要である。たとえ井戸を掘ったとしても，充分な水を得る可能性が低いため，東部を中心に耕作の放棄が著しい。

Ⅲ．資料の内容

1. 各村の人口
   1980 年と 1954 年の人口を記載した。1980 年については，1980 年国勢調査の速報を基にし，1954 年については，ZAKARIYĀ（1955，1957）に基づいている。
2. 表流水路の名称および水源
   各村が取水している水路とその水源を示す。水源としては，バラダ川の本・支流あるいは扇端部に湧出する泉の名称をあげる。
3. 水利権を示す'addān及びqīrāṭの慣行
   'addānは，慣用的に取水日と次の取水日との間隔を表す言葉として用いられる。又，いくつかの村では，1年間にaddānがいくつある，という表現をするが，この場合1年間の日数を，その'addān数で割ったものが，1回の取水期間を表すことになる。他にも水利権の単位として，1 feddān（約 6 donum；1 donum＝930 ㎡）を灌漑する時間を規定して，土地の面積に対応した取水時間を定める方法がある。1 feddānあたり30分を基準とする例が多くみられる。この方法をfeddān al-mā'（水のfeddān）と呼ぶ。本項では，各村の採用している方法に基づいて記載している。
   qīrāṭとは英語のkaratに相当する語である。1本の河川または水路から複数の支流が分かれているとき，本の水路の総流量を24とし，各水路の流量を無名数で表した数をqīrāṭ数という。各々の支流の流域に水利権を持つ村の間で，支流ごとのqīrāṭ数が定められている。規定のqīrāṭ数に従って分水するための計測の方法は，基本的に取水時間（水門の開閉時間）によっているが，一つの分流点で複数の支流に分かれる場合は，図5のように複数の石を等間隔に配置した分流点での石（mezzāz）の数を比例配分の基準としている。
4. 地下水灌漑の現状
   ここでいう井戸とは，全て電力またはディーゼルを動力とするモーター・ポンピングによる井戸を示している。
   ①井戸の本数：基本的に「村落統計帳」に記載された数値を基にしているが，動力を伴った井戸の鑿井は，1959年以降オアシスの全域で禁止されている。したがって，公的な「村落統計帳」の数値は，現実を下回ることが多い。そのような場合は，複数の農民から得た数値を，参考のため併記した。
   ②井戸の規模：動力の大きさ（馬力），揚水管の口径，井戸の深さなどを農民からの聴き取りを基に，当該村での平均的値を記した。
   ③鑿井の時期：これも農民からの聴き取りの結果得た年代をそのまま記載した。

④地下水面の深さ：雨季が11月から3月に偏っているこの地域では，夏季（6～10月）には地下水面が低下し，下流域では灌漑に支障をきたしている。オアシスの全村の井戸について，地下水面の深さを計測した資料がないため，ここでは農民の経験に基づいた数値を記載した。

5. 土地利用の実態

「村落統計帳」に記載された各村の土地利用を，1978年，1982年の2年度について示した。都市化の影響が著しいオアシスの西部と，灌漑用水の不足によって耕作放棄が進行しつつあるオアシスの東部では，この4年の間にも土地利用（特に耕地面積）の変化を見ることができる。耕地面積については，全村面積に占める割合を%で示している。なお面積の単位はhaである。

6. 主要農産物の生産量（t）及び作付け面積（donum）

資料の出典は，同じく「村落統計帳」である。河川あるいは灌漑用水路を上流から下流に向かって，各村の農業生産を比較することによって，灌漑用水を得やすい上流域と，用水の不足しがちな下流域との農耕形態の差を見ていく。作付け面積を記載したのは，単位面積あたりの収量を算出するためである。同一の耕地で夏作物と冬作物，あるいは蔬菜と穀類を栽培している村も多く，作付け面積の大小から作物の重要性をはかりにくいことは言うまでもない。なお面積の単位は，現地で用いるdonumによっている。930～940 m²に相当する。

7. 農業の現状に関するコメント

筆者のフィールド・ノートに基づいて，1981年～1983年における農業と農村の実態に関する若干のコメントを付した。

Ⅳ．各村の記載順序

本稿では，バラダ川本流より分流する主要灌漑水路のうち，最も北に位置するヤズィード水路（Qanāt Yazīd）およびその南を流れるトーラー水路（Qanāt Tōrā）に水利権を共有する諸村を，上流から下流へ記載していく。複数の水路に水利権を有する村の場合，主たる水路の流域の項に記載した。本稿ではトーラー水路，およびアイン・ファスリヤー（'Ayn Fasriyā）から取水しているアドラー村（Adrā），ヤズィード水路およびトーラー水路から取水しているハラスタ　アル・バサル村（Ḥarasta al-Baṣal），そしてダーイヤーニー水路（Qanāt Dā'yānī）およびトーラ水路から取水しているアイン・タルマー村（'Ayn Tarmā）のがこれにあたる。アドラーはトーラー水路の受益村，ハラスタ　アル・バサルはヤズィード水路の受益村として記載し，アイン・タルマーは主たる水路がダーイヤーニーであるため，別稿のダーイヤーニー水路受益村の項目に記載する。

なお，本稿において単にカナート（qanāt）とあるのは，カレーズあるいはフォガラの別名で知られる地下水路のことではない。対象地域では，灌漑水路を総称してカナートと呼ぶ

のが通例であり，上記の水路は全て表流水路である。本稿では扱われていないが，地下水路については特にカナート・ロマーニ（Qanāt Romāni；ローマ時代のカナート）と称する。

V．地名の表記方法

できるだけ正則アラビア語（フスハー）の発音に近いローマ字表語としたが，同時に現地での発音を尊重している。本来，正則アラビア語にはないｅ，ｏなどの音が記されているのはそのためである。また，地名語末の長母音については，現地での慣用読みを採用し，必ずしも（－）を付していない。古い文書史料では短母音＋ター・マルブータ（tā marbutā）で終わっていた地名で，近年，長母音で終わるように書かれているケースがしばしば見られる。にもかかわらず，現地での発音を聞く限り，日本語で（－）を付すほどに，母音を引きのばしていない地名がこれにあたる。種々の記号を付した文字の発音については，英文の Phonetic Transcription of Arabic Terms and Place Names の項を参照されたい。