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### *A geographical study of the jebel tarhuna, Tripolitania*

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VOLUME TWO.

PART ONE cont.

SECTION FOUR.

AGRICULTURE AND PASTORALISM.

CHAPTER XI.LAND USE AND LAND OWNERSHIP.A. Introduction.

There are no accurate statistics of land use in the Eastern Jebel, and the Government estimates must be treated with circumspection. Estimates for Tripolitania are as follows:-

Table XI - 1. Land use in Tripolitania.

Total area	35,000,000 ha.
Unproductive land	24,998,000 ha.
Rough grazing	8,000,000 ha.
Shifting cultivation	1,600,000 ha.
Sedentary agriculture	400,000 ha.
Forest	2,000 ha.

The area in sedentary cultivation consists of 127,000 ha. of privately owned farms, 103,000 ha. of Italian demographic farms and 120,000 ha. of dryland Libyan agriculture and 50,000 ha. of irrigation. Land is classified in a different manner in Cyrenaica, where statistics provided by Kroeller (1) show that the productive area is below that of Tripolitania:-

Arable land	420,000 ha.
Land under tree crops	30,000 ha.
Forest	450,000 ha.
Irrigated agriculture	1,000 ha.

The Eastern Jebel, which accounts for about 9% of Tripolitania's area, is devoted mainly to rough grazing and cereal cultivation, but also to dryland arboriculture in Cussabat and Italian farming in parts of Tarhuna. Just as

there are three distinct patterns of settlement, profoundly influenced on one hand by tribalism and on the other by modern centralised planning, so there are three systems of land use. On *cabila* land in Tarhuna, the land is devoted to animal pasture supplemented by cereal cultivation, in Cussabat to dryland or inundated agriculture and in the Italian areas to arboriculture. Water is the critical factor, and the absence of large groundwater reserves excludes irrigation, which gives rise to the great variety of crops and land use found in the Jefara and Misuratio. The landscape is much more uniform in the Eastern Jebel, dominated by the olive in Cussabat, sheep and goats in Tarhuna and the olive, almond and vine in Italian areas.

Though the greater part of the region is in pasture and shifting cultivation, these aspects will be discussed in detail later. This chapter will confine itself to sedentary cultivation, which is influenced by the traditional system of Cussabat and parts of Tarhuna and the modern system of the Italian zone. The local tribesmen classify the land as follows:-

1. Unused land
  - a. Meghila or rocky areas. Esparto grass is found in this zone.
  - b. Ramla or very sandy areas.
2. Extensive cultivation
  - a. Gaba zeitun or extensive olive cultivation.
  - b. Ars or cereal cultivation.

- c. Menga or mixed olive and cereal cultivation.
- 3. Small garden cultivation
  - a. Swani or irrigated gardens.
  - b. Ginanat or unirrigated gardens.
- 4. Pasture
  - a. Permanent.
  - b. Temporary (Burr).

The Italian and post-Italian periods have added afforested land (Chapter VII), concession farms, demographic farms and state-owned land.

## B. Traditional forms of land use.

### 1. Sedentary arboriculture and cereal cultivation.

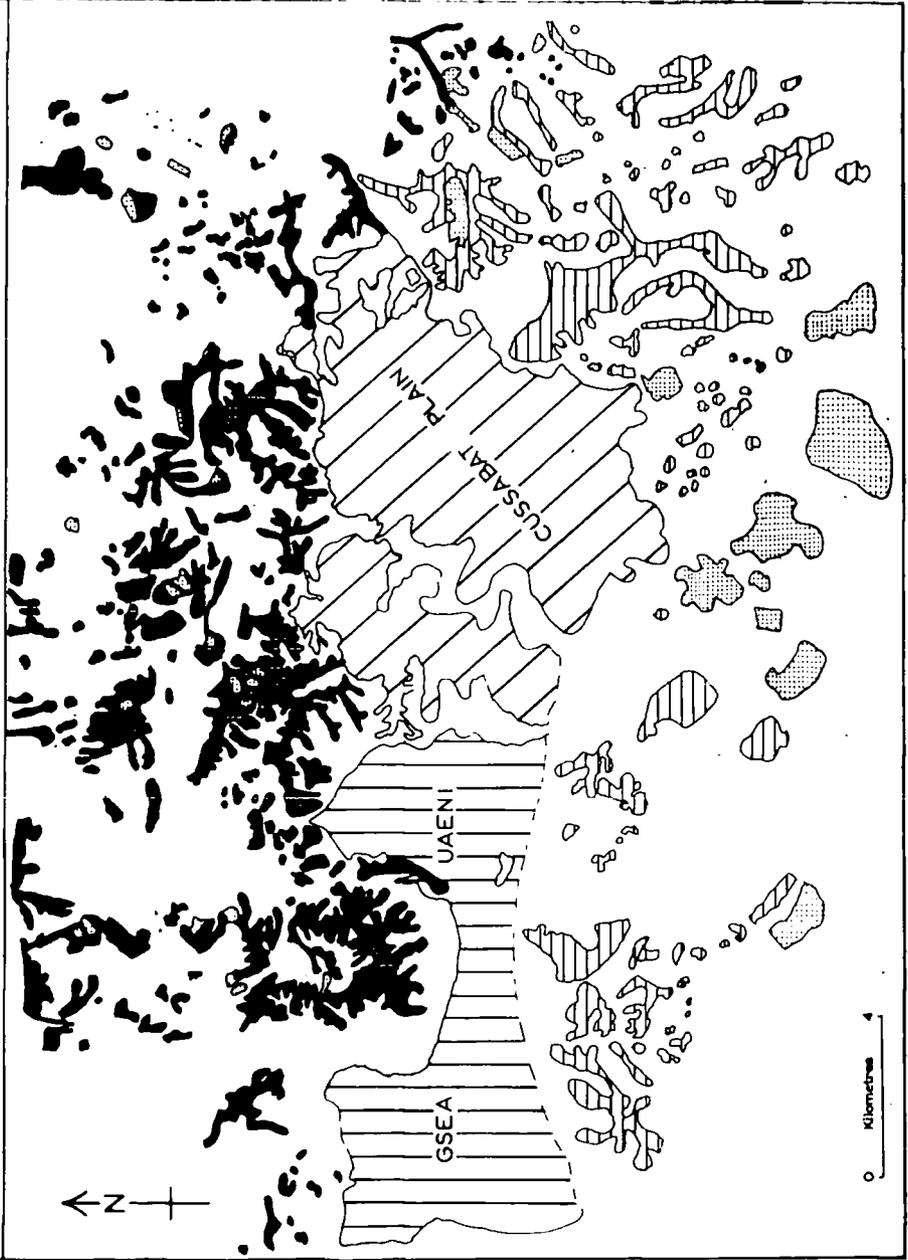
This system of land use is confined to Cussabat, where it is called gaba zeitun when olives alone are grown, and menga when the olives are associated with cereals. The olive is the dominant tree crop, and other trees are rare outside the ginanat and swani. Menga predominates on the Cussabat Plain, and gaba zeitun in the Scarp Zone. However, if the land use is defined on the basis of how soil and water are conserved, there are three main types: dryland menga on the Cussabat Plain, terraced or inundated gardens in the Scarp Zone and semi-inundated gardens and menga in western Cussabat (Fig. 31).

#### (a). Dryland menga of the Cussabat Plain.

The Cussabat Plain is covered with olives and has the appearance of being afforested (Plate 21 ). The flat

# LAND USE AND OLIVE CULTIVATION IN CUSSABAT

- TERRACED GARDENS
- WADI OLIVES
- DRYLAND MENGHA
- AREAS PLANTED SINCE 1950
- SEMI INUNDATED GARDENS
- UNCULTIVATED AREAS



or undulating surfaces with their deep deposits of Ard Hammari and Ard Ten, and the high rainfall of Cussabat, permit the cultivation of olives and cereals without additional water. The olives are scattered about the Plain, which is divided into numerous tiny parcels of land on which cereals are sown in two years out of three. No other crop is found, except for one huge carob tree in the Cabila Uadna. After the cereal harvest in May animals graze the area, but normally they are kept in small communal stockades which lie near the village.

(b). Terraced or inundated gardens of the Scarp Zone.

In the Scarp Zone, cultivable land is restricted to residual plateau surfaces where pockets of Ard Hamra are found, and to the alluvial soils and Ard Ten of the wadi floors. Patches of Ard Hamra are rare, so that cultivation is mainly confined to the wadis. The wadis are often steep-sided and deeply incised, producing high run-off rates. Because of this, farmers adopt methods of soil and water collection and conservation. They do this by terracing, but the terraces are different from those of the Jebel Nefousa and other parts of North Africa. The terraces are usually built up naturally behind small dykes constructed by farmers. The dykes are built around a small wall of limestone chippings cemented together with mud. The wall is then covered with

more mud, which is beaten until it becomes compact. The dyke, which has a semi-oval profile, varies in height, breadth and thickness according to the configuration of the wadi or its slopes. In the broad channels of the Wadi Gherrim, the dykes are about 2-4 feet in height, but can be over 100 feet long; in the narrower and steeper tributaries, they are 6-7 feet high, very thick, but short. Other dykes are built on wadi slopes parallel to the wadi channel. These are called dreik, and they are usually found singly with groups of the first type of dyke (merghed) in the wadi channels. The earth behind the dykes is levelled and soil is often brought from elsewhere to effect the levelling. In most cases, however, cultivators channel run-off into the terraces, where alluvium is deposited and soil fertility renewed annually.

The terraces vary enormously. Some are very large and contain 20-30 olive trees, whilst others may be planted with only one tree (Plate 10). The largest terraces are cultivated with cereals, which are more usually grown on the slopes above the terraces. Small hollows are excavated around the feet of the olives and rainwater is channelled to them by small ditches cut in the wadi slopes. After rainfall, the feet of the olives are often inundated and this caused the Italians to refer to this type of terracing as 'inundated agriculture' (Plate 11). On very steep slopes, farmers occasionally

excavate tiny terraces, and like those of the Jebel Nefousa, they often contain only one olive tree.

The terraces and dykes require constant attention and maintenance, and the ditches feeding them must be cleared or renewed after rainfall. The soil is difficult to work in the smaller terraces, but the farmers plough them manually.

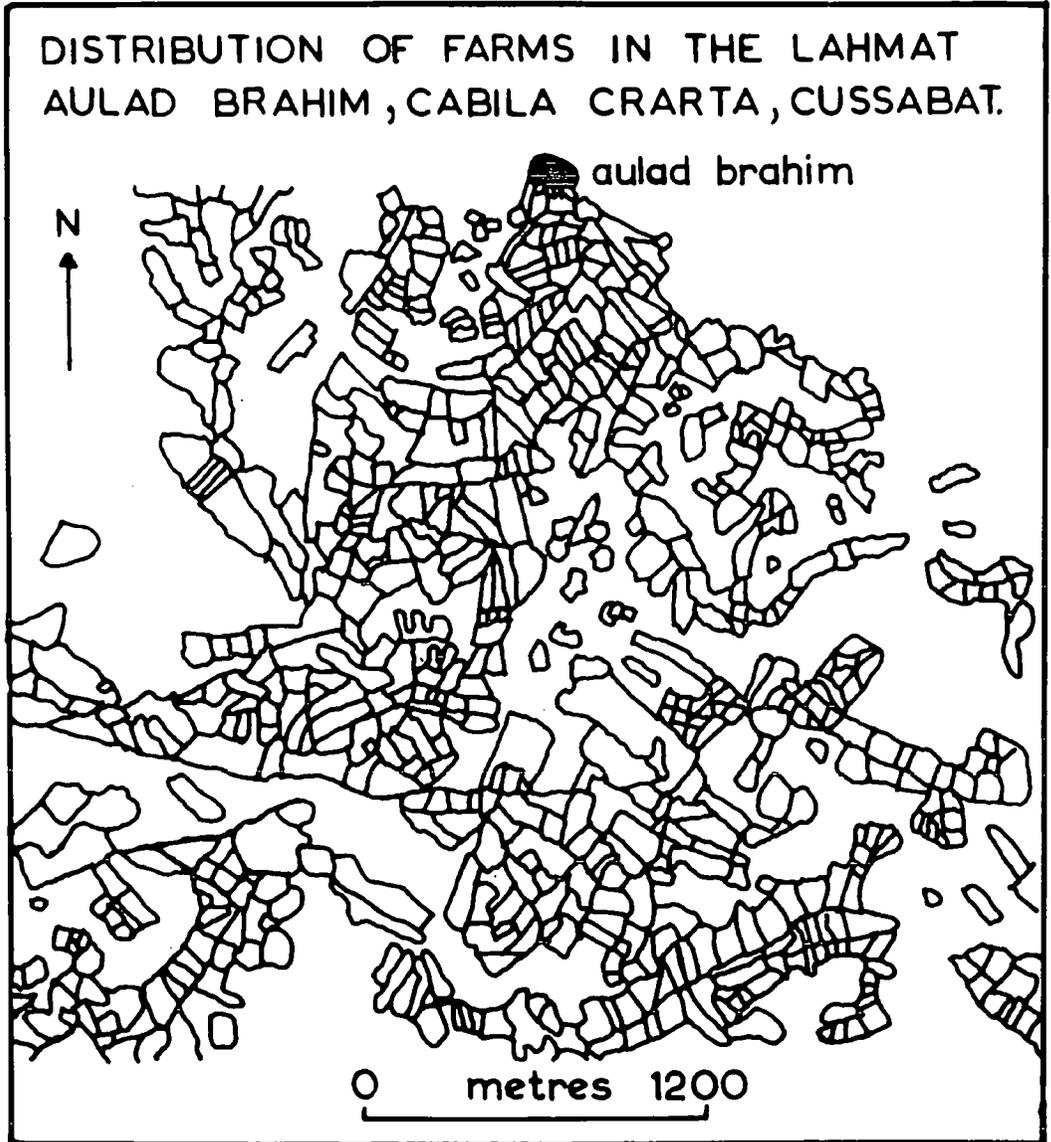
(c). Semi-inundated gardens of the Gsea and Uaeni basins.

The system of semi-inundated cultivation found in the Gsea and Uaeni basins is unique in Tripolitania. Much of the land may have been brought into cultivation only recently because:-

1. Land holdings are much larger than elsewhere in Cussabat (fig. 32).
2. Most of the land is fenced off.
3. There are many young trees, and many more almonds and other tree crops compared with other parts of Cussabat.
4. Many of the people live in temporary dwellings such as the tent, Moghara or cave, and live in lahmat groupings.

Cultivation is much more diversified, and both dryland menga and terraced gardens are found. However, the most typical features are series of interconnected fenced gardens. Water enters the upper gardens through a wide ditch and is then channelled into each garden, the outer ones being fed by small saghia (earth-cut channels). The gardens are privately

figure 32.



owned and appear to be related to ginanat (see below) rather than to the extensive systems of cultivation of the Cussabat Plain and Scarp Zone. The gardens are sown in both tree and field crops, but many contain trees, between which the soil has never been cleared of the spontaneous Esparto grass vegetation (Plates 22 & 23).

## 2. Small garden cultivation.

### (a). Swani.

Swani are extremely rare in the Eastern Jebel, since wells and springs are both poor and maldistributed. They are found near springs, particularly the larger ones along the Abanat Scarp in Tarhuna. Swani in Cussabat are restricted to the Wadis Safrania and Gheleel, and in El Amamra to Biar Fagghin. The only Italian swani is located on the Concession Fontana Piacenza. The principal distinguishing feature of the swani is the appearance of the palm among the cultivated crops. Other tree crops are grown, but these are mostly found in terraces built above the swani on the valley sides. For example, a series of terraces is found above a swani at Gasr Doga, and the terraces are sown in olives, almonds and figs, whilst in the swani palms are associated with medical herbs, beans, potatoes, peppers, peas, onions, carrots, maize, millet, mint and parsley. The significance of the swani is restricted to the fact that they

are so rare.

(b). Ginanat.

The ginanat are small dry gardens, though some are irrigated occasionally from cisterns. Most are fed by saghia, like terraces, and they are always surrounded by a wall, which indicates that they are privately owned. The wall gives the crops protection from animals. Ginanat are very rare in Msellata, where they are found in and around the villages, or in western Cussabat, but most of the tree cultivators of Tarhuna sow in the ginanat. Manetti (2) found that ginanat were never built on slopes of more than 9-10° and were usually found on slopes of 3-4° (5-7%). Ginanat are spreading in Tarhuna, where they are usually laid out during the summer and planted in autumn. They are cleared of all tuberous and bulbous plants and ploughed to a depth of 50 cms.. The cultivator only plants about 50% of the ginanat in one season. They are usually grouped and use a common system of water concentration and channelling. The ginanat are widespread in Tarhuna, but are concentrated near the Abanat Scarp and the Basin zones; in the last three years several have been laid out in the Wadi Taraglat.

The ginanat are sown in tree crops, and usually no variety is dominant. In the first years, they are densely packed with vines, almonds, figs and olives, but gradually the plants are

thinned out by natural selection (Plate 26). Some vegetables are grown - beans, onions and peas - but the most important field crops are the pumpkin, melon and water melon, which are cultivated during the summer.

C. Italian and post-Italian patterns.

Italian development began with the reconquest of the Eastern Jebel in 1923. Between then and 1939, the Italians expropriated, purchased or nationalised about 60,000 ha. of cabila land. Colonisation of this land was in two phases: 1923-1932 and 1933-1939. During the first period, private Italian citizens were granted concessions by the State, and in the second, Italian peasants were settled on large demographic estates by the Italian government.

1. Concession farms.

By a concession scheme established in 1923 and renewed in 1925, Italian citizens were granted land by the State with the right of perpetual ownership on an immediate nominal payment of 30-50 lire per ha.. To obtain the grant, the farmers had to raise a mortgage on the concession after it had been developed. This prevented speculation and genuine farmers were encouraged by subsidies provided by the State until crops began to yield. The State also set up committees to see that the farmer worked, that he could obtain loans and

credit and that he would obtain the best price and market for his products. Tripolitania was divided into three great zones: the coast and Jefara for irrigated agriculture, the Jebel and Misuratino for dryland arboriculture and more marginal areas for future development by both Libyans and Italians. In the Jebel, the Italians were principally interested in finding flat or undulating zones which were not already in tree cultivation. They were thus restricted to Tarhuna, the El Amamra and western Garian. In Tarhuna, they expropriated the sandy northern edge of the dip slope and divided it into lots. It was planned to sell the lots at 30 lire per ha. and to ensure that each concessionaire had at least 100 ha. of cultivable land.

Seven concessions were granted between 1927 and 1930, and they are still owned and farmed by Italians. They total 2,000 ha. and are located along the main Cussabat-Tarhuna road between Sidi Essed and Al Khadra. With an average size of 1,143 ha. they are much larger than those of the Jefara, of which only 20% exceed 400 ha. in area. However, three of the farms are less than 300 ha., whilst the concession Societa Agraria Fondaria Industria Libia, the largest, is over 2,000 ha.. The farms were settled by 'poor relations' of rich Sicilian families, except S.A.F.I.L., which is owned by a limited company operating farms in Italy and Tunisia.

Today, the concession farms are the largest single units in the region, and are also the best developed and most prosperous. Land use and the location of the farms is shown in figure 33, and it can be seen that the olive tree is the keystone of farm economy. Initially, most of the farms were sown in almonds, vines and cereals as well as olives, but once the olives matured most of the other crops were taken out. Nonetheless, S.A.F.I.L. is the only farm on which monoculture of the olive is extensively practised, and even here there are about 50 ha. of almonds. Most of the other estates continue to intercrop olives and almonds, despite the fact that it was originally planned to uproot the almonds. This is due to the fact that the almond has done very well in the region, and though it is less profitable than the olive, farmers maintain that it is better adapted to the climatic conditions.

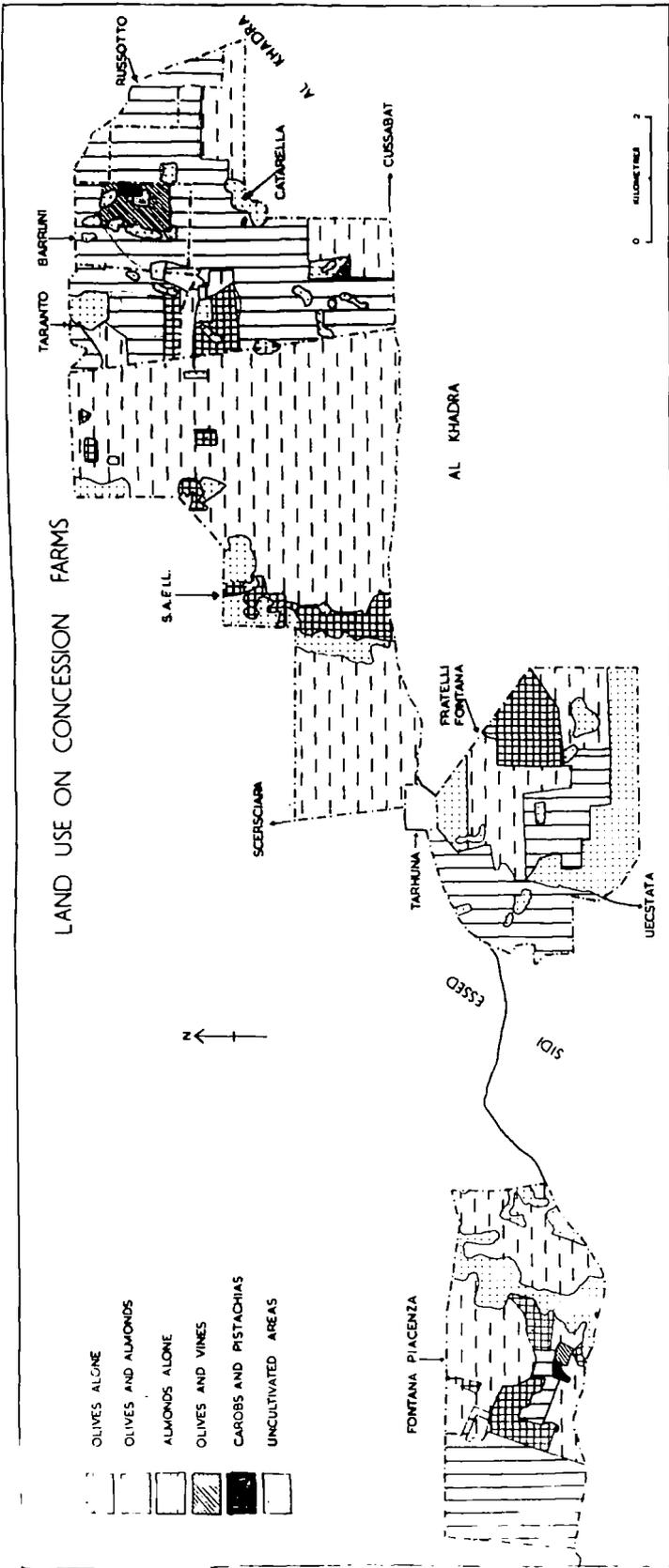
The future of the estates seems secure, as the Libyan Government has recognised the ownership rights of the farmers.

## 2. Demographic farms.

Overpopulation in Italy, together with his restriction of international emigration, led Mussolini to attempt the mass colonisation of suitable areas of land in Libya by Italian peasants. This project was put into practise by the clearing and preparation of large areas of land, which were then divided into 100-200 allotments by three organisations, two of which

# LAND USE ON CONCESSION FARMS

- OLIVES ALONE
- OLIVES AND ALMONDS
- ALMONDS ALONE
- OLIVES AND VINES
- CAROBS AND PISTACHIAS
- UNCULTIVATED AREAS



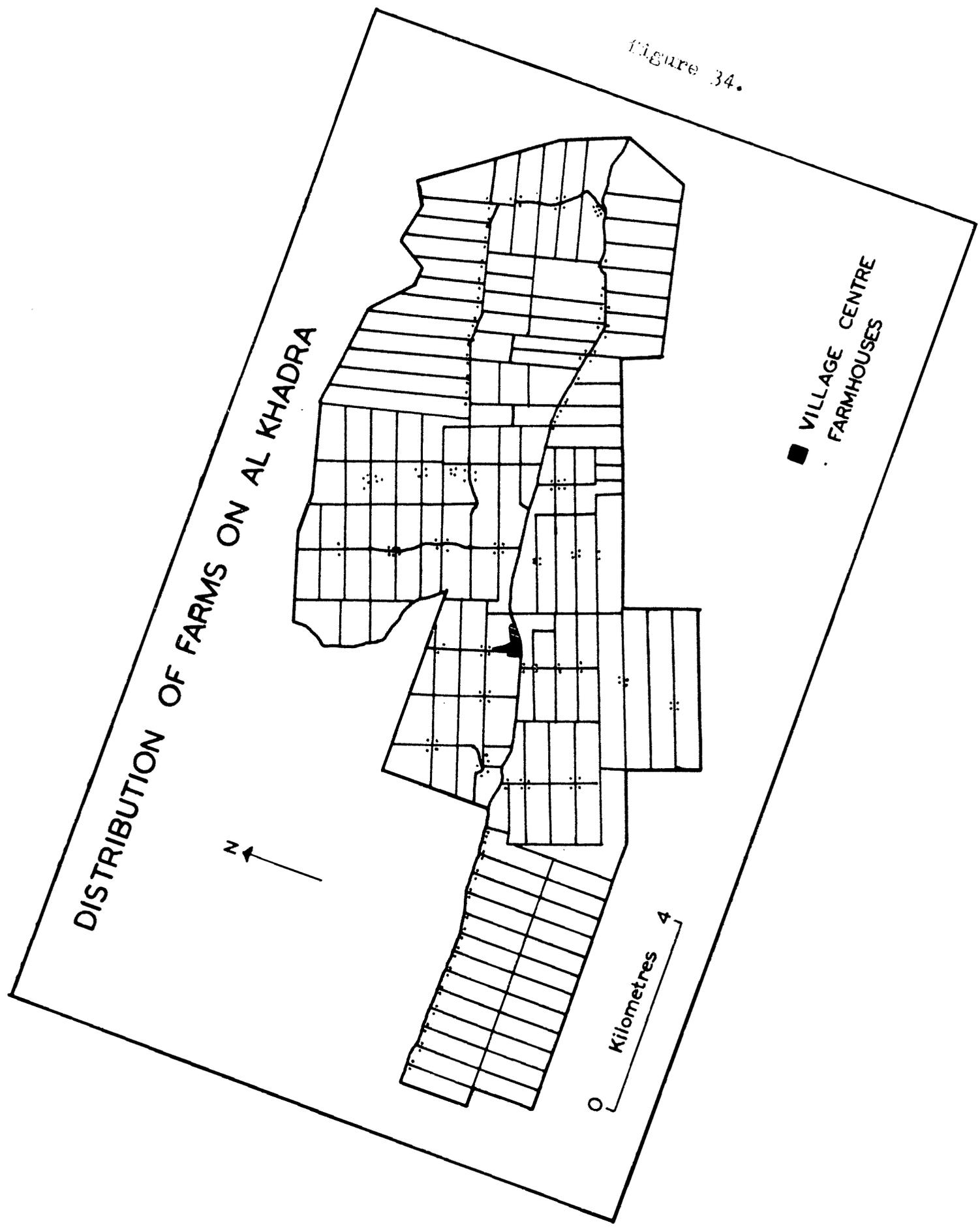
operated in the Eastern Jebel: Ente per Colonizzazione della Libia (Ente) and Istituto Nazionale della Previdenza Sociale (I.N.P.S.).

Ente, which operated Al Khadra, was constituted by royal decree in 1932 for the purpose of colonising Cyrenaica, and in 1936 its activities were extended to Tripolitania. It was financed by the State and by Italian organisations such as banks. It took over expropriated land, cleared it and divided it into neat geometrical holdings (fig. 34). Ente built and equipped the houses, outhouses, storage tanks, reservoirs, wells and aqueducts, whilst the State built the village centre, which consisted of a school, a church, offices and shops. Farm-houses were built on the farms and roads linked them to the village. The settlers, who were recruited from the more prolific, impoverished and fascist peasants, found everything ready for them when they arrived. At Al Khadra, for example, there was one week's supply of food in the houses plus farm implements and crops. The farmers were simply required to plough the land and then sow it according to the following plan:-

Table XI-2. Land use on Al Khadra.

Olives alone	24 ha.
Olives and vines	5 ha.
Almonds alone	5 ha.
Fruit orchard	0.5 ha.
Windbreaks	0.5 ha.
Sowing	14 ha.

Figure 34.



The rest of the farms were given over to the farmhouses, outhouses and roads. The pattern of land use was identical on every farm, and each farmer sowed exactly the same crops on the same parts of his farm as the others.

The cost of the Ente estate was approximately 31 million lire, or 135,000 lire per farm. The money was to be repaid by the farmer over a 40 year period, after which they were given full rights of ownership. Repayment of the debt plus a 2% interest was divided into four periods:

1. Salarito: during this period, which lasted for 3 years, the farmer was paid a salary by Ente, but had to turn over all his produce.
2. Mezzadria: in the next five years, the farmer shared his crop with Ente.
3. Vincolata: in the ninth year, the farmer assumed complete responsibility for the holding and was expected to repay part of the interest on his debt.
4. Libera proprieta: for the first 15 years of this period the farmer had to repay one third of his debt and all the interest, and he repaid the rest in the following 15 years.

The war intervened, and after it Ente was wound up. The farmers were given property rights after 1953, providing they had fulfilled a certain quota of plantings. Each farm, by 1956,

had to be sown in 500 olives, 250 almonds and 300 vines. Most farmers have fulfilled this quota, but in 1960 they received a bill from the Libyan government demanding that they repay the outstanding part of their debt to the Libyan government. This has increased the rate of emigration from Al Khadra, and even in 1959 several of the farms had been abandoned, and some farmers now own several farms. Despite this, the land use pattern has not changed, except for the fact that whilst Ente ruled that there was to be no inter-cultivation, many farmers now intersow almonds and vines with the olive (Appendix IX and Table XII - II)

I.N.P.S. started in Italy in 1898 as a national provident society for sickness and old age, and in 1919 it became a social insurance institution. It began its activities in Tripolitania in 1928 and later entered the field of demographic colonisation. Its clearance, development and settlement of land did not differ greatly from that of Ente, but its discipline of the peasants was not as great, and the land was often only partially prepared. The farmers paid part of their debt for 24 years, after which the remainder was transferred to a mortgage. Because of these facts and its late start, its activities were curtailed by the war. I.N.P.S. established two estates in the Eastern Jebel at El Gsea in the Wadi Gsea valley and at Sidi Essed (fig. 39). 135 and 170 farms, each

of 50 ha., were established at El Usca and Sidi Hased respectively. They were only partially developed by 1949, and have now been transferred to state ownership and are rented on a yearly basis to the tribesmen.

### 3. State-owned land.

The land ownership pattern in Tripolitania is so confused that even the State does not know which land it owns. The ex-Italian estates definitely belong to the State, as does about 4,000 ha. of land surrounding Al Khadra and the experimental farms near Sidi Higgi and at Soersciara. According to Bologna (3), the State may own 5,000 ha. of land in 'El Anamra'.

The Government plans to develop the ex-Italian estates in a manner similar to that of Ente. At present, the farms are rented to Libyans at annual costs of 270-100<sup>PER FARM</sup>/ha. according to the state of their development. The Government has published a plan for both estates, laying down that the farms will be sown as follows:-

Olives alone	5 ha.
Almonds alone	5 ha.
Vines alone	4.25 ha.

The rest will be used for pasture and cereal cultivation, which will be replaced by arboriculture in the second phase of the plan.

1. Land use and land ownership.

The land ownership position in the Eastern Sabel is very confused, and there has been no authoritative answer to the question 'Who owns the land?'. The Government and Gureshi (4), who studied land ownership in Tripolitania, say that most of the land is tribal. The tribesmen say that it is privately owned, whilst the most recent legislation - Italian - maintains that the land is owned by the State. The question of ownership is of great importance, because in Moslem law there are several types of ownership which define special rights or restrictions of usufruct by the occupant. To appreciate the position, it is essential to examine briefly the laws governing property ownership, and how these have changed in the last 30 years.

1. The role of the State and 19th century legislation.

Throughout Islamic institutions, the role of the State has always been important. As Bonne (5) points out, 'Moslem land law assimilated the old Oriental conceptions of the supreme ownership on the part of the State or ruler. The State possessed, in one form or another, a kind of supreme right of disposal'. From the beginning of the Ottoman Empire, occupiers of land had to pay a tax to the State. Initially, this was of two types: the kharaaj and the qshar. The qshar or tithe was paid by those occupants who embraced the Moslem

faith at the time of conquest, or who were granted land by the conquerors. Holders of Kharaj lands paid a tribute to the ruler. During the 18th century, the power of the Ottoman rulers diminished, especially in the more distant parts of the Empire. In areas like Tripolitania, the State became identified with its functionaries. At the same time, a system of tax farming emerged, whereby a government ministry or army regiment financed itself with taxes collected from a certain area. Thus, at this time, occupants of land paid a tax to the State, with whom eventually ownership was vested.

In the early part of the 19th century, feudalism and tax farming were abolished, and in 1858 the laws relating to the ownership of property were clarified. Five principal types of land ownership were defined, and these are still recognised. They were:-

(a). Mulk or private ownership.

Mulk land was privately owned, but the owner had to possess a title deed. He had full rights of disposal and usufruct. The code classed mulk into four main types:-

1. Land situated in communes and land bordering such territories up to a distance of 1,210 metres.
2. Former State-owned land which had been handed over to private citizens.
3. Osher lands.

4. Kharaj lands which had been left in the hands of non-Moslem people.

These classes are confusing, because they do not stipulate whether ownership is vested in an individual or a group. A tribe could, for instance, own their land collectively in mulk. Normally, however, mulk means that land is privately owned by a person.

(b). Miri or State-owned land.

Miri lands are owned by the State and could only be granted to citizens by a special concession. Though the concession is given in perpetuity, it is applied to usufruct and disposal and not actual ownership, which remains with the State.

(c). Wakaf.

Wakef IS RELIGIOUS land, and is of two types:-

1. Land which had been mulk, but was granted to the wakaf administration, who then administered the land and shared its profits.
2. Land which had been converted to wakaf by persons who had no heirs or who wanted to keep their land intact.

(d). Metrouke.

Metrouke was communally owned land and was divided into two classes:-

1. Public highways, market places, pastoral migration routes,

etc..

2. Pastures etc. at the disposal of a cabila and administered by the Sheik.

Metrouke could not be alienated by an individual on the basis of 'non-usus' by the community. If people from one cabila used the pasture of another, their cabila was forced to pay a tax into the miri fund, indicating the role of the State.

- (e). Mewat.

Mewat are wastelands which are uncultivated and are found about 0.5 kilometres from the boundary of used land.

## 2. Land ownership in the Eastern Jebel.

These definitions exist today, but it is not certain whether tribal land falls into any of these categories or is related to mushaa or the collective ownership of land found in other parts of North Africa. According to the tribesmen, the land is privately owned and most of it is in mulk. The chief problem is that very few tribesmen possess a title deed to their land, and claim ownership through continual usufruct. According to them, the land was transferred from collective to private ownership 'in 1892 when the Turks decreed that land belonging to the tribes was to be transferred to State ownership'.<sup>H</sup>

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<sup>H</sup> Personal communication from Abdul Kader Agissa, a well-educated Government official from the Cabila Auasa.

Tribesmen could then claim ownership of land because they used it, or they could purchase it from the State. Qureshi, however, does not refer to this decree, and the only reference to it was made by Bertolini (6) in 1911. He stated 'about 40 years ago, the Turkish Government suspended the tax on land which was paid jointly by the *cabila*. Land is no longer distributed among tribes every year'. This Turkish decree may be related to the redistribution of land which took place in the Homs area at the end of the 19th century (7). In 1913, Manetti (2) was able to say that 'all land is mulk, except for a little miri, wafak and metrouke' in Tarhuna, whilst Bertolini found that in Cussabat 'in comparison with 1,000 large landowners, there are about 1,500 medium and 1,000 small land owners; the rest of the population are labourers, many of whom own small parcels of land'. Bertolini gave the following table, showing the number of olive trees on various types of land.

Table XI-3. Olives on different types of land in Msellata  
(except Auled El Aalem).

<u>Type of land</u>	<u>Number of trees (mature)</u>	<u>%</u>
Private ( <u>mulk</u> )	112,388	95.20
<u>Wakaf</u> Type 1	1,417	1.20
Type 2	4,254	3.58
<u>Metrouke</u>	0	-
<u>Miri</u>	22	0.02
<u>Total</u>	<u>118,081</u>	<u>100.00</u>

It is clear that, as far as the Turkish authorities and the tribesmen were concerned, most land was in mulk and in individual hands. The only exceptions were the Aulad Shukir of Msellata and the Aulad El Aalem. In the former, land is still redistributed annually, and in the latter about 50% of the land belongs to the Mosque. <sup>8</sup>

Although much of the land has not been registered with the Land Registrars at Misurata and Tripoli, the Registrars say that a great deal of land was registered orally in the late Turkish period, but no record remains. Today, land is regarded as being in mulk by the tribesmen, except for a little in wakaf (virtually none in Tarhuna), some State-owned land totalling about 20,000 ha. in Tarhuna, and some metrouke, most of which is found in the Aulad Shukir. That part of Cussebat which lies beyond the boundaries of the Cabile Jareen and Aulad Hamed may be mewat.

Although the land is in mulk, usufruct is still influenced by the traditions of collective ownership. Thus several types of ownership or usufruct rights are recognised locally. These affect permanently and temporarily improved land and unimproved land.

Permanently improved land is that land on which an olive

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<sup>8</sup> Personal communication from the Nazirate of Agriculture, Noms District.

tree has been planted, on which a garden or terrace has been laid out, or on which a cistern or house has been built. Full rights of ownership are vested in the person to whom the tree, garden etc. belongs. If, for instance, a man owns an olive tree planted on someone else's land, the land around the tree belongs to the owner of the tree. This has led to endless complications on the Gussabat Plain, where land and tree ownership are often divorced.

Temporarily improved land includes land sown in cereals or the land around a tent. Full rights of ownership are often conferred only while the cereals or tent remain in situ. After the harvest, animals belonging to other people may pasture the land, though the owner's permission is generally required.

Unimproved land includes uncultivated areas and pasture. The person who supposedly owns pasture has prior claim on it, but members of his cabila may use it. In many cases, his permission is needed.

It is not easy for an individual to improve land permanently, since by doing so he may alienate it from the cabila. Frage Ben Ammer, of the Cabila Ras el Ain, wanted to plant olives on his sowing land in the Wadi el Maader. However, he was prevented from doing so by other members of his lahmat, who said that they would no longer be able to use their

forefather's land as pasture after the cereal harvest. An L.A.J.S. scheme for afforestation and arboriculture based on a co-operative in the Cabila Aulad Ali broke down because the larger flock owners would not allow land to be used for anything but pasture, even though the area concerned did not belong to them. Further, tree cultivation in Tarhuna is restricted to a few cabile or lehma, whilst elsewhere trees are grown only on the poorer land, the land of the rich, or on land which has been registered in private ownership.

These customs suggest that the land is in mulk in so far as a man practising an accepted form of land utilisation has first right of usufruct. The cabila acting through social pressure still has the final say on land use in many areas.

### 3. Size of land holdings.

Because of the paradoxical nature of land ownership, every family owns some land. But it is important to know how much land a family possesses and what is the nature of the land holding. Land holdings in the Eastern Jebel are fragmented and held in several parcels, and the average area of land owned by a family is small.

#### (a). Fragmentation of land.

Most families hold their land in tiny plots, which may vary in size from as little as a gedula (9 sq. metres) to as much as 500 ha.. The smallest and largest pieces owned by

twelve families in the Cabila Beni Let were as follows:-

Table XI - 4. Size of parcels in Beni Let.

<u>Family</u>	<u>Smallest parcel</u>	<u>Largest parcel</u>
1	10 sq. metres	20 sq. metres
2	10 sq. metres	20 sq. metres
3	1 ha.	1.5 ha.
4	10 sq. metres	25 sq. metres
5	5 sq. metres	15 sq. metres
6	2 sq. metres	10 sq. metres
7	10 sq. metres	20 sq. metres
8	15 sq. metres	30 sq. metres
9	2 sq. metres	10 sq. metres
10	2 sq. metres	20 sq. metres
11	5 sq. metres	20 sq. metres
12	-	500 sq. metres

The largest holdings of many people in Beni Let are only 20-30 sq. metres, whilst the largest holding apart from family 12 was only 1.5 ha.. The same position is found throughout the Cussabat Plain and the Scarp Zone. In the Beni Mislem, however, parcels were larger, and averaged about 50 sq. metres. The situation is the same in Tarhuna, but size varies according to use. Most of the ginanat are only 20-40 sq. metres, and parcels of sowing land vary from 10 sq. metres to a maximum of about 50 sq. metres. The pasture is similarly divided into small parcels, larger than those of the sowing land and varying in the Auassa and Aulad Ali from 20-30 sq. metres to several plots of 10-15 ha..

(b). Parcelling of land.

Very few people own their land in one piece. In

Beni Let, the average number of plots was about 10 per family, and varied in the case studies from 7 in family 5 to 32 in family 8. In the Beni Mislem and the Scarp Zone, several families own over 50 parcels of land. On the other hand, a very poor family in Meindara shared with two others three small plots of land.

Parcelling is even more marked in Tarhuna. Here, each family usually owns land in the Jebel and also in either the Jefara, or Ghibla, or both. The families have several parcels of sowing land and several of pasture in each area, and in addition, may own a small pinanat. In ten samples in the Cabila Auasa, families owned between 10 and 64 parcels, whilst the average figure in the Cabila Maragnat was 30 per family.

(c). The low average area of land holdings.

The majority of the population in Cussabat own a small area of land. In Beni Let, the distribution of holdings by size was as follows:-

Table XI-5. Sizes of land holdings in Beni Let, Cussabat.

(80% sample)

<u>Area of farm</u>	<u>Nos. of holdings</u>	<u>%</u>
0 - 5	40	45.4
5 -10	21	23.9
10 -20	19	21.6
20 -30	4	4.6
30 -50	2	2.25
above 50	2	2.25
	<u>88</u>	<u>100.00</u>

Most holdings are less than 10 ha. and nearly half are below 5 ha.. Holdings are slightly larger in Beni Mislem, Uadna and Crarta, where they average about 6-7 ha., but they are smaller in the Scarp Zone (Gherrim - 3-4). Larger holdings prevail in Tarhuna, where an average family holding is 3-6 ha. of sowing land in addition to pasture. In the Aulad Ali, holdings range from less than a gedula to over 400 ha. of sowing land, and in Gabila Auasa, most families own 3-4 ha..

Fragmentation is a fairly recent development. As yet, it has not given rise to the highly varied land use patterns of the coastal oases, and families continue to use the land in the same way. Previously, sowing areas were distributed each year to the heads of families, but the Turkish legislation established individual land holdings. With stabilisation came fragmentation resulting from buying, selling and inheritance. When a Moslem dies, his property is sold or divided to pay off his debts, funeral expenses and legacies. The residue is distributed among his relatives, direct descendants receiving a larger share than cousins etc., the male receiving twice as much as the female, and the wife, mother or father receiving a reserved share. This division of property has only been applied to land since about 1880 or 1890, but it has already led to severe fragmentation. At present, poorer families are living off gradually decreasing land holdings, while the rich

are building up large farms.

#### E. Taxes.

The abolition of the tax on land has led the Government to tax the means of production - trees and animals, and products - cereals. The taxes on non-irrigated areas may be divided into two types: that paid on cereals and that on trees.

The tax on cereals is called the osher or tithe, and is ordained by the Koran. It consists of a tax on 10% of the harvest, plus 2% to cover Government expenses in collection. It may be paid in kind or in cash. When the cereals are grown on State land or private concessions, the osher is charged on 75% of the gross yield, the remaining 25% going to the concessionaire or State.

The tax on trees is again roughly 12% of the product, but it varies from year to year according to conditions. The rates in millimes are as follows:-

Table XI-6. Tax on tree crops. Value/tree in millimes.

<u>Tree</u>	<u>Average year</u>	<u>Good year</u>	<u>Bad year</u>
Olives	31	42	21
Palms	15	19	10
Fruits	8	13	4
Vines	2	-	-

Only productive trees over 10 years old are taxed.

The tax on animals has been restricted to sheep and goats

since 1943 and is suspended completely in bad years. It amounts to 2% of the value of the animals in a flock, the sheep and goats being assessed separately.

The variation in the rate of taxation according to conditions is necessary in a country as poor as Tripolitania, but it tends to counteract incentive.

#### F. Labour.

In 1911, there were many types of labourers who were employed under different types of contract. In Gussabat, for example, a farmer often hired a labourer to clear and plant a ainanat or terraced garden, the labourer sharing the produce for the first eight years, after which he was given one third of the land. This was called mo-hara, and was subject to a group of special laws administered by the regional Cadi (Moslem judge). This, together with the giabda (animal of labour) - a labourer hired to sow 20 marte (260 kilos) of barley seed - has disappeared, and the only types of labourer found now are the khamessi (share-croppers), day labourers and shepherds. Most of them are still paid in kind when working on the harvest, or in cash when sowing. They are still fed and sometimes clothed by their employer. Today, there is a chronic shortage of labour in rural Libyan areas because of the attraction of higher pay on Italian farms or in the urban

areas. Most families in Beni Let and the Auasa rely on family workers, particularly young children. People from Tarhuna and El Amamra still make annual trips to Cussabat for the olive harvest, but they are few in number compared to the 'vast immigration' recorded by Bertolini. When a labourer is employed for the olive harvest, he is paid in cash or kind to a value of between one tenth and one seventh of the harvest. For barley cultivation, the labourer is paid according to how much he sows or harvests. Labour costs on cereals are equivalent to 25% of the total yield, and according to the Sheik of Beni Let a labourer usually sows or harvests about two marte (30 kilos) of barley a day, and thus receives a wage of 15-20 piastres. Shepherds, who form a separate class, will be considered in Chapter XIII.

G. Land use and future development.

Land use is still influenced by the traditional collective ownership and exploitation of land. Though land is in theory in private ownership, its use, and in some cases its disposal, are affected by the organisation of the population and its traditional attitudes. In Cussabat, for example, olives and cereals are virtually the only cultivated crops, and their cultivation still reflects the influence of the past in the use of similar methods of soil and water conservation and

utilisation, and in the divorce between tree and land ownership on the Gussabat Plain. Everyone in Gussabat is a farmer and everyone grows the same crops. The position is the same in Tarhuna, where animals replace the trees. The Italians affected land use by expropriating land from the Libyans, by introducing modern techniques and by developing the country and creating labour opportunities. The effect on land use is not apparent in Gussabat, where cultivators appear to be extending the traditional rather than modern types of land use. In Tarhuna, on the other hand, the linanat are spreading and olives sown on the Italian pattern are increasing near the Abanet Scarp.

Any plans for the future development of the Western Jebel are likely to be unsuccessful unless they take into account the fragmentation of land, its ownership in parcels and the fact that ownership is ill-defined. The land laws need authoritative clarification. If, for example, the State owned the land, it could in theory force nomadic tribesmen to settle. If it is collectively owned, the stronger and more powerful elements (i.e. the traditionalists) may prevent others from changing the usufruct of tribal land. If it is in private ownership, it will be difficult to enforce afforestation, improve soil and water conservation and establish zones of pasture and arboriculture as advocated by Broc (8).

CHAPTER XIIOLIVE CULTIVATIONA. Introduction

The olive tree has a limited distribution in the world and is almost entirely confined to those countries bordering the Mediterranean. It thrives in areas which have relatively moist mild winters and hot dry summers. The olive is not a demanding crop and will grow in areas with very low rainfall. It can tolerate a little frost, but temperatures below  $-10^{\circ}\text{C}$ . have disastrous effects on the plant. It can do well on calcareous sandy soils of moderate fertility, but yields can be affected by the long dry period of the Mediterranean winter and by cold spells during the spring. Ecologically, the olive can be cultivated over most of the Eastern Jebel north of the 180 mms. isohyet and in these parts of the Ghibla where water is available.

The olive usually flowers in March, fruits in April and can be harvested from late September. In the Eastern Jebel, the olive harvest often continues until early February. September rains are valuable for maturing the fruit, but too much rain in November and December can lower yields by filling the fruit with water. Out of season rains, which are very rare in the region under study, may cause premature blossoming and falling of the fruit. Recurrent droughts may disturb the balance of productivity of the tree for several years.

Because the olive is so hardy and undemanding, it has

been widely cultivated in the Mediterranean area between the 8°C. minimum isotherm and the 200 mms. isohyet from Phoenician and earlier times. The Phoenicians introduced the olive to Tripolitania, but olive cultivation did not spread far into the Eastern Jebel until Roman times. Under the Romans, the Berber tribes became small farmers and labourers. The extent of Roman arboriculture may be measured by examining the distribution of olive presses, dams, fortified farms and the Zizyphus lotus. Roman agriculture covered most of Cussabat, northern El Amamra and western Tarhuna with important outlying zones in the Scarp and Basin Zones of Tarhuna. Olive cultivation took place on the northern edge of the Tarhuna plateau and in the main Ghibla wadis, where there were a number of 'limitanei' settlements. The region was very productive under the Romans. This is demonstrated by the fact that in the last few years of the first century A.D. Leptis Magna could pay an annual tribute of 3 million pounds of olive oil to Rome (1). The fine and rich architecture of Roman and Byzantine Leptis Magna show that the city was very prosperous. At the zenith of Roman rule, there were at least 600 olive presses in the region under study (2).

When the Romans withdrew, arboriculture continued for at least 2 - 3 centuries. It was destroyed over most of the region by the Aulad Hamed in the 10th century. By the end

of the 16th century, when the Turks gained control of Tripolitania, olive cultivation was restricted to the Cussabat area and possibly to some isolated areas in the Scarp Zone of Tarhuna. The Turks maintained the status quo and the number of olives and the area under cultivation probably remained static until the Italian invasions. At the end of the 18th century, Cussabat was a very important centre of olive oil production and Tully (3) describes how merchants from Tripoli annually brought back large quantities of oil from Msellata.

At the present time, arboriculture and olive cultivation are again extending. In this chapter, the recent changes in the distribution of olive cultivation will be considered, together with the methods of cultivation as they affect yields. An attempt will be made to assess the importance of olive cultivation to the farmer and to the local and Libyan economies. It is aimed to show that cultivation is extending, that olive cultivation is profitable and that yields can be improved by the adoption of new agricultural techniques.

#### B. Distribution of olive trees and olive cultivation

Olive trees are basic to sedentary cultivation in the region under study and they are of growing importance in semi-nomadic areas. They are cultivated in several different systems and each must be considered. However, there have been

significant changes in the number and distribution of population and olive trees in the region under study as well as in Tripolitania as a whole. To appreciate the changes, and the importance of olive cultivation in the Eastern Jebel and the importance of the Eastern Jebel in Tripolitania, it is first necessary to examine the position in Tripolitania as a whole.

1. Changes in the number and distribution of olive trees in Tripolitania

When the Italians invaded Tripolitania in 1911, they found only 500,000 olive trees (4). Most of these were in the Berber or Arabised Berber zones of the Jebel and in coastal oases; Cussabat, with 25% of the olives, was the most important area of cultivation.

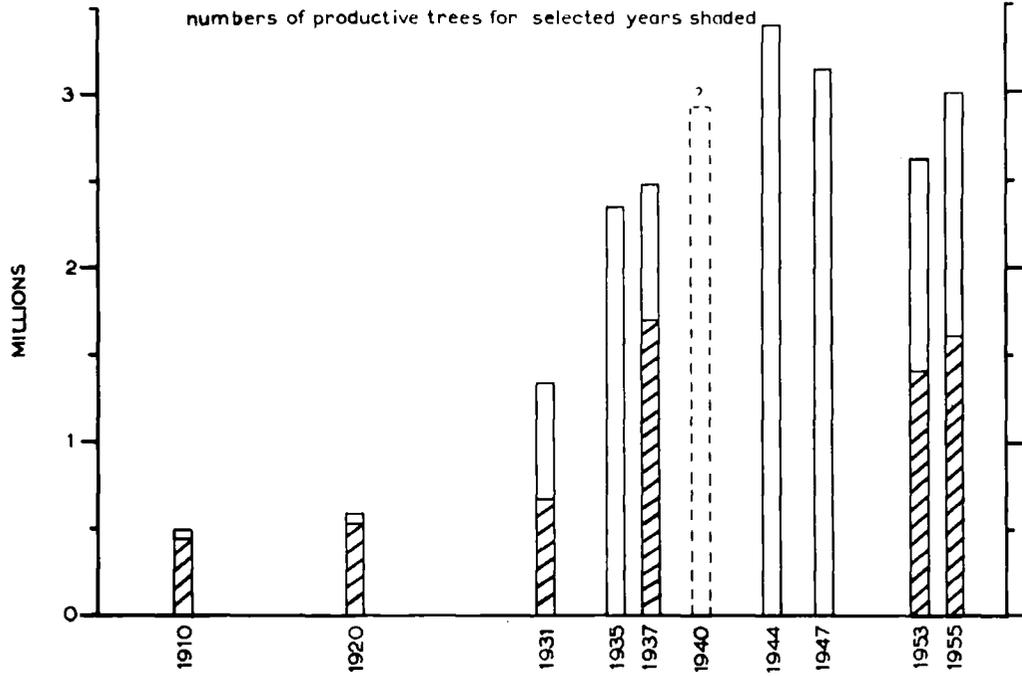
The Italians began to plant olives on their concession farms after 1923 and by 1925 there were 1,280,000 olives, of which 680,000 were Italian. By 1935, the Italians had planted 1,342,000 olives, and planting continued as the demographic farms were established in the late 1930's. Thus, by 1944, there were 2,411,000 Italian-owned olive trees. The tremendous rate of expansion ceased after about 1942-4 and the number of Italian trees has since fallen. (Fig. 35 and Appendix VIIIA).

The number reached a peak of 3,381,000 in 1944, declined to 2,607,600 in 1953 but rallied to about 3,000,000 in 1957.

Figure 35.

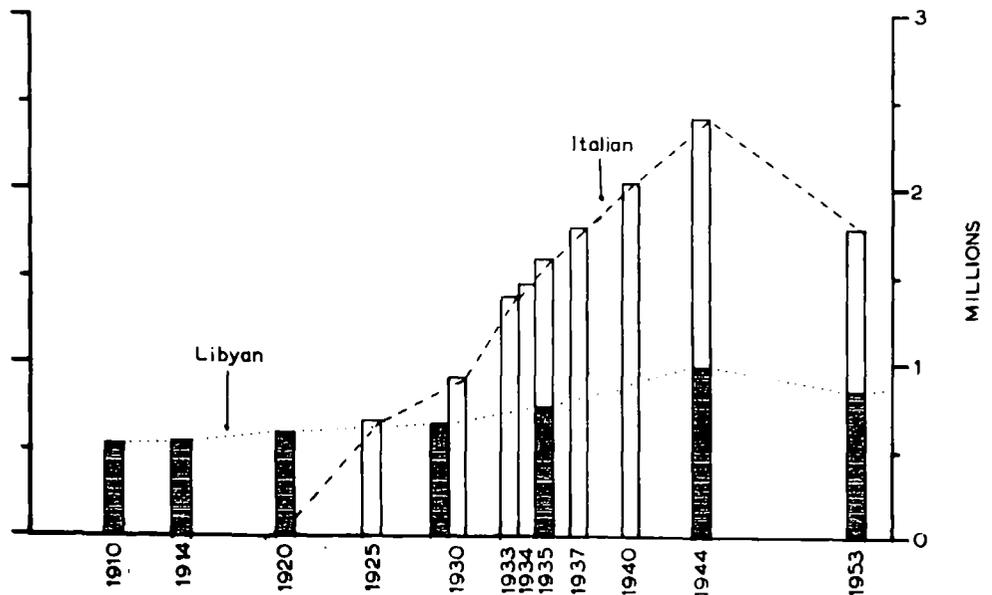
(a)

TOTAL NUMBER OF OLIVE TREES IN TRIPOLITANIA



(b)

ITALIAN AND LIBYAN OLIVE TREES IN TRIPOLITANIA



After Hill.

During the Italian period, the numbers of Libyan-owned trees showed a slight but steady increase followed by a small decline in the post-Italian period. Whereas in 1910 all olives were owned by Libyans, 68.2% were Italian-owned in 1953. The influence of the earlier plantings is clearly demonstrated by the fact that 51.3% of Tripolitanian olives are found on concession farms.

In 1910, only 10% of the trees were immature, but in 1938 the proportion had risen to 66% and was still 53% in 1953. Today, about 1,200,000 trees are unproductive and considerably more than half of these belong to Italians.

The tremendous expansion of the olive has been accompanied by a re-distribution of olive cultivation. The change in distribution may be examined by comparing the total number of Libyan-owned trees for the year 1935 and the total number of all trees in 1956.

Table XII - 1. Distribution of olive trees by province, 1935 and 1956 in percentages

	<u>Tripolitania</u>	<u>Eastern</u>	<u>Central</u>	<u>Tripoli and Western</u>
1935	100.0	48.8	31.9	19.3
1956	100.0	36.7	10.0	53.3

The Eastern Province has been surpassed in importance by Tripoli and the Western Province, which together own more olives than the other two provinces combined. The Jefara

has emerged as the main area of olive cultivation. This is because the Italians planted most of their trees in the Jefara.

## 2. Changes in number and distribution in the Eastern Jebel

Cussabat was the most important area of cultivation in Tripolitania in 1910 and had 125,000 olive trees, of which 90% were productive. The number rose to 138,000 by 1935 (9% immature) and is about 149,000 at the present time. Numbers have increased by 18% since 1910, compared to the Tripolitanian rate of 500%. Though Cussabat is still the most important area of indigenous tree cultivation, with 18.6% of all Libyan-owned trees, it is less important relatively and absolutely than it was before the Italian invasions.

The main effect of Italian colonisation in the region under study is the emergence of Tarhuna as the most important area of olive cultivation. There are now 209,000 olives in Tarhuna, of which 88% are Italian. In 1959, the distribution of olive trees in the region was as follows:-

Table XII - 2. Distribution of olive trees in the

### Eastern Jebel

<u>Mudiriya or area</u>	<u>Number</u>	<u>%</u>
Cussabat	149,000	41.1
Concession Farms	110,000	30.0
Demographic farms	74,000	20.5
El Amamra	7,500	2.1
Aulad Msellem	8,900	2.8
Aulad Mahareff	4,400	1.4
El Hawatem	2,150	0.9
Ed Darahib	<u>3,160</u>	<u>1.2</u>
<u>Total</u>	359,110	100.0

Most of the region's olive trees are found on less than 12% of the total area, and the rest are scattered about the Jebel, with the greatest concentrations in northern El Amamra and just south of the Abanat Scarp in Tarhuna. The northern edge of the dip slope, with its gently undulating relief, humidity and thick soil mantle is the most important zone of olive cultivation.

(a). Olives in Cussabat: the 'pastoral' olive

Olives in Cussabat are pastured rather than cultivated. The analogy between animals and olives will be carried further in later sections but, at this point, it is necessary to emphasise that the distribution of olive trees in relation to each other and to the land on which they are found is more like that of a flock of sheep than cultivated crops. If, for example, each person in Cussabat owned several plots of land and about 10 sheep and if these sheep were allowed to wander and graze where they liked, then their distribution over the land would resemble that of the olive trees in Cussabat. Olives are often found on land that does not belong to the owner of the tree: sometimes they are densely packed, sometimes scattered. There is no fixed distance between trees nor a fixed number per hectare as in the Italian zone. Farmers were asked how many of their trees were planted on their own land, but no useful results were obtained because the land under

the olive tree belongs to the owner of the tree, even if the tree is situated in someone else's land. One farmer at Beni Mislem had 25 olives, of these 16 were situated on 4 plots of his own land, and the rest were on his uncle's or bothers' lands. This distribution is a relic of the time when land was divided amongst the tribesmen, who, however, had full rights of ownership of their trees and the land beneath them.

This system disappears in parts of the Scarp Zone and eastern Cussabat, where there is improved land and where olives are found mostly in terraces and ginanat. But as the following figures show, most of the olives lay in 1910 (5) in the Cussabat Plain and Wadis Gsea and Uaeni, where there was very little improved land.

Table XII - 3. Distribution of olive trees in Cussabat, 1910. <sup>5</sup>

<u>Area</u>	<u>Number</u>	<u>%</u>
Cussabat Plain	43,000	34.4
Wadi Gsea	10,000	8.0
Wadi Uaeni	30,000	23.5
Western Cussabat	19,000	15.6
Scarp Zone	<u>23,000</u>	<u>18.5</u>
<u>Total</u>	<u>125,000</u>	<u>100.0</u>

The greatest area of olive cultivation in 1910 was the northern edge of the dip slope, particularly in the Cussabat

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\* Based on Bertolini's figures (5).

Plain. The distribution in 1960 has been mapped from aerial photographs (1954, 1:24,000) (6) and from the writer's field-work (fig. 31 ). In fig. 31 , an attempt has been made to distinguish between areas which were cultivated before and after 1950. Olive cultivation is densest and most important in the Cussabat Plain and the Wadi Uaeni, but fingers of cultivation extend southwards in to El Amamra along the wadi courses. To the north and east, cultivation is patchy, but there are important concentrations of olive trees in the Wadis Gherrim and Ben Gebara and their tributaries. In the Scarp Zone, cultivation is restricted to the wadi beds and to Pleistocene and man-made terraces on the wadi slopes.

Since 1950, large areas of Cussabat have been brought into cultivation, mainly on the southern margins in Uadna, Luata, Aulad Hamed and the formerly pastoral Burcat Uaeni, but also in the Scarp Zone and extreme eastern Cussabat. The principal differences between the old and new areas of cultivation is that Italian systems of spacing and distribution have usually been employed in the new areas.

(b) The Italian Zone

Olives in the Italian zone are cultivated on farms larger than those of Cussabat. The farms are in one piece, though on Al Khadra some farmers now own 2 - 4 farms. 60% of the olives are on concession farms.

Table XII - 4. Distribution of olives in  
the Italian zone

	<u>Number</u>	
Al Khadra (168 farms)	74,000	40
S.A.P.I.L.	37,000	20.3
Catarella	20,000	10.8
Fr. Fontana	24,000	13.1
Fontana Piacenza	26,000	14.2
Others	<u>3,000</u>	<u>1.6</u>
<u>Total</u>	<u>184,000</u>	<u>100.0</u>

The largest olive farm is the S.A.P.I.L. estate, where the olives are not intersown with other crops. On the other concession farms, most of the olives are intersown with almonds or vines as on Al Khadra (fig. 33 ). On Al Khadra, there are roughly 500 olives per farm, but many are immature, because about 40 of the farmers were forced to sow more trees to meet a quota of 500 per farm under the development plan. Most trees on the concession farms are now mature.

(c). Tarhuna: cabilia land

Olive cultivation is increasing on cabilia land in Tarhuna. In 1935, there were only 8,000 olives, but in 1958 and 1960 there were 20,000 and 25,000 respectively. Between 1935 and 1960, the number of olives increased by 212.5%, compared to an increase of only 8% in Cuesabat. The increase probably began in the early 1930's, because in 1935, 26% of Tarhuna's olives were immature, compared to 9% in

Cussabat and 16% of all Libyan-owned trees. However, the rate of increase has risen sharply in the last few years.

Recent extension of olive cultivation in Tarhuna is associated with a general increase in tree cultivation, in which the olives play an important but as yet minor role. There are 40,000 almonds, 100,000 vines and several thousand fruit trees being cultivated on cabila land. In 1910, there were only about 10,000 almonds in the whole of Tripolitania.

As there were no detailed cabila statistics available, the writer made a sample survey of ten selected cabile in 1960. The results are summarised in Table XII - 5.

Table XII - 5. Number of trees in ten selected cabile,

Tarhuna 1960

<u>Cabila</u>	<u>Olives</u>		<u>Almonds</u>		<u>Vines</u>	<u>Fruit Trees</u>
	<u>Over 10</u>	<u>Under 10</u>	<u>Over 10</u>	<u>Under 10</u>		
Masabha	100	195	409	600	5,817	777
Tella	200	328	400	800	2,316	9,940
Auasa	100	59	200	400	1,172	575
Msellem	150	310	400	600	10,000	1,000
Hamamla	90	27	20	50	1,800	235
Fergian	-	147	80	70	190	125
Darahib	200	12	-	-	140	42
Auled Ali	200	74	200	280	500	450
Nehagia	100	-	-	-	-	-
Terscian	150	310	100	100	300	206
<u>Total</u>	<u>1,290</u>	<u>1,462</u>	<u>1,809</u>	<u>2,900</u>	<u>22,235</u>	<u>13,350</u>

In all, there were 2,752 olives, 4709 almonds, 22,235

vines and 13,350 fruit trees. 56% of the olives and 63% of the almonds had been planted since 1950.

Although almonds, vines and fruit trees are more numerous, the olive is still the most important tree. It is because the olive takes so long to mature that tribesmen are planting other trees which produce sooner and the trees give a quick return. The Italians used this system to provide a cash income while the olives were immature. At the same time, the great number of other types of tree crops indicates that cultivation is tending to expand in the ginanat system. In the ginanat trees are planted close together and many types of tree are found. Yields are poor and very few of the plants survive to maturity. Nonetheless, tribesmen in the Cabila Auasa and other cabile near the Italian zone have adopted the Italian system of cultivation. Most of the newly planted trees are found in these cabile, and in parts of the Tarhuna plateau, north of the concession farms, there are many olives. Trees are being planted in all parts of Tarhuna and there are several dry gardens at Uesctata and in the Wadi Taraglat. One of the gardens at Uesctata contains 400 olives planted on the Italian basis.

It is not surprising that tree cultivation is extending. Yields from pastoralism are declining and it has been shown that emigration is reducing the dependence of the population

on their animals. The fact that tree cultivation can be successful has been proved to the Arabs by the Italians, on whose farms many of the tribesmen have worked. They have seen and taken part in the conversion of uncultivated steppe into modern and prosperous farms. Many Libyan labourers from the Italian farms have started planting olives in the Cabila Auasa.

In 1958/9, the Nazirate of Agriculture launched a programme aimed at extending tree cultivation in Tarhuna. There was a vigorous programme of education and demonstration and trees were sold at the nominal price of 5 piastres each. At present, the Government is considering the possibility of giving credit to people who want to cultivate olives. Though the L.A.J.S. afforestation and arboricultural scheme failed at Ain Uif (Chapter VII), it succeeded in the neighbouring Orban. In 1960, many of the tribesmen at Ain Uif had started to plant trees on their own initiative and others told the writer that they intended to grow trees. The same is found in all parts of Tarhuna. Returning migrants are planting trees instead of buying more animals.

Arboriculture is still very limited in Tarhuna and there are several important influences working against its extension. The olive takes a long time to mature, and even if other trees are planted, the farmer has to wait for 3 or 5

years before his vines or almonds mature. The land ownership position is unresolved, and where there are large and influential flock-owners it is difficult for the small land-owner to improve his land permanently. This same situation has been reported from other parts of North Africa and the Sahara (7). The forces which are reducing pastoralism are also limiting tree cultivation. When a man emigrates, he cannot expect his family to live off a few unproductive trees, and therefore he prefers to leave a few goats and sheep to keep his family alive. While emigration continues at its present rate, arboriculture will not extend very quickly, unless a greater proportion of returning migrants reject pastoralism for tree cultivation.

The question of the kind of people who are planting trees is best answered by reference to the following case samples:-

(1) Abu Bakir of the Lahmat Malte of the Cabila Aulad Mahareff Abu Bakir is very rich and is a merchant dealing in livestock at Tarhuna town and Tripoli. He owns 80 sheep, 120 goats and 20 camels. About 15 years ago, he decided to invest some of his money in olive cultivation, planting and caring for the trees like the Italians, for whom his eldest son had once worked. He planted 40 trees in the first year and added to these later on his land at Uesctata, where he

used water from a Roman cistern to irrigate the young trees. He now owns 400 olives, 200 almonds, 250 vines and 15 figs and is one of the largest farmers in Tarhuna. 150 of his trees have been planted in the last five years and he intends to plant more on a 25 ha. plot he owns at Tenzina. His son looks after the farms, which, with the animals and his business, support 10 people, of whom only his son and himself work.

Though Abu Bakir is exceptional, he is an example of the richer and more progressive tribesmen powerful enough to overcome any opposition from their cabile.

(11) Herma Ben Ammar Gijam of the Giabeen Lahmat, Cabila Aulad Ali. This man is an example of the tribesmen in the Aulad Ali who have started to plant trees near Ain Uif despite the opposition encountered from the larger flock owners. He has only 25 sheep and 10 goats on which to support his family of 6, and in 1959 he decided with others in his lahmat to plant olives. At present the olives are unproductive, but he earns a few piastres a year from two vines. He says that he cannot afford to buy animals, which cost £3 - 7, but he needs more money because he cannot support his family on what he earns from pastoralism. He does not want to emigrate, because all his children are less than 7 years old. He says, as does the Mayor of Tarhuna, who comes from the Aulad Ali, that others in his lahmat have 20 - 30 young olives.

(iii). Ali Abdul Hamman of the Lahmat Abd el Crim, Cabila Auasa. Ali is one of a group from the Auasa who have rejected pastoralism for tree cultivation. He and a group of nine families have planted nearly 200 trees, about one-third of which are mature, in the Cabila near Concession Catarella, just south of the Abanat Scarp (fig. 33). Most of the trees are olives and almonds which are cultivated in the Italian manner. Ali Abdul has 20 olives and 10 almonds. He intersows his trees with cereals for his family, and a shepherd looks after his 20 sheep, and those of the other families, in the Wadi Taraglat. The reason he is planting trees is that "with olives, I can work in Tarhuna (where he is employed as a labourer), but with a lot of sheep I would have to go to Taraglat". His earnings from his animals are about £50 per annum, from olives only £6 per annum, but from his job in Tarhuna £120.

His case is typical of the newly converted farmers of the Cabile Auasa, Msellen, Shiafafti and Hamamla.

Tree cultivation is thus extending where an individual is strong enough to withstand the opposition of the rest of his cabila, where groups of small men combine to meet this opposition, where a group decides that arboriculture is more profitable or more convenient than pastoralism or where an individual wants to work and cultivate at the same time.

On the other hand, Frage Ben Ammar of the Cabila Aulad Mahereff cannot plant trees because his bothers object to the fact that the land will no longer be available for pasture (see Chapter XIII) and Milad Ben Abdulla Sira of the Cabila Mahadi has only about 40 square metres of land, whilst Ali Besalam of the Cabila Nahagia owns his land in the Ghibla, which is generally too arid for cultivation.

At the present time, arboriculture is extending where the land is humid and where the social conditions permit, in northern Tarhuna along the dip slope and in some Ghibla wadis. Elsewhere, it is expanding (e.g. Masabha of the Scarp Zone) within the ginanat system. The ginanat are found where land has been registered in private property and they are chiefly restricted to the Abanat Scarp and parts of the Basin and Scarp Zones.

### 3. The distribution of olives per head of the population

In an area where the ownership and acreage of the land is not accurately known and where land is measured according to volume (i.e. its sowing capacity in terms of seed), it is essential to relate the olive tree to population. It is possible to calculate the number of olives per capita in some areas and this is referred to as the olive/man ratio.

#### (a) Olive/man ratio in Cussabat

Detailed statistics of population and olive tree

numbers are only available for 1910. The present position may be judged from projections based on several sample surveys made by the author.

In 1910, there were about 10.417 olives/head of the population in Cussabat. Though the number of olives increased by 18% between 1910 and 1960, there are still only 10.489 olives/head. The olive/man ratio may have declined in this period, since de Agostini (8) points out that the population of Cussabat was under-enumerated in 1910.

The ratio in 1910 for each cabila (except the Aulad el Aalem) has been calculated from 1917 population figures (Appendix VIIb). It varied from 3.9 in the Cabila Shiabarna to 28.8 in the Cabila Luata. However, most cabile had ratios of between 7 and 12 (fig. 36). The lowest ratios occurred in the Scarp Zone (8 - 10), but the Bu Aish and the Shiabarna had low values (fig. 36). Cabile in the Cussabat Plain and around the Wadi Zaafrania had the highest values, and the higher ratios generally coincided with cabile where much land was already under cultivation. Ratios were lowest where it was necessary to build terraces or ginanat to conserve soil and water.

The position in 1960 may be determined from the following examples:-

CUSSABAT OLIVE/MAN RATIOS 1910

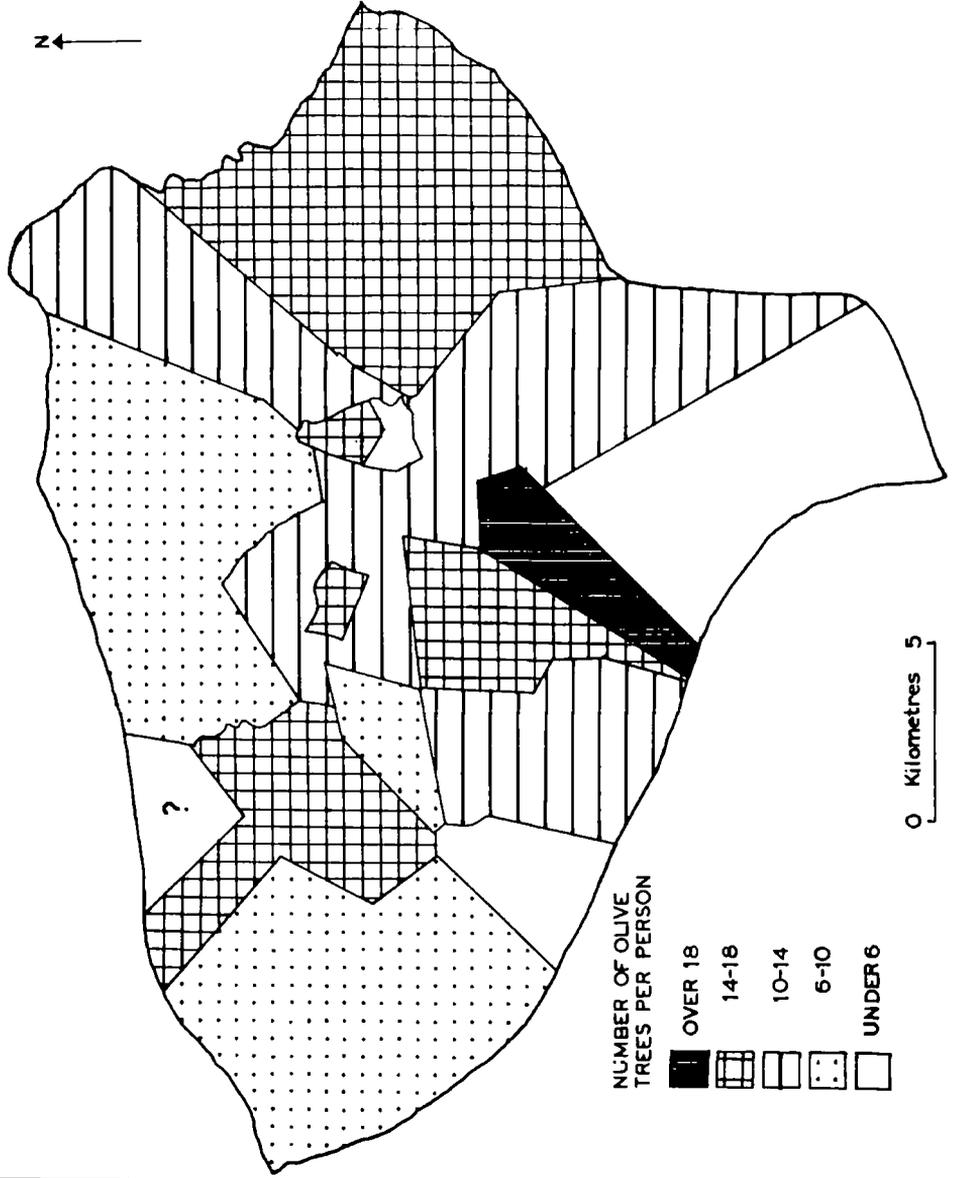


Table XII - 6. Olive/man ratios in five Cussabat cabile, 1960

<u>Cabila</u>	<u>Population</u>		<u>Olives</u>		<u>Olives/head</u>	
	<u>1917</u>	<u>1960</u>	<u>1917</u>	<u>1960</u>	<u>1910</u>	<u>1960</u>
Uadna	850	900	10,100	11,500	11.9	12.8
Jareen	550	1250	8,950	11,000	16.3	9.6
Beni Let	600	559	6,230	6,750	10.4	12.3
Gherrim	130	160	1,190	2,000	9.2	12.5
Zaafran	260	240	4,772	4,800	18.3	20.0
Beni Mislem	1,340	1,250	9,589	11,000	7.2	9.0

The olive/man ratio has increased in the sampled cabile either at the expense of population or because there are more olives. On the whole, the number of emigrants has increased more than the numbers of olive trees planted. These samples must be treated with circumspection because they suggest that the olive/man ratio has increased, whilst in fact it has probably declined. A fairer example can be provided if the figures for Beni Mislem are broken down:-

Table XII - 7. Olive/man ratios in Beni Mislem

<u>Village</u>	<u>Population</u>		<u>Olives</u>		<u>Olive/man/ratio</u>	
	<u>1917</u>	<u>1960</u>	<u>1910</u>	<u>1060</u>	<u>1910</u>	<u>1960</u>
Beni Mislem	610	850	2,503	3,900	4.1	4.6
Morad	190	200	5,300	5,300	27.9	26.1
Gmata	540	200	9,859	11,000	7.2	9.0

It appears that the ratio has declined in places where it was high in 1910 and risen in places where emigration has been heavy. In Jareen, for instance, population has increased faster than the olives and the ratio has declined by one-third; in Gmata population has decreased by over 50%, so that

the olive/man ratio has increased even though the number of olives rose by only 12% in the period 1910 - 60.

It is essential to know whether the olive/man ratio approximates to the actual distribution of olives per person. The following table shows the position in Beni Let.

Table XII - 8. Olives and people in Beni Let.

<u>Number</u>	<u>Size of household</u>	<u>Nos of olives</u>	<u>Nos. of olives/man</u>
1	9	75	8.33
2	14	290	20.72
3	14	250	17.85
4	8	100	12.50
5	5	75	15.00
6	10	40	4.00
7	4	150	32.50
8	2	350	175.00
9	15	390	26.00
10	5	49	2.80
11	9	10	1.11
12	3	10	3.33
13	5	150	50.00
<u>Total</u>	<u>103</u>	<u>1,839</u>	Average <u>17.95</u>

(b) The Italian area

The most striking difference between the Italian and Libyan zones of olive cultivation is that there are over 190 olives for every Italian living in Tarhuna. On Al Khadra, there are 72 olives per person and each family lives off 500 olives plus about 250 vines and 100 almonds.

(c) Tarhuna The olive/man ratio is not very valuable in an area like Tarhuna where there are still very few olives. In 1960, for instance, there were about two people

for every olive but there were 9 - 10 other trees for every person. As olives cannot be divorced from other trees in Tarhuna, the tree/man ratio has been calculated instead of the olive/man ratio for the ten selected cabile.

Table XII - 9. Tree/man ratio in ten selected cabile.

Tarhuna, 1960

<u>Cabila</u>	<u>Nos. of trees</u>	<u>Nos. of olives</u>	<u>Population</u>	<u>Tree/man ratio</u>	<u>% of Olives</u>
Et Tella	13,984	528	956	14.3	4
Msellem	12,460	460	995	12.4	3.4
Masabha	7,898	295	920	8.5	3.0
Auasa	2,516	159	607	4.9	6.0
Terscian	1,166	460	486	3.1	40.0
Hamamla	2,222	117	1,470	1.5	5.5
Aulad Ali	1,704	274	2,899	0.6	16.0
Darahib	394	212	946	0.4	65.0
Fergian	612	147	2,865	0.2	24.0
Nahagia	100	100	1,528	0.06	100.0

Tree cultivation is more important to tribes in the Basin and Scarp Zones and the northern edge of the dip slope than in western Tarhuna and the more arid parts of the dip slope. In eastern Tarhuna, cabile lost much land to the Italians, and although their population decreased, the density of settlement increased. Because of this, the tribesmen have been forced to make their land more productive. The Auasa and Msellem are doing this by planting trees, but the Fergian and Hamamla, who live in a more arid area, are increasing the number of sheep. Scarp and Basin Zone tribes preserved

tree cultivation for some time after the Arab invasions and Mazzochi<sup>¶</sup> claims that some gardens were only abandoned in the Et Tella after the Italian invasions. The large number of trees in the Masabha is due to the fact that tree cultivation has extended in the Jefara, south of Gasr Garabulli, and some Masabha tribesmen have switched from pastoralism to agriculture.

### C. Methods of cultivation

Yields of olive trees in Cussabat and Tarhuna could be raised if the methods of cultivation were improved. The effect of cultivation methods on yields will be examined in this section and yields later.

In the first place, it is essential to bear in mind three main points about the olive tree:

1. It takes a long time to mature and does not start to bear fruit until at least its eighth year.
2. The olive tree fruits biennially, so that its cycle is characterised by regular fluctuation in yields.
3. The yield of an olive tree depends on the oil content of its fruit (as few table olives are produced in Tripolitania) and the olive tree with 15% has the lowest extraction rate of any plant producing vegetable oil.

<sup>¶</sup> Personal communication.

Yields reflect these factors and are influenced by the variety and age of the tree, soil nutrient and moisture availability and the techniques of cultivation employed.

### 1. Variety

Little research has been carried out on the varieties of olive trees cultivated in Tripolitania, but there are at least 40 - 50 varieties in cultivation. Marroni (8) has pointed out that more research must be directed towards determining which varieties are most suited to each area of cultivation. Olives in Tripolitania are of three main types: Local, Tunisian and Italian. Local varieties are named after the area in which they are most abundant, but Manetti found that the so called 'Cussabat olives' consisted of at least 23 different varieties (9). Of these, only six are widely cultivated and they are the Rasli, Garghashi, Futuri, Hammuri, Chemlali and Zarasi. All of these are cultivated for olive oil except for the Zarasi, which, with the Mammari and Neb Gemal, produces table olives. The Rasli is the most numerous of the varieties grown in Cussabat and it gives the highest yields. It is replaced in parts of western Cussabat by the Garghashi, which is only slightly inferior in both numbers and yield to the Rasli in the rest of Msellata. The other varieties are well distributed, and one or two Zarasi are found on most Cussabat farms. The

Rasli is the most important variety on cabila land in Tarhuna, but the Arasci replaces the Garghashi in most ginanat.

Italian varieties are confined to the Italian estates and consist of the following in order of importance: Frantoio, Piacenza, Romana, Scana, Licino, and Coratine. The Frantoio is the most numerous and it gives the highest yields and with 20 - 23%, it has the highest extraction rate of olive oil. Most of the olives on Al Khadra and the S.A.F.I.L. farm are Frantoio, but other varieties are found in significant numbers on the other concession farms. All but the Coratine have done well and they give higher yields of olives and olive oil than local varieties.

Tunisian varieties are those which have been imported from Sfax and the most numerous in Tripolitania is the Chemlali. It is not widely cultivated in the Eastern Jebel except where tribesmen have brought young trees from the Government. The Chemlali, which has been a great success in Tripolitania, is thus more numerous in Tarhuna than Cussabat.

The Frantoio is undoubtedly the most productive variety cultivated in the region and offers the best scope for development. Few of the local varieties have been tested on Italian farms, but the Rasli and Garghashi are clearly suited to conditions in the Eastern Jebel.

## 2. The age of the olive

The age of an olive tree is important, because immature olives do not bear fruit and mature olives reach a production peak at a certain age and after a period of years production declines. At Sfax, olives are replaced after 70 years by young trees. Many olives in Cussabat are more than 70 years old and some may have been planted by the Romans. It is possible to preserve old trees by a number of techniques and these are practised in Cussabat. An old olive may be allowed to re-shoot or may be pruned in such a way that it is rejuvenated. Thus, many of the trees are huge and unshapely specimens and dwarf the small, rounded, neat Italian olives. The oldest trees usually have several trunks forming a circle round the old nucleus of the tree (Plate 26 )<sup>ii</sup> The smaller Italian trees give higher yields than the giant olives of Cussabat and many Libyan-owned olives are well past their period of full production. They are preserved mainly because the farmer cannot afford to replace a tree giving a low but constant yield by a sapling which may never reach maturity. A period of 6 - 7 years is too long for the farmer to wait. Thus, yields of olive oil are very low in Cussabat.

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<sup>ii</sup>

These very old trees are referred to as "Rumi" or Roman.

### 3. Soil nutrient and moisture availability

The nutrient and organic status of the soil is poor, there is very little moisture available to crops even in the rainy season and groundwater resources are barely adequate for population needs in Cussabat. In such conditions the farmer must attempt to provide the optimum amounts of soil nutrients and moisture to his olives by fertilisation, by watering the plants at critical periods or by restricting the number of trees per hectare by the careful spacing of the individual plants.

Most farmers cannot afford fertilisers, and there is little surplus water in most areas for irrigation. Views on the spacing of olive trees differ, but the Italians have adopted the distances specified by Combremont (10) and Vivoli (11) who based their calculations on soil and water conditions in Sicily and Tunisia. They recommended that with a rainfall of 160 - 300 mms. olives should be sown at intervals of 20 - 24 metres, and with a rainfall of over 300 metres at 15 - 16 metres. Olives can be cultivated in Cussabat and north-eastern Tarhuna in systems of 16 x 16 metre plantings and in the rest of Tarhuna in 24 x 24 or 20 x 20 metre systems. In the Italian areas, the spacings are 24 x 24 and 24 x 16 metres on Al Khadra, and 20 x 20 metres on the concession farms. There are thus 17, 24 and

25 trees per ha. on Italian farms. On Al Khadra, the same yields are obtained from a ha. of 17 trees on the 24 x 24 metre system as from a ha. of 24 trees on the 24 x 16 metre system.

The pastoral olives of Cussabat are not regularly spaced and the number per hectare varies. Although there are 30 - 35 trees per hectare in Beni Let, the trees are usually densely grouped. If they were dispersed evenly over the cultivated area, there could be 35 - 40 trees per hectare and yields would probably be higher.

In the Scarp Zone and in parts of the Cussabat Plain, the trees are not evenly spaced because they are planted either in ginanat or terraces to which run off is channelled. Fertility and moisture are renewed from time to time in the terraces and ginanat, but because the trees are too close together yields are not always high. In the Jefara, yields from irrigated olives can be 2 - 4 times as high as those from dryland olives (Table XII - 10) even in a wet year.

Table XII - 10. Yields of dryland and irrigated olives on I.N.P.S. farms in the Jefara, 1956/7 (wet year). Kgs./tree(12)

<u>Settlement</u>	<u>Dry</u>	<u>Irrig.</u>
Olivetti	10.02	44.0
Bianchi	9.02	10.22
Hashian	10.52	20.7
Giordani	9.37	21.2
Micca	10.91	17.1
Corrandini	15.02	40.0

However, in the Eastern Jebel olives in the terraces receive more water than olives on the Cusabat Plain; this is not reflected in yields, because the supply of water depends on the highly variable rainfall. If rainwater were stored and fed to the olives in the long dry periods of the winter, yields would rise.

Olives are often intersown with other tree crops and cereals. The olive takes a long time to mature, so that the Italians usually sowed almonds and vines between the rows of young olives. On Al Khadra, for instance, each farmer had to sow 24 ha. of unassociated olives, 5 ha. of olives and vines and on some farms several ha. of olives and almonds. Thus, in 1936, only 46% of the olives were sown by themselves, on concession farms.

Table XII - 11. Olives and other plants on concession farms in Tarhuna, 1936 (13)

<u>Olives alone</u>		<u>Olives and vines</u>		<u>Olives and almonds</u>		<u>Olives, almonds and vines</u>	
Nos.	Ha.	Nos.	Ha.	Nos.	Ha.	Nos.	Ha.
73,305	3,468.5	52,051	2,051.9	10,330	519.2	1,400	61.4

Most of the vines have been uprooted, but it is clear from figure 33 that many of the olives are still associated. On Al Khadra, 37.2% of the olives are associated with vines or almonds.

Table XII - 12. Olives and other plants, Al Khadra, 1958

<u>Olives alone</u>		<u>Olives and vines</u>		<u>Olives and almonds</u>		<u>Total area</u>	
<u>Area</u>	<u>%</u>	<u>Area</u>	<u>%</u>	<u>Area</u>	<u>%</u>	<u>Area</u>	<u>%</u>
2657.2	62.8	862.0	20.4	701.8	16.8	4221.0	100.0

When the ex-Italian estates at El Gsea and Sidi Essed are finally re-developed, each farm will have 5 ha. of olives, 5 ha. of almonds and 4.25 ha. of vines. This system has been adopted because inter-cultivation lowers the yields of all trees and may eventually lower the total income from tree crops per ha.. Inter-cultivation was encouraged by the Italians simply because the almond and vine matured more quickly than the olive, so that farmers would have some return before the olives became productive. When this occurred the other trees were to be uprooted. This has been done on the concession farms, but some farmers still prefer to associate their tree crops. Association accounts for the high variation in the yield of olives between S.A.F.I.L. and Catarella, for example.

In Cussabat, the olive is rarely associated with other trees, but is always intersown with cereals. This affects yields because (a). cereals rob the soil of nutrients needed by the olive and (b). cereals impair the proper circulation of air in the soil necessary to keep pH values down. Both Italian and F.A.O. experts advocate that there should be no

intercultivation of olives and cereals and that the soil between the trees be regularly cleared of weeds and ploughed.

#### 4. Techniques of cultivation

The olive is propagated by agamic means in both areas and some attempt is made to increase the moisture available to the plant during its first five years. The Italians usually water the young olive at critical periods, but Libyans rely on rainfall, though they attempt to channel run-off to the young tree. However, water is essential during the dry periods of the winter as well as the summer, so that the Libyans who rely on rainfall, get poorer developed trees than Italians.

To ensure the proper percolation of rainwater and the circulation of air in the soil, it is necessary to plough between and around the trees at certain times of the year. The Italians and Libyans plough just after rain begins and 3 - 4 weeks before it stops. Some Italians also plough in the second half of the winter. Whilst Italians plough the whole field of olives, Libyans only plough around the tree itself. This is less efficient, since it only cleans part of the soil, but it is a necessity when someone else owns the land immediately surrounding the tree.

Olives must be pruned every 2 - 3 years to remove dead

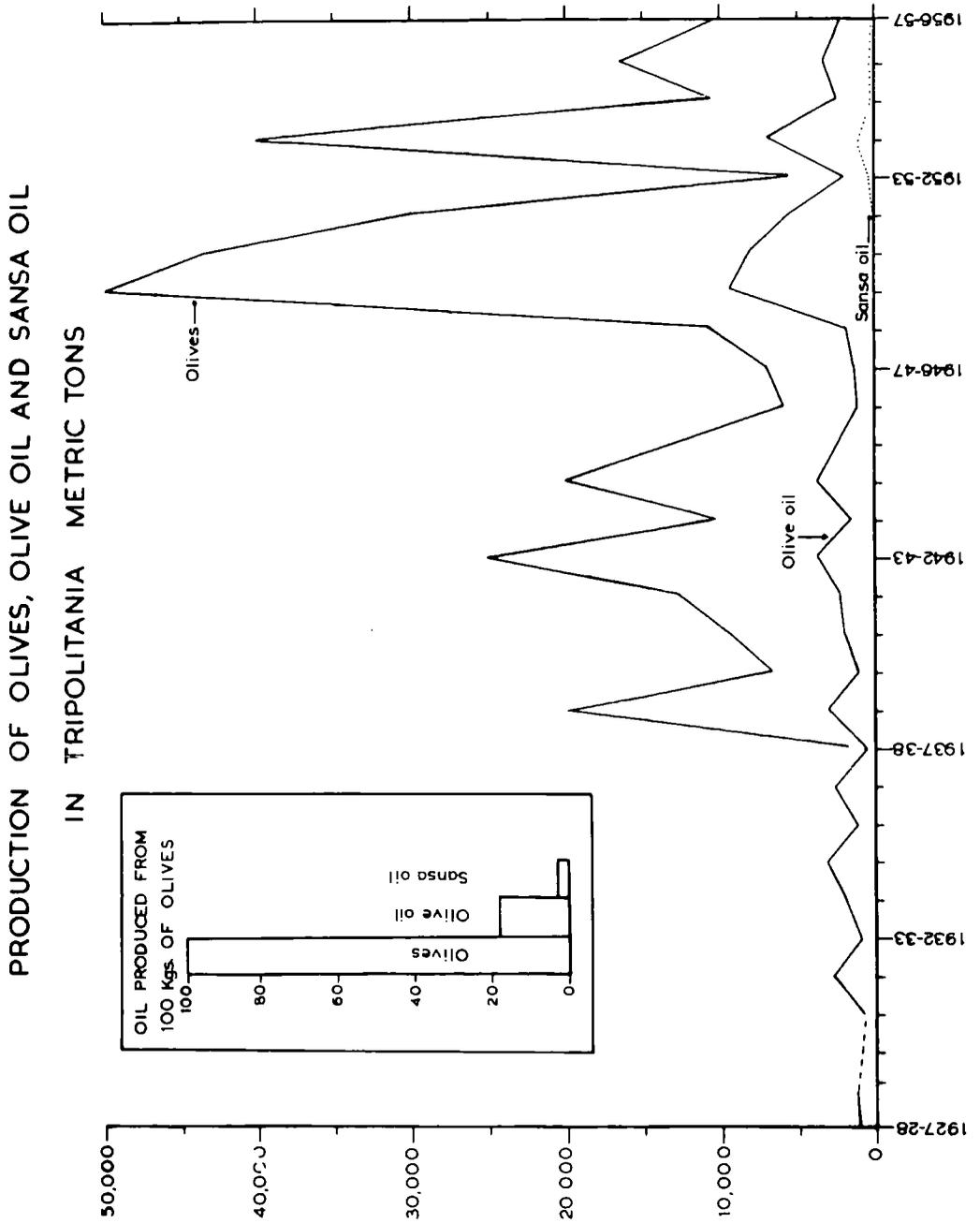
or unproductive branches, to encourage the growth of new branches and to shape the foliage and branches of the tree so that the productive branches have sufficient, but not too much, sunlight. The ideal shape for an olive tree is round compact foliage with one thin but straight trunk. Libyan trees are often huge and unshapely and the older specimens are supported by several trunks. This is because Libyans try to preserve old trees instead of replacing them. They do this by pruning the tree back and eventually removing the central trunk. Libyan methods of pruning often do more harm than good to the olive and impair its productivity.

The Italians harvest the fruit with a special instrument, but Libyans harvest by shaking and beating the branches, often damaging both the fruit and the tree.

#### D. Yields

Yields vary highly from year to year, and from area to area. This is demonstrated by the fluctuation in the production of olives and olive oil in Tripolitania (Fig. 37 and Appendix VIII). In the wet year of 1956/7, the yield in Cussebat averaged 30.4 kgs./tree, in the dry year of 1957/8 only 3.6 and 14.3 kgs./tree in Cussebat and Tarhuna respectively and in the dry/average year of 1958/9, 19.03 kgs. in Tarhuna.

Figure 37.



It is difficult to calculate the exact yield and its variations in Cussabat. 24 farmers in Beni Let and 10 others in Chalfun, Shaffeen and Zaafran were given a questionnaire which asked them to state the total yield of their olive trees in 1957/8 and 1958/9. They answered the question by putting down the total yield of olive oil, which is more important than the weight of olives to the farmers, and most only replied for one year. The results are summarised in Table XII - 13.

Table XII - 13. Yields of olive oil in the Lahmat Orfella, Beni Let, and other cabile, 1957-1958

	<u>Noa. of trees</u>	<u>Olive oil production</u>	<u>Oil/tree (kgs.)</u>
1. Lahmat Orfella, Beni Let			
1	75	370	4.9
2	290	750	2.6
3	250	750	3.0
4	100	370	3.7
5	75	320	4.3
6	40	200	5.0
7	150	750	5.0
8	350	750	2.4
9	390	1080	2.7
10	49	320	6.5
11	10	44	4.4
12	10	30	3.0
13	150	800	3.3
14	400	1000	2.5
15	170	440	2.6
16	<u>60</u>	<u>300</u>	<u>3.8</u>
Total	2,589	8,974	Average 3.06
2. Other cabile			
Shaffeen	400	3,000	7.13
Shiabarna	180	500	
Zaafran	260	480	2.3
Chalfun	150	160	0.2
Smah	600	640	1.2

Yields vary highly, but average about 3 litres of oil per tree. Manetti found that the oil content of Cussabat olives was between 10 and 12% in 1911, but as there are now many modern presses in Cussabat the oil yield is probably 15% - as in Garian and the Jefara (14). Therefore olives yield about 25 - 30 kgs./tree. Farmers in various parts of Cassabat reported yields of between 20 and 35 kgs./tree, though a good tree can give up to 50 kgs.. With about 3 litres of oil and 25 kgs. of olives per tree, one hectare of cultivated trees can produce about 90 litres (83.3 kgs.) of oil and 750 kgs. of olives. These figures may be compared to yields of 300 kgs. of oil per ha. in the Sfax area.

In 1958/9, Italian farmers sent 19,060 qls. of olives to olive factories, where 4,375 qls. of olive oil was pressed. Italian trees give more olive oil than Libyan trees, since the extraction rate is 22.8% compared to about 15% in Cussabat.

Yields of olives from mature Italian trees are higher than from mature Libyan trees. Yields varied from about 25 - 30 kgs./tree on the southern margins of Al Khadra to 55 - 60 kgs./tree on the S.A.F.I.L. estate. Yields per ha. varied highly from farm to farm on Al Khadra, where the large number of immature trees reduced the average yield per tree to 10.10 kgs. in the dry year of 1957/8. In this year,

yields per ha. varied from 120 on the southern margins to about 400 on the central farms. The highest yields were found in the broad east-west central zone of the estate, where the oldest farms and highest number of mature trees are found.

On the S.A.F.I.L. estate, olives gave yields of between 1,000 and 1,200 kgs./ha. or about 220 - 270 kgs. of olive oil/ha.. Yields were lower on the other estates, where many of the trees are still intercultivated and on Fontana Piacenza and Catarella respectively, the yields were 650 kgs./ha and 600 kgs./ha. for olives, and 143 and 130 kgs. for olive oil.

It is interesting to examine the yields of olives and olive oil on cabila land in Tarhuna to find out how they correspond to yields in the zones of sedentary agriculture. For the ten selected cabile referred to earlier, figures for the number of trees over the age of ten and the total olive and olive oil production were collected by the writer.

Table XII - 14. Yields of olives and olive oil in

	<u>Tarhuna, 1958/9</u>				
	<u>Nos. of olives over 10 yrs.</u>	<u>Total olive production (kgs)</u>	<u>Olive oil Production (kgs)</u>	<u>Yields per tree</u>	
<u>Cabila</u>				<u>Olives</u>	<u>Olive oil</u>
Masabha	190	1,500	220	7.9	1.2
Tella	328	5,000	700	15.3	2.1
Auasa	59	2,000	350	33.1	5.9
Msellem	210	6,000	1060	28.8	5.1
Tersoian	341	5,000	850	12.7	2.
Fergian	148	600	120	4.1	0.8
Nahagia	-	-	-	-	-
Darahib	12	700	120	58.3	10.0
Aulad Ali	74	1,200	240	16.2	3.2
Hamamla	28	900	200	32.2	7.
<u>Total</u>	<u>1,390</u>	<u>22,900</u>	<u>3,860</u>	<u>16.5</u>	<u>2.7</u>

Yields in this dry/average year were slightly below the average for Tarhuna (19.03), but the average rate of extraction of olive oil is only 16.3%. The yields may be understated because local varieties often begin to bear fruit after only 7 or 8 years.

#### E. Olive oil production and the olive oil industry

After the harvest, the olives are sent to olive presses where olive oil and sansa are produced. Sansa, which is the residue, is sent to coastal factories where it is again pressed to produce sansa oil.

##### 1. Production

There are no statistics for olive, olive oil and sansa oil production in Tripolitania, but there are estimates. The earliest are those of Ferrara (15), but his figures conflict with those issued by the Nazirate of Agriculture. Though production is affected by the biennial fruiting of the olive, and by rainfall, the output of olives, olive oil and sansa oil is rising (fig. 37). In the three ten-year periods between 1928 and 1958, the highest production figures were as follows:-

1928 - 38	2,800 metric tons
1938 - 48	2,700 metric tons
1948 - 58	9,000 metric tons

Production is rising as Italian trees reach maturity

and as the older olive presses are replaced. Estimates for provincial yields are available for the period 1943/4 - 1951/2 (Appendix VIII A). In a wet year (1943/4), the Eastern Province produced 50 - 60% of Tripolitania's olive oil, but in a dry year (1947/8) production was negligible. The later figures show that Tripoli and the Western Province were becoming the important centre of production.

The Nazirate of Agriculture estimated that olive oil production in the Eastern Jebel was 590 metric tons in 1957/8, of which 437 metric tons came from Tarhuna. In the following year, Tarhuna alone produced 1,413 metric tons. These estimates must be treated with circumspection. Those from Tarhuna are based on the returns of olive presses and are probably reasonable. In the year 1957/8, production in Beni Let averaged about 3 litres/tree. If the same average occurred in other parts of Cussabat, total production would have been about 400 - 440 metric tons. In Tarhuna, S.A.F.I.L. alone produced 300 metric tons of olive oil in the same year.

## 2. The olive oil industry

Most of the olives are pressed locally. The presses are of three types: mechanical, animal and hand. There are 135 mechanical, 108 animal and still 472 hand olive presses in Tripolitania. They are distributed as follows:-

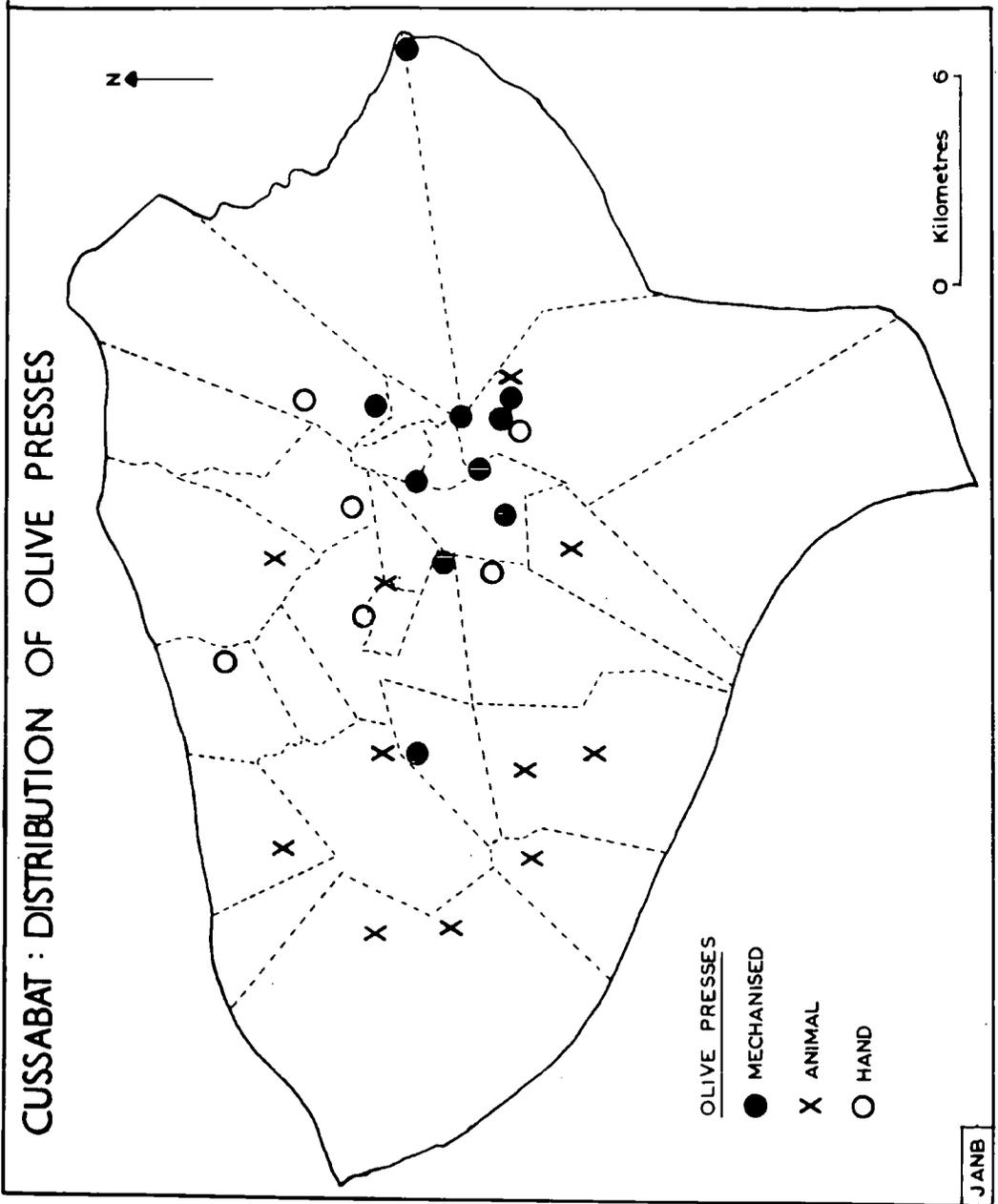
Table XII - 15. Distribution of types of olive pressesin Tripolitania

<u>Type</u>	<u>Tripolitania</u>	<u>Tripoli and Western Province</u>	<u>Eastern</u>	<u>Central</u>
Mechanical	135	77	57	1
Animal	108	29	18	61
Hand	472	7	196	269

Most of the modern presses are on the Jefara, and most of the hand and animal presses in the Central and Eastern Provinces. There are 27 presses in Cussabat and 5 in Tarhuna. Of these, the five in Tarhuna are mechanical and are located on S.A.F.I.L. (2), Fontana Piacenza and Al Khadra (2). The distribution of the olive presses in Cussabat is shown in figure 38. There are 9 mechanical, 6 hand and 11 animal presses. Most of the hand and animal presses have fallen into disuse and many are of great antiquity. They are used mainly in the more isolated areas and have a strictly limited clientele. The modern mechanical presses vary in efficiency but those at Beni Let, Msindara and Gheleel are only 2 - 3 years old and are rapidly taking the market from the older presses. However, outside the Cussabat Plain, olives are pressed on the cabila presses.

In the Cabila Uadna, there are 3 olive presses, two of which are mechanical and the other animal. There are the remains of 3 ancient hand or animal presses in the village.

Figure 39.



One of the modern presses has two crushers with a daily capacity of 200 qls. of olives, and the factory can handle up to 30,000 qls. in a season. Pressing begins in October and carries on until Mid-February. Throughout the season, pressing is continuous in two 12-hour shifts. 7 or 8 men are employed and receive about 80 piastres per day, and the owner of the press is paid the standard rate of 10% of the oil produced. The sansa is always sent to Tripoli.

The animal press in the Cabila Esc-Shaffeen is, like the others, subterranean and is similar to those ancient presses found throughout the Mediterranean. The olives are passed into the chamber through the zuarif into the central chamber. Here, a wooden cylindrical block is revolved around a central circular stone by a lever, which is moved in a clockwise direction by a donkey or a man. The oil passes along a ditch cut in the floor to three small decanting chambers which sort the oil by gravity.

This press works for 60 days from late September with two 12-hour shifts a day. It can handle about 12 qls. of olives per day, with an average seasonal production of 120 qls. of oil and sansa. As in the mechanical presses, the sansa is given to the proprietor of the press together with about 10% of the oil. The sansa is often sold for fuel, though more and more press owners are selling it to sansa presses.

The presses in Tarhuna correspond to the Uadna type except for the one at S.A.F.I.L., which is one of the most up-to-date in Tripolitania. The olives are brought to the delivery plants, of which there are four, and are washed before entering a lift, being weighed and passed into the first of the six crushing plants, one of which is a light pressure crusher, the others crushing the olives at a pressure of 400 kgs./cm. for one hour. The oil collects at the bottom of the crushers, after which it flows through a filter and refining plant which separates the oil from water. The oil collects in six tanks and is allowed to filter into large storage reservoirs beneath the factory. There are ten of these and they have a capacity of 600 qls. each. The oil is loaded by pump into lorries and sold to merchants, and the sansa is sent to Misurata. Modern methods are employed and the factory is scrupulously cleaned. It handles 12,000 qls. of olives between October and February and produces 3,000 qls. of olive oil.

On the whole, the presses are old and inefficient and produce a poor quality, very acid oil. Consumers who use oil for salads and cooking prefer this strong, full-bodied type of oil.

#### F. Consumption

It is difficult to determine how much olive oil is sold

by farmers because statistics in Cussabat are unreliable and because, in Tarhuna, the Italians sell their oil to a number of merchants. However, between 40% and 50% of the oil is sold by the producers in Cussabat. This is deduced from the following factors:-

1. 10% of the olive oil is kept by the owners of olive presses and they sell most of it to merchants. In some cases, the owners of the presses are merchants themselves. Mohammed Khalifa, for example, owns the largest and most efficient olive press in Cussabat and is the largest dealer in olive oil, buying it from both locals and Italians in Tarhuna.
2. 120,660 litres of olive oil were sold at Cussabat market between September, 1958 and June 1959. This represents about 30% of the total production.

Table XII - 16. Quantity of olive oil sold at Cussabat

market, September 1958 - June 1959 (Litres)

September	13,200
October	1,000
November	14,000
December	19,000
January	18,000
February	14,000
March	10,000
April	2,260
May	24,000
June	<u>5,200</u>
<u>Total</u>	<u>120,660</u>

3. Other farmers sell their oil directly to merchants or more occasionally sell them their olives.

4. The questionnaire which was distributed to farmers in Cussabat revealed that only 4 out of 32 farmers did not sell part of their oil. These farmers were full time olive oil producers and not poorer people who would sell very little of their oil. Only two farmers stated how much oil they sold: Miftah Embayer of Beni Let produced 300 litres and sold 140; Ramadam el Bakut, Sheik of Smah, sold 420 out of his production of 700 litres.

5. If 40 - 50% of the produce was sold in 1957/8, there was still enough oil to provide 15 - 20 litres for every person in Cussabat. The production per person amongst the farmers covered by the questionnaire was between 20 and 100 litres, whilst Ramadam el Bakhut and Miftah Embayer retained about 20 litres for each member of their families.

6. Olive oil is the main source of income to most farmers, who must sell oil to buy other necessities. The poorer farmers usually rely on external sources of income for their day-to-day needs.

If about 40 - 50% of the olive oil is sold by producers, then in 1957/8 about 200 metric tons of oil were sold by Cussabat farmers.

Italians sell most of their oil and keep very little for domestic consumption. Nearly the whole production is sold by the concession farmers and demographic farmers keep very

little. Italians have more trees/head of population and their needs for other foods and household goods are greater than those of Libyans. It is impossible to assess how much oil is sold, because most of it is handled by Tripoli merchants. S.A.F.I.L. sold 240 metric tons and Fontana Piacenza 90 metric tons of oil in 1957/8. About 400 metric tons of olive oil are produced for external markets in Tarhuna.

#### G. Marketing

In 1956/57, 50% of the olive oil produced was consumed in Tripolitania, one-third sent to Cyrenaica and the rest exported. As production is increasing and new plantations are being made, the amount available for export will increase, especially since Cyrenaica is aiming to become self-sufficient in olive oil. The Libyan Government is encouraging further exports by fostering the spread of cultivation, abolishing export duties and reducing through G.A.T.T. the import duties imposed by Italy, Libya's main market.

At the present time, production is so variable that it is difficult to know how much is available for export. In 1959/60, for instance, large quantities of olive oil were imported. However, exports are increasing, as the following table shows:-

Table XII - 17. Exports of olive and sansa oil  
(yearly averages)

<u>Period</u>		<u>Olive oil</u>		<u>Sansa oil</u>	
1934-8	300	metric tons	(with sansa)	?	
1948-50	586	"	"	"	?
1950-54	1,228	"	"		431 metric tons
1954-58	2,739	"	"	1,048	" "

Tripolitanian oil is exported in bulk and is often unlabelled and ungraded (the production from S.A.F.I.L. being an exception). The oil has up to 7% acidity and is usually refined again in the importing countries. These facts are reflected both in the low price the oil fetches (18 piastres/litre at Cussabat) and in the imports of good quality olive oil (40 metric tons in 1954/5 and 500 metric tons in 1960/61).

Libya's markets are confined to countries where a strong-smelling, full-bodied, acid oil is appreciated. These countries themselves produce olive oil which severely limits the capacity for export from Libya. Libya's main customer is Italy, which has recently raised the quota of imports from Libya to 2,500 metric tons in 1955/6 and 3,500 metric tons in 1958/9. In 1958/9, the Libyan Government renewed its request to Italy to raise the quota to 10,000 metric tons.

Olive oil exports are important to the economy of Tripolitania and thus to that of the Eastern Jebel. Exports brought revenues of £17,000 in 1956, £161,000 in 1957 and

£11,170,630 in 1958. As olive oil exports are so important to Tripolitania, and as arboriculture will increase in the region under study, it is essential to examine which countries are Libya's main competitors (and also potential markets for low quality oil).

In 1956, the main olive oil producing countries were as follows:-

Table XII - 18. Olive oil producing countries in 1956

<u>Country</u>	<u>(metric tons)</u>	<u>Production</u>
Spain		396,000
Italy		170,000
Greece		163,000
Portugal		93,000
Turkey		90,000
Morocco		35,000
Algeria		26,000

In 1956/7, Tunisia produced 80,000 metric tons of olive oil. Libya in 1958/9, produced only 11.25% of Tunisia's total.

Most of the main producing countries consume the olive oil themselves. Most imports went to the U.S.A. and the main exporting countries were:-

Table XII - 19. Olive oil exports in 1957

<u>Country</u>	<u>(metric tons)</u>	<u>Production</u>
Tunisia		34,000
Spain		22,000
Morocco		20,000
Greece		15,000
Portugal		12,000
Argentina		8,000
Libya		5,000
Algeria		4,000

Thus Libya is one of the main exporting countries, but is completely overshadowed by its western neighbour. However, exports will increase and may reach at least 10,000 metric tons by 1970.

#### H. Olive oil and the local economy

The olive oil produced by Libyans is of poor quality and therefore receives a low price. Between 1956 and 1960, the cost of olive oil varied from 16 to 20 piastres and has not risen significantly. The olive oil sold at Cussabat fetches only 18 piastres, a lower price than that of oil produced in Tarhuna. This means that a tree, on average, yields 54 piastres and ten trees £L5.4. The average income per head is, thus, £L5.4 and per ha. £L16.2. The normal family of 5 - 6 people with 51 - 64 olives only receives £L80.2 - £L107.2 per annum. The average per capita income varies from only 162 piastres at Shaffeen to 1,458 piastres at Luata. It is interesting to examine the average income from olive cultivation on 13 farms at Beni Let.

Table XII - 20. Income from olive cultivation in Beni Let

<u>Farm Nos.</u>	<u>Size (ha)</u>	<u>No. of people it supports</u>	<u>Olive oil income (£L)</u>	<u>Income/ha. (£L)</u>	<u>Income/person (£L)</u>
1	5	9	66.60	13.32	7.40
2	16	14	135.40	8.50	9.60
3	25	14	135.40	5.42	9.60
4	16	8	66.60	4.17	8.33
5	20	5	57.60	2.88	11.54
6	15	10	63.00	4.20	6.30

Table XII - 20 (Contd).

<u>Farm Nos.</u>	<u>Size (ha)</u>	<u>No. of people it supports</u>	<u>Olive oil income (£L)</u>	<u>Income/ha. (£L)</u>	<u>Income/person (£L)</u>
7	20	4	135.40	6.77	33.35
8	20	2	135.40	6.77	66.70
9	30	15	194.40	6.48	12.94
10	5	5	57.60	11.52	11.52
11	2	9	7.92	3.96	0.88
12	10	3	5.40	0.54	1.80
13	20	5	144.00	7.20	28.80
<u>Total</u>	<u>204</u>	<u>103</u>	<u>1,204.72</u>	<u>Average 5.8</u>	<u>Average 11.5</u>

Family income (gross) from olive cultivation varies from £L5.4 to £L194.4 and averages £L91.28. The income per ha. of farmland is low and averages only £L5.8, being highest on fairly small farms and lowest on very small and very large farms. Income per capita averages £L11.5 and is highest on the larger farms. The importance of olive cultivation to these families is demonstrated by the following table, which shows the total gross income from cultivation and pastoralism:-

Table XII - 21. Gross income from cultivation and pastoralism in Beni Let in £L.

<u>Farm Nos.</u>	<u>Gross Income</u>				<u>Total</u>	<u>Income per</u>	
	<u>Olive oil</u>	<u>Cereals</u>	<u>Other trees</u>	<u>Animals</u>		<u>ha.</u>	<u>per head</u>
1	66.6	26.9	-	55	148.5	24.5	13.6
2	135.4	18.6	0.4	60	214.4	13.4	15.3
3	135.4	14.9	-	85	235.3	9.2	16.7
4	66.6	14.85	-	-	81.45	5.1	10.2
5	57.6	18.9	-	-	76.5	3.8	15.2
6	63.0	19.52	-	60	142.52	9.5	14.5
7	135.4	11.05	-	-	146.45	7.3	38.6
8	135.4	14.5	2.0	-	151.9	7.6	75.9
9	194.4	48.6	1.5	25	269.5	8.9	17.8

Table XII - 21 (Contd).

<u>Farm Nos.</u>	<u>Olive oil</u>	<u>Gross Income</u>			<u>Animals</u>	<u>Total</u>	<u>Income</u>	
		<u>Cereals</u>	<u>Other trees</u>				<u>per ha.</u>	<u>per head</u>
10	57.6	18.9	-	-	76.5	15.3	15.3	
11	7.92	6.75	-	-	14.67	7.3	1.5	
12	5.4	5.3	-	-	10.7	1.7	3.6	
13	<u>144.0</u>	<u>40.53</u>	<u>-</u>	<u>-</u>	<u>184.53</u>	<u>9.4</u>	<u>36.9</u>	
Total	<u>1204.72</u>	<u>259.30</u>	<u>3.9</u>	<u>285</u>	<u>1752.92</u>	<u>8.5</u>	<u>15.9</u>	

Average family income is about £L133.26, and 68% of this is derived from olive oil. Incomes per head averaged £L15.9 and incomes on most farms were near this figure, with the exception of three large and two small farms. Income per ha. of farmland averaged £L8.5, being high on medium sized and low on small sized farms. In an area like Cussabat, large farm units are necessary.

It is difficult to compare gross incomes in Cussabat with those of semi-nomadic and Italian areas, because the former consists of arid and semi-arid zones integrated through animal movement and the latter large farm units. With yields of 130 - 270 kgs. of oil on the concession farms the income from 1 ha. of olives varies from £L16 to £L54. The average income per ha. on S.A.F.I.L. is about £L20 - £L30, twice as high as from Libyan farms in Beni Let. Incomes per ha. are lower on Al Khadra and the other concession farms, but almonds, vines and cereals are also cultivated.

The following table shows the gross income per ha. and per capita in ten selected cabile in Tarhuna (see Chapters XIII and XIV).

Table XII - 23. Gross incomes in ten selected cabile.

Cabila	Income per head (£L)			Income per ha. (£L)		
	Animals	Cereals	Total	Animals	Cereals	Total
Masabha	5.6	0.65	6.25	1.13	0.14	1.27
Et Tella	5.3	0.34	5.64	1.12	0.08	1.20
Auasa	6.6	0.43	7.03	1.67	0.16	1.83
Msellem	5.6	0.22	5.82	2.97	0.13	3.10
Terscian	29.5	0.00	29.50	5.31	0.00	5.31
Fergian	10.0	0.54	10.54	1.41	0.08	1.49
Nahagia	5.5	1.07	6.57	0.72	0.13	0.85
Darahib	5.0	0.82	5.82	0.68	0.16	0.84
Aulad Ali	4.0	1.07	5.07	0.54	0.16	0.70
Hamamla	9.03	0.73	9.76	3.11	0.08	3.19

In the same year, income per ha. and per head were much higher in Beni Let, except in the Cabile Fergian and Hamamla, which have adopted extensive sheep husbandry. However, in cabile with their lands situated in the humid area - Masabha, Tella, Auasa and Msellem - income from pastoralism was very low. These cabile have adopted tree cultivation, which means that their actual income is fairly high, but below that of Cussabat. In the humid and semi-arid plateau areas of the Eastern Jebel olive cultivation, even if it is as primitive as that of Cussabat, is more profitable than pastoralism. Where olive cultivation is not possible, more sheep must be introduced to raise income. Income from tree cultivation could be raised if Italian methods were employed.

## I. Conclusions

The olive tree is ecologically well adapted to conditions in the Eastern Jebel, where it has been in cultivation since Phoenician times. During the Roman period, olive cultivation extended over most of Tarhuna and El Amamra, but retreated to the Cussabat area as a result of the Arab invasions. Cussabat remained an important olive production area and today is the main centre of native Libyan cultivation. Between about 1920 and 1944 the number of olive trees in Tripolitania and the Eastern Jebel increased tremendously, largely as a consequence of Italian colonisation. Though the numbers declined after 1944, olive cultivation is again extending in both the Jefara and the Eastern Jebel. Cultivation is becoming important on cabila land in Tarhuna, because pastoralism is declining as a result of both emigration and the low income obtained from animal husbandry. Even in a fairly dry year cultivators at Bent Let received higher incomes per ha. of land and per head of the population from olive cultivation than pastoralists did from their animals in Tarhuna. The large number of other tree crops being cultivated in Tarhuna partly reflects the need for alternative sources of income while olives are immature and partly the fact that olives are being inter-cultivated with other crops in the ginanat. Farmers must abandon the ginanat for the Italian systems of farming because

the ginanat are so densely cropped that many plants die and the survivors give very low yields.

Tribesmen in Tarhuna are becoming 'psychologically' adapted to cultivation, especially in cabile affected by Italian colonisation. The readiness of tribesmen to cultivate must be encouraged by the Government. At the same time, the Government should help farmers to raise yields in both Tarhuna and Cussabat. The Italian farmers have demonstrated that if proper techniques are used high yields can be obtained. Despite the fact that the rainfall in the Italian zone is lower than that of Cussabat, Italian farmers obtain much higher yields than Libyans.

The Government could encourage the extension of olive cultivation and the improvement of yields by education and demonstration, the distribution of young trees at nominal prices, the granting of short term loans to farmers who wish to plant young olives or replace old ones, and the establishment of centres where modern pruning, harvesting, ploughing and other implements could be sold, hired or given to tribesmen. Co-operative centres have already been established in Garian and the Jebel Nefousa, and more could be set up in the Eastern Jebel. Co-operatives might prove to be the best means of extending and improving cultivation in view of the small size and fragmentation of land holdings, and the poverty of the tribesmen.

The whole olive oil industry needs reorganising. The primitive hand and animal powered presses should be scrapped and replaced by a few large modern units situated near the main Tarhuna-Cussabat road. Alternatively, large presses could be built at Tripoli with collecting centres in the Eastern Jebel and Jefara and small but modern presses dealing with olive oil for the local market. Libyan oil cannot compete successfully with oil from other producing countries unless its quality is improved and the oil properly labelled and graded. If this is done, farmers and press owners would receive higher prices for their oil.

Government action is needed, as it is doubtful if the individual farmer will have much enthusiasm for reorganisation in view of the fluctuating production of olive oil. The Government could finance a policy of expanding and improving olive cultivation and olive oil from revenues received from the fuel oil industry. Again, only the Government could ensure that olive cultivation is confined to the areas where it is profitable and that zones are reserved for pastoralism, which is more productive than olive cultivation over large parts of the Ghibia.

CHAPTER XIIIPASTORALISMA. Introduction

Despite recent trends towards more agriculture, and increasing emigration from semi-nomadic pastoral areas to towns, livestock remains one of the pillars of the Libyan economy. 80% of the utilised land in Tripolitania is composed of rough grazing; 25% of the population reside in pastoral areas, and though much of the livestock production is consumed locally, the value of animal, meat, wool and leather exports totals about £1220,000 per annum. The principal areas of livestock production are the nomadic and semi-nomadic zones of the arid Jefara and Ghibla, which are separated by the semi-arid Jebel. Tarhuna, which lies in the semi-arid area, is the gap which joins and integrates the Jefara and Ghibla. Some tribes in Tarhuna, for example, own land in the Jefara, Jebel and Ghibla. About half of Tripolitania's livestock is found in the Jefara or coastal areas and about 30% in the Ghibla. The rest are found in the Jebel and half of these are in Tarhuna. Cussabat has few animals, and most of Msellata's livestock is located in El Amamra, which is an easterly projection of Tarhuna.

Pastoralism was finally established in Tarhuna and El Amamra by the 13th century, and between then and the beginning

of the 20th century it completely dominated the economy of the tribes. Since 1911, pastoralism in Tarhuna has been forced to compete with agriculture for land and with the towns for labour; it has lost and still is losing to both. Previously, the animals were the wealth, food and bargaining power of the tribes, and the flocks combined the roles of larder, bank and stock exchange of modern society. If a man needed money he sold a sheep; if he had some to invest he bought a sheep. The goats provided him with meat and milk and the sheep's wool with clothing. Today, the tribesmen are rejecting pastoralism for agriculture and urban employment. Migrant labourers send money back to their families, many of whom only keep a few sheep to provide the basic necessities. Returning migrants often invest their savings in olive trees. As tribalism is losing its vitality, so pastoralism is losing pre-eminence. It will be shown that this situation has been brought about not only by external developments, but also because of the low yields and income from animal husbandry, and the waste of valuable soil resources.

B. The animals: breeds and characteristics

The animal herds in the Eastern Jebel are made up of sheep and goats, with some cattle and camels. In addition, there are a few horses, donkeys and poultry.

1. The sheep

Sheep are the main commercial animals and are kept for their wool, meat and skins, which are usually sold, and their milk, which is consumed locally. Nearly all the sheep belong to the fat-tailed Barbary breed, which is found throughout the Middle East and North Africa, but which was probably introduced to Libya by the Romans (1). The Barbary sheep are well adapted to the climate and vegetation conditions. They are medium sized animals, about 60 - 70 cms. in height, with a round rather squat body and strongly jointed legs. In size and build, they are adapted to considerable abuse and can withstand the continuous movement over large areas necessary in the Eastern Jebel.

The fat tail, characteristic of this breed, consists of equal parts of fat and water for body metabolism. This means that the sheep can thrive on green pasture without access to water and can survive on coarse browse during the summer if watered at intervals of 2 - 3 days (2). The concentration of fat in the tail, which can weigh up to 4 - 5 kgs., allows heat to radiate freely from other parts of the body. This is an important feature in an area with high summer temperatures and little shade (3).

Despite the harsh environment, the Barbary sheep give high meat yields and young lambs can weigh 20 kilos. at 3 - 4 months,

whilst mature ewes and rams weigh on average 30 - 35 kilos. and 40 - 60 kilos. respectively. On the other hand, this breed gives poor milk yields and produces only carpet or semi-improved wools. Despite this, Grandstaff believed that "from the standpoint of productive capacity, the Barbary sheep is definitely superior to other types of native livestock and affords a desirable base for future improvement" (4).

## 2. Goats

Goats are very numerous in Tripolitania, except in the coastal districts, where they are being replaced by cows. Goats are kept for their milk, meat, hair and hides but, unlike the sheep, their products are consumed mainly by the local population. Little is known about the indigenous goat, but Pucci (5) believes that it is related to the famous Capra hircus Kelleri breed. It is a medium sized animal, about the same height as the sheep, but it is thinner, weighing only 30 - 35 kilos when mature. Its chief merits are its resistance to abuse and its ability to thrive on the unpromising vegetation. The local shepherds say that the goat eats a much greater variety of plants than the sheep, even the sparse Garrigue of the steep slopes in northern Tarhuna. Because of these features and its role as a milk and meat producer, the goat plays a smaller part in transhumance than the sheep. Small herds of goats often remain with the pastoral family throughout the year.

The goat is a good milk producer and can give up to 150 litres per season. Lately, there has been a growing demand for goat skins and hair, and more goats are now slaughtered each year. Nonetheless, there are too many goats in Tripolitania and they are chiefly responsible for overgrazing and the decline of the range.

### 3. Camels

The Eastern Jebel lies outside the main camel breeding areas of Tripolitania, which are located in the Syrtica and Orfella. There are few camel herds, but many families keep one or two camels for draft purposes. The Tripolitanian camel is the dromedary, of which there are three breeds: one for draft work, one for speed and an intermediate type. The first breed is found on the coast, the second in the Orfella and desert and the third in the zone between: the Jebel. The coarse-skinned camels of Tarhuna are bred to withstand heavy burdens and long distances, and they are able to do without water for several days, which makes them particularly useful in the summer months.

### 4. Cattle

Cattle are important in the areas of sedentary cultivation, but few are found in nomadic areas. There are as many cattle in Cussabat as in Tarhuna. Nevertheless, cattle are

becoming more important in both areas. The number of sheep, goats, and camels fell between 1957 and 1959, but the number of cattle rose. This trend has been found in other areas when society is becoming less nomadic (6).

Tripolitanian cattle belong to an indigenous breed found all over North Africa and are small light brown horned animals. They give poor milk and meat yields, but are still highly prized. Cattle are kept at a low nutritional plane and few take part in transhumance. The Libyan Government has been seeking to raise milk yields by crossing the local breed with Pantellerians, Brown Swiss, Frisians, Zebu and Kenanas, but has not yet found a satisfactory cross.

#### 5. Other animals

The donkey is an important beast of burden and means of transport. Donkeys are thus numerous and despite their small size, can carry loads of over 2 cwt.. Some have recently been crossed with Sicilian Regua Jacks and Pyrenean Jacks.

The horse is a symbol of prestige like the car of urban societies. They are fairly numerous but of no real importance. There are virtually no mules, because the Arabs dislike defiling the noble horse by crossing it with the abused ass.

Apart from these animals, nearly every household possesses a few black chickens which give small eggs.

## 6. State of the animals

Deficiency diseases are very common, but often go unobserved because of inadequate veterinary services. Ecto-parasites of stock are particularly troublesome and the main recorded diseases are:

Psoroptic Mange  
Sarcoptic Mange  
Tuberculosis

In 1950, foot and mouth disease was recorded, but the country is so far free from major epidemics.

## C. Animal numbers and distribution

There are no statistics of livestock numbers; only estimates based on tax returns. The tax returns deal with mature animals, the number of young animals being calculated by an 'intelligent guess'. The only census of livestock was made by the Italians in 1928, when there were one million animals in Tripolitania. A later sample census in 1930 showed that there were then 1.5 million, of which 56% were sheep (7). Government estimates for the years 1943 - 1956 are shown in Table XIII - 1 and graphed in fig. 40.

# LAND USE IN TARHUNA

-  ZONE OF WINTER PASTURE
-  MAIN AREAS OF CEREAL CULTIVATION
-  CONCESSION FARMS
-  ZONE OF SUMMER PASTURE
-  SHIFTING CULTIVATION & GOAT PASTURE
-  DEMOGRAPHIC FARMS
-  STATE LAND

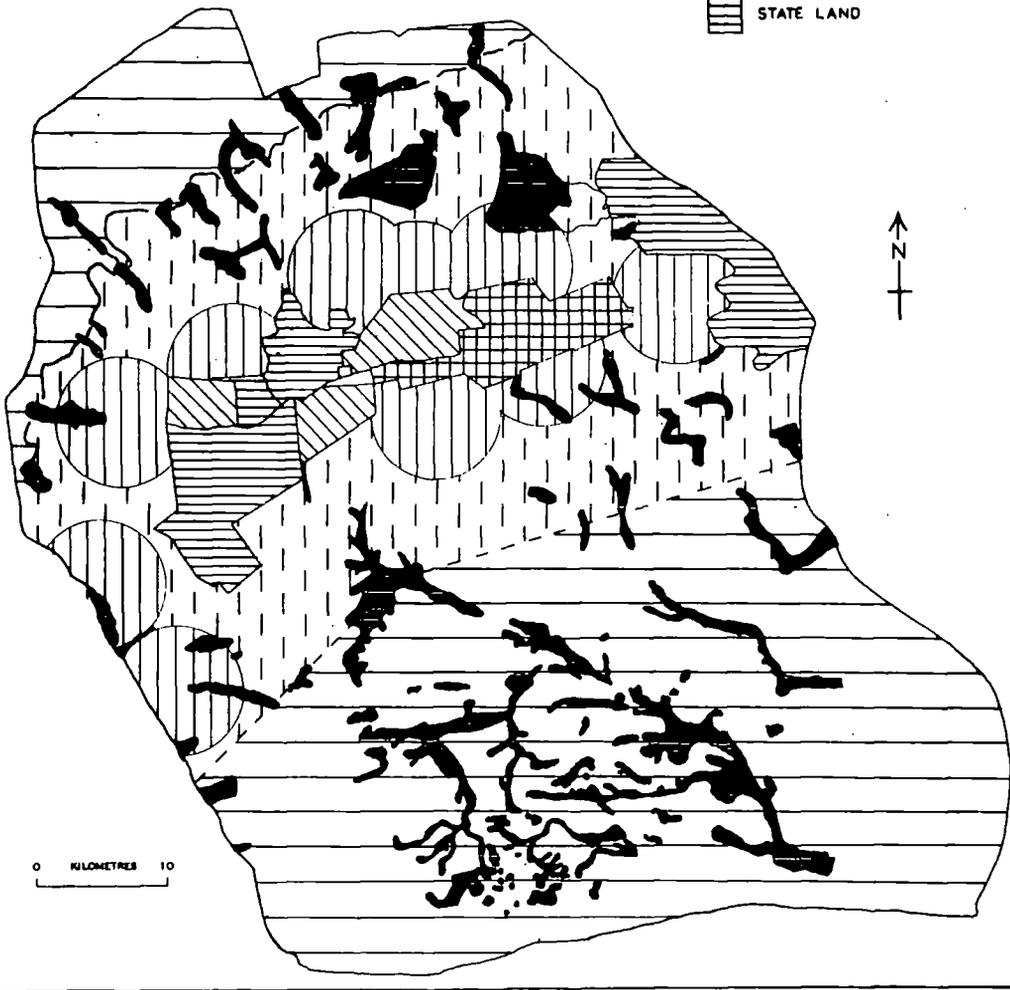


Figure 40..

### Nos. of sheep and goats in Tripolitania

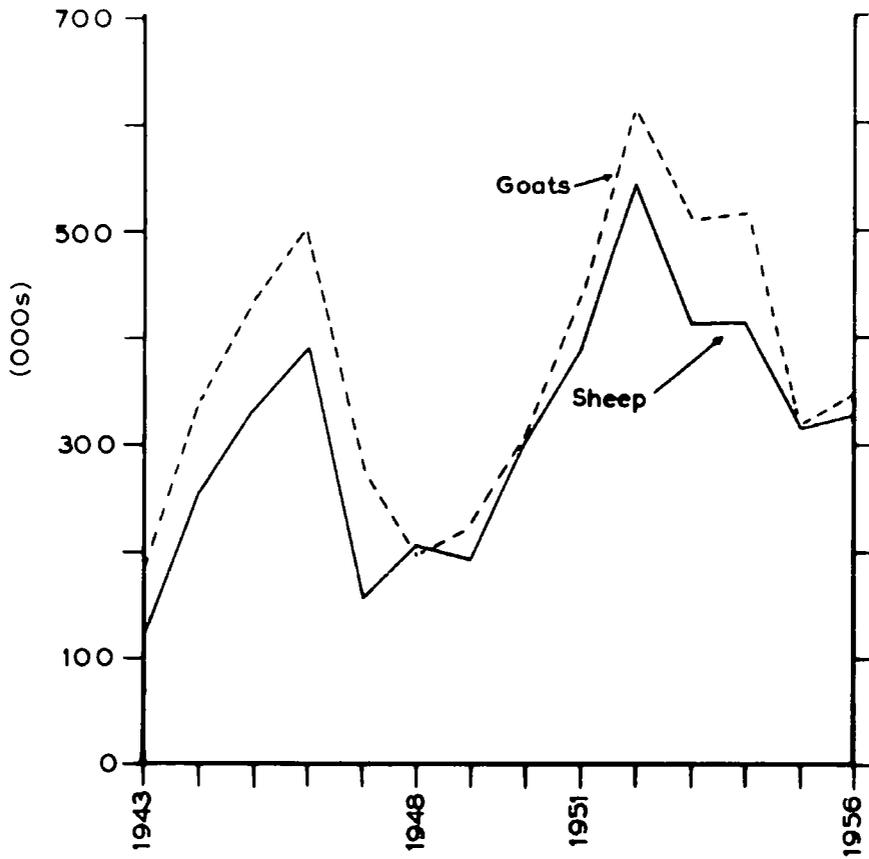


Table XIII - 1. Livestock numbers in Tripolitania.1943 - 1956

<u>Year</u>	<u>Sheep</u>	<u>Goats</u>	<u>Cattle</u>	<u>Camels</u>	<u>Donkeys</u>	<u>Horses</u>	<u>Mules</u>
1943	128,000	161,000	23,000	23,000	15,000	4,700	700
1944	250,000	333,000	31,000	35,000	24,000	3,600	1,200
1945	330,638	430,568	32,100	56,979	29,000	6,000	1,700
1946	385,506	501,880	31,553	55,791	27,000	5,700	800
1947	254,944	267,384	32,050	54,011	25,000	5,000	1,000
1948	207,701	202,107	21,069	66,239	27,000	5,000	1,400
1949	194,000	221,035	35,382	52,730	20,900	4,700	1,200
1950	300,000	308,000	29,188	64,065	28,000	5,200	1,200
1951	390,687	433,424	38,705	61,311	19,000	5,500	1,500
1952	531,860	601,180	53,937	64,900	29,500	6,000	1,200
1953	419,000	514,000	43,000	61,000	29,800	5,800	1,300
1954	416,000	514,000	35,000	52,000	28,600	5,400	800
1955	318,000	322,000	33,500	39,000	?	?	?
1956	326,000	344,000	?	?	?	?	?

The numbers fluctuate violently from year to year, and these variations are related to rainfall. In the dry year of 1946/7, there were only 255,000 sheep and 267,000 goats; in the wet year of 1949/50 there were 300,000 sheep and 308,000 goats. The violent fluctuations reflect the fact that in a wet year pastoralists expand their capital to the upper limit of water and pasture resources, but in a dry year are forced to liquidate their capital as pasture and water is restricted. Unfortunately, most pastoralists retain their animals for too long a period in dry years, so that many die. There appears to have been no startling increase in animal numbers over the 30 year period 1928 - 1957. 1928 was a wet year, whilst in the average year of 1952 there were more

than 1.4 million animals in Tripolitania. There has, however, been a steady increase in numbers since 1943. During the war, the Axis powers slaughtered 30 - 40% of native livestock for leather. \* Since then, animal numbers have risen from an average of 280,000 sheep and 320,000 goats in the period 1943 to 1950 to 380,000 sheep and 420,000 goats between 1951 and 1956.

The most significant trend within the last 30 years is the increase in importance of the goat. In 1928 and 1930, 54% and 56% of all animals were sheep. Between 1944 and 1950 goats accounted for 55 - 56% of all animals and even today over half of all animals are goats. Despite this trend, goats are more affected by drought than sheep. Though the numbers of both animals contract sharply in dry years, there were fewer goats than sheep in the dry year of 1947/8.

Figures for the provincial distribution are available for only one year, 1952 when there were 501,180 goats and 531,860 sheep in Tripolitania. The distribution in this somewhat exceptional year was as follows:-

Table XIII - 2. Provincial distribution of sheep and goats in

<u>Tripolitania, 1952</u>		
<u>Province</u>	<u>Nos. of sheep</u>	<u>Nos. of goats</u>
Tripoli & Western	128,844	173,367
Eastern	315,590	288,269
Central	87,426	140,544
<u>Total</u>	<u>531,860</u>	<u>602,180</u>

\* Rennel of Rodd: British Military Administration (?)

In this wet year, the Eastern Province was the most important producing area with 59.3% of Tripolitania's sheep and 37.9% of its goats. In 1952, Tarhuna was much more important for goats than for sheep, with more goats than any other district in the Eastern Province, but with less sheep than the districts of Homs/Cusseabat, Zliten and Sirte.

Table XIII - 3. Distribution of sheep and goats in the Eastern Province, 1952 (8)

<u>District</u>	<u>Nos. of sheep</u>	<u>Nos. of goats</u>
Misurata	44,491	20,031
Zliten	66,614	33,623
Homs/Cusseabat	65,783	63,251
Tarhuna	53,776	80,079
Beni Ulid	20,627	40,036
Sirte	64,299	51,249
<u>Total</u>	<u>315,590</u>	<u>288,269</u>

The number of sheep and goats in Tarhuna in recent years was as follows:-

Table XIII - 4. Nos. of sheep and goats in Tarhuna in selected years

<u>Year</u>	<u>Nos. of sheep</u>	<u>Nos. of goats</u>
1928	55,830	52,662
1950	48,000	74,000
1952	53,776	80,100
1954	47,000	69,000
1956	50,000	80,000
1957	41,000	56,000
1958	27,000	41,400
1959	42,310	51,030

The figures show the fluctuation in numbers from year to year and the increased importance of the goat compared to the sheep since 1928. Figures for Cussabat are usually included with Homs, but in 1959, there were approximately 12,000 sheep and 6,000 goats in Msellata; in 1928, there were 16,800 sheep in Msellata. Figures for other breeds of animals are available for 1958, when they were as follows:-

Table XIII - 5. Numbers of camels, cattle, horses and donkeys in Tarhuna and Cussabat, 1958

<u>Animal</u>	<u>Tarhuna</u>	<u>Cussabat</u>
Camels	3,411	929
Cattle	1,087	1,091
Horses	431	294
Mules	431	?
Donkeys	1,709	1,475

It is difficult to calculate regional variations within the Eastern Jabel, because the data is limited. In 1959, animals were distributed in Tarhuna as follows:-

Table XIII - 6. Distribution of animals in Tarhuna, 1959

<u>Mudiriat</u>	<u>Sheep</u>		<u>Goats</u>		<u>Camels</u>		<u>Cattle</u>	
	<u>Nos.</u>	<u>%</u>	<u>Nos.</u>	<u>%</u>	<u>Nos.</u>	<u>%</u>	<u>Nos.</u>	<u>%</u>
Aulad Msellem	20,150	46.5	24,140	47.2	1,770	43.0	740	43.1
Aulad Mahareff	12,010	28.5	13,800	26.8	790	19.2	150	9.0
El Hawatem	3,780	8.9	4,460	8.6	680	16.5	300	18.0
Ed Darahib	6,370	16.1	8,630	17.4	870	21.3	520	30.9
<u>Total</u>	<u>42,310</u>	<u>100.0</u>	<u>51,030</u>	<u>100.0</u>	<u>4,110</u>	<u>100.0</u>	<u>1,710</u>	<u>100.0</u>

Over 43% of each type of animal is found in the Aulad Msellem, but there were comparatively large proportions of camels and cattle in the peripheral and poorer mudiriats of the El Hawatem and Ed Darahib.

#### D. Animal density

The distribution of animals may only be satisfactorily studied in terms of area and population. Unfortunately, the mudiriatic areas are too large, whilst there is not a complete statistical cover by cabila. To offset these factors, a sample survey in ten selected cabile was made in 1960. The sample was taken in April after a low/average year of rainfall and covered approximately 15% of Tarhuna's sheep, 25% of its goats, 13% of the cattle and 30% of the camels. The totals are shown in Appendix Ka.

Table XIII - 7. Density of sheep and goats in ten selected cabile, Tarhuna, 1960

<u>Cabila</u>	<u>Nos. per sq.km.</u>	
	<u>Sheep</u>	<u>Goats</u>
Aulad Ali	6.0	8.0
Nahagia	8.9	9.2
Darahib	5.0	14.3
Auasa	20.1	22.1
Fergian	18.0	17.0
Et Tella	10.4	20.6
Masabha	10.0	24.4
Msellem	35.3	40.3
Hamamla	42.0	33.9
Terscian	26.7	136.6

The cabile fall into four major groups. A fifth composed of the Cabila Terscian is definitely atypical. The four major groups indicate tentative regional variations in animal distribution. These are:-

(i) Low density zone of the western dip slope. This is an area of low rainfall and it also includes several large cabile with low population densities.

(ii) Medium density zone of the eastern dip slope. In this area, rainfall is higher, so that more animals may be supported by the vegetation. The cabile also share the springs of Gasr ed - Dauum, which give a steady and perennial flow of water.

(iii) High density zone of the northern edge of the dip slope. Cabile in this zone lost large areas of land to the Italians. However, population did not decline so that today a large number of animals are found on the small area of pasture.

(iv) Low sheep but medium goat density zone. This area lies in the Scarp and Basin Zones of Tarhuna, where cabile are forced to send a small number of animals to the distant Ghibla pasture or to the limited winter grazing areas of the Jefara. As a result, transhumance is not so important among the cabile and relatively few sheep are kept. The goat, which is more sedentary than the sheep, increases in importance.

### 1. Animals and people

As the animals are the main source of income, it is essential to know how many animals there are to each person.

There are very few animals per person in the Eastern Jebel. The highest number of sheep and goats found in Tarhuna in any recent year was 50,000 and 80,000 respectively in 1956. This means that in the best recent year there were only about five sheep for every three people and two goats to every one person. The figures for Cussabat in 1958 were 6 sheep and 3 goats to every 10 people.

To find out how these figures varied within Tarhuna, the man/animal ratios in ten cabile were calculated.

Table XIII - 8. Man/animal ratios in ten selected cabile, Tarhuna, 1960

<u>Cabila</u>	<u>Nos. of people per animal</u>			
	<u>Sheep</u>	<u>Goats</u>	<u>Cattle</u>	<u>Camels</u>
Aulad Ali	2.5	1.5	114	5
Darahib	2.5	1.0	31	11
Nahagia	1.5	1.3	-	10
Masebha	2.0	0.9	28	23
Et Tella	2.0	1.1	23	19
Msellem	1.8	1.7	25	20
Auasa	1.6	1.4	25	25
Hamamla	0.8	1.1	28	12
Fergian	0.7	0.9	71	16
Tersoien	1.2	0.2	15	15

The man/animal ratios fall into four main groups, only two of which directly correspond with those groups calculated

on density. In eastern Tarhuna, the cabila groupings change to give a pattern of few animals per person in the Auasa and Msellem compared to the Hamamla and Fergian. However, the latter two cabile have more sheep than goats, which indicates that the tribesmen are concentrating on commercial stock raising rather than subsistence pastoralism. On the other hand, the density of population is extremely high in the Auasa and Msellem, which also have a much larger area of land in tree cultivation than the Hamamla or Fergian. This shows that pastoralism is being rejected in favour of agriculture by some tribesmen, as a result of population pressure on grazing and water resources. The cabile of south-west Tarhuna and of the Scarp and Basin Zones are sparsely populated and still rely on subsistence pastoralism with some tree cultivation in the Scarp Zone (Masabha). The Nahagia of central Tarhuna are still mainly pastoralists. This is shown by the absence of any cattle or trees (Table XIII - 8) and the relatively high man/camel ratio. The man/camel and man/cattle ratios further emphasise the difference between the two groups in eastern Tarhuna.

## 2. Flock size

The theoretical distribution of animals in relation to men and land indicates that the average family of five or six persons would have only between 2 to 6 sheep, and 4 to 6

goats on which to exist, in addition to barley and wheat. There would be about one cow to every 3 to 20 families and one camel for every 2 to 4 families. In practice, however, flocks are larger. According to the local yardstick, a family of 5 - 6 can live at subsistence level on about ten sheep; it can live well on 50 and very well on 100. Despite the low man/animal ratios, it was found that most families own between 10 and 20 sheep, and about 20 - 40% of the population live on less than 10.

Table XIII - 9. Flock size in six lahmat, Tarhuna, 1960<sup>\*</sup>

<u>Cabila</u>	<u>Lahmat</u>	<u>Nos. of Flocks</u>	<u>Size of flocks (sheep)</u>				
			<u>0-10</u>	<u>11-20</u>	<u>21-30</u>	<u>31-50</u>	<u>Over 51</u>
Maharref	Malte	19	10	24	46	15	5
Guazi	Decalia	24	20	50	25	5	-
Auasa	Risalia	5	35	50	10	-	5
Auasa	Habasha	9	45	40	10	5	-
Auasa	Abā el Crim	4	40	35	25	-	-
Maragnat		28	35	45	15	-	5
Case samples (sheep)		20	10	60	20	-	10
Goats		20	30	60	-	-	10
Camels		20	90	10			
Cattle		20	100				

There are thus relatively few large flocks of sheep, and most people seem to own between 5 and 20 sheep. The discrepancy with the man/animal ratios is very important, as it reflects the increasing dependence of many tribal families on income

<sup>\*</sup> Communications from Sheiks.

from outside sources. It also shows that the migrants do not always re-invest their money in stock-raising and seem prepared either to live on the cash in the knowledge that they still have some land if anything goes wrong, or to invest their money in agriculture, where the returns are greater over a long period of time. This same problem has been identified in other parts of Africa and means that a part of Libya's limited resources are not being fully exploited.

Very few farmers in Cussabat own any sheep or goats. Most farmers keep their animals in a cabila flock which is usually looked after by a shepherd from the el Amamra.

#### E. Pastoralism and resource use

The pastoralists integrate the environmental resources, which are grazing land and water, through movement. The need for movement is determined by the needs of the animals, the climatic and vegetation regimes and the distribution of watering points.

The animals can thrive on green pasture without access to drinking water, but in the hot dry summers the coarse browse must be supplemented with regular watering of the stock. In a good year the winter vegetation is sufficient to sustain the animals in all parts of the region, with the exception of the thin Garrigue and degraded pasture of the steeply sloped

Scarp Zone. The pasture withers in the summer, so that the animals must remain within about 5 kilometres of water.

Continuous water supply is restricted to the central zone of the Eastern Jebel between Gasr ed Dauum and Biar Milgha. Hence, this zone is used for summer pasture by most flocks and herds. This zone, as well as the Basin Zone to the north, are the 'homelands' of the tribesmen and the main areas of cereal cultivation. The best areas of winter pasture lie on the extensive flat or rolling areas of the Ghibla and Jefara and in the wadis which cut through them. These areas are divided amongst the cabile and are used only for winter pasture and some cereal cultivation.

Hence, the movements of animals are directed north-south across the east-west land use areas from the centrally situated zone of good ground water. However, the pattern of movement is defined for any cabila by the general situation of its zones of winter and summer pasture and its watering points.

#### 1. Location of winter pasture

Some tribes possess their winter and summer pasture within one territory, but most tribes have them in separate allotments. Some have their winter pasture in the Jefara and others in the Ghibla.

(a). Tribes with summer and winter Ghibla pasture in one territory

These tribes are found along the Tazhuna plateau and their territory stretches from the main wells into the Ghibla (fig. 3 ). These tribes, which are territorially the largest, include the following:-

Mahadi (3 cabile)	Abanat Higgi	Neragnat Ras el Air
Aulad Mahareff	El Amib	Mahagia (3 cabile)
Aulad Ali	Fergian (5 cabile)	Masadna

The el Amara and el Haderat of the El Amara fall into this group and move between the wells of Diar Wagghin and the Oasis Guezi, Gasa and Teraglat.

(b). Tribes with summer and winter Jefara pasture in one territory

Cabile in this group are found in the Scarp Zone of Tazhuna and usually control part of a major wadi. They move from the Jebel into the Jefara and are the only examples in Libya of tribes practising complete mountain/plain transhumance. They include the following cabile:-

Abadsa	Duzim Guessen	Hamadat Labeter
Abanat Aburu	Gregta	Masabha
Aulad Bu Med	Hamadat Gret	Seima
		Shemashia

(c). Tribes with summer and winter Ghibla pasture in separate allotments

Most of these cabile live on the northern edge of the Tazhuna plateau around the main wells or in the wadi

basins east of the Wadi Ramle. They move to their winter pasture over well defined routes along the Wadi Tamamura, Wadi el Fresh and the Trigh Taraglat to the Wadi Taraglat and along the Wadi Tenzina to the Wadi el Maader, Wadi Tmasla or Uesotata. Cabile from the Aulad Msellem go to the Taraglat, cabile from the Aulad Mahareff go to Uesotata and cabile from the El Hawatem and Darahib go to the Tmasla and Maader (fig. 3). The tribes in this group include most of the small but densely populated groups and are:-

Auasa (Msellem)	Cuanin	Sualah (Hawatem)
Aulad Hamed "	Rahamia (Msellem)	Sualah Ariasc "
Aulad Msellem"	Aulad Tarhun "	Wersheffana "
Auamer "	Maamereen "	Shubbeen (Darahib)
Gelas "	Shefasti "	Jusef "
Hamamla "	Aabsa (Mahareff)	Smumat (Mahareff)

(d). Tribes with summer and winter pasture in separate allotments.

The remaining seven cabile using the Jefara instead of the Ghibla are in this group. They are all located in the Basin and Scarp Zones east of the Wadi Ramle, so that all are separated from the Ghibla by the Ababat Scarp. They move to their pastures along the Wadis Ramle, Masabha, Targut and Migdal and are allowed free passage by the Scarp Zone cabile, if they do not remain in any locality for more than a day. They are the:-

Arabeen	Grarat Loteen	Hawatem Ras el Ain
Amareen	Grarat Fogghin	Terscian
		Et Tella

In addition to these groupings, two cabile (the Burcat Ibadī and Fergian Grara) live permanently in the Ghibla and have their wells on the Garian border, three cabile (Neffat, Dunes and Chregi) live permanently in the Jefara, where they have wells, and the ed Darahib owns land in both the Jefara and Ghibla.

The move south begins in October when all the sheep and most of the goats are collected into flocks and given over to the shepherds. They move slowly south, taking about 4 - 6 days to reach their grazing lands. The flocks usually stay in one area for several weeks at a time, and move only when the grazing is exhausted. Most tribes have several areas of grazing and the flocks move from one to the other. They usually remain close to the owner's land, but can graze other people's land providing permission has been granted. They rarely leave tribal or mudiriāt land and only leave Tarhuna in very dry years. When grazing is bad, the animals move into the Orfella, but in 1947 many animals were sent to the coast or even to Cyrenaica.

The number of animals that the pasture can support varies according to rainfall. The variation in animal density in 1960 indicates that the most favourable areas lie in the Wadi Taraglat and the Jefara. In the latter, there were densities of 30 - 36 animals per square kilometre

of tribal land and in the former densities of 40 - 75. These contrast with densities of 14 - 20 in the western part of Tarhuna. However, in a good year animals increase to the limit of pasture availability and decline to its limit in dry years. It seems that animal nutrition is kept at the same fairly low plane in every year.

## 2. Summer pasture and water

It has been shown that:-

(i). Animals must be watered every 2 - 3 days during summer, and that they require about 2 litres of water on each occasion.

(ii). Total demand on water supplies by the animal and human populations is great but that it can be met by the wells and cisterns.

(iii) Wells are badly distributed and limited to about 10 small areas.

The average capacity of a cistern is about 4 cu. metres. If they were all full at the beginning of summer, they would supply about 16,000 cu. metres. Though this is more water than the animals would require, the cisterns are (a) not always full at the beginning of summer; (b) in a bad state of repair and (c) used mainly for family water supplies. In practice, the population remains in the tribal area, whilst the animals are sent to the main wells. As the following

table shows, most tribes could not water their animals from their cisterns.

Table XIII - 10. Cistern water supplies and animal water demands

<u>Cabila</u>	<u>Nos. of cisterns</u>	<u>Maximum cistern capacity</u>	<u>Number of animals</u>	<u>Water needs of animals</u>	<u>Nos. of wells.</u>
Masabha	60	240	1,834	183.4	2
Tella	30	120	1,386	138.6	-
Auasa	35	140	755	75.5	3
Msellem	15	90	1,200	120.0	5
Terscian	12	49	2,000	200	-
Fergian	9	36	7,300	730.0	11
Nahagia	120	480	2,300	230	-
Darahib	13	60	1,500	150.0	3
Aulad Ali	45	180	4,250	425	2
Hamamla	25	100	3,450	345	2

Nearly every cabila must water animals from wells. As a result, animals are concentrated within 5 kilometres of the main wells for most of the summer. At Gasr ed - Dauum, for instance, 12,000 animals congregate every summer. There are very large concentrations of animals around Scersciara, Tarhuna town, Gasr Doga and Biar Milgha. As fig. 39 shows, the concentration of animals in these areas means that large sections of the region remain unused for most of the summer, especially in the fertile Basin Zone. The large numbers of animals on very small areas speed overgrazing and the deterioration of the pasture near the main wells.

F. Animal movements and the division of labour

It has been shown that the economy rather than the social life is semi-nomadic. Many of the animal owners remain in the northern Jebel all year round, though they may move into the Jefara or Ghibla to sow and harvest cereals. This is not a recent development because Pucci noted it in 1913. It reflects the small size of the normal family herd and the need for a division of labour. This need has probably increased as emigration grew, so that many more of the pastoralists lead a sedentary life, occupying themselves with agriculture or employment in non-pastoral pursuits. As a consequence, many animals are handed over to professional or family shepherds, with whom they remain for most of the year. The practice, however, varies in four main ways.

Frage Ben Ammar of the Maragnat Ras el Ain has 20 sheep, 15 goats and 3 camels and like many other people in his cabila owns land in the Wadi el Maader near Gasr Tenzina and at Uesctata. His family of five includes two sons who are both at school and he has a small shop and looks after an Esparto press. He cannot take his sheep to Uesctata in the winter, so he has to hire a shepherd. To do this, he combines his animals with those of five other men in his lahmat and hires a shepherd to supervise them. The other men have sons working in Tripoli. The animals are gathered in a flock

of about 100 animals. Each man gives all his sheep and about half his goats to the common flock. The shepherd takes the animals to Uesctata in winter and to Tarhuna town in the summer. He is hired on a yearly basis and is given one sheep or goat for every 25 animals, oil and barley for himself and his family and a shirt, trousers and sandals.

The Sheik of the Cabila Ed Darahib is rich and owns 20 pieces of land in the Jefara at Fonmulgha, in the Ghibla, in the Tmasla, and in the Jebel at Biar Milgha. He has 250 goats and 190 sheep, as well as 15 camels. Each year he divides his animals into two flocks, one consisting of all but 2 or 3 sheep and about 180 goats, and the other consisting of 70 goats. The first is sent to the Ghibla each autumn under the charge of a shepherd and the second to Fonmulgha under the charge of one of his three sons, who take it in turns to look after the goats. In spring, the animals all return to Biar Milgha and join those of four cabile (Hamadat Sret, Hamadat Labeter, Darahib and Shubeen). They remain in this area for the summer and are watched over by the Sheik's sons.

Hermat Jejam of the Aulad Ali owns two sections of land, one at the spring of Ain Uif and the other at Uesctata. He has 25 sheep, 30 goats, 2 camels and a cow. Each winter the sheep and 20 of the goats go to Uesctata in the charge of one of his sons, whilst the rest stay with Hermat. In summer,

they all returned to Ain Uif.

The Lahmat Uba of the Cabila Aulad Hamed owns land in the Wadi Taraglat. . They live here all year round. However, until 1958, all the families in this lahmat left the area each summer to take their animals to Gasr ed-Daum. During the winter, they used to follow their flocks searching for good pasture and leaving only a few of the older people in the Wadi Taraglat. They had no fixed place of residence. Today, however, as a result of the L.A.J.S. dams in the Taraglat, they have plenty of water, so that there is good pasture each winter and sufficient water to maintain a few of them during the summer. Some families now hire professional shepherds to take their flocks from the Taraglat to Gasr ed-Daum.

#### G. Breeding.

The pastoralists usually keep a few male lambs for breeding, so that in each flock there is at least one male to every 20 - 25 sheep and goats and every 20 camels. The smaller flock owners normally make arrangements with other pastoralists if they have no male animals. In most cases, sheep and goats breed every year and cattle and camels every 2 - 3 years. . As most flocks are small, there is little selection in breeding but the pastoralists prefer whiter fleeced and heavier sheep,

and the darker and longer haired goats. Breeding begins as soon as the animals are capable: sheep and goats after 8 - 10 months; cattle after  $1\frac{1}{2}$  - 2 years and camels after 3 - 5 years.

Animals are bred all year round, largely because separation of the males and females and gelding are not practised, but also because the pastoralists need milk at every season. Nonetheless, the majority of animals breed in spring, during the cereal harvest, or in autumn just before the first rains. Some pastoralists believe that lambs do better if born in autumn, so that they may have green pasture for the first nine months of life, but others think that better lambs are produced from ewes who have already been able to feed off the winter pasture. Thus, most births take place in September and October or in late winter.

It is difficult to determine how many lambs are sold or slaughtered and how many replace the productive sector of the flocks. It was found that in the flocks of ten selected cabile, the distribution between the three main age groups was as follows:- (See also Appendix Xb ).

Table XIII - 11. Age structure of sheep and goat flocks in ten selected cabile, Tarhuna 1960 (%)

<u>Cabila</u>	<u>Age in years</u>					
	<u>Under 1 yr.</u>	<u>Sheep 1-2 years</u>	<u>Over 2 yrs.</u>	<u>Under 1 yr.</u>	<u>Goats 1-2 years</u>	<u>Over 2 yrs.</u>
Masabha	22	11	67	16	10	74
Et Tella	17	5	78	15	10	75
Auasa	17	10	73	25	12	63
Msellem	16	8	76	25	10	65
Terscian	19	9	72	20	8	72
Fergian	8	5	77	16	4	80
Nahagia	18	8	74	23	10	67
Darahib	26	8	66	24	12	64
Aulad Ali	34	6	60	18	6	76
Hamamla	18	6	76	20	9	71

Thus, in April 1960, 89 - 95% of the sheep and 88 - 96% of the goats were in the productive age groups. For every 100 sheep, there were about 70 - 80 breeding ewes, and if only 75% of these lambed in 1959/60, at least 55 - 60 lambs would have been born. But in April 1960, only 4 - 12% of the animals were in the age group 1 - 2 years and therefore about one-fifth or one-sixth of the lambs entered the productive age group. The rest must have been sold or slaughtered.

Most lambs are sold between the age of three and six months, according to the tribesmen, and this may be shown by the monthly variation in the number sold at Tarhuna market. Figures for the period 1956/7 to 1958/9 are given in Appendix Xc, and it can be seen that most lambs are sold in

March and April, with a secondary peak in September. It is also clear from the figures in Appendix Xc that the number of lambs being sold is increasing. The number sold in 1956/7 was 510, in 1957/8 1,170 and in 1958/9 3,030. The trend is continuing, since the number of lambs sold in the first three months of the year between 1957 and 1960 was:-

1957	145
1958	460
1959	970
1960	1,850

Figures for lamb meat as well as for kids and kid meat show the same trend, and, indeed, more mature animals are also being sold. However, despite the large number of goats, fewer kids than lambs are sold, because the former are an important item in the local diet.

#### H. Animal Products

The animals produce meat and milk, which is mainly consumed by the producers, and wool, hair, hides and skins, which are mainly sold.

##### 1. Meat

The local population eat goat's meat, but sell that of the sheep and cow. Camels are not eaten, and when past their usefulness they are kept as 'pensioners' on the range. Much of the goat's meat is derived from the kids, who yield about 4 - 6 kilos. The goat itself can give 10 - 15 kilos of meat.

The sheep produce a good meat with more than a local market. More lambs than sheep are sold at Tarhuna, so that the lamb, weighing 10 - 20 kilos, and giving about 40% meat is the main producer. Mutton yields vary highly, but according to Pucci, the average yield ranges from 15 - 30 kilos., according to age and the state of the pasture. Cattle give about 100 kilos. of meat.

## 2. Milk

Both sheep and goats give milk for about 2 - 3 months each year. However, not all the animals are milked and they are dried out if bad grazing is expected. Yields vary enormously. Goats give about 1.5 litres per day in Cuasabat, 1 - 2 litres per day in western Tarhuna and 2 litres per day at Gasr ed- Daum. Sheep give much less milk; in the Cobila Ras el Ain, goats give twice as much milk as sheep.

Some of the milk is made into butter, which is consumed by the producers. Sheep milk gives more butter than goat's milk - about 500 grammes/10 litres to 350 grammes/10 litres.

## 3. Wool and hair

The Barbary sheep gives a mixed wool type consisting of carpet wools (long wool fibres and varying amounts of coarser hair fibre and up to 4% kemp fibre), and a small amount of semi-improved wools. About 15% of the fleeces are black, brown or grey and the rest are white. The

weight of fleece does not seem to vary regionally in the Eastern Jebel, but does vary according to the state of the sheep. Fleeces weigh about 4 - 5 kilos. from a mature sheep, but according to Grandstaff, the average weight in the Eastern Province is only 2.75 kilos. of raw wool per fleece.

Some goat's hair is occasionally sheared and the average yield is about 0.5 kilos. per mature goat. The hair has never been important, but recently there has been a small export from Tripolitania.

#### 4. Hides and skins

Hides and skins are now being sold for export and leather working locally.

### I. The livestock and associated industries

#### 1. Production

There are no statistics on livestock production in Libya. The only estimates available are those of F.A.O., based on production factors calculated by Rowland and Robb (10). These factors attempt to establish an average per capita production of milk, meat, wool and hair based on the actual production from several areas of northern Tripolitania. They are as follows:-

Sheep: 10 kgs. meat, 25 kgs. milk, 2 kgs. wool.  
 Goats: 5 " " 30 " " 0.3 kgs. hair.  
 Cattle: 95 " " 30 " "  
 Camels: 45 " "

They are useful because they eliminate from calculations the non-productive element present in all flocks.

Estimates for livestock production based on these factors are given in Appendix Xd. The annual average production figures for the period 1950 - 1956 were as follows:-

Table XIII - 12. Average annual production from livestock in Tripolitania 1950/6  
(metric tons)

<u>Product</u>	<u>Sheep</u>	<u>Goats</u>	<u>Cattle</u>	<u>Camels</u>	<u>Total</u>
Meat	4,330	2,160	3,720	-	10,210
Milk	9,700	13,000	1,170	2,570	26,440
Wool	786	-	-	-	786
Hair	-	130	-	?	130

Tarhuna contributes 8 - 10% of Tripolitania's production and the share of the Eastern Jebel is roughly 10 - 13% per annum.

## 2. Processing and marketing

Animal products and the animals themselves are sold by the pastoralists, except for milk, which is entirely consumed locally.

At the close of the Turkish period, livestock produce was consumed in Tripolitania and the surplus was exported mainly as live animals. Between 1907 and 1913, for example,

20,000 - 78,000 animals were exported.<sup>#</sup> However, with the growth of the towns and the non-agricultural section of the population, live animal exports have fallen. Further, the Libyan government is anxious to foster a meat processing industry in Tripolitania, so that the income from its by-products - skins, hides, bones and horns - will enter the local economy. But this policy has also been brought about by the difficulty of finding foreign markets because of the great variability of animal numbers in Tripolitania, and the low state of health and variable quality of the animals.

Since 1956, no animals have been exported alive from Tripolitania, but in 1958 the first exports of frozen and canned meat were recorded. Well-kept slaughter houses with facilities for flaying dead animals have been established at the main municipalities, with the result that Tripoli merchants are now buying more live animals from the pastoral areas and slaughtering them at the markets. Most of the meat is sold in Tripoli, where mutton and lamb have a large market. Some is sent to the recently established canning and frozen meat plants, which hope to develop an export trade in the next ten years.

The other main animal products - wool and hides - are

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<sup>#</sup> Quoted by Pucci from figures supplied by the French Consul to Tripoli.

basic raw materials of established Libyan and foreign industries and will be considered separately.

### 3. Wool.

Tripolitanian wool is suited to carpet, rug and baracan making and most of it is woven locally. However, the wool is no longer finding its way to the best and more modern Libyan factories and it fetches a very low price on foreign markets. This is not due to the quality of the wool, but to its condition when it reaches the weaver or manufacturer. The wool is unwashed, unsorted and ungraded. As wool loses about 60 - 70% of its weight when washed, transportation costs are high and are born by the consumer, who also has to pay for the washing and sorting. As the local wool contains kemp and coloured fibres it fetches low prices.

#### (a) Local industry

Local industry, which absorbs about 75% of the raw wool, is divided into two sectors; utilities weaving and carpet making.

(i) Utilities weaving The Tripolitanian weaving industry is backward. It consists of 3 - 4 modern powered workshops in Tripoli, several hundred privately owned looms weaving wool supplied by merchants in Tripoli and other urban areas, and thousands of primitive hand looms scattered throughout rural Tripolitania. The greatest concentrations

are in the villages and areas of sedentary but mixed agriculture and there is one loom to every 10 - 15 people in parts of the Jebel Nefouss (11). The looms are worked by one or two family labourers, who take nearly two months, according to one estimate, to produce a yarn of wool. Their clientele is restricted to the kinsmen or lahmat of the owner, the looms working to demand. They are important because they are the main market for raw wool, but as competition from Tripoli and foreign produced fabrics is growing, the primitive looms are losing their traditional market and some are abandoning raw wool for imported wool, cotton and other fibres.

(11) Carpet making. The Tripolitanian carpet-making industry also produces rugs and heavy baracan. The industry is concentrated in the traditional centres of Misurata and Tripoli and used local wool, which by nature and colouring is suited to carpet making. In recent years, demand for carpets, rugs and blankets has increased but, because of the small volume that can be produced from an industry organised in tiny units, this demand has led to imports of carpets from the Fezzan and abroad.

(b) Exports

Because of the fall in demand for raw wool by weavers, and because of the small capacity of the carpet-making

industry, less raw wool has been sold locally and more is being exported. These trends are clearly shown by export/import figures. Between 1945 and 1950, 70 - 80 metric tons of wool and 30 - 35 metric tons of woollen goods were exported. Between 1955 and 1959, 140 - 240 metric tons of wool and 1 - 2 metric tons of woollens were exported. In 1956, exports of wool fetched £L55,000, but imports of woollens cost £L248,000. Tripolitanian wool is costly to treat and manufacture and thus it is bought for a low price. Indeed, until 1958, it was difficult to find a stable market for Tripolitanian wool. Since then, the U.S.S.R. has become Libya's main customer, and bought nearly 80% of the raw wool exports in 1959. If the U.S.S.R. continues to expand its imports of Tripolitanian wool, less wool may be available locally, unless the Government encourages local industry. Otherwise, the already unfavourable balance of trade in wool and woollens in a country with a large sheep population will deteriorate.

#### 4. Hides and skins

There are no statistics or estimates for hide and skin production in Tripolitania. Many animals are slaughtered on oabila land, but in recent years, more and more sheep and goats are being slaughtered at the municipal slaughter houses of Tripolitania. In 1958, a total of 184,000 skins were played in the Tripolitanian slaughter houses and the figures

at Cussabat and Tarhuna were respectively 3,790, and 1,591.

Table XIII - 13. Hides and skins flayed at Tarhuna  
and Cussabat and in Tripolitania during 1958

<u>Animal</u>	<u>Tarhuna</u>	<u>Nos. of skins</u>	
		<u>Cussabat</u>	<u>Tripolitania</u>
Sheep	1,305	2,455	103,600
Goats	276	1,215	65,500
Cattle	2	50	9,500
Camels	8	70	5,500
<u>Total</u>	<u>1,591</u>	<u>3,790</u>	<u>184,100</u>

The figures for Tarhuna clearly show that the slaughter houses are not being widely used. If the same proportion of animals were flayed at Tarhuna as at Cussabat, then at least 6,000 sheep skins, 8,000 goat skins, 20 cattle hides and 75 camel hides were flayed at Tarhuna in 1958. The figures also show the importance of the sheep as the main commercial animal.

The skins are either kept by the pastoralists for tent making etc., sold to local tanneries or exported. The local leather industry is not as well developed as that of the Fezzan or as the Tripolitanian woollen industry. It is concentrated in Tripoli, where the main tanneries, which employ about 100 workers, are located. The skins are often in a bad state, suffering from deep flay cuts, warble holes and branding marks. At Tarhuna, for example, 25% of the skins were spoilt by bad flaying. Most of the tanneries cure the skin badly, so that they putrefy in storage. The tanners

use imported tanning material - mimosa from Kenya and afa from the United Kingdom. Because of the poor quality of the skins, leather works rely on imported raw material, particular for shoe leather. In 1957, for example, the value of leather exports was £L915 and that of imports £L58,110.

Tripolitania is a big exporter of undressed hides and skins. In 1956, 1,130 metric tons of skins were exported, in 1958, 770 metric tons, and in 1957, exports were valued at £L220,000 (compared to £L61,000 of olive oil). However, the skins are unsorted and ungraded and this is an important disadvantage, because the leather industries of Europe are divided into highly specialised sectors. Therefore, hides and skins are exported on a consignment basis and receive low prices. In 1957, Italy was Tripolitania's main customer and took 49.8% of the skins. In 1958, Italy was replaced by the U.S.S.R., which imported 60% of the Tripolitanian production.

As Harding (12) has pointed out, income from pastoralism will not rise substantially until the skins are properly flayed and cured and then graded and sorted.

#### J. Livestock and the local economy

Because of the poor quality of animal products, pastoralists do not gain high incomes from their animals unless they possess a large number of them. The normal family would

possess in theory only 5 - 6 sheep and 8 - 9 goats, with perhaps a cow or camel; in practice some families have large numbers of animals and others only one or two goats. Without accurate statistics, it is necessary to examine animal productivity and income either in general terms or with reference to specific examples.

Rowland's and Robb's factors of production may be used to estimate the yields of large numbers of animals and are thus applied to the ten sampled cabile. Income is calculated as follows:-

- (i) Sheep: One sheep will yield 10 kilos of meat selling at 38 piastres per kilo.  
and 2 kilos of wool selling at 24 piastres per kilo.  
and 25 kilos of milk selling at 3 piastres per kilo.

A sheep will thus give an income of £4.98 or £5.0 per annum.

- (ii) Goats: One goat will yield 5 kilos of meat selling at 32 piastres per kilo.  
and 0.3 kilos of hair selling at 30 piastres per kilo.  
and 30 kilos of milk selling at 2.6 piastres per kilo.

A goat will give an income of £2.23 or £2.25 per annum.

The prices are the average prices for the year 1959/60 at Tarnuna market. The factors are useful because they synthesise the possibilities confronting a pastoralist who

may either sell his sheep, keep them for breeding, wool and milk, or slaughter them for meat and skins. The factors also eliminate the under-exploitation of animals in some areas and over-exploitation in others, by considering the actual yields from large groups of animals.

Animal productivity in the ten sampled cabile is thus as follows:-

Table XIII - 14. Total gross income from sheep and goats in selected cabile, Tarihuna

<u>Cabila</u>	<u>Total income</u> (£L)			<u>Income per ha.</u>			<u>Income per head</u>		
	<u>Sheep</u>	<u>Goats</u>	<u>Total</u>	<u>Sheep</u>	<u>Goats</u>	<u>Total</u>	<u>Sheep</u>	<u>Goats</u>	<u>Total</u>
Masabha	2,146	2,668	4,814	0.50	0.63	1.13	2.5	3.1	5.6
Tella	2,065	2,475	4,540	0.52	0.60	1.12	2.52	2.8	5.32
Aussa	1,510	1,925	3,435	1.01	0.66	1.67	3.10	3.50	6.60
Msellen	2,600	2,770	5,370	1.76	1.21	2.97	2.80	2.80	5.60
Fergien	37,285	10,589	47,874	0.90	0.51	1.41	7.10	2.90	10.00
Hamarla	8,845	4,251	13,096	2.10	1.01	3.11	6.33	2.70	9.03
Nahagia	5,600	3,483	9,083	0.44	0.28	0.72	3.30	2.20	5.50
Darahib	1,625	2,891	4,516	0.25	0.43	0.68	2.00	3.00	5.00
Aulad Ali	7,350	5,470	12,820	0.30	0.24	0.54	2.00	2.00	4.00
Terscian	1,600	2,565	4,165	1.35	3.96	5.31	4.25	25.00	29.25

Income varies highly, but it can be seen that the main groupings are as follows:-

(i) Scarp and Basin Zones. Modium productivity per ha. and per capita. These cabile supplement their income from tree cultivation.

(ii) Italian - affected zone. The Auasa and Msellem gain more from their land and enjoy higher per capita incomes than cabile in the Scarp and Basin Zones, and are able to cultivate more cereals to raise total income. Tree cultivation is also important in these cabile.

(iii) Pastoral cabile of eastern Tarhuna. Cabile concentrating on sheep husbandry are getting higher incomes from their land than cabile relying extensively on the goat. If incomes are to be raised in the pastoral areas the other cabile will have to keep more sheep. The income per ha. is very high on the Cabila Hamamla, where population is very densely distributed.

(iv) Arid western Tarhuna. Income is low in these areas, particularly in terms of land area. The three cabile are very large, but the aridity of their environment means that productivity is low. They also rely heavily on the goat and supplement income more by shifting than sedentary cultivation.

The low incomes are not supplemented to a great extent by other forms of pastoralism or cultivation. However, it is clear that many tribesmen are no longer relying on their animals for livelihood, but are finding work outside the pastoral economy. It has been shown that incomes are higher in semi-arid and humid areas of the region when arboriculture is practised, and that in the pastoral system incomes are highest when people keep more sheep than goats. Future development of Tarhuna must take into account these facts, together with the facts that animal husbandry often employs primitive techniques, whilst over-grazing is reducing the quality of the pasture.

#### K. Conclusions

Animal husbandry is very important in Tripolitania, but tends to be a subsistence rather than a commercial industry. Though animals are numerous and the extent of grazing land great, exports of animal products are inferior in value to those from the cultivation of groundnuts and olive trees and the harvesting of wild and cultivated castor bushes. Moreover, exports of crude and unprocessed animal products are increasing and those of processed materials declining.

The animals in the Eastern Jebel are made up from

indigenous breeds, of which the most important are the Barbary sheep and local goat. Cattle are important in areas of sedentary cultivation, and camels in the semi-nomadic areas. Production from animal husbandry fluctuates annually according to rainfall, but the fluctuation depends upon the number of animals, since the same poor yields in quality and quantity are obtained from individual specimens each year. Pastoralists still try to keep as many animals as possible and do not attempt to improve individual animal productivity by keeping fewer livestock at a higher nutritional plane.

Pastoralism is being rejected for either agriculture or non-pastoral pursuits in Tarhuna. The sheep, which are the most productive animals, have declined in number absolutely and relatively to the number of goats, which are now the most numerous animals. Though the goat is well adapted to even the degraded vegetation of the Scarp Zone, it produces only small quantities of meat and milk, most of which is consumed by the pastoralists themselves. The productivity of pastoralism per ha. and per capita is low, and tree cultivation has proved more profitable in parts of eastern and northern Tarhuna. More and more people are finding work in the towns and cannot devote their time or energy to the movement of animals. Thus, many of the animals are kept merely to feed the families of emigrants, and the number of sheep flocks is

declining and becoming concentrated in fewer hands.

Despite this, animal husbandry is still the most important source of income, and it is clear that much of Tarhuna and El Amamra is not suited to agriculture. Pastoralism, which integrates the arid and semi-arid zones of the region, cannot be entirely replaced by arboriculture. The position in ten sample cabile indicates which patterns are emerging in Tarhuna. Small cabile on the Tarhuna plateau and larger tribes living in the Scarp and Basin Zones are devoting some of their land to arboriculture and are keeping fewer sheep. The larger cabile lying on the dip slope of Tarhuna are increasing their sheep and gaining higher incomes in terms of land and population. In western Tarhuna, increasing aridity means that fewer animals can be kept and pastoralists are depending on external sources of income.

Arboriculture should be encouraged in areas where it is more profitable than pastoralism, but elsewhere efforts must be made to improve the productivity of animal husbandry.

The following improvements are the most necessary:-

1. Research into methods of improving animal yields. The animals should be selected for breeding so that the optimum yields of any product can be obtained. Other breeds should be introduced or crossed with indigenous animals. Research should concentrate on the Barbary

- sheep, which offers the best scope for improvement.
2. The number of goats should be drastically reduced, since they are chiefly responsible for the degradation of the range.
  3. Education and demonstration in proper breeding, flaying, shearing and veterinary practises must be initiated. Modern hand shears could be introduced, and pastoralists should be encouraged to send animals to the municipal slaughter houses, where hides would be flayed correctly.
  4. The range must be improved by proper management and research into the most nutritious plant communities.
  5. Forage crops must be cultivated for supplemental feeding, either in areas of sedentary cultivation or in the Ghibla, where a plant like the prickly pear (Opuntia sp.) could be grown (Chapter XV).
  6. Water supplies must be improved by the construction of cisterns in the Ghibla and Jefara, the drilling of new wells in northern Tarhuna and the exploration for deep aquifers in the Ghibla.
  7. Communications must be improved between areas of summer and winter pasture and lorries used to transport animals.
  8. Proper sorting and grading arrangements must be introduced for hides, skins and wool.
  9. Refrigerating and canning plants must be established on the coast and an export meat trade developed.

10. The livestock processing industry must be reorganised by the setting up of carpet-making and leather manufacturing units in Tripoli.

These improvements are vast and cover the whole livestock industry. There are many complicated problems involved, such as the ignorance of the pastoralists and the land ownership question, but the improvements are urgently needed. They can only be carried out by the Government, and could be financed by revenue from the oil industry. The improvements are essential if income is to be raised in pastoral areas and if cultivation is to be prevented from encroaching on too much of the pasture in areas like the Eastern Jebel.

CHAPTER XIVBARLEY AND WHEAT, THE SUPPLEMENTARY CROPSA. Introduction

Though barley, wheat, maize sorghums, oats and millets are grown in Libya, only wheat and barley are cultivated in the region under study. The other cereals are located in irrigated gardens in the Jefara and Misuratino and are not found in the swani of the Eastern Jebel. Barley is the most important cereal, mainly because its short growing season enables it to escape the summer drought. Wheat, which dislikes aridity and sandy alkaline soils, is not widely cultivated in Tripolitania, but after barley it is the most important cereal crop. In the world as a whole, wheat is generally grown for human consumption and barley for animal feed. In Tripolitania, much of the barley is consumed by the local population and the straw is fed to animals. Barley is widely cultivated in the region under study in both sedentary and semi-nomadic areas, Italian and Libyan. Therefore it is necessary to examine the systems of cereal cultivation before considering the individual crops in detail. It is also necessary to examine the main characteristics of barley and wheat production in Tripolitania, because statistics relating to the Eastern Jebel are available for only three years.

## B. Systems and methods of cereal cultivation

Cereals are ancillary to pastoralism in Tarhuna and to arboriculture in Cussabat and the Italian area, but they are the only crop grown extensively in all three areas.

### 1. Italian farms

Though the Italians are arboriculturalists, they grow cereals as a cash crop on Al Khadra and for domestic consumption on the concession farms. On Al Khadra, Ente laid down that 15 ha. of each farm were to be reserved for cereal cultivation during the period before the olives matured. Farmers were encouraged to sow more cereals between the lines of young trees. It was planned to reduce the area under cultivation gradually by abandoning intersowing and extending arboriculture to the area initially reserved for cereals. The war interfered with Ente's plans and an average of 8.6 ha. of cereals are still sown on every farm on Al Khadra. Thus, 17.2% of Al Khadra is devoted to cereals, compared to less than 1% of the concession farms. Italians employ modern methods of cultivation and sell most of their produce.

### 2. Libyan farms

Libyans in Cussabat cultivate cereals both for domestic and animal consumption and as a cash crop. Over most of Cussabat, the system of menga predominates, so that cereals,

mainly barley, are intersown with olives. In the Scarp Zone, however, cereals are usually sown on the lower hill slopes just above the inundated gardens. The system of cultivation differs and there are three main types:-

(a) Cussabat Plain

On the Cussabat Plain, farmers sow as many plots as they like and there are no laws governing which plots will be sown. They sow their land in alternate or two successive years so that each plot of land is sown in two out of three or four years. In Beni Let, only about 60% of the plots are sown in any year, but the number and their distribution vary with rainfall. The farmers' land is scattered against the risk of drought, so that no hard and fast rules govern sowing.

(b) Communal sowing

In north-west Cussabat (Cabile Crarta, Fuartir, Shiabarna and Shaffeen) and in parts of the Scarp Zone (Cabile Chalfun, Atia and Amareen), the cereal lands are divided into two great sections and every family owns land in both. In the Cabila Chalfun, for instance, cereals are sown in the western section in one year and the eastern in the next. Every family sows in the same section each year but the rotations found in the Cussabat Plain are used according to rainfall. Lands are scattered within each section, but less land is cultivated in cereals than in the Cussabat Plain.

This system is well preserved, but does not operate in the privately owned ginanat or in the more recently reclaimed land.

(c) Semi-shifting cultivation

In the Cabile Beni Mislem, Jareen and Aulad Hamed of north-eastern Cussabat and Uadna and Luata of the south-west and south, there are large stretches of uncultivated land near the Cussabat borders. The land is not owned by anyone, but in dry years, cultivators sow cereals in Wadi areas.

3. Shifting cultivation

The term shifting cultivation has been abused in Tripolitania, where it is often interpreted as meaning that nomads and semi-nomads wander at will looking for land to sow and plough. However, cereal land is no longer distributed among tribal families (except in the Cabila Aulad Shukir) and it is held in private usufruct, if not private ownership. This in itself limits the spatial patterns of cultivation in any year. Cultivators do not rush to communally owned land after rainfall, but move and plough on their own land according to where and when it rains. The family's plots are widely scattered and some are located in humid areas. In the Cabila Auasa, for example, most families own at least one plot of land in three areas: north of Al Khadra astride a tributary of the upper Wadi Mensci, at Swintina, and in the Wadi

Taraglat at its confluence with the Wadi Tamamura. In the Wadi Taraglat, the Gabila owns several strips of land which are 50 - 100 metres wide and run across the wadi bed, which is nearly 400 metres broad. Families sow on alternate sides of the wadi in successive years, and plant cereals near the wadi channel, which is very shallow. The wadi spate irrigates the land in autumn, after which cereals are sown, whilst later floods ensure that the cereals mature. At Swintina, families own a plot of land in the wadi channel (Wadi Mensci) and one or two plots on the sandy soils of the plateau. They usually sow the wadi land every year and the plateau land when it rains. North of Al Khadra, the land is divided into two sections which are sown in alternate years; cultivators own at least one gedula (9 sq. metres) in both. The same pattern is found in the Cabila Aulad Mahareff, where cereals are sown at Uesctata, Tenzina and near Abbiar Miggi. Families own land in all three sections and sow at Uesctata every year, because several wadis rising in Tarhuna and Garian meet there. Other land is sown when it rains. If the rain or spate fails on one family's land they may sow, with permission, on the holdings of some one else.

These patterns are typical of all cabile, whether or not they own land in the Ghibla or Jefara. It means that the land sown in cereals may be divided into three main

categories, which are:-

(1) Wadi land Wadi land in the Ghibla, Basin and Scarp Zones and Jefara is sown nearly every year and is irrigated by the wadi spate.

(ii) Northern Jebel In the northern Jebel, cereals are sown in one or two years in three, because rainfall is comparatively high. The main areas lie on the northern edge of the Tarhuna plateau, the Basin Zone and Pleistocene terraces of the Scarp Zone.

(iii) Ghibla and Jefara South of the Italian zone and north of the Jebel Scarp, cereals are sown on the patches of Ard Hamra and Ard Hammari lying outside the wadi channels, according to rainfall.

Thus, in wet years cultivation is extensive, but in dry years it shrinks to the wadi channels.

Sowing commences immediately after the first rains and can continue until early January. The time of sowing depends upon locality and rainfall and takes longer to complete in Tarhuna and El Amamra than in Cussabat, where a farmer's holdings are much closer together. In both areas, farmers use family and day labourers and occasionally khammesi to sow both the bedri (early sowings) and masusi (late sowings). The barley and wheat are usually sown separately, but many farmers in Cussabat and eastern Tarhuna mix barley and wheat

seed together. Before sowing, the farmer defines the area he will sow by scratching out a rectangular shaped plot called the marghia. The size of the marghia is fixed at about a gajulu in Cassabat, but in the areas of shifting cultivation it can vary widely. One marghia in El Amara measured nearly a hectare, whilst another at Gar Doga consisted of numerous tiny plots within an area of less than 200 sq. metres. The seed is then sown by broadcasting and the cultivator attempts to sow as little and as lightly as possible, since he must conserve his seed in case of drought. He therefore sows many widely scattered plots. Despois rightly described this method of cultivation as: 'une loterie; un jeu avec le ciel'. The farmer increases his chances of winning by sowing many plots lightly. As yields are low, he plays for low stakes and expects to win in only three years in five. After the seed is scattered, he ploughs or rather scratches the earth, always ploughing from right to left between the two nearest sides of the marghia. He uses the type of primitive iron shod plough found throughout North Africa; an example from Cassabat is shown in Plate 8. The plough is drawn by an ox or camel, or occasionally by a donkey.

The cultivator will sow on any type of soil, if it has rained, and frequently sows on steep slopes, always along

instead of across the slope. After the sowing has been completed, the rest is left to rainfall and Allah. The farmer expects to harvest only a proportion of what he sows.

### C. Cereal production

Because of the scanty and unreliable data on barley and wheat production in the Eastern Jebel, it is necessary to examine the main trends of cereal cultivation in Tripolitania. This will also elucidate the role of the Eastern Jebel within Libya's cereal producing areas.

#### 1. Barley

##### (a) Characteristics of Tripolitanian production

Barley is the most important cereal crop in Tripolitania and is the only cereal grown under all systems of cultivation. As a dryland crop, barley is unsurpassed in the arid and semi-arid areas of North Africa and it is cultivated up to the margins of the desert. It forms a major part of the staple diet of Tripolitania's population, and its straw provides the only fodder fed to animals in most pastoral areas. The local varieties, if low yielding, are extremely hardy. The six-bladed, long stalked sciar nelba and the ghelb sciar of the Eastern Jebel are able to withstand the hot dry conditions of the Tripolitanian winter. The barley, which is sown between October and January, is harvested in April, and thus

avoids the worst spring Ghiblis, which often ruin the late maturing wheat. Despite its hardness, the straw becomes too soft and the ears dessicated in very dry winters. The poor soils lead to physiological accidents, whilst rust and blue stain were commonly found in barley patches throughout Tarhuna in 1960.

The annual production of barley in Tripolitania for the period 1930/1 - 1959/60 is given in Appendix XIa. The figures show that production is intimately related to rainfall, and it is interesting to compare production figures with the rainfall graph in figure 17a. In the wet years of 1943/4 and 1948/9, production rose to 125,000 and 135,000 metric tons respectively; in the dry years of 1935/6 and 1946/7, it fell to 3,000 and 1,700 metric tons respectively. The average year is a myth, but a production of 40,000 metric tons would be satisfactory. Figures for the area sown in barley (Appendix XIb) must be treated with circumspection, as Arab cultivators do not always distinguish between the area they sow and the area they harvest. However, the figures show that figures for the area in cultivation are more stable than those for production, and if the very dry and very wet years are eliminated, they average about 250,000 ha. per annum.

Production is more influenced by rainfall in the Eastern and Central Provinces than in Tripoli and the Western Provinces (Appendix XIc). This is due to the great increase in irrigation since 1945 in the Jefara (3). The increase in irrigation has also meant that Tripoli and the Western Province have replaced the Eastern Province as the largest producer of barley (Appendix XIc). Between 1943/4 and 1949/50, the Eastern Province produced 40-50% of Tripolitania's barley, but since 1949/50 production from the Eastern Province has been only 20-33% of the total. The actual production from the Eastern Province has declined as well as the proportion of Tripolitania's total production. Until 1951/2, the Eastern Province produced 15,000 - 52,000 metric tons in good and average years, but since then, production has risen above 15,000 in only one year (1955/6). This decline is also evident in the Central Province and is related to two factors. The most important is the rapid increase in emigration, which means that families no longer depend upon rainfall to eat. The other factor has been the large grants of American wheat to Libya, which according to some F.A.O. experts is discouraging the Libyan farmers from producing wheat and barley in the more marginal areas.

(b) Barley production in the Eastern Jebel

In 1957/8, which was a dry/average year, 37,100 metric tons of barley were produced in Tripolitania; 3% of this came from the Eastern Province. In the same year, the Eastern Jebel produced 2,730.4 metric tons, which was 24% and 7% of the production from the Eastern Province and Tripolitania respectively. As the harvest failed over much of the Jefara in this year, the Eastern Jebel would not normally produce as much as 7% of Tripolitania's barley. The distribution of barley production was as follows:-

Table XIV - 1. Barley production in the Eastern Jebel, 1957/8

<u>Area</u>	<u>Production</u> <u>(quintals)</u>	<u>Percentage of</u> <u>production</u>
1. <u>Tarhuna cabile</u>	<u>22,000</u>	<u>80.5</u>
Aulad Msellem	9,450	34.3
Aulad Mahareff	5,780	21.2
El Hawatem	5,120	18.6
Ed Darahib	1,650	6.4
2. <u>Cussabat cabile</u>	<u>3,000</u>	<u>10.9</u>
3. <u>Italian</u>	<u>2,340</u>	<u>8.6</u>
Al Khadra	2,300	8.4
Concessions	40	0.2
<u>Total</u>	<u>27,340</u>	<u>100.0</u>

Over 80% of the production came from areas where shifting cultivation is practised, and Italian farmers produced nearly as much as Libyan sedentary farmers.

However, when the production is considered in terms of land area and population, interesting patterns emerge. In Tarhuna, 0.05 qts. of barley were produced for every ha. of land area, compared to 0.09 qts./ha. and 0.20 qts./ha. in Cussabat and Al Khadra respectively. Though shifting cultivators produce most of the barley, they devote a smaller area of land to it than sedentary farmers.

More land is devoted to cereal cultivation on Al Khadra than anywhere else in the Eastern Jebel. Barley was grown on 8% of the cultivated area and occupied about 4 ha. on each farm. Only about 1 ha. of land was cultivated in barley on the centrally situated farms, where yields from olives are high, compared to 5 - 7 ha. on the southern margins of the estate. This is because the central zones were developed in arboriculture first and now have a greater number of mature trees than marginal farms where it is still necessary to cash crop barley to supplement family income.

The influence of rainfall on shifting cultivation is clearly shown by the change in distribution of the barley production between 1957/8 and 1958/9. (Tables XIV - 1 & 2).

Table XIV - 2. Barley production in Tarhuna 1958/9

(Metric Tons)

<u>Mudiriat</u>	<u>Production</u>	<u>Percentage</u>
Aulad Msellem	331.0	24.9
Aulad Mahareff	234.0	17.6
El Hawatem	620.0	46.6
Ed Darahib	145.0	10.9
<u>Total</u>	<u>1,330.0</u>	<u>100.0%</u>

Production declined from 2,200 metric tons to 1,330 metric tons, but production rose in the Mudiriat El Hawatem, and the proportion of the harvest from extreme western Tarhuna also increased. In both years, productivity was greatest from the El Hawatem, where twice as much barley was produced per hectare and per capita as in the other Mudiriats.

Table XIV - 3. Barley production per hectare of total land area and per capita of the population,

1957/8 and 1958/9

<u>Mudiriat</u>	<u>Production/ha.</u>		<u>Production/capita</u>	
	<u>1957/8</u>	<u>1958/9</u>	<u>1957/8</u>	<u>1958/9</u>
Aulad Msellem	0.076	0.020	0.44	0.16
Aulad Maharreff	0.064	0.027	0.71	0.29
El Hawatem	0.173	0.207	0.93	1.13
Ed Darahib	0.083	0.073	0.42	0.37

Nonetheless, productivity is very low, for the highest figure is only equivalent to 20.7 kilos./ha. of total land area and 93 kilos. per person. To examine the variation in productivity from region to region, production figures were collected from ten selected cabile.

Table XIV - 4. Barley production in ten selected  
cabile, Tarhuna, 1960 (qts.)

<u>Mudiriat</u>	<u>Cabila</u>	<u>Production</u>	<u>Production/ha</u>	<u>Production/capita</u>
Msellem	Masabha	330.0	0.0717	0.35
"	Tella	180.0	0.0450	0.18
"	Auasa	128.0	0.0850	0.23
"	Msellem	115.2	0.0700	0.12
"	Fergian	948.8	0.0445	0.29
"	Hamamla	563.2	0.0425	0.39
"	Nahagia	906.4	0.0695	0.57
Darahib	Darahib	416.0	0.0866	0.44
<u>Mahareff</u>	Aulad Ali	1,653.0	0.0840	0.57

The cabile may be divided into three main groups which are:-

(i) The Aulad Ali, Darahib and Nahagia of central and western Tarhuna. These cabile produce 0.069 - 0.086 qts./ha. and 0.44 - 0.57 qts./capita. Though they lie in the more arid parts of Tarhuna, they possess large land areas which are sparsely populated by men and animals. As a result, more land spread over a greater area is available for barley cultivation. These conditions are necessary in a zone of low and unreliable rainfall.

(ii) The Hamamla and Fergian of eastern Tarhuna. In these cabile, sheep are more important than goats and thus income from animals is higher per person and per hectare than in other parts of Tarhuna. As a result, a smaller income is derived from shifting cultivation, because cereals may be purchased from sheep sales. Thus, productivity

is low both in terms of land and population.

(111) The Buasa and Gulad Msellien of the northern edge of the Tarkuna plateau. Both of these cabile lost much of their land to the Italians. However, they continue to devote a large area to barley cultivation in the Gadi Taraglat, and barley is being intersown with trees, which are rapidly extending in the Buasa and Msellien. Thus, productivity is high per ha., but low per head of population because arboriculture can support a higher density of population than pastoralism.

The Masabha, which lies in the zone of highest rainfall, is also an area of increasing tree cultivation, but the cabile has a large area of land at its disposal. Thus, it is one of the most productive areas of Tarkuna. The Et Tella, on the other hand, lies on the watershed of the Masabha and Turgut and has only a small area of land suited to barley cultivation.

The ten cabile illustrate some of the diversity which exists between eastern and western Tarkuna and between the Plateau, Basin and Scarp zones. Overall productivity is low because the yields make cultivation barely profitable, whilst emigration means that only part of the cultivable area is being used. People appear to be buying cereals with the remittances of emigrants.

Much more land is devoted to cereal cultivation in Cussabat. In 1957/8, for example, one metric ton of barley was produced for every square kilometre of land. In Beni Let, 13 farmers produced 135.89 qts. from a total farm area of 204 ha. for 103 people. On these farms, approximately 0.66 qts. were produced for every ha. and 1.32 qts. for each person. Most of the cultivation takes place on the Cussabat Plain, where olives are intersown with cereals. Land is restricted in the Scarp Zone, where in Beni Mislem, for instance, 500 qts. of barley were produced here, 0.42 qts. were produced for each person.

Table XIV - 5. Barley production on 13 farms,

Cabila Beni Let

<u>Farm</u>	<u>Area</u> (ha.)	<u>People it</u> <u>supports</u>	<u>Barley production</u> <u>1957/8 (qts.)</u>	<u>Production</u>	
				<u>per ha.</u>	<u>per cap.</u>
1	5	9	13.0	2.6	1.33
2	16	14	8.99	0.56	0.64
3	25	14	7.2	0.28	0.52
4	16	8	7.15	0.45	0.89
5	20	5	9.10	0.45	1.82
6	15	10	10.40	0.69	1.04
7	20	4	5.30	0.26	1.32
8	20	2	7.0	0.35	3.50
9	30	15	23.4	0.78	1.56
10	5	5	9.10	1.82	1.82
11	2	9	3.25	1.62	0.36
12	10	3	2.60	0.26	0.87
13	20	5	19.40	0.97	4.88
<b>Total</b>	<b>204</b>	<b>103</b>	<b>125.89</b>	<b>0.66</b>	<b>1.32</b>

(c) Yields

Yields are very low. In a wet year (1943/4), the average yield in Tripolitania was 4.515 qts./ha., in a dry year (1946/7) 1.9 qts./ha., and in an average year (1956/7) 2.7 qts./ha.. Yields are lowest in the Eastern Province.

In the last seven years, four gave yields of less than 2 qts./ha., two between 2 qts./ha. and 3 qts./ha. and only one more than 3 qts./ha. For the same period, the Central Province gave an average yield of 3.2 qts./ha. per annum and Tripoli and the Western Province 3.7 qts./ha.. Yields in the Central Province are higher because rainfall is greater and thus more reliable, whilst yields in Tripoli and the Western Province are influenced by the greater area under irrigation, since irrigated barley gives about 30 qts./ha., compared to a maximum yield of about 5 qts./ha. from dryland barley.

It is very difficult to calculate yields in the region under study. Manetti quoted figures of 25 - 40 qts./ha. and the Turkish Administration 17 qts./ha. (4). Both figures are obviously too high. The locals measure yield as a return on seed sown and not in terms of area. In a good year, barley will produce 10 fold; in a dry year only 2 - 3 fold. In Beni Let, yields varied from 5 to 9.1

times the weight of seed sown in 1957/8; Rowland (5) considers that Arabs sow about 40 kilos. of seed per hectare; this figure corresponds to about 3 marta, which is approximately what the locals say they sow. In Beni Let, yields thus varied from 2.0 to 3.32 qts./ha. in 1957/8 (Table XIV-6).

Table XIV - 6. Return from seed on farms in

<u>Beni Let</u>		
<u>Weight of seed</u> (Kgs.)	<u>Weight of barley</u> (Kgs.)	<u>Approx. yield</u> (qts.)
122	1,300	2.8
39	325	3.32
156	1,105	2.8
205	910	1.84
52	260	2.00
65	390	2.40
130	910	2.80
130	715	2.20
221	1,300	2.32
205	1,104	2.10
260	2,050	3.00

In the Cabila Beni Mislem, yields are about 3.6 qts./ha., and are higher in the Scarp Zone, where cereals in inundated gardens can produce 5-6 qts./ha.. The Mayor of Cussabat, who uses more seed than most farmers, obtains yields of 5 qts./ha. from his farm in Beni Let.

In Tarhuna, yields of 2.0 - 3.5 qts./ha. are regarded as satisfactory in most areas. In 1957/8, yields of 1.6 - 2.4 qts./ha. were obtained at Gasr Doga and Gasr ed Dauum and 3.0 - 4.0 qts./ha. at Uesctata, where consistently high

yields are obtained despite the fact that land is sown nearly every year; the Nazirate of Agriculture say that Uesctata is one of the best areas for dryland cereal cultivation in Tripolitania.

Yields from Italian farms are higher than those from Libyan-owned land. In 1957/8, yields averaged 3.0 qts./ha. in 1957/8, but 4.42 qts./ha. in the wet year of 1956/7. Yields vary from farm to farm, but are higher in the south, where barley cultivation is very important.

## 2. Wheat

### (a) Characteristics of Tripolitanian production

Wheat replaces barley as the major cereal crop in North Africa in the more humid areas of the coast and Atlas mountains. Wheat is the most important cereal in Tunisia, but its cultivation is restricted mainly to the humid dorsale. In southern Tunisia and in Tripolitania barley replaces wheat, which is found only along parts of the coast and in the irrigated gardens. Very little wheat is cultivated by shifting farmers in the inner Jefara or Jebel, because wheat is much more sensitive than barley to the hot dry periods of the Tripolitanian winter, and to the spring Ghiblis. Despite its sensitivity, the acreage of wheat is expanding. In the period 1942/3 - 1949/50, 17,000 - 30,000 ha. of wheat were sown annually, but between 1950/1 and 1957/8

44,000 - 80,000 ha. of wheat have been cultivated per annum (Appendix XId). The expansion is common to all three Provinces and is particularly marked in the Eastern Province, where barley cultivation is declining. Before 1949/50, 4,000 - 7,000 ha. of wheat produced 1,500 - 2,400 metric tons annually, but since then production has risen to 3,000 - 5,000 metric tons and the acreage to 15,000 - 30,000 ha. per year.

Wheat production is more important to the Italians than to the Libyans and wheat is more important than barley on Italian farms. In 1948/9, the Italians produced 4,000 metric tons of dryland wheat and Libyans only 2,500 metric tons. In 1954/5, Italians produced 2,800 metric tons of dryland wheat, but only 1,000 metric tons of dryland barley in the Eastern Province.

(b) Production in the Eastern Jebel

In 1957/8, Tripolitania produced 58,000 metric tons of wheat, of which the Eastern Province produced 20,600 metric tons. 849 metric tons were produced in the Eastern Jebel, which was 15% and 4% of the production from the Eastern Province and Tripolitania respectively. Thus, the Eastern Jebel is less important for wheat than for barley.

The distribution of the wheat production in 1957/8 was as follows:-

Tarhuna cabile	520 metric tons	(61.2%)
Cussabat cabile	6 " "	(7.6%)
Demographic farms	324 " "	(31.8%)
Concession farms	-	-

Though most of the wheat was produced in areas of shifting cultivation, a much larger percentage of the wheat than of the barley came from Italian demographic farms. For every ha. of land, Italian demographic farmers produced 1.001 qts. of wheat, Libyan shifting cultivators 0.112 qts. and Libyan sedentary farmers 0.0187. Italian concession farmers did not grow any wheat. Wheat tends to be concentrated in areas of static agriculture in Tripolitania, but in the Eastern Jebel more wheat is grown by nomadic pastoralists than by sedentary cultivators.

The high production from Al Khadra is due to the fact that wheat is more productive than barley and, as a cash crop, the returns are higher. An average of 4.8 ha. of wheat is grown on the demographic farms but, like barley, the peripheral farms devote a higher percentage of their land to wheat than the central farms. Less than 1% of the cultivated area near Al Khadra village is devoted to wheat compared to 15% on farms on the northern and southern margins.

Only three of the ten sampled cabile grew wheat in 1958/9, and the total production was only 22.9 metric tons,

of which the Nahagia produced 11.4 metric tons, the Ed Darahib 8.5 metric tons and the Hamamla 3 metric tons. Most of this wheat was cultivated on the ex-Italian estates of el Gsea and Sidi Essed. Elsewhere in Tarhuna, wheat is grown mainly in the north, where it is sown between rows of barley.

Very little wheat is grown in Cussabat and only 4 out of 100 farmers in Beni Let produced any wheat in 1958/9. It is mainly grown in the inundated gardens, where small patches of wheat are intersown with barley. Wheat and barley seed are often mixed together in Cussabat, so that production of wheat may be higher than the figures indicate

(c) Yields

Yields of wheat are lower than those of barley. In Tripolitania, the average yield in a wet year (1956/7) was 3.43 qts./ha., in a dry year (1946/7) 1.275 qts./ha. and in the average year about 2.76 qts./ha. The average yields for the period 1952/3 - 1957/8 have been 2.32 qts./ha. in the Eastern Province, 2.54 qts./ha. in the Central and 3.4 qts./ha. in Tripoli and the Western Province. Yields on Al Khadra ranged from 2.0 - 5.6 qts./ha. in 1956/7 and 1.5 - 2.7 qts./ha. in 1957/8, averaging 3.6 and 2.0 qts./ha. respectively. Yields were again highest in the central farms where less land is devoted to wheat than in the peripheral

Cereal grains are part of the staple diet of the population, and the stalks feed the animals. Therefore much of the production is consumed locally. Between the harvests of April 1958 and April 1959, 10,023.1 metric tons of barley were sold at the municipal markets of Tripolitania; this was about 27.02% of the total production. The figures for Cussabat and Tarhuna are 114 metric tons and 38.5% and

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Appendix XIg). Most of Cussabat's barley is sold between the end of the harvest and December and that of Tarhuna between December and the following harvest. Discounting the autumn months, when barley is sold for seed, Cussabat farmers sell their product after the harvest for cash, but Tarhuna cultivators sell only their surplus when they have ensured that the following harvest is successful. This arises from the greater insecurity of the shifting system, but also from the fact that, because of emigration, cultivators no longer depend on cereals for cash income, or in some cases for food.

These factors are expressed in the differences in the prices of barley sold at Tarhuna and Cussabat markets.

farms. In Tarhuna, the tribesmen reckon that a yield of 1.4 - 2.5 qts./ha. is satisfactory, though so much of the wheat is intersown with barley that it is difficult to be exact. Wheat is not widely grown in Cussabat and there are no figures for yields.

#### D. Cereals and their consumption

After the cereals have been harvested, they are dried in the sun and then threshed. On Libyan farms, threshing is carried out by animals who tread the cereals, for Libyans do not possess special threshing implements like the Italians. The straw is kept for animal feed and is stored in small silos excavated in the earth. That portion of grain earmarked for domestic consumption or sale is sent to one of 15 flour mills in Cussabat and twelve in Tarhuna. These are now electrically powered and are located in the main olive presses and in the rural markets. Some people still use the traditional millstone (the rakah), which consists of two flat basalt stones rotated by a small stick. They are made in Beni Uliḍ, where there are large outcrops of Basalt, and this area once supplied millstones to the whole of northern Tripolitania. The flour and grain is stored either in the small underground granaries (gusbat) or in special store rooms in Cussabat.

In 1958/9, the average price of barley was £L2.065/qt. in Tripolitania, £L2.077 at Cussabat and £L1.872 at Tarhuna. This means that cereal cultivation is more profitable in Cussabat than in Tarhuna. Italian barley fetches a higher price - c.£L2.1 - £L2.3 - but is sold direct to merchants.

The same factors apply to wheat, but very little is sold. Wheat, however, gains a much higher price than barley - £L3 - £L3.5/qt.. It is thus more profitable to cultivate wheat.

It is difficult to estimate the cost of producing cereals, because of the labour situation. Farmers once employed day labourers for the harvest, but now prefer to rely on family workers. Migrants often return to the cabila for the sowing and harvesting of cereals. Rowland (7) estimated that the cost of producing dryland barley was £L3.65/ha. at a time when barley seed cost £L2.5, compared to the present price of about £L2.0/qt.. If the present costs of production are thus £L3.15 and the value of one quintal of barley is about £L2.0, then with a yield of 3 qts./ha., the profit is about £L2.85, which is very low. In many parts of the Eastern Jebel, yields are lower than 3 qts./ha., so that in some years barley cultivation may be unprofitable. This situation has been found in parts of northern Tunisia, where shifting farmers cultivate cereals at a loss (8).

The cost of producing wheat is only slightly higher - £L4.15 - £L4.65 /ha., and with a yield of 3 qts./ha. the profit is £L4.85 - £L5.85. Wheat cultivation can be more profitable than barley cultivation in the more humid and protected areas of Cussabat. The contribution of cereals to gross family income has been examined (Chapter XII and tables XII - 21,22 compare the contribution of cereals to family income. Bearing in mind the high costs of production, the income derived from cereals is proportionately greater in Cussabat, where yields are higher, than in Tarhuna.

#### E. Cereals in Tripolitania

Libya was once part of the granary of the Roman Empire and it exported large quantities of barley during the Turkish period. Today, cereals must be imported. In 1945, barley was still exported to the extent of 20,217 metric tons, but in 1955 and 1956 there were no exports, and in 1957 there was one small export valued at £L33, and in 1958 a small barley export of 703 metric tons. In 1956, wheat imports were 702 and barley 3,397 metric tons, and at present about 25,000 metric tons of wheat are imported annually, plus any gift of wheat or flour. More wheat and barley are needed for the home market, and cultivation, particularly of wheat, could be extended in the northern parts of the Eastern Jebel.

## F. Conclusions

In the Eastern Jebel, cereals are grown under all three types of farming systems. The Italian demographic farmers produce more per hectare and per capita than Libyans, and also obtain higher yields. Nonetheless, barley, in particular, makes a greater contribution to Libyan than to Italian farm income. Surprisingly little barley and wheat are produced by shifting cultivators and the profit they make is very low. Cereals are still subsistence crops in semi-nomadic areas. However, in recent years, pastoralists have not had to rely on their animals and land for subsistence, and many now live off the remittances of emigrants, and sell for cash a growing proportion of pastoral products. As a result, the need to cultivate cereals is disappearing and many families produce barley to keep themselves and their animals, whilst relatives take paid labour in the towns. Emigration has produced labour shortages and the low profit margins of barley cultivation are discouraging some farmers from growing it. As a result, barley is declining in importance and less is being cultivated.

Gussabat, because of its higher rainfall and better soils, enjoys higher yields than Tarhuna. Also, land holdings are less scattered and emigration less important. Therefore, barley cultivation is more secure and profitable. This is manifest in the greater proportion of land devoted to barley

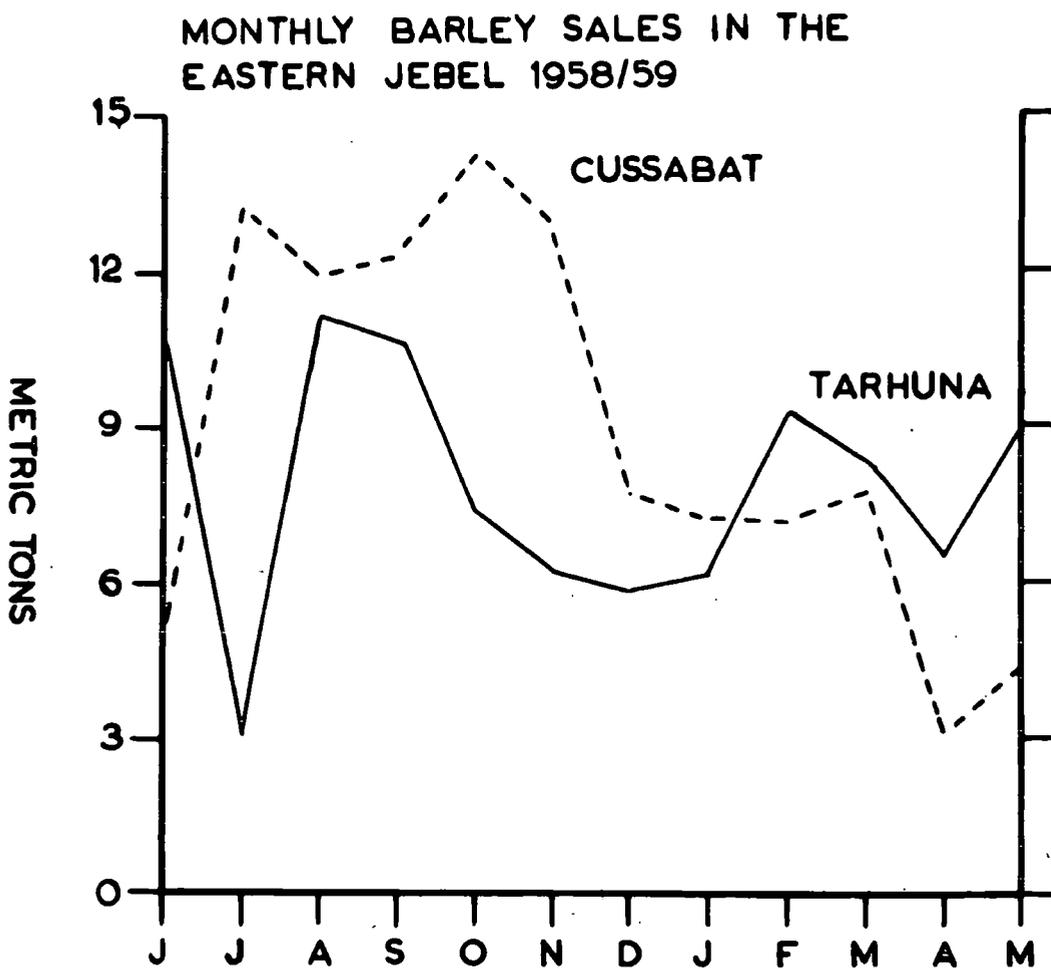
and the relatively high production per capita. Over one-third of the harvest is sold.

In Tripolitania as a whole, cereal production has not expanded at the same rate as population, so that Tripolitania, once an exporter of cereals, must import wheat. The Government is trying to encourage cereal cultivation by buying the harvest at fixed prices in some years (e.g. 1956/7), fostering water spreading schemes, and the spread of irrigation, and by raising the duty on imported flour from £L2.5 to £L7. The spread of irrigation has already resulted in a trend away from dryland cereal cultivation, which is much less profitable than irrigated cultivation. However, the Government must also attempt to foster cultivation in the Eastern Jebel. This may happen with the spread of arboriculture and the development of water spreading schemes, but in Tarhuna there must be more positive encouragement to the farmers. The profits from cultivation can be increased by the improvement of farming techniques, co-operative sowing and harvesting, the introduction of Italian and other varieties and the fostering of wheat cultivation.

Farmers in the region cannot hope to make large profits from cereal cultivation, even if yields are raised, because of the low and unreliable rainfall. Profits can be increased and the region could at least produce enough for its own population. The danger is that cereals are decreasing in

importance in Tarhuna, where they are grown partially for subsistence and partially for insurance against the loss of income from other sources. They must once again become the full supplementary and subsistence crop they were under the traditional systems of cultivation.

figure 41.



CHAPTER XVOTHER CROPSA. Introduction

Economic activity in the Eastern Jebel is dominated by the systems of gaba zeitun and menga in Cussabat, animal husbandry in Tarhuna and olive cultivation in Italian areas. Crops other than cereals and olives are grown and their number is tending to increase. These are mainly tree crops and include the almond and vine on Italian farms, fruit, nut and forage crops in the ginanat and swani and deciduous and other fruit trees in small orchards on Italian farms. Almonds and vines play the juvenile leads on Italian farms, but play very minor roles in Libyan gardens. The rest of the crops are ancillary and are grown mainly for domestic consumption; economically, they are of importance because of their potential rather than present role, and they are being considered from the viewpoint of future development.

B. The Almond

The almond is well adapted to aridity and thrives in countries bordering the Mediterranean, being most widely cultivated in the eastern Mediterranean. It starts its cycle in December and is in flower by January or February, depending on variety. The harvest is usually completed by July, after

which the plant rests for the remainder of the summer. It therefore takes full advantage of the winter rains and forms its fruit while there is still a moisture surplus in the soil; it avoids the worst part of the summer and is little affected by drought. The almond can be damaged by cold humid air and frost occurring in depressions and hollows in the region under study, and Ghiblis blowing during the flowering period are detrimental to it. Nonetheless, the almond is well adapted to the region and it is not surprising to find Manetti stating in 1914 that 'Il mandorlo e pianta di sicuro avvenire nelle Tripolitania tutta' (1).

Vitale (2) found that the almond did very well on alluvial soils and the Ard Ten of the Jefara and Jebel. It dislikes marine winds and the crusty limestone soils of the coast, but is suited to 'azienda' farming in the inner Jefara and Eastern Jebel, where on clayey soils the almond needs little cultivation. However, there were very few almonds in Tripolitania in 1911, and many of these were recent plantings. According to Manetti, the Turkish Government tried to encourage almond cultivation by distributing free seeds. The Italians started to cultivate the almond after 1920 and there were 70,000 by 1925, 540,000 by 1930 and over 1,740,000 by 1940. Numbers remained steady after the war, but fell to about 1,400,000 in 1956. At the present time, many of the

Tripolitanian almonds, which cover an area of about 30,000 ha., are mature, though since about 1957 many have been planted.

As the almond is a tree grown by Italians rather than by Libyans, its distribution is similar to that of Italian land. 73% of the almonds are in Tripoli and the Western Province, 25% in the Eastern and 2% in the Central Province. The Jefara is the most important producing area and the fact that production is 83% of Tripolitania's total (3) almonds shows that most of the mature trees are located in the Jefara.

Most of the almonds in the Eastern Province are found in the Eastern Jebel, where there were 340,984 almonds in 1958 (23% of Tripolitania's almonds). Of these, 334,430 were in Tarhuna and only 6,544 in Cussabat. Most of the almonds are immature and two thirds of Tarhuna's trees are unproductive. It is difficult to estimate what proportion of the almonds are on cabila land in Tarhuna. The Nazirate of Agriculture estimated about 1,500 in 1958, but this figure may not include unproductive trees, because in 1960 the writer found that there were 4,600 almonds in ten selected oabile and of these 63% were under 10 years old.

The almond plays different roles on Italian and Libyan farms, and they must be considered separately.

### 1. Almonds on Italian farms

The almond in Libya was not destined to be a permanent crop, but was cultivated to provide a cash income while the olives were immature. The almond was well suited to its role because of its adaptivity to aridity and its quick maturing quality. It was usually intersown with the olive or limited to a small area of the farm. As the olives matured, the almonds were to be uprooted, leaving only a few hectares in permanent cultivation. Thus, in 1937, 2,700 ha. of land on concession farms were devoted to olives associated with almonds, and in 1939 over 75% of the almonds on Al Khadra were intercultivated with olives or vines.

Vitale was one of several Italian experts who disliked the system of intercultivation. He believed that almonds and olives should be sown separately and that the almond had a very important role to play in the future of Italian farms in Libya. He based his arguments on the following factors:-

(1) There were too many trees per hectare. If olives were grown by themselves in the eastern Jebel, they were planted at intervals of 20 - 24 metres; if almonds were intersown, they were planted in lines between the olives, so that a 24 x 12 system of planting resulted. Some concession farmers planted another row of almonds between the olives, so that the trees were only 12 metres apart.

Density of planting was doubled and the yields of both almonds and olives were affected.

(ii) It has been proved in Sicily that almonds and olives give higher yields if cultivated separately.

(iii) It was ridiculous to uproot the almond after 20 years, when it was productive for another 60 - 70, and it would be impossible to dig out the almonds without damaging the roots of the olives.

(iv) It was bad economics to base the future of Italian farms on the olive alone.

He argued in vain and nearly all the almonds on concession farms are intercultivated with olives, and the farmers have no intention of uprooting them. This adversely affects yields and returns are higher where there are specialised almonds. On the S.A.F.I.L. farm there are 60 ha. devoted to specialised almond cultivation, and yields of 20 - 23 kgs./tree are obtained, compared to 16 - 18 on the other Italian farms.

Italian trees are of several different Sicilian and Puglian varieties, but the most widely grown are the following:-

- Pizzuta, which is known as the Ayola Scelta on world markets, and has a large smooth hard-shelled nut.
- Romara, which gives a clear white nut in a hard smooth shell.
- Fragiulus, which has a semi-hard shell and a flat elongated

nut.

Harvesting is carried out by shaking the tree and it starts when the husk on the nut begins to split. Broc (4) maintains that almond cultivation could be improved on Italian farms if the practice of harvesting by shaking was abandoned, and if the Tunisian varieties Zaaf, Abiod and Constantin were introduced.

Although the almond is disappearing from Italian farms in the Jefara, it is very important in the Eastern Jebel, where its cultivation is increasing.

## 2. Cabila land

The almond, like all other trees crops except the olive, is found wherever a piece of land is fenced or walled off in Libyan areas. The almond did not enter the system of gaba zeitun or pastoralism, and was grown only on improved or privately owned land. There are no almonds (nor any other fruit or nut tree except for one carob) growing in the Cussabat Plain and almonds are rare in the Scarp Zone. Most almonds are found in western Cussabat, especially on the newly laid out dry gardens and in the small ginanat surrounding the villages. In Tarhuna, almonds occur in the ginanat and swani and more recently on the areas turned over to olive cultivation in the Italian system. Almonds are being planted on El Gsea and Sidi Essed, where eventually they will cover 5 ha./farm.

Almond production from the Eastern Jebel ranges between 390 and 590 metric tons per annum out of Tripolitania's total of 2,700 - 3,200 metric tons. The most important producing area is Al Khadra, where productions of 153.2 and 101.4 metric tons were obtained in the wet year of 1956/7 and the dry/average year of 1957/8 respectively. Cussabat, with 18.5 metric tons, is an insignificant producer. Most of the Italian crop is sold, but most of the Libyan crop is consumed locally. Approximately 500 metric tons of almonds are exported annually, and this could be increased. As an export crop, the almond has the advantage of keeping indefinitely. However, 100 kgs. of nuts from the tree yield about 25 kgs. of almonds kernels, of which 20 kgs. are suitable for export.

Unfortunately, the Italians chose to develop the hard-shelled almond, which commands a lower price on world markets. Exporters, for example, were paying 20 piastres per kilogram for soft-shelled almonds in 1957 and 16 piastres per kg. in 1958, compared to 8 piastres per kg. for the hard-shelled variety. The exports are mainly to the U.K. and Germany, who between them absorb about 75% of Libya's almonds. Libya, as an almond producing country, is inferior to Italy (50,000 m.t.), Spain (30,000 m.t.) U.S.A. (20,000) and Iran (7,000) (5).

There is no reason why almonds should not be cultivated more extensively. They have already proved themselves and

have exceeded Italian expectations. Almond cultivation could be made more profitable if more of the soft-shelled varieties were grown.

### C. Vines

The vine was the principal 'fill in' crop on some Italian concession farms and demographic farms in the Eastern Jebel. Nonetheless, there were already 700 ha. of vines producing about 100 metric tons of grapes in 1911. The vine was important on Libyan farms, where it produced table grapes; there was a small wine industry at Cussabat until about 1940, producing a very coarse rough liquid which was made and consumed by the Jews. The number of vines in Tripolitania increased rapidly after 1925 to reach a peak of 42,525,000 in 1944.

Table XV - 1. Number of vines in Tripolitania for

#### Selected years

<u>Year</u>	<u>Nos. of vines</u>
1925	920,000
1930	1,361,000
1937	29,061,000
1940	41,298,000
1944	42,525,000
1953	10,576,892
1956	1,650,000

The number declined rapidly after the war and is probably still falling, because of the following factors:-

1. The vine, like the almond, was not meant to be a

permanent crop; on Al Khadra, for instance, 5 ha. were devoted to the intercultivation of vines with olives, the vines to be removed after 20 years.

2. Unlike the Libyans, the Italians grew wine-producing varieties and the Italian government set up a wine-making and distributing industry. Though the industry is still important, the wine drinking population has shrunk, and Moslems are discouraged by the Koran from consuming alcoholic beverages. (This does not apply to all, but very few of the poorer people drink wine).

3. The market for grapes is restricted to Tripoli, whose intake is small, and the dry dusty atmosphere as well as the poor quality of the fruit preclude a dried fruit industry. At present, there is no canning or processing industry.

4. Rascovitch (6) doubts whether Libyan wines could compete successfully with the cheaper wines produced in Italy or France. In Libya itself, most wine drinkers prefer the Cyrenaican to the Tripolitanian wines. Nonetheless, 2,840 hectolitres of wine was exported, mainly to Germany in the first three months of 1961 (7). Rascovitch suggests that the number of vines be allowed to decrease whilst efforts are made to improve the quality of table grapes.

Roebben (8), who examined the possibility of establishing a fruit and vegetable cannery in Libya, believes that grapes can be canned if other fruit and vegetables are supplied to the cannery at different periods of the year to maintain the working of the plant. In 1954, he found that only 620 metric tons of grapes were sold in the home market and he advocated that the export market could be developed if the grapes were processed into grape juice. He estimated that the cannery could absorb 1,500 metric tons of grapes over a period of 50 days between mid-August and late September, when the grapes are harvested.

With this possibility in mind, the Libyan government is encouraging vine cultivation by compelling farmers on the state lands of Sidi Essed and El Gsea to cultivate 4.5 ha. of vines.

The decline in the number of grapes has been less marked in the Eastern than in the other provinces. In 1953, 60% of Tripolitania's vines were in the Eastern Province, compared to 20% in 1945. Though numbers have fallen sharply since, in 1958 there were still about 184,000 vines in the region under study.

Table XV - 2. Distribution of vines in the Eastern

Jebel, 1958

<u>Area</u>	<u>number</u>
Msellata	4,388
Aulad Msellem	53,810
Aulad Mahareff	23,750

<u>Area</u>	<u>number</u>
El Hawatem	10,750
Ed Darahib	4,600
Al Khadra	86,968
Concession farms	400
<u>Total</u>	<u>184,566</u>

Al Khadra, with 47% of the vines, most of which are wine varieties, is one of the most important wine-producing areas in Tripolitania. The alicante is the most popular variety, but yields are very low: 8-10 metric quintals/ha.. The vines are sown at intervals of 2 metres by themselves, or 3 x 3 metres between olive trees planted at distances of 24 metres.

The vine is of increasing importance on Libyan-farmed land in Tarhuna, particularly on El Gsea and Sidi Essed. Here, Italian varieties are being cultivated, and some of the varieties at present being tried out at Sidi Mesri and Abbiar Miggi may be introduced. These are the Italia, Baresani, Frio Vana 14, and the Panse Precoce. The methods of cultivation are similar to those employed on Al Khadra and involve the very short pruning of the plants. On cabila land, vines are grown in the ginanat and are important in eastern Tarhuna as the following figures show:-

Table XV - 3. Vines on selected cabile.Tarhuna, 1960

<u>Cabila</u>	<u>Nos. of vines</u>
Hamamla	1,800
Masabha	5,817
Et Tella	2,316
Auasa	1,172
Aulad Msellem	10,000
Terscian	300
Fergian	190
Nahagia	-
Darahib	140
Aulad Ali	450
Total	<u>22,185</u>

Vines are important in Cussabat, where they are consumed by the farmers. In both areas, local varieties, of which the most numerous is the Khaduri, are grown. They are often regularly spaced at intervals of from 2 - 8 metres - an unusual feature in the ginanat. They are allowed to develop to enormous dimensions, but yields are even lower than on Al Khadra.

It is unfortunate that the position of the vine is so insecure, because it is well suited to local conditions. Though 400,000 litres of wine was produced in 1958 in Tripolitania, the market is falling, and prices have dropped from 250 mms./kg. to 150/kg. between 1954 and 1958. Every effort should be made to improve the quality of the Libyan grape and wine producing varieties as well as to establish

a canning plant. Otherwise, it may prove imprudent to encourage the extension of vine cultivation.

D. Deciduous and other fruit trees

These include the fig, peach, apricot, pear, pomegranate, plum, apple and mulberry in roughly that order of importance. The large number of "other trees" given in Nazirate of Agriculture statistics are made up mainly of figs in Libyan areas and peaches and apricots in Italian areas. On cabila land, the distribution of these trees corresponds to that of the almond and vine, but in Italian areas there are small orchards surrounding the farmhouse. Ente reserved 0.5 ha./farm for fruit trees which were sown on an 8 x 8 system. Fruit trees are grown for domestic consumption in the region and their products are rarely sold. Several foreign experts, notably Broc and Mazzochi (9) believe that the profitable cultivation of fruit trees can be extended in the Eastern Jebel. Broc pointed out that before this could happen the tribesmen must be educated in arboriculture and taught to be 'friends of the tree'. Fruit cultivation would also need a foreign market, as that at Tripoli is too small. This in turn necessitates the establishment of canning plants as well as the setting up of proper drying and refrigerating facilities. Communications would have to be improved, or

cultivation restricted to the more accessible parts of the region. Mazzochi is experimenting with different varieties and different types of fruit trees at Garian and Abbiar Miggi and he states that he is obtaining remarkable yields.

In 1911, Manetti (10) found that the fig was second only to the olive as a cultivated tree crop in the Jebel. The fig is widely cultivated in the Jebel Nefousa and Garian, where, in parts, it replaces the olive. The local figs, of which there are at least 14 different varieties, are found in the ginanat of Cussabat and Tarhuna, but they are not cultivated by Italians. They play an important part in the economy of some families and according to a local proverb 'after 50 days (of summer) the fig matures, after 60 days the poor are glutted'. Local figs are large bushy plants and Broc considers that this reduces the yield of fruit. He suggests that the leaves should be used for forage or that the yield be raised by careful pruning. He advocates that dried figs should be produced and recommends the introduction of the Dottate.

Peaches and apricots appear to offer the best potential for development according to Mazzochi. Both are widely grown in the ginanat and Italian orchards, but are at present consumed by the producers. The peach and apricot dislike dry atmospheres and are particularly susceptible to attacks of the Mediterranean fly. In Tripolitania, the coast is

too unhealthy and the Ghibla and Jefara too dry; the best area for their cultivation is in the Jebel, particularly Cussabat, where physiosanitary and moisture conditions are at an optimum. Local varieties, which are sown from seed, yield after 4 years and are harvested in the first half of May. Occasionally, the apricot is grafted on to an almond rootstock and yields often exceed 40 - 50 kilos. per tree. Italian planted peaches - May Flower, Triumph, Amsden, Vainqueir - yield over 100 kgs., and sometimes even 400 kgs., and Mazzochi maintains that both peaches and apricots will give remarkable yields when grafted on bitter almond rootstock. The main difficulty with the development of peaches and apricots is the lack of a market. Tripoli's intake is very small and only a few tons of apricots are exported to Malta. For this, too, a canning plant will have to be set up. Broc believes that it would be profitable, since the plant could be kept working by dealing with other fruits - citrus and grapes, for example, - and by the cultivation of early and late maturing varieties which would help to stagger the harvest. However, the quality of the fruit would first have to be improved.

The other tree crops are of little importance. Apples, pears and plums are grown by Italians and pears and palms by Libyans, but in very small quantities. They are not suited

to Tripolitanian conditions. Plums could be adapted to conditions in Cussabat if they were grafted on bitter almond rootstock. The pomegranate is a useful tree because it can withstand the heat and alkaline soils, but the fruit is often collected too late on Libyan farms so that it bursts open.

Date palms, which are numerically the most important tree in Tripolitania, are notably rare in the region under study. They are cultivated in only one small area in Cussabat, around Hiar Mafrania between the villages of Ghelael and Ghah. Most of Cussabat's 300 palms are found here. They are grown for their dates and not lagby (sugar) and the product is consumed locally. Though palms are found in other parts of the region, farmers claim that the dates are 'wild' and are not cultivated and only rarely harvested.

### B. Forage crops

Despite the fact that Farhuna is a pastoral area and that, in Cussabat, animals are of some importance, forage crops are not grown and animals are rarely fed by their owners. The principal possibilities appear to be the cultivation of medical herbs, beans, carrots, barley, trifolium lucerne and the tree crops, carobs and forage cactus. The chief problem is the fact that most of the field crops demand high quantities of water and are unsuited to the

Eastern Jebel. Medical herbs are grown on a small scale in the swani, whilst forage barley and lucerne are cultivated under irrigation on the Government farm at Scersciara. Surprisingly little research has been carried out on the possibility of producing forage crops on dryland farms. The F.A.O. report dismisses the problem, whilst Government officials are more concerned with improving the range. The only crops which have been successfully grown in the region under study are the prickly pear (Opuntia Sp.) and the carob. There is no reason why the prickly pear could not be cultivated for forage. It is used to demarcate ginanet, but its leaves are rarely fed to animals. The Italians laid out a demonstration plot of prickly pear at Tarhuna, but to no avail. The prickly pear could best be developed for livestock in regions with less than 150 mms. of rainfall and would do well in the Ghibla, where it is most needed. Rowland (11) states that in such areas, one ha. of 4,000 plants would supply enough leaves to feed 30 sheep for 200 days. If 1,500 ha. were cultivated it would be sufficient to maintain the entire sheep population of Tarhuna throughout the summer months. The planting of prickly pears must be carried out if pastoralism is to be made more productive and secure.

Carobs are widely grown in parts of the eastern Mediterranean, notably Cyprus, and they are ecologically suited to the

Eastern Jebel. Manetti said "Il carrubo prospera meravigliosamente in tutta la regione del Gebel" (12). He noted that there were many finely developed carobs in Cussabat and thought that its future in cultivation was assured. The carob is a large leguminous evergreen which in August yields a 5 - 6 inches long pod, which will keep for three years. However, the carob is not widely cultivated because it takes 25 years to reach maturity and is not in full production (75 - 100 kgs. per tree) until it is 80 years old. About 1,000 metric tons of carobs are produced annually, mainly from the Jefara. They could be cultivated in the Eastern Jebel or or planted in afforested areas. The three Cypriot varieties, Templiotive, Kyruiotike and Sarakine are being tried out on the experimental farm, where they do best on deep lime-rich permeable soils in areas which are not exposed to north winds.

#### F. Miscellaneous crops

Other crops cultivated in dry gardens are the melon, water melon, chickpea, saffron, and very small quantities of peas, onions and beans. The melon is the most important of the herbaceous plants grown in dry gardens and is significant because it is the main summer crop. It is sown in early summer and harvested about 3 months later. Melons are usually associated with water melons and form an important supplement to the family economy. Some are taken each year to Garabulli

or Homs where they are sold, and before the Italian invasions melons from Cussabat were exported. Chickpeas are grown in small quantities and are rarely sold, whilst little saffron is now grown in Cussabat, where it was once quite important.

Only two other crops enter the economy: pistacia vera and castor. The latter has spread like a weed over the Jefara since about 1945 and is now extending into the Eastern Jebel; it does not appear to be cultivated in the region. The pistachia is a nut tree widely grown in the Mediterranean, its habits being similar to that of the almond and its nut like the groundnut. It is ecologically suited to the area, but at present only 20 ha. are cultivated and this is on the concession Fontana Piacenza. The farmer has found the tree to be successful, but its cultivation is limited by the facts that grafting is difficult as there should be one male pistachia to every 10 females (at present there are too many males), and pollination must be done by hand. The pistachia does well where there is 25% of lime in the soil and prefers dry warm slopes. Broc advises against its development.

#### G. Conclusions

Farm income from both Italian and Libyan areas depends

on a narrow range of products and in Libyan areas only on animals, olives and cereals. Very few other crops are cultivated, apart from the almond and vine in Italian farms, except in the ginanat and swani and Italian orchards. The Italians originally planned to cultivate almonds and vines as 'fill in' crops and only the breakdown of Italian rule and the success of the almond, which has proved more profitable and adaptable than originally expected, have led to the survival of these plants. The vines have lost importance because the wine drinking population has declined, but the decline may have ceased because the Government is encouraging the production of table grapes, and exports of wine are increasing.

The narrow range of crops cultivated in the region under study can and should be widened, since several other tree crops, notably peaches, almonds and carobs, are suited to the Eastern Jebel, where phytosanitary conditions are better than those of the coastal areas. The spread of olive cultivation in Tarhuna is being encouraged, and the trend towards increased arboriculture should be used by the government to increase the numbers of almonds, table vines and fruit trees. At present, the farmers do not know which varieties to grow and the local market is small. Much more research, demonstration and education in arboriculture is needed and the export market cannot be developed until communications are improved

and drying and refrigerating facilities and a cannery established. Both Broc and Reobben have shown that a cannery is a practicable proposition if a sufficiently large range of products are available to maintain the working of the plant. As tomatoes and citrus fruit are already produced in the coastal areas, more grapes and fruits could be produced from the Eastern Jebel.

At the same time, farmers could grow forage crops, the need for which will increase as agriculture encroaches on pasture. The prickly pear does well in the region and is important because it can be cultivated in the Ghibla, where an area of 3,500 ha. of prickly pear would maintain the whole of Tarhuna's animal population. The carob does well in the Eastern Jebel and it could be cultivated on hill slopes as an alternative to afforestation.

A greater range of tree crops can be grown and their development should be fostered to diversify the sources of farm income and to increase the profitability of arboriculture.

CONCLUSION.

CHAPTER XVI.CONCLUSIONS AND FUTURE DEVELOPMENT.A. Conclusions.

Though many changes have taken place since the Italian invasions of 1911, the Libyans, particularly in rural areas, have remained poor and backward. The Italians transformed the face of the country through an energetic programme of development based on colonisation. However, the peoples of the Eastern Jebel continued to eke out a living from the types of resource use evolved by successive Roman and Arab invasions and perpetuated by the loose Turkish rule and the all-embracing and resilient social structure resisting all innovation and change. The confine between pastoralism and agriculture had been defined by ancient tribal and historical differences within the region; it was not based on the potentialities of the resources. The Italians, unlike their ancient predecessors, did not convert the indigenous people to sedentary arboriculture, but confined themselves to setting up an oasis of cultivation, demarcated by geometrically precise boundaries, in the steppe and overgrazed pasture of Tarhuna.

The Italian development indirectly caused many changes in the Libyan way of life. Land was forcibly expropriated and the tribesmen were thus compelled to seek compensation in jobs created by Italian projects. Emigration, which had

always been important in Tarhuna, grew to immense proportions and people stayed away for longer periods.

The growth of emigration has been the most important development in tribal life since the Arab invasions. It has helped to accelerate changes in the way of life which were emerging before the Italian invasions. The rise of a military leader in the late 19th century and the change from communal to private usufruct and ownership of land had already undermined local society. Emigration meant that the individual need not depend upon the other members of his tribe for a living, and gave him a greater degree of independence and freedom. Today, the cabila and lahmat have lost much of their importance and are little more than administrative units. Economically, the large social group has been replaced by the family, and though traditionalism remains strong, education in the new schools or in the urban environments is causing old values to be rejected without the acceptance of new or positive ideals.

Emigration has speeded the movement towards private property ownership. The land holdings of the rich are getting larger, those of the poor smaller. This not only applies to land, but to the means of producing from the land; poor families seem to have fewer and fewer animals or trees, whilst these as well as their land are subject to the laws of

inheritance, thus widening the gap between the rich and the poor. The breakdown of communal ownership has meant that the individual must face drought, illness or disaster by himself and that he cannot rely on his tribal brethren for aid.

Under the communal way of life, the income of a group was determined by the number of animals and trees it possessed and the quantity of cereals it harvested. There were few other sources of income. The gross per capita income from these sources is today extremely low in all parts of the Jebel. This is because people have become accustomed to working outside the region and to gaining income from non-agricultural sources. In some cases, land is held as a security against the loss of outside labour and the family of the migrant labourer keep enough goats and olives to maintain themselves. Emigration is no longer undertaken in emergency, but is a way of life in the Eastern Jebel. In Cussabat and Tarhuna, income per ha. and per capita is falling and the resources are probably being exploited at a lower level than when the Italians invaded the area. The population has little incentive to develop the region. The people are poor and cannot afford to take risks. There are no credit facilities and even the rich farmers have difficulty in finding labour.

Yet emigration cannot continue indefinitely, because

there is little prospect in Libya of extensive industrial development. The oil industry can absorb only about 5% of Libya's working population. Agriculture must remain the country's largest source of employment and it must be made both viable and diverse. This must be done as quickly as possible. In both the Eastern Jebel and in Tripolitania, the capacity for population increase is tremendous and the rate of natural increase will certainly rise within the next few years as death rates fall and people marry younger. It is thus urgent that the population be encouraged to look to the land for livelihood and that the most efficient and profitable means of using the land be found.

Arboriculture is extending on the northern and southern margins of Cussabat and in Tarhuna. In those parts of Tarhuna which are too arid for arboriculture, some tribes are concentrating on the husbandry of sheep and are gaining higher incomes from their land. However, over most of the region, the economy is dominated by the subsistence husbandry of the goat and the olive and by primitive methods and techniques.

#### B. Future development.

Development projects in Libya must be based on the need to develop a viable agricultural economy independent of oil. Oil revenues must be invested in agriculture, so that rural

per capita incomes can be raised and exports increased. It is also essential that the type of development chosen is suited to the natural and social environment and that every effort is made on one hand to conserve and use physical resources and on the other to educate and improve the technical ability of the human resources.

In the Eastern Jebel, there are two main avenues for development: the extension and improvement of arboriculture and the reorganisation and increased productivity of pastoralism.

Arboriculture should be encouraged in Tarhuna, especially in the humid north and in cabile where tree crops are already in cultivation. Trees cannot be profitably grown everywhere and therefore it is essential that zones primarily devoted to arboriculture should be demarcated. The extension of tree cropping must be accompanied by improvements in the systems and methods of cultivation. Farmers should stop planting trees in the ginanat and be encouraged to plant either like the Italians or in terraces and contour ridges. They should plant the best local and Italian varieties, especially the Rasli and Frantoio olive trees, as well as other tree and field crops. Under present conditions, almonds offer the best scope, but vines, figs and forage crops, for example, could be sold to pastoralists or used to

feed cattle who would manure the farms. Direct encouragement to tree cropping is necessary, on the one hand by the creation of adequate processing and marketing facilities (like a cannery), and on the other by short-term loans to established and would-be cultivators. These are important provisions, because trees take a long time to mature. Farmers badly need credit facilities, improved implements such as steel mould-board ploughs, digging hoes, sickles, pruners and harvesting gear (1), as well as education, advice and demonstration in the application of modern techniques. These could be supplied by Government-subsidised co-operatives on the model of those already successfully established in the western Jebel.

Control over the spread of arboriculture is essential, because so much of the region is arid. Animal husbandry is the most effective means of developing the Ghibla and the Jefara and therefore must remain. If it is to remain, it must be reorganised so that it becomes less dependent for water and summer pasture on the northern Jebel, where, however, areas of pasture must be retained near the main wells. Before pastoralism is reorganised, it is essential to explore the region's groundwater reserves, as there may be deep-lying aquifers in the Ghibla and localised Pleistocene reserves in the Basin Zone of Tarhuna. Large cisterns of the 'beehive' anti-evaporation type should be built in the Piedmont and Scarp

Zones and, where practicable, in the Ghibla. If water-spreading schemes are developed in suitable Jefara and Ghibla wadis, forage crops could be cultivated, and elsewhere the prickly pear could be grown. The prickly pear does well in arid zones and is definitely a plant with a future in the region under study. The number of goats must be drastically reduced and should be replaced by sheep in pastoral areas and by cattle in sedentary areas. Research into means of improving animal health and yields is essential, while other breeds should be introduced or crossed with the Barbary sheep. Investigations should also be conducted into the means of improving the nutritiousness of the pasture through the isolation of zones in which para-climax communities could develop. Education in modern techniques and the introduction, possibly on a co-operative basis, of hand and powered shears, castrators, drench guns and sheep dips are necessary, and veterinary advice must be extended.

The parallel development of arboriculture and pastoralism should be carried out so that both conserve and use the precious resources at an optimum level of efficiency, and so that the dual economies are linked. The main possibilities seem to lie in the following methods:-

1. Conservation of water. Much of the rainfall and run-off is unnecessarily wasted. Large cisterns must be built and

run-off channelled to terraces and cultivated plots. Small conservation dams could be built, especially in the upper tributaries of north-flowing wadis. However, because of the high evaporation rates, development should first concentrate on water spreading, terracing and beehive cisterns.

2. Soil conservation through improved methods of farming, afforestation, gully reclamation and proper terracing.

Afforestation is essential in the Scarp Zone, whilst elsewhere windbreaks must be planted. Slow maturing tree crops like the Pistachia vera or Carob could be sown among forest trees like the Eucalyptus.

3. Conservation of pasture by range management, the delimitation of areas devoted primarily to pastoralism, range improvement and the construction of roads or good tracks linking areas of pasture and watering points. This is essential because of the frequency of drought in the Ghibla and Jefara.

4. Introduction of modern farming techniques involving the correct spacing of tree crops, the abandonment of inter-cultivation and the strict rotation of field crops. Research into the best varieties of cultivated crops is necessary. Fertilisers must be made available to farmers, who could also allow animals to graze their land when in fallow.

5. The cultivation of forage crops by farmers, who could buy

milk and meat from pastoralists. Areas in the Ghibla and Jefara could be devoted to the prickly pear.

6. Provisions of credit facilities to both farmers and pastoralists.

7. The setting up of processing plants for animal and agricultural products in the region and the improvement of communications.

Such developments are of an immense scope and therefore need direct and co-ordinated Government action. It is difficult to say what form such action could take; communes on the Russian and Chinese patterns are undesirable. Libya is desperately short of skilled manpower and thus the first step lies in the extension of education and the employment of overseas experts, not only to say what should be done (enough do this already), but also to see that it is done. Within the region, co-operatives offer the best means of development.

Gaudefroy-Demombynes (2), who investigated the possibility of co-operative societies in Libya, argued that they were necessary because of (a) the poverty and backwardness of the population (b) the small size of farms (c) the lack of credit facilities and (d) the unwillingness of farmers to take even the slightest risks. These conditions are marked in the Eastern Jebel, where land holdings are fragmented and

parcelled and where the void left by the disintegration of communal resource use has not been filled. Government-subsidised co-operatives have already been set up in the Jebel Nefousa, Garian and other parts of Libya and have been successful. Though the Ain Uif afforestation scheme failed, this was because pastoralists could not see any direct gain from forest trees. Co-operatives could be set up in Cussabat, and through initial Government subsidies could provide not only pressing facilities, but short-term loans for tree replacement and a pool of improved agricultural implements. Experts or members of the excellent but under-staffed Extension Service of the Nazarate of Agriculture could advise and educate members in improved techniques. Co-operatives could also be established in Tarhuna for pastoralists and farmers. If the growing number of farmers is to be dispersed, then the Government should provide advice, implements, trees and credit independent of co-operatives, which should be established later.

Development can be financed from oil revenues and be piloted by work on the Government-owned land at Sidi Essed and El Gsea. Farmers are to be settled in these areas and they will cultivate olives, vines and almonds. These farms will form the vanguard of development and the Eastern Jebel should within the next few decades be exploited by inter-

linking economies based primarily on the Barbary sheep and the olive tree.

PART TWO.

APPENDICES AND REFERENCES.

APPENDIX I.Administrative units and boundaries in Tripolitania  
and the Eastern Jebel.

The United Kingdom of Libya is a federation of the three states or Wilayet of Cyrenaica, Fezzan and Tripolitania. Each state is ruled by a Wali or governor responsible to the King, and is divided into a number of provinces called Muqata'ah administered by the Ministry of the Interior. The Muqata'ah are divided into Districts or Mutsarrifiah, which are in turn divided into Mudiriats. The Districts and Mudiriats are administered by Commissioners and Mudirs respectively, appointed by the Wilayet administration. Mudiriats boundaries are indefinite, because the Mudir is responsible for a group of tribes instead of the specific area. In Tarhuna, for example, the Mudiriats are based on ancient tribal aggregates and several tribes in the same aggregate may live at different places in Tarhuna.

Tripolitania is composed of three provinces, which are broken down into Mutasarrifiah as follows:-

<u>Muqata'ah</u>	<u>Mutasarrifiah</u>
Tripoli and Western Province	Tripoli City Souk el Ciama Zawia Zuara
Central Province	Garian-Mizda Jefren Nalut
Eastern Province	Misurata

Muqata'ahMutasarrifiah

Eastern Province (cont). Zliten  
 Homs-Cussabat  
 Tarhuna  
 Sirte  
 Beni Ulid

The Eastern Jebel lies in the Eastern Province, which is extremely large and embraces parts of the Jefara, Ghibla and Jebel. In recent years, the Eastern Province has been reduced in size by the creation of a Northern Province composed of the Districts of Tarhuna, Homs-Cussabat and Beni Ulid. The Northern Province will be centred on Tarhuna and Homs town, but at present it is of little importance, as most statistics are still based on the old Eastern Province as a whole. It is, however, important to bear in mind the great size of the Eastern Province.

The Eastern Jebel consists of the District of Tarhuna and the two Mudiriats of Cussabat and El Amamra. Cussabat and El Amamra (Msellata) are in the Homs District and are administered by a joint Mudir living in Homs. Local affairs are looked after by a Kaimakan who lives in Cussabat. Some of his duties have been delegated to the Mayor of Cussabat. The rest of the Homs District is made up of the following Mudiriats:-

Homs municipality	Gasr Chiar
Sciogran	Souk el Kemis

The District thus includes part of the Jefara (Gasr Chiar), part of the Misuratino (Homs and Souk el Kemis) and the low foothills east of Cussabat (Sciogran).

Tarhuna is divided into four Mudiriats based on ancient tribal aggregates. These tribes do not always live together, and therefore the Mudiriats are split into several sections. Basically, each Mudiriati consists of the tribal homelands in the north, and areas of winter pasture and cereal cultivation in the Ghibla. This latter area is subdivided into numerous allotments held by the tribes. The four Mudiriats are:-

Aulad Msellem	El Hawatem
Aulad Mahareff	Ed Darahib

The Italian villages form a fifth administrative unit called 'Italian Villages' and this has the status of a Mudiriati.

Tribal boundaries, which are shown in figures 3 and 4, are indefinite. Those for Tarhuna have been drawn from an Italian map of 1934, and those for Cussabat by the writer on the basis of fieldwork in 1960. The boundaries are rarely straight, as shown on the map, but they give an idea of how large individual tribes can be.

Table of Equivalents.

A. Weight.

1 kilogramme - 2.20462 lbs..  
100 kilogrammes - 1 quintal - 1.968 cwt..  
1,000 kilogrammes - 10 quintals - 1 metric ton (short ton)  
- 2,205 lbs..  
1,016 kilogrammes - 1 English ton (long ton) - 2,240 lbs..  
1 cubic metre - 0.973 tons.

Local.

Note: Local measures of weight are based on the marta, which is a unit of volume. Therefore, the value of 1 marta changes according to the material being weighed and also to the time of year. Thus:

1 marta of olives - 13 kilogrammes in autumn, 14 in winter and 15 in late winter and spring.  
1 marta of barley weighs between 12.19 kilogrammes and 13.45 kilogrammes according to quality.  
1 marta of wheat varies between 14.09 and 17.09 kilogrammes.  
108 litres of olive oil - 100 kilogrammes.

B. Currency.

Present day.

10 millimes - 1 piastre - 2.4 pence.  
5 piastres - £L0.65 - 1/-.  
50 piastres - £L0.5 - 10/-.  
100 piastres - £L1.0 - £1 sterling.

1943-1951.

1 B.M.A. lire - 2.12 millimes.  
480 M.A.L. - £L1 sterling.

C. Area.

1 sq. metre - 10.7639 sq. feet - 1.196 sq. yards.  
10,000 sq. metres - 1 hectare (ha.) - 2.471 acres.  
100 hectares - 1 sq. kilometre - 247.1 acres.  
258.2 ha. - 640 acres - 1 sq. mile.

Local.

1 gedula - 9 sq. metres.

10 gedula - 1 giabia - 90 sq. metres.

D. Distances.

10 millimetres - 1 centimetre - 0.394 inches.

100 centimetres - 1 metre - 39.37 inches.

1,000 metres - 1 kilometre - 1.0931.61 yards.

1 mile - 1.609 kilometres.

E. Volume.

1 litre - 0.0353 cu. feet.

1,000 litres - 1 cu. metre - 35.315 cu. feet.

1 cu. metre - 220.0 gallons (Imp.) - 264.2 cu. gallons (U.S.).

1 cu. metre - 0.00973 acres/inch - 0.01 ha./cm..

F. Discharges.

1 litre/sec. - 3.6 cu. metres/hr. - 0.0353 cu. feet/sec..

1 cu. metre/hr. - 0.0098 cu. feet/sec. - 3.668 gals./min. (Imp.) - 4.403 gals./min. (U.S.).

1 cu. metre/hr. - 0.0097 acre/ins. per hr. - 0.01 ha./cms. per hr..

APPENDIX IIIa.List of cabile and major lahma in Cussabat.

<u>Cabile</u>	<u>Lahma</u>	<u>Remarks on origin and changes since 1917.</u>
1. <u>Hawara cabile</u>		
Chalfun	Guaznia Shiabarna	The esc Shiabarna are Addasa derived from the cabila of the same name.
Imumen	El Arabeen El Hadjahadj El Habaiba	The El Hadjahadj are from Cabila Selma. One lahmat - Dibra - has disappeared since 1917.
Selma	Ez Ziata El Fogga El Hadjahadj	The El Fogga are Addasa from the Orfella. The Ez Ziata consists of three old men.
Gherrim	Et Tuabisk Es Sara El Mased Aulad Meelad	The Sara are Addasa from the Orfella. The Aulad Meelad was not mentioned by de Agostini in 1917.
Msindara	Aulad Bu Ras Aulad Gedafi El Hogiat Er Ruasat El Erugh Es Swadnia Coroglia	No change since 1917. This Cabila is dominated by the Aulad Bu Ras and the other lahma are exceptionally small. The Erugh live in tents outside the village and are the tribal shepherds.
Beni Mislem	<u>Gmata</u> Ailet Haddar Ailet Dabia Ailet Sengulli <u>Morad</u> El Mohammed El Mahasma Aulad Ben Ras Es Shenashia <u>Razagnia</u> Ailet et Tib Ailet Ben Hoba Ailet Ben Tella El Ganafda El Grarat En Negemat <u>El Megatat</u> Ailet et Iwenia Ailet Bu Gazia Esc Shemat	The underlined names are groups of lahma. The Gmata and Mored live in the villages of the same name, but the Razagnia and Megatat live in Beni Mislem village. There is one sheik who lives in Gmata. No significant changes since 1917.  The Grarat are Marabatin derived from the Grarat in Tarhuna through the Beni Iechlef of Cussabat.

<u>Cabile</u>	<u>Lahma</u>	<u>Remarks on origin and changes since 1917.</u>
Zaafran	Ed Ducalia En Nagiat Ailet Ben Fresh Coroglia	The Lahmat el Gedua of Cabila Jareen lives in Zaafran village.
Bu Aish	Aulad Duma Aulad Bu Aish Aulad Husein Sciara el Zurgha	The Bu Aish live in Cussabat village and were probably its founders. They were referred to as the Esc-Shiaura by de Agostini.
Luata	El Mased El Araba	This tribe is not Hawara, but Luata, and is the only surviving Luata group in Eastern Tripolitania.
2. <u>Addasa cabile.</u>		
Esc Shiabarna	Aulad Rahumna Aulad Mohammed El Maamoura	From the Orfella. No change.
Esc Shurruff	Aulad Musa Aulad Tamna Aulad esc Sherriff	The Aulad Tamna was not mentioned by de Agostini. This cabila is from the Orfella Addasa.
El Crarta	Aulad Brahim El Acarit En Nuerat Er Raffia El Breber Aulad Migdal El Gargaresh Ez Ziann	De Agostini did not mention the last three lahma. The lahma live separately and say they are from the Orfella.
Esc Shaffeen	Ed Diabat El Mataiba El Guader El Martigh	There are at least six other lahma in this tribe.
El Gheleel	Er Room El Hamada Esc Shenashia El Hawanau	No change. From the Orfella.

<u>Cabile</u>	<u>Lahma</u>	<u>Remarks on origin and changes since 1917.</u>
Beni Let	El Orfella El Faseen El Hawausa Coroglia El Berat	From the Orfella. The Lahmat El Faseen is Marabatin and the El Berat is from Jareen.
Zaviet Sidi Atia	El Bukir Es Sualah El Blansa	From the El Gelas of Tarhuna. No change.
Zaviet es Smah	En Nebiat El Uhedat El Atauna El Jebaila	From Tarhuna except for the El Jebaila, who are from Homs. No change.

### 3. Later migrants.

Aulad Hamed	Aulad Nur ed Deen Aulad Amor Aulad abd el Janada Aulad Hamed	Sherriffs who live in Cussabat town. They are from the Uaddan in the Fezzan.
El Glasat		Now a lahmat of the Aulad Hamed.
Es Swadnia	Ailet Husein El Cussah Eso Shiaghlia Et Uma	Uaddan Sherriffs living in Cussabat with some land in the Cabila Jareen.
Es Zurgan	?	Uaddan Sherriffs. They were not mentioned by de Agostini.
Shorfet Uadna	Aulad Ahmed Aulad Otman El Araba	Uaddan Sherriffs.
Jareen	El Amor El Shemnashia El Futuh El Khamara El Bakakshia El Gedua El Berat Ailet el Kresch Ailet Harshia	Sherriffs from the Saghia el Homra in Morocco.

<u>Cabila</u>	<u>Lahma</u>	<u>Remarks on origin and changes since 1917.</u>
El Amareen	El Masaid Aulad Abd el Mola	<u>Marabatin</u> from Tarhuna. No change.
El Fuartir	Er Rahmia El Hueden El Hawatem Ez Zaret	<u>Marabatin</u> Sherriffs from Zliten.
Aulad El Aalem (El Corratia)	Ailet Mohammed Ailet Abd du Salam El Huardia Aulad Hargia	<u>Marabatin</u> from Zliten. These lahma are different from the three named by de Agostini.
Beni Iechlef	Aulad Farhad Aulad Bu Nahagia	<u>Marabatin</u> from El Grarat of Tarhuna. The Nahagia is very large and dominates the cabila.
Coroglia	?	There are nine lahma, two of which live in Zaafran and Msindara and Beni Let.
Jews		All Jews have now migrated and the ancient Jewish quarter of Cussabat has been razed to the ground.

APPENDIX IIIb.List of cabile and major lahma in El Amamra.

<u>Cabile group</u>	<u>Cabile</u>	<u>Lahma</u>	<u>Remarks</u>
El Amamra	Aulad Rahumma	?	Semi-nomadic Arabised Berbers. They say they migrated from the Orfella after Arab invasions. The cabile were listed as lahma by de Agostini and have become 'cabile' as a result of Italian administrative reforms.
	Aulad Mohamed	?	
	El Jiabarna	?	
	Et Tlask	?	
	El Gurna	?	
	El Jemura	?	
El Hadida	El Hadida	Et Tiru	Semi-nomadic Arabised Berbers. Some live in a small village called Hadida near Uadna.
		El Huekat	
		Aulad Swad	
Aulad Shukir	Aulad Shukir	Ailet es Souk	Arabs who live in Msollata and also occupy neighbouring areas in the Sahel el Ahamed, Orfella and Zliten. Some now live on the Misur- atino coast.
		El Huecat	
		Aulad Brahim	
		?	
		?	

APPENDIX IIIc.

List of cabile and major lahms in Tarhuna  
with some remarks on origins.

Note. The following list is based on de Agostini's tables (Vol. 1 pp. 75-90), but his notes have been brought up to date.

<u>Cabile groups</u>	<u>Cabile</u>	<u>Lahma</u>	<u>Remarks</u>
<b>1. <u>Aulad Msellem</u></b>			
Fergian ed Dauum	Et Tuafiga	Es Saa Idia El Hanadra El Mahara	<u>Marabatin</u> , probably from Egypt or Tunisia.
	Er Rematat	El Matargha Aulad Amor	
	El Fruh	El Gwalbia Esc Shiauta	No longer exists as separate group.
	Es Subha	Ed Dual ?	
	El Amor	Dena Chalifa El Fatarshia Es Snenat	
El Mahadi	El Guazi	El Jenani Ed Ducalia El Matair El Corma El Great	The El Mahadi are Arabs from the Zogba of the Hilal. They are now divided into three groups:
	Esc Sheredat	El Gazalat En Nagiat El Uchiorgha El Houarfia	Sheredat, Guan and Kelebat.
El Grarat	El Fogghin	Aulad Bu Gerida Aulad Abd el Krim ?	<u>Marabatin</u> . Their saint - Sidi ed Drann - is buried in Wadi Turgut.
	Loteen	El Guasam Aulad Iechlef Aulad Abd el Hadi ?	

<u>Cabile groups</u>	<u>Cabile</u>	<u>Lahma</u>	<u>Remarks</u>
Ed Duaim	El Guasam	Er Rezat El Azgab Ez Zuata Dena Atigh Dena Krim	Arabised Berbers.
	Es Sauda	El Khorm El Abadla Ez Zattran Dena Dau Dena Said El Atagh	
	Esc Shiur	Dena Brahim Dena Salem El Araghib Esc Sherua El Atamna El Uhedat El Hamudat	
El Hamamla	Es Sudan	Es Shiar En Nebiat Es Sualia El Uhedat Dena Muftah El Giauda	<u>Marabatin</u> and probably Sherriff. The Giauda migrated from Tunisia in about 1890.
	El Guasam	Esc Shiusk Et Torbaba Es Surara Dena Abadla El Shiabarna Dena Fergiani En Narmat	
Aulad Hamed	Es Sudul	El Og El Hagal Dena Muftah Dena Megiad El Bushera ?	Arabs from the Aulad Hamed of the Debab, Beni Suleim.
	El Chatala	Dena Khalifa El Auberdad El Corma El Bursh Ed Duil ?	

<u>Cabile groups</u>	<u>Cabile</u>	<u>Lehma</u>	<u>Remarks</u>
	El Marazig	Esh Shiabarna El Lessma El Wabra ?	
El Ausmer	Aulad Zavia Es Sualah El Corma	? ? ?	Arabs from the Beni Amer of the Beni Hilal.
	El Ausa	1. <u>El Corma</u> * El Gielat Aulad es Sheik Ailet el Mored 2. <u>Er Risalia</u> * Aulad Bu Grara Aulad Abd El Mola El Helegat Aulad el Hadj	Arabs from Morocco. The trad- itional head of Tarhuna comes from the Ailet el Mored of this cabila.
	El Arabeen	Aulad el Hadj Aulad Ben Ammar Aulad Ben Khalifa ?	Arabised Berbers.
	El Abadla	Et Atsmann El Heddat El Haratla Dena Abd en Nebi	Arabs from Morocco who migrated to Tar- huna after first settling in Sirte.
	Esc Shiafati	En Negiat El Gudua Es Slamati Esc Shiaushi	Arabised Berbers. This cabila lost most of its land to the Italians and is now very small.
	El Uhedat	?	<u>Marabatin-al-</u> <u>sadka</u> under the protection of the Aulad Tarhun.

<u>Cabile groups</u>	<u>Cabile</u>	<u>Lahma</u>	<u>Remarks</u>
Aulad Tarhun	Es Sarata Aulad el Hadj En Nebiat Dena Salah Et Teabia Aulad Mangi		De Agostini thought this tribe was Berber from the Addasa of the Madges.
Er Rahamia	El Madachir Er Ruzugat Ek Kresat ?		This tribe was once the most important and numerous in Tarhuna. It still has a large territory.
El Cuanin	El Khalala Dena Abd en Nebi El Corma Es Starat ?		<u>Marabatin</u> possibly Sherriff, because they are derived from Beni Cunan of the Beni Hilal.
Buroat Uaeni	1. <u>Ed Drbich</u> <sup>*</sup> 2. <u>El Jiar-</u> <u>barna</u> <sup>*</sup> 3. <u>Aulad</u> <u>Salem</u> <sup>*</sup>		Arabs. Used to live in Msellata, but are a part of the Mudiriati Aulad Msellem.
Aulad Sidi Maamer (Maamereen)	Aulad Abd el Krim ?		<u>Marabatin</u> , probably Sherriff. Derived from Ham-amlia and live in a small village.
Et Terscian	El Hadjahadj El Badarua El Clela El Ganua Aulad Swesi Et Tuall Er Regioubat		Arabised Berbers from Morocco. Some of the El Clela live in a small village called Clela near Gasr ed Dauum.
El Masabha	El Abedat Esc Shatatha Ez Zaviadta Et Tegaiflia El Hamarn Et Giakkek		One of the oldest settled of Arab tribes in Tarhuna.

<u>Cabile groups</u>	<u>Cabile</u>	<u>Lahma</u>	<u>Remarks.</u>
	Et Tella	El Masaïd Ez Zaraugha El Fitimna Dena Khalifa El Halafi El Hadjahajd El Uhedat El Hamudat El Machilfa El Magausa	Berbers according to de Agostini, who said they were the oldest settled tribe in Tarhuna.
	El Gragta	El Jorsck El Gaunamen El Jereri Ed Daumaria Dena Serd	Arabised Berbers living in the Jefara.
En Nahagia	Nahagia Aulad Khalifa Nahagia Muana Nahagia Giabarna	? ? ?	Arabised Berbers. Whole group was a single cabila in 1917.
	Abanat Aulad Msellem	El Abanat El Mesarda Ez Zigaiza Er Ruarna En Nafascia Aulad Ali El Gofra El Franna Ez Zavia El Hadadra El Burcat	Arabised Berbers. The lahma indicated come from several different areas.  From Zliten From Cyrenaica From Zavia (Sirte) From Orfella From Burcat; Arabs
	El Gelas	Ed Decalia El Khodre En Negiat Er Rabaia	Berbers from Tunisia.
	El Azib	1. <u>El Auali</u> <sup>H</sup> El Gemagta En Nahasa Er Riana ? 2. <u>Aulad Said</u> <sup>H</sup> Es Mana El Gerud Ez Sartra El Aduar	<u>Marabatin</u> , probably immigrants from Garian.

<u>Cabile groups</u>	<u>Cabile</u>	<u>Lahma</u>	<u>Remarks</u>
		El Amor ?	
	Unattached	El Hadadra	Sherriffs living with the Mahadi.
		Et Tuabet	Sherriffs living with the Mahadi.
		Aulad Ben Ammar	<u>Marabatin</u> , off-shoot of the Ed Dauim.
		El Bagagra Ez Zauita	Migrants from the Aulad Mahareff.
		El Frana	<u>Marabatin</u> .
		Es Smumat	
		El Hediat	
2.	<u>Aulad Mahareff.</u>		
	<u>Aulad Mahareff</u>	Aulad Husein	?
		En Nahasa	?
		Aulad Rahumma	?
		El Casshera	?
		Es Snenat	?
		Aulad Junes	?
	El Burcat	Burcat es Snem	?
			?
		Burcat el Chosa	?
		(Burcat Grezzin)	
		El Hamudat	
	El Abanat	Abanat Miggi	
		El Annauer	
		El Joran	
		Et Lisna	
		El Cababta	
		Et Trusk	
		?	
		Abanat Abura	
		El Hadjahadj	
		El Amamra	

<u>Cabile groups</u>	<u>Cabile</u>	<u>Lahma</u>	<u>Remarks</u>
		Aulad el Madj Slama El Humudat ?	
El Mazaugha	El Mazaugha	Er Ruasheda Et Tuaria	<u>Marabatin</u> and probably Sherriff. May be derived from Mazaughin Sherriffs of Morocco.
	Mazaughet Aulad Abd es Said	Aulad Sidi Mabruch Ben Mabruch ? ?	Aulad Abd es Said has disappeared since 1917.
	Aulad Ali	El Fataita Er Rebiat El Hababsa El Ara Er Ruabeh Esc Skenatria Es Swadnia ? ?	Arabs from the Beni Ali Ben Merghem of the Beni Suleim.
	Fergian El Grera	Es Saïda Al Abadba Dena es Segier El Frugh ? ?	<u>Marabatin</u> off-shoots from Fergian ed Dauun.
	El Ariasc	?	<u>Marabatin</u> .
	Es Slamati	?	<u>Marabatin</u> from Fassato.
	El Ibbadi	Dena Embarek ?	<u>Marabatin</u> .
	El Shemashia	Er Remetata Aulad Moh- ammed El Atiat El Hafedat ?	<u>Marabatin</u> from Morocco.



<u>Cabile groups</u>	<u>Cabile</u>	<u>Lahme</u>	<u>Remarks</u>
	Esc Segatata cont.	Et Tunasma El Begagra Dena abd el Mola	Off-shoot of Aulad Sultan.
	Es Sualah	El Fogga Er Rahafna El Getti Aulad el Fergiani Aulad Ben Ammar	Arabised Berbers derived from Aulad Sultan.
	El Ganima	El Adua Er Rahadna El Jiurb Et Tobaba Ailet Shebani	This tribe is now part of the Jefaran Mutsar- rifya al-Gara- bulli.
	Aulad Bu Zed	Aulad Moham- med Aulad Rahumma	<u>Marabatin.</u>
	El Amareen	Esc Sheholm Dena Abd el Hadi Dena Banon	<u>Marabatin.</u>
	Aulad Ur- sheffana	El Madadha El Martigh El Bahalil Er Ruassheda	This group was created by the Italians from several small cabile.

4. Ed Darahib

	Ed Darahib	<u>Dena Abd en</u> <u>Nebi<sup>H</sup></u> <u>Dena Ibrahim<sup>H</sup></u> <u>Dena Ahmed<sup>H</sup></u> <u>El Atia<sup>H</sup></u> <u>Dena Khalifa<sup>H</sup></u>	Arabised Berbers.
El Hamadat	Hamadat Sret	<u>El Idreen<sup>H</sup></u> <u>El Gerban<sup>H</sup></u> <u>El Jalla<sup>H</sup></u> <u>El Atia<sup>H</sup></u> <u>Er Rauzigha<sup>H</sup></u> <u>Aulad Abdullah<sup>H</sup></u>	Arabised Berbers.

<u>Cabile groups</u>	<u>Cabile</u>	<u>Lahma</u>	<u>Remarks</u>
	Hamadat Labeter	<u>Er Ruashed</u> <sup>κ</sup> <u>El Gaua</u> <sup>κ</sup> <u>Es Swari</u> <sup>κ</sup> <u>Et Tobaba</u> <sup>κ</sup>	Arabised Berbers.
	Aulad Jusef	En Naughia Ez Zavida Er Remetat Dena Salem	Arabs from the Beni Hilal.
	Ez Zagadna	Er Regebat Et Talaga El Megaidia	Arabised Berbers.
	El Magagra	El Atiat El Aishia Dena Milad Aulad Salem ?	Arabised Berbers.
	Mazaughat Shubbeen	?	<u>Marabatin.</u>
	Ez Zurgan	?	<u>Marabatin immi-</u> <u>grants from</u> Tunisia under the protection of Hamadat Sret.
	Unattached groups	Ez Zurga Es Smalga El Adiar	<u>Marabatin lahma</u> now part of the Cabila Darahib.

<sup>κ</sup> Lahma groups or sub-tribes.

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APPENDIX IVa.

Average number of rainy days at selected stations  
in the Eastern Jebel.

	<u>Tarhuna</u>	<u>Cussabat</u>	<u>Biar Miggi</u>	<u>El Gsea</u>	<u>Al Khadra</u>		
					1	2	3
Sep.	1.7	1.8	1.2	1.3	0.9	1.0	0.9
Oct.	3.5	3.8	2.5	3.5	2.6	2.7	2.1
Nov.	5.7	5.6	4.1	5.5	5.3	4.5	4.0
Dec.	8.3	9.3	6.8	7.4	5.6	6.3	5.0
Jan.	8.0	9.8	6.6	6.3	6.7	6.0	5.1
Feb.	6.8	7.9	5.3	4.7	4.9	5.3	4.1
Mar.	5.4	5.5	4.9	5.0	4.9	4.7	5.0
Apr.	2.6	2.8	2.2	2.6	2.3	2.9	2.1
May	1.6	1.2	0.8	1.2	1.1	1.0	0.7
June	0.5	0.9	0.1	0.3	0.0	0.4	0.0
July	0.1	0.9	0.0	0.1	0.1	0.1	0.1
Aug.	0.2	0.2	0.1	0.3	0.1	0.1	0.1
Year	44.4	49.7	34.6	38.2	34.5	35.0	29.2

APPENDIX IVb.

Rainfall totals by month and agricultural year for selected stations in the Eastern Jebel.

(MILLIMETRES)

<u>Year</u>	<u>Jan.</u>	<u>Feb.</u>	<u>Mar.</u>	<u>Apr.</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug.</u>	<u>Year</u>
1913/4	66.0	68.0	48.5	12.5	0.0	0.0	0.0	0.0	311.0
1926/7	74.4	35.7	58.6	1.8	0.6	3.3	0.0	0.0	258.3
1927/8	63.0	43.9	38.2	18.0	0.0	8.7	0.0	0.0	292.5
1928/9	116.6	140.7	89.1	7.4	3.6	17.9	0.5	0.0	503.6
1929/30	39.2	41.7	6.7	3.2	0.0	0.0	0.0	0.0	157.4
1930/1	46.9	60.0	0.0	1.3	17.5	0.0	0.0	0.0	193.9
1931/2	101.3	14.4	27.2	0.0	1.8	0.0	0.0	0.0	249.4
1932/3	41.6	60.7	131.8	0.0	10.7	0.0	0.0	0.0	433.0
1933/4	63.4	56.2	15.6	0.0	0.3	0.0	0.0	0.0	258.0
1934/5	43.7	4.6	12.3	0.3	0.0	0.0	0.0	0.0	246.2
1935/6	7.7	12.6	0.0	30.7	12.6	0.0	0.0	0.0	110.0
1936/7	19.6	88.8	5.1	17.2	0.0	0.5	0.0	0.0	223.6
1937/8	53.2	139.4	61.9	37.0	4.0	0.0	0.0	0.0	353.7
1938/9	35.7	81.5	44.9	25.0	4.5	0.0	0.0	0.0	317.6
1939/40	?	?	?	?	?	?	?	?	230.0
1943/4	141.0	75.2	54.5	43.5	0.0	0.0	0.0	0.0	382.0
1944/5	42.4	80.7	30.4	2.3	40.2	0.0	0.0	0.0	279.0
1945/6	66.2	51.9	5.0	4.0	0.0	0.0	0.0	0.0	237.3
1946/7	39.5	0.0	4.5	16.8	0.0	0.0	0.0	0.0	175.4
1947/8	7.5	18.6	9.0	0.0	0.0	0.0	0.0	0.0	147.6
1948/9	73.0	58.3	17.8	23.2	2.5	0.0	0.0	1.3	276.6

APPENDIX IVb. (cont.)

2. Cussabat.

	<u>Sep.</u>	<u>Oct.</u>	<u>Nov.</u>	<u>Dec.</u>	<u>Jan.</u>	<u>Feb.</u>	<u>Mar.</u>	<u>Apr.</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug.</u>	<u>Year</u>
1926/7	0.0	2.6	30.6	76.2	86.6	50.2	37.6	4.2	0.0	1.2	0.0	0.0	289.2
1927/8	0.0	4.6	1.4	0.8	109.7	64.8	16.2	5.6	2.2	0.0	0.0	0.0	205.3
1928/9	0.0	0.7	29.7	96.0	90.3	99.6	40.8	3.6	3.2	9.8	0.0	1.3	375.0
1929/30	16.9	14.3	33.5	50.7	29.7	124.5	2.4	13.2	0.0	6.0	0.0	0.0	291.2
1930/1	1.0	18.9	30.3	44.9	61.2	58.5	0.0	2.7	35.3	0.0	0.0	0.0	252.8
1931/2	30.8	18.6	7.3	57.6	113.9	18.4	40.5	16.6	0.0	6.0	0.0	0.0	329.7
1932/3	10.0	45.5	70.0	53.6	42.7	41.9	144.3	0.0	7.5	1.7	0.0	0.0	417.2
1933/4	2.2	0.5	16.7	93.1	136.6	52.4	12.8	0.0	0.2	0.0	0.0	0.0	314.5
1934/5	0.0	186.1	67.3	68.1	161.9	23.6	23.1	4.7	0.0	0.0	0.0	0.0	534.8
1935/6	11.4	7.1	18.9	1.9	20.0	32.1	0.0	69.3	19.9	0.0	0.0	0.0	180.6
1936/7	0.0	44.3	116.7	112.0	73.4	71.3	6.6	21.0	0.0	0.0	0.0	0.0	445.3
1937/8	6.2	86.5	18.5	3.8	76.4	113.4	72.4	36.1	2.9	0.0	0.0	0.0	416.2
1938/9	0.0	23.0	36.0	66.1	39.0	51.5	34.7	21.0	0.0	0.0	0.0	0.0	271.3
1939/40	18.9	0.0	16.0	10.4	41.2	0.0	3.5	18.9	1.0	2.4	0.0	1.7	114.0

3. El Gsea.

1943/4	0.0	10.6	58.9	6.5	125.2	120.9	38.9	35.3	0.7	1.0	0.0	0.0	398.0
1944/5	40.8	0.0	49.5	14.2	50.7	71.3	31.6	2.1	15.5	0.0	2.6	0.0	278.3
1945/6	0.0	73.6	13.6	44.2	34.0	41.2	9.5	10.0	0.0	0.0	0.0	0.0	226.1
1946/7	23.6	4.0	6.0	49.9	24.6	0.0	0.0	5.5	0.0	0.0	0.0	0.0	113.6
1947/8	0.0	20.5	34.7	30.5	56.8	1.0	40.0	12.5	7.0	0.0	0.0	0.0	203.0
1948/9	1.2	13.5	44.0	72.8	90.2	11.6	29.0	20.5	1.0	0.0	0.0	8.0	281.8

APPENDIX IVb. (cont.)

4. Al Khadra 1.

	<u>Sep.</u>	<u>Oct.</u>	<u>Nov.</u>	<u>Dec.</u>	<u>Jan.</u>	<u>Feb.</u>	<u>Mar.</u>	<u>Apr.</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug.</u>	<u>Year</u>
1943/4	0.0	6.5	42.0	2.5	121.5	84.5	48.0	24.0	0.0	0.0	0.0	0.0	229.0
1944/5	13.0	0.0	24.5	14.5	34.0	82.5	29.0	5.0	20.0	0.0	3.5	0.0	226.0
1945/6	0.0	107.7	16.8	51.5	45.0	54.0	7.5	11.5	9.0	0.0	0.0	0.0	303.0
1946/7	18.8	7.0	8.0	62.0	24.0	0.0	1.0	13.0	0.0	0.0	0.0	0.0	133.8
1947/8	0.0	14.5	50.0	27.5	42.0	0.0	37.5	8.0	0.0	0.0	0.0	0.0	179.5
1948/9	2.0	12.0	68.5	40.0	86.0	55.0	32.0	14.0	1.5	0.0	0.0	33.5	344.5

5. Al Khadra 2.

1943/4	0.0	5.5	38.0	1.5	111.5	82.5	47.5	26.5	0.0	0.0	0.0	0.0	314.5
1944/5	12.5	0.0	10.0	14.0	37.0	52.5	23.0	1.5	17.0	0.0	2.0	0.0	169.5
1945/6	0.0	79.0	10.0	39.8	36.2	32.0	6.0	14.5	8.5	0.0	0.0	0.0	226.0
1946/7	22.5	2.0	16.5	52.5	25.0	0.0	1.0	4.5	0.0	0.0	0.0	0.0	124.0
1947/8	0.0	42.0	26.5	24.0	32.5	1.5	20.0	3.0	0.0	0.0	0.0	0.0	149.5
1948/9	0.5	16.5	33.0	35.9	72.3	68.6	19.4	21.8	1.5	0.0	0.0	11.1	280.6

6. Al Khadra 3.

1943/4	0.0	0.0	43.7	6.0	129.8	90.0	27.6	45.0	0.0	0.0	0.0	0.0	342.1
1944/5	8.0	0.0	29.5	15.8	37.9	78.5	3.0	52.5	0.0	1.0	0.0	0.0	226.2
1945/6	0.0	99.0	6.5	76.0	43.0	28.0	4.5	8.0	0.0	0.0	0.0	0.0	265.0
1946/7	37.0	4.0	11.0	90.0	39.5	0.0	1.0	9.0	0.0	0.0	0.0	0.0	191.5
1947/8	0.0	61.5	29.5	22.5	61.5	2.5	22.0	9.0	0.0	0.0	0.0	0.0	207.5
1948/9	0.5	14.5	43.7	40.0	60.0	52.9	19.0	19.0	1.5	0.0	0.0	31.0	282.1

APPENDIX IVb. (cont.)

7. Biar Migg1.

	<u>Sep.</u>	<u>Oct.</u>	<u>Nov.</u>	<u>Dec.</u>	<u>Jan.</u>	<u>Feb.</u>	<u>Mar.</u>	<u>Apr.</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug.</u>	<u>Year</u>
1930/1	0.0	10.0	21.5	15.7	54.2	62.8	0.0	0.0	8.5	0.0	0.0	0.0	163.7
1931/2	44.5	9.5	3.5	55.5	132.0	19.0	38.0	3.5	3.5	0.0	0.0	0.0	309.0
1932/3	4.0	55.5	43.5	32.0	34.5	76.5	107.0	0.0	0.0	0.0	0.0	0.0	353.0
1933/4	0.0	2.0	33.5	107.5	124.0	33.5	9.5	0.0	10.5	0.0	0.0	0.0	520.5
1934/5	16.5	47.0	48.5	64.5	75.5	5.0	16.0	2.5	0.0	0.0	0.0	0.0	275.5
1935/6	18.0	0.0	25.5	7.5	37.0	8.5	0.5	36.5	16.0	0.0	0.0	0.0	149.5
1936/7	0.0	70.5	59.5	77.5	44.0	83.0	4.0	10.5	4.0	0.0	0.0	0.0	353.0
1937/8	7.5	36.0	12.5	12.0	102.0	117.0	48.5	48.5	0.0	0.0	0.0	0.0	384.0
1938/9	0.0	9.5	11.5	98.5	51.5	61.5	27.0	21.0	1.5	0.0	0.0	0.0	282.0
1939/40	4.0	0.0	51.5	9.5	46.5	0.0	14.0	27.5	0.0	0.0	0.0	0.0	153.0
1940/1	54.0	5.5	2.5	105.5	4.0	27.0	14.0	8.0	5.0	0.0	0.0	0.0	225.5
1941/2	0.0	3.5	49.0	12.0	28.0	16.5	7.5	0.0	0.0	0.0	0.0	0.0	116.5
1942/3	5.5	6.5	9.0	39.0	?	?	?	?	?	0.0	0.0	0.0	?
1943/4	0.0	10.0	46.0	5.0	99.3	53.5	44.0	37.0	0.0	0.0	0.0	0.0	294.8
1944/5	7.0	0.0	21.8	12.5	27.0	56.5	19.0	2.0	12.5	0.0	0.0	0.0	158.3
1945/6	0.0	37.5	5.6	49.3	36.3	31.8	6.0	2.5	0.0	0.0	0.0	0.0	169.0
1946/7	8.0	7.0	?	58.3	29.6	0.0	0.0	12.7	0.0	0.0	0.0	0.0	?
1947/8	0.0	0.0	29.6	26.7	28.0	2.0	23.0	20.4	0.0	0.0	0.0	0.0	129.7
1948/9	2.0	14.7	52.3	11.1	69.8	67.6	15.7	20.2	3.3	0.0	0.0	0.0	256.7

## APPENDIX IVC.

Rainfall totals for calendar years at selected stations in the Eastern Jebel.

(MILLIMETERS)

<u>Year</u>	<u>Cussabat</u>	<u>Tarhuna</u>	<u>El Gsee</u>	<u>Al Khadra</u>			<u>Biar Miggel</u>	<u>Tazzoll</u>
				<u>1</u>	<u>2</u>	<u>3</u>		
1925		293.0					229.5	
1926		211.0					331.0	
1927	186.0	352.7					361.0	
1928	324.9	442.4					354.0	
1929	363.4	165.0					150.0	
1930	170.9	230.4					306.0	
1931	272.0	333.1					214.0	
1932	394.3	387.3					436.0	
1933	350.6	299.0					227.5	
1934	523.5	299.8					255.5	
1935	256.6	109.6					122.5	
1936	414.3	156.0						
1937	287.8	189.4						
1938	436.9	421.5						
1939	191.5	?						
1940	208.0	245.6						
1941		?						
1942		?						
1943		305.7	230.0	213.2	193.5	188.5	275.1	
1944		397.2	426.1	345.7	306.5	330.0	209.4	
1945		306.2	308.4	390.2	261.8	359.9		
1946		241.7	178.2	225.5	190.7	222.0		
1947		128.7	115.8	163.0	123.0	130.0	98.5	
1948		179.2	248.8	193.7	142.9	210.0	153.5	
1949		238.5	322.3	229.5	253.2	296.7	203.0	228.9
1950	447.2	259.0						

APPENDIX IVd.Three year running means at Tarhuna.

(Millimetres).

1925/6 - 1928/9	287.3
1926/7 - 1929/30	351.5
1927/8 - 1930/1	317.8
1928/9 - 1931/2	288.3
1929/30- 1932/3	200.2
1930/1 - 1933/4	293.1
1931/2 - 1934/5	313.5
1932/3 - 1935/6	312.4
1933/4 - 1936/7	204.7
1934/5 - 1937/8	193.3
1935/6 - 1938/9	229.1
1936/7 - 1939/40	278.3
1937/8 - 1940/1	300.4

APPENDIX V.Capacities of Roman cisterns in the Eastern Jebel.

<u>Cabile</u>	<u>Name of cistern</u>	<u>Capacity</u> (cu. metres)	<u>Depth</u> (metres)
a. <u>Cussabat.</u>			
Aulad Hamed	M. Suadenia	7.02	3
Jareen	M. Jareen	2.94	8
Ez Zurga	M. Zurga	1.60	5
Coroglia		0.97	5
Bu Aish		3.37	6
Beni Let		3.34	5.5
Fuartir		1.92	2
Uadna		2.25	6
Gheleel		1.84	5
Msindara		4.09	4
Beni Mislem	Biar Ues	1.80	4
Luata		5.60	5
Shiabarna	El Gargur	4.85	2
Atia	M. Sidi Atia	1.92	5
Chalfun		3.96	5.5
Selma		1.64	5
Zaafran		2.82	5
Imumen		0.70	2
Crarta		1.06	6
Shaffeen		3.15	6
Jareen		0.96	4
Gheleel		1.12	4
Msindara		0.82	5
Uadna		0.96	6
Beni Let		0.68	4
Fuartir		1.14	3
Gherrim		1.44	4
Smah		0.72	3
Cussabat town	M. el Police	0.52	5
" "	M. el Kaimakam	0.32	5
" "	M. Baladia	0.40	4
" "	M. Baladia	0.55	4
" "	M. Biar Souk	0.54	4
Beni Iechlef		1.20	4
Amareen		0.68	5
Aulad el Aalem		0.84	4
Shurruff		1.51	2.5
Shiabarna		1.15	3.5
Crarta		0.90	3
Beni Let	M. Sidi Fasi	1.05	6
Beni Mislem		1.36	2.5
Shaffeen		1.68	8

<u>Cabile</u>	<u>Name of cistern</u>	<u>Capacity</u> (cu. metres)	<u>Depth</u> (metres)
b. <u>Aulad Msellem.</u>			
	Maragnat er Rimi	3.85	
	" Tieb Liam	7.30	
	" Maiuff	5.45	
	" Duaim	3.00	
	" Duaim	?	
	" Beni Mussa (4)	?	
	" Megag (4)	?	
	" El Behra (5)	6.75 (1)	
	" Ghazal (3)	6.65 (1)	
	" el Taraglat	?	
	" "	?	
	" El Tez	6.0	
	" El Uesca (4)	?	
	" el Yehudi	?	
	" Gasr Yehudi	3.10	
	" "	6.90	
	" El Agobia	4.05	
	" El Jehadia	6.00	
	" Megaz	4.25	
	" Kheiran (2)	5.30	5.90
	" Maharuq (2)	?	
	" Eas el Ahmer (2)?	?	
	" Azib (2)	?	
	" El Hasbha	?	
	" Umm el Fejel	?	
	" Lelaib	?	
	" Nesara	?	
	" Fresh (2)	?	
	" Umm el Halfa	?	
	" Zlass	?	
	" Umm el Shardari (3) ?	?	
	" Sidi Maamer (3) ?	?	
	" Bu Ghashmia (4) ?	?	

c. El Amamra.

<u>Cabile</u>	<u>Location</u>	<u>Capacity</u>	<u>Depth</u>
El Haderat	Village	0.99	1.5
Aulad Rakhuma	W. Omram	2.64	4
Aulad Shukir	W. Taraglat	2.17	2.5
Aulad Mohammed		1.68	7

APPENDIX VI.

Quality of grazing in Tarhuna between March 31st and April 14th, 1913.

<u>Locality</u>	<u>Quality</u>	<u>Wgt. of grass from an area of 1 sq. metre</u>		<u>The principal plants to be found</u>	<u>Other species</u>
		<u>Wet.</u>	<u>Dry wgt.</u>		
1. Wadi Taraglat	Poor over a large area.	260	71	<u>Vulpia inorassata,</u> <u>Anthemis glauca,</u> <u>Rumex tingitanus.</u>	<u>Koeleria sp.</u>
2. Wadi Taraglat	"	300	80	"	"
3. Wadi Tamamura	"	345	113	<u>Vulpia inc., Koeleria sp., Scleropoa divaricata.</u>	<u>Anthemis,</u> <u>Rumex, Lolium</u>
4. Wadi Tamamura	"	408	144	"	"
5. Wadi Tamamura	Rich but not uniform; small area.	930	205	<u>Elymus caput-medusae,</u> <u>Anthemis glauca</u>	<u>Koeleria sp.,</u> <u>Vulpia</u>
6. Wadi Tamamura	"	1,550	325	<u>Chrysanthemum coronarium</u>	<u>Anthemis,</u> <u>Medicago</u>
7. Near present site of Al Khadra village	"	1,507	312	<u>Rumex tingitanus,</u> <u>Bromus villosus</u>	<u>Medicago,</u> <u>Vulpia</u>
8. Near Gasr Doga	"	1,254	260	<u>Chrysanthemum coronarium,</u> <u>Rumex tingitanus</u>	<u>Lolium, Ferula,</u> <u>Scleropoa</u>

<u>Locality</u>	<u>Quality</u>	<u>Wgt. of grass from an area of 1 sq. metre</u> Wgt. Dry wgt.	<u>The principal plants to be found</u>	<u>Other species</u>
9. Near Gasr Doga	Rich but not uniform; small area.	2,090 490	<u>Chrysanthemum coronarium</u> , <u>Enarthrocarpus clavatus</u> , <u>Astragalus baeticus</u> , <u>Papaver hybridum</u>	<u>Koeleria sp.</u> , <u>Medicago</u> , <u>Astragalus hamosus</u> , <u>Ferula</u> , <u>Lolium</u>
10. Just north of Tarhuna town	Mediocre.	883 225	<u>Lolium rigidum</u> , <u>Scleropa simplex</u> , <u>Anthemis glauca</u>	Asphodel
11. Scersciara	Poor.	414 136	<u>Vulpia incassata</u> , <u>Rumex tingitanus</u>	<u>Koeleria sp.</u>
12. Scersciara	"	227 66	"	"
13. Uscotata	Excellent over large area.	1,209 274	<u>Asphodelus microcarpus</u>	<u>Romus</u> , <u>Anthemium</u>
14. Gasr ed Daum	Poor	290 90	<u>Bromus rubens</u> , <u>Scleropa divericata</u>	"
15. Gasr ed Daum	"	260 82	<u>Koeleria sp.</u> , <u>Rumex tingitanus</u>	<u>Palantago</u> , <u>Albicans</u>

Changes in the distribution of population  
in Tripolitania, 1917-1954.

	<u>Population 1917</u>	<u>Population 1954</u>	<u>Percentage change</u>
<u>Coastal areas.</u>			
Tripoli City	30,000	130,238	433
Souk el Giuma <sup>R</sup>	17,000	109,624	
Zavia <sup>R</sup>		115,114	75
Zuara	11,000	30,806	190
Misurata <sup>R</sup>	33,000	66,738	109
Zliten	33,000	41,000	27
Homs <sup>R</sup>	8,700	11,581	30
Souk el Chemis	15,000	20,144	32
<u>Jebel areas.</u>			
Cussabat <sup>RR</sup>	12,000	14,227	20
Nalut	13,000	15,424	19
Jefren	40,000	32,000	24
Garian <sup>RRR</sup>	44,000	35,000	27
El Amamra	3,400	4,458	27
Aulad Msellem	26,240	21,317	23
Aulad Mahareff	12,700	8,031	37
El Hawatem	9,200	5,438	48
Ed Darahib	8,750	3,869	57
<u>Ghibla areas.</u>			
Beni Ulid	30,000	22,000	27
Sirtica	17,000	18,191	7
Taourgha	6,200	6,616	8
<u>Desert areas.</u>			
Hon and Soona	4,700	7,200	50

<sup>R</sup> Figures approximate because of boundary changes.

<sup>RR</sup> 1917 figure is understated.

<sup>RRR</sup> Garian figures excluded Mudiriats Zintan, Masashashi and Kikla.

Note. Coastal areas include both areas of sedentary cultivation in oases and semi-nomadism in the Jefara. Increases along the coast are much higher than those given, as it is probable that the rate of increase is much lower among pastoralists, who suffered considerably under the Italians.

APPENDIX VIIb.Distribution of population in 1917.A. Tarhuna.

	<u>Cabile</u>	<u>Population</u>
1. <u>Aulad Msellem.</u>		
	Grarat el Oteen	600
	Fergian - ed Dauum	3,250
	El Mahadi	2,300
	Grarat el Fogghin	600
	Ed Dauim	2,500
	El Hamamla	1,500
	Aulad Hamed	2,000
	El Auamer	2,000
	El Auasa	420
	El Arabeen	500
	El Abadla	250
	Esc Shiafafti	700
	El Uhedat	350
	Aulad Tarhun.	650
	Er Rahamia	200
	El Cuanin	500
	Burcat Uaeni	1,160
	Maamereen	400
	Et Terscian	800
	El Masabha	600
	Et Tella	1,300
	El Gragta	500
	En Nahagia	1,500
	Abanat Aulad Msellem	850
	El Gelas	300
	El Azib	800
	Small lahna	610
2. <u>Aulad Mahareff.</u>		
	Aulad Mahareff	3,150
	Burcat es Snem	400
	Burcat el Shossia	500
	Abanat Miggi	700
	Abanat Abura	1,000
	El Mazaugha	750
	Aulad Ali	3,000
	Fergian el Grara	1,000
	El Ariaso	250
	El Ibbadi	250
	El Ababsa	500
	El Shemashia	300
	Neffat	450
	Small lahna	150

	<u>Cabile</u>	<u>Population</u>
3. <u>El Hawatem.</u>		
	Hawatem Bu Salima	600
	Hawatem Bu Rahma	500
	Hawatem Ras el Ain	1,300
	Maraghnat Ras el Ain	1,800
	Maraghnat el Chregi	900
	Maraghnat et Tina	150
	Mazaugha er Ragagsa	150
	Aulad Sultan	200
	Esc Scogat	300
	Es Sualah	350
	El Ganima	950
	Aulad Bu Zed	1,000
	El Amareen	300
	Aulad el Ursheffana	650
	Er Ruasceda	150
4. <u>Ed Darahib.</u>		
	Ed Darahib	1,500
	Hamadat Sret	2,500
	Hamadat Labeter	1,500
	Aulad Jusef	700
	Ez Zagadna	700
	El Magra	700
	Mazaughat esc Shubeen	800
	Ez Zurgan	450
B. <u>Msellata.</u>		
1. <u>Cussabat.</u>		
	Chalfun	210
	Imumen	300
	Selma	130
	Gherrim	130
	Msindara	450
	Morad	190
	Gmata	540
	Beni Mislem	610
	Zaafran	260
	Bu Aish	540
	Luata	160
	Esc Shiabarna	350
	Esc Shurruf	200
	El Crarta	560
	Esc Shaffeen	1,000
	El Gheleel	750
	Beni Let	600
	Zaviet Sidi Atia	300
	Zaviet Sidi Smah	380
	Zaviet El Amareen	120
	Aulad Hamed	360

	<u>Cabile</u>	<u>Population</u>
	El Glasat	180
	Es Swadnia	280
	Uadna	850
	El Fuartir	730
	Aulad el Aalem	150
	El Jareen	550
	Beni Iechlef	160
	El Coroglia	540
	Jews	450
2. <u>El Amamra.</u>		
	El Amamra group	2,700
	El Haderat	180
	Aulad Shukir	590

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APPENDIX VIIc.Population density in the Eastern Jebel, 1917

1. <u>Cussabat.</u>	<u>Cabile</u>	<u>Density per</u> <u>sq. kilometre</u>
	Chalfun	29
	Imumen	19
	Selma	17
	Gherrim	17
	Msindara	36
	Beni Mislem	25
	Zaafran	88
	Bu Aish	85
	Luata	35
	Shiabarna	38
	Shurruff	50
	Crarta	47
	Shaffeen	60
	Gheleel	65
	Beni Let	808
	Atia	36
	Smah	47
	Aulad Hamed	25
	Es Swadnia	90
	Shorfet Uadna	35
	Amareen	40
	Fuartir	60
	Aulad el Aalem	17
	Jareen	23
	Beni Iechlef	25

	<u>Cabile</u>	<u>Density per</u> <u>sq. kilometre</u>
	Coroglia	90
	El Amamra	12
2.	<u>Aulad Msellem.</u>	
	Fergian	16
	Mahadi	17
	Grarat Fogghin	56
	Loteen	60
	Duain Guasam	21
	Hamamla	30
	Aulad Hamed	40
	El Auamer	59
	Auasa	20
	Arabeen	35
	Abadla	35
	Shiafafti	46
	Auled Tarhun	48
	Rahamia	32
	Cuanin	41
	Buroat Uaeni	14
	Maamereen	15
	Terscian	62
	Masabha	12
	Tella	34
	Gragta	11
	Nahagia	15
	Aulad Msellem	40
	Gelas	18
	Azib	17
3.	<u>Aulad Mahareff.</u>	
	Aulad Mahareff	20
	Abanat Miggi	19
	Abanat Abura	51
	El Mazaugha	14
	Aulad Ali	15
	Fergian Grara	6
	Ariaso	23
	Buroat Ibbadi	7
	Ababsa	21
	Shemashia	22
	Neffat	14
4.	<u>El Hawatem.</u>	
	Hawatem Ras el Ain	21
	Hawatem Bu Selma	52
	Maragnet Ras el Ain	16
	Maragnet Chregi	21
	Ragagsa	20

	<u>Cabile</u>	<u>Density per sq. kilometre</u>
	Aulad Bu Zed	24
	Amareen	23
	Ursheffana	26
5. <u>Ed Darahib.</u>		
	Ed Darahib	30
	Hamadat Sret	42
	Hamadat Labeter	48
	Aulad Jusef	28
	Zagadna	15
	Magagra	7
	Shubbeen	14

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APPENDIX VIId.Population and dwellings in ten selected cabile,Tarhuna, April, 1960.

<u>Cabile</u>	<u>Population number</u>			<u>Nos. of tents</u>	<u>Nos. of houses</u>
	<u>Males</u>	<u>Females</u>	<u>Total</u>		
Masabha	495	425	920	184	1
Tella	520	436	956	191	2
Auasa	257	250	507	100	4
Msellem	500	495	995	199	4
Terscian	179	207	386	77	-
Fergian	1,545	1,320	2,865	572	-
Nahagia	874	654	1,528	305	30
Darahib	544	402	946	189	3
Aulad Ali	1,548	1,351	2,899	270	5
Hamamia	756	714	1,470	290	6
<u>Total</u>	<u>7,218</u>	<u>6,254</u>	<u>13,472</u>	<u>2,377</u>	<u>55</u>

APPENDIX VIIe.

Density of population per square kilometre of agricultural  
land in ten selected cabile in Cussabat, 1917.

<u>Cabila</u>	<u>Density per square kilometre of agricultural land</u>
Gherrim	70
Imumen	100
Selma	75
Msindara	110
Beni Let	120
Jareen	65
Crarta	80
Uadna	85
Fuartir	73
Zaafran	120

Note: These figures have been calculated from de Agostini's tables and from aerial photographs. They are not accurate, because tribal boundaries are not accurately known, but they provide an indication of the position in 1917.

## APPENDIX VII F.

Marital status of the population of Terhuna by age and sex, 1954.a. Males.

Age group	Single	Total	Married			Widowed	Divorced	Unknown
			Nos.	of wives				
			1	2	3	4		
Under 15	7,800	4	4	-	-	-	-	-
15 - 19	1,579	39	39	-	-	-	4	11
20 - 24	1,092	334	330	4	-	-	24	3
25 - 29	1,498	983	976	8	-	-	43	2
30 - 34	146	1,151	1,135	16	-	-	44	-
35 - 39	48	1,162	1,128	34	-	-	29	-
40 - 44	13	869	836	33	-	-	19	-
45 - 49	8	702	659	42	1	-	10	-
50 - 54	7	842	803	38	1	-	20	-
55 - 59	8	595	545	50	-	-	8	1
60 - 64	6	699	661	37	1	-	17	-
65 - 69	1	400	374	24	2	-	10	-
Over 70	7	867	829	37	1	-	20	5
<u>Total over</u>								
<u>15 yrs. old</u>	<u>3,413</u>	<u>8,643</u>	<u>8,314</u>	<u>323</u>	<u>6</u>	<u>-</u>	<u>248</u>	<u>22</u>

## APPENDIX VIIF (cont.).

Marital status of the population of Terhuna by age and sex, 1954.

b. Females.

<u>Age group</u>	<u>Single</u>	<u>Married</u>	<u>Widowed</u>	<u>Divorced</u>	<u>Unknown</u>
Under 15	7,204	6	-	-	-
15 - 19	975	390	7	18	6
20 - 24	133	1,232	7	32	2
25 - 29	44	1,653	19	23	2
30 - 34	12	1,344	19	23	1
35 - 39	7	1,806	20	16	1
40 - 44	5	903	59	11	1
45 - 49	3	591	70	9	2
50 - 54	5	682	152	18	1
55 - 59	3	366	123	9	1
60 - 64	1	407	291	13	5
65 - 69	-	179	150	8	9
Over 70	5	232	828	18	22
<u>Total over</u>	<u>1,193</u>	<u>9,785</u>	<u>1,745</u>	<u>209</u>	<u>53</u>
<u>15 yrs. old</u>					

APPENDIX VIII.Fertility ratios and Net Reproduction Ratesfor selected areas, 1954.

<u>Area</u>	<u>Fertility ratio</u>	<u>Net Reproduction Rate</u>
Tripolitania	769	1.9 - 2.1 ?
Tarhuna	722	1.9 - 2.1 ?
Trinidad	754	2.0
Japan	580	1.5
Israel	578	1.7
Yugoslavia	560	1.6
New Zealand	556	1.6
Netherlands	509	1.4
United States	478	0.9
Cyprus	464	1.8
France	461	1.3
Norway	428	1.1
Austria	282	0.9

APPENDIX VIIIa.The number of olive trees in Tripolitania.

<u>Year</u>	<u>Italian owned</u>	<u>Libyan owned</u>	<u>Total productive</u>	<u>Unproductive</u>	<u>Total</u>
1910	-	450,000	450,000	50,000	500,000
1914	-	550,000	?	?	?
1920	-	600,000	550,000	50,000	600,000
1925	680,000	?	?	?	?
1929	?	676,000	?	?	?
1930	954,000	?	?	?	?
1931	?	?	700,000	700,000	1,400,000
1933	1,342,000	?	?	?	?
1934	1,418,000	?	?	?	?
1935	1,545,000	828,000	?	?	2,373,000
1937	1,745,000	?	850,000	1,650,000	2,500,000
1940	2,054,000	?	?	?	?
1944	2,411,000	970,000	?	?	3,381,000
1947	?	?	?	?	3,280,000
1953	1,778,655	827,928	1,200,185	1,407,408	2,607,583
1955	?	?	1,400,000	1,600,000	3,000,000

APPENDIX VIIIb.Number of olives and man/olive ratios in Msellata, 1910.

<u>Cabila</u>	<u>Nos. of olives</u>	<u>Man/olive ratio</u>
Uadna	10,041	10.7
Shaffeen	9,545	9.945
Crarta	9,018	15.1
Jareen	8,949	16.2
Fuattir	8,542	11.6
Gheleel	8,260	11.01
Aulad Hamed	6,278	17.0
Luata	6,263	38.8
Beni Let	6,203	10.4
Coroglia	6,189	11.3
Smah	5,656	18.7
Morad	5,299	27.9
Zaafran	4,772	18.3
Msindara	3,506	7.9
Atia	3,247	10.2
Bu Aish	3,047	5.6
Imumen	2,798	9.3
Chalfun	2,580	10.3
Beni Mislem	2,530	4.1
Amareen	2,043	17.0
Shurruff	1,829	9.2
Gmata	1,789	3.4
Gherrim	1,199	9.2
Shiabarna	1,196	3.4
Selma	1,186	9.1
Beni Iechlef	1,068	6.8
El Corratia	?	?

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APPENDIX VIIIc.Production of olive oil by provinces 1943/4-1951/2, metric tons.

<u>Year</u>	<u>Tripoli and Western</u>	<u>Eastern</u>	<u>Central</u>
1943/4	820	1,000	180
1944/5	1,300	500	200
1945/6	450	200	42.4
1946/7	811	125	-
1947/8	?	?	?
1948/9	?	?	?
1949/50	3,000	4,000	700
1950/1	?	?	?
1951/2	300	500	200

APPENDIX VIIIId.Production of olives, olive oil and sansa oil in Tripolitania.

( METRIC TONS )

<u>Year</u>	<u>Olives</u>	<u>Olive oil</u>	<u>Sansa oil</u>
1927	?	900	?
1928	?	1,000	?
1929	?	500	?
1930	?	2,500	?
1931	?	800	?
1932	?	1,500	?
1933	?	2,800	?
1934	?	900	?
1935	?	2,300	?
1936	?		?
1937	250	37	?
1938	19,700	2,700	?
1939	5,000	800	?
1940	9,000	1,600	?
1941	12,000	1,800	?
1942	25,000	3,400	?
1943	10,000	1,200	?
1944	20,000	3,300	?
1945	13,000	2,000	?
1946	5,500	700	?
1947	6,500	936	?
1948	10,000	1,500	?
1949	50,000	9,000	?
1950	42,000	7,700	?
1951/2	30,000	5,000	600
1952/3	5,000	1,000	150
1953/4	40,000	6,500	1,100
1954/5	10,000	1,800	300
1955/6	16,000	2,700	450
1956/7	10,300	1,850	306

Note. The figures given above have been taken from the files of the Statistics Section of the Nazarate of Agriculture. They are estimates and therefore give only a general indication of production trends. Figure 37 gives the conversion table for olives, olive oil and sansa oil and by using this, estimates for the production of olives and sansa oil for the years preceding 1937 may be calculated. It is not known whether the figures for the period 1927-1950 are for agricultural or calendar years.

APPENDIX IX.Calcium phosphate content in a series of rock samples  
in the Eastern Jebel.

<u>Formation</u>	<u>Calcium Phosphate</u> Ca. (PO <sub>4</sub> ) <sub>2</sub>
Ain Tobi limestones	Trace 0.15 0.05 0.05 0.42 0.43 0.18 0.43
Garian limestones	Trace Trace 0.10 0.05 0.15 0.15 0.15
Jefren Marls	Trace Trace 0.27 Trace 0.10 zero 0.25
Tortonian	0.10
Helvetian	0.15
Quaternary	9.15 Trace

APPENDIX Xa.Estimates of livestock production in Tripolitania (metric tons).

	<u>Meat</u>			<u>Milk</u>			<u>Camels</u>	<u>Wool</u>	<u>Goat Hair</u>
	<u>Sheep</u>	<u>Goats</u>	<u>Cattle</u>	<u>Sheep</u>	<u>Goats</u>	<u>Cattle</u>			
1950	3,000	1,540	2,945	7,500	9,240	930	2,880	600	92
1951	3,907	2,165	3,625	9,767	12,990	1,170	2,745	780	129
1952	5,387	3,042	5,035	13,670	18,252	1,620	2,950	1,076	182
1953	4,190	2,520	4,175	10,500	15,310	1,290	2,745	838	153
1954	4,160	2,520	3,325	10,400	15,310	1,050	2,350	832	153
1955	3,180	1,610	3,200	7,950	9,660	990	1,750	636	97
1956	3,260	1,720	?	8,150	10,320	?	?	652	103

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APPENDIX Xb.Livestock numbers in ten selected cabile, Tarhuna, 1960.

<u>Cabile</u>	<u>Sheep</u>	<u>Goats</u>	<u>Cattle</u>	<u>Camels</u>	<u>Horses</u>	<u>Donkeys</u>
Auasa	302	385	26	25	4	12
Darahib	335	967	29	80	27	40
Et Tella	415	825	43	50	3	50
Fergian	3,457	3,523	40	195	13	60
Hamamla	1,769	1,417	52	125	12	50
Aulad Ali	1,470	1,830	25	670	47	210
Aulad Msellem	520	554	37	50	8	30
Masabha	462	1,186	32	45	4	25
Nahagia	1,120	1,161	-	160	9	82
Terscian	320	1,640	25	25	3	20

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APPENDIX Xc.

Monthly sales of live animals at Tarhuna market, 1956-1959.

a. Sheep sales.

<u>Month</u>	<u>Number of sheep sold</u>		
	<u>1956/7</u>	<u>1957/8</u>	<u>1958/9</u>
July	110	120	300
Aug.	110	110	140
Sep.	?	130	300
Oct.	90	160	300
Nov.	60	160	450
Dec.	50	110	300
Jan.	90	300	350
Feb.	75	200	350
March	110	260	500
April	60	200	500
May	70	130	400
June	360	300	450
<u>Total</u>	<u>1,185</u>	<u>2,180</u>	<u>4,340</u>

b. Lamb sales.

	<u>Number of lambs sold</u>		
	<u>1956/7</u>	<u>1957/8</u>	<u>1958/9</u>
	40	60	90
	45	60	100
	?	40	150
	40	70	120
	30	70	190
	45	50	160
	35	170	210
	40	150	110
	60	140	650
	65	200	550
	70	70	400
	40	90	300
	<u>510</u>	<u>1,170</u>	<u>3,030</u>

c. Goat sales.

<u>Month</u>	<u>Number of goats sold</u>		
	<u>1956/7</u>	<u>1957/8</u>	<u>1958/9</u>
July	45	60	220
Aug.	30	40	50
Sep.	?	40	110
Oct.	30	35	110
Nov.	35	40	140
Dec.	40	35	140
Jan.	25	50	90
Feb.	45	80	80
March	35	120	110
April	50	80	300
May	40	50	250
June	30	220	250
<u>Total</u>	<u>405</u>	<u>850</u>	<u>1,850</u>

d. Kid sales.

	<u>Number of kids sold</u>		
	<u>1956/7</u>	<u>1957/8</u>	<u>1958/9</u>
	40	60	200
	30	30	100
	?	65	250
	20	35	170
	30	35	170
	45	30	150
	25	60	100
	25	80	100
	30	70	200
	50	100	110
	84	60	180
	55	200	300
	<u>434</u>	<u>825</u>	<u>2,030</u>

APPENDIX Xd.Monthly sales of meat at Tarhuna market.a. Sales of mutton (kgs.).

	<u>1956/7</u>	<u>1957/8</u>	<u>1958/9</u>
July	300	120	300
Aug.	350	250	600
Sep.	700	350	100
Oct.	900	250	450
Nov.	500	550	350
Dec.	700	400	290
Jan.	370	350	340
Feb.	350	400	900
March	300	300	-
April	450	200	-
May	310	500	-
June	300	350	-
<u>Total</u>	<u>5,530</u>	<u>4,020</u>	<u>3,330</u>

b. Sales of lamb (kgs.).

	<u>1956/7</u>	<u>1957/8</u>	<u>1958/9</u>
July	400	80	450
Aug.	450	450	900
Sep.	700	600	270
Oct.	700	400	360
Nov.	700	700	200
Dec.	800	450	160
Jan.	350	500	240
Feb.	400	600	1,300
March	400	400	260
April	700	800	2,300
May	300	700	1,090
June	1,000	350	500
<u>Total</u>	<u>6,900</u>	<u>6,030</u>	<u>8,030</u>

c. Sales of goat meat (kgs.).

	<u>1956/7</u>	<u>1957/8</u>	<u>1958/9</u>
July	250	400	300
Aug.	200	200	400
Sept.	700	500	390
Oct.	1,000	200	215
Nov.	500	1,000	280
Dec.	600	400	40
Jan.	250	350	50
Feb.	200	200	-
March	200	200	-
April	300	200	-
May	290	300	-
June	600	240	-
<u>Total</u>	<u>5,090</u>	<u>4,190</u>	<u>1,675</u>

d. Sales of kid meat (kgs.).

	<u>1956/7</u>	<u>1957/8</u>	<u>1958/9</u>
July	170	200	310
Aug.	200	250	600
Sept.	200	150	950
Oct.	500	300	240
Nov.	300	-	200
Dec.	300	300	24
Jan.	200	250	-
Feb.	250	300	-
March	200	300	-
April	280	300	-
May	290	450	390
June	1,600	300	-
<u>Total</u>	<u>4,490</u>	<u>3,100</u>	<u>2,714</u>

APPENDIX Xe.Age structure of sheep and goat flocks in  
ten selected cabile, Tarhuna, 1960.

<u>Cabile</u>	<u>Age of sheep</u>			<u>Age of goats</u>		
	<u>Under 1 yr</u>	<u>1-2</u>	<u>Over 2</u>	<u>Under 1 yr</u>	<u>1-2</u>	<u>Over 2</u>
Aulad Ali	500	110	860	340	100	1,390
Aulad Msellem	85	40	395	130	50	374
Ausa	70	40	192	90	40	255
Darahib	90	30	215	227	100	640
Et Tella	70	15	330	130	90	605
Fergian	600	170	2,687	570	150	2,803
Hamamla	300	100	1,369	300	120	997
Masabha	100	50	312	200	140	846
Nahagia	200	90	830	270	100	791
Terscian	60	30	230	240	80	1,320

APPENDIX XIa.Production of barley in Tripolitania, 1930/1-1959/60.

(Metric tons).

<u>Year</u>	<u>Production</u>
1930/1	22,000
1931/2	32,000
1932/3	63,000
1933/4	30,000
1934/5	41,000
1935/6	3,000
1936/7	32,000
1937/8	42,000
1938/9	16,000
1939/40	11,000
1940/1	9,760
1941/2	13,560
1942/3	26,500
1943/4	125,000
1944/5	95,000
1945/6	71,200
1946/7	1,700
1947/8	22,010
1948/9	135,000
1949/50	85,000
1950/1	53,700
1951/2	74,000
1952/3	11,000
1953/4	30,000
1954/5	35,000
1955/6	80,000
1956/7	76,000
1957/8	37,100
1958/9	23,200
1959/60	17,500

Note: The statistics given for wheat and barley are unreliable, and there are serious differences between figures supplied by the Tithe Assessments, Nazarat of Agriculture, Chief Administrator Reports and the Foreign Office Working Party. Where several figures are available, the one considered to be the most accurate has been included in the following tables. Statistics for 1958-1960 are based on estimates given by Barclays Bank D.C.O. as percentages on the 1957/8 figure.

APPENDIX XIb.Area sown in barley in Tripolitania for selected years.

(Hectares).

1942/3	325,000
1943/4	276,800
1944/5	558,000
1945/6	138,000
1946/7	9,250
1947/8	109,000
1949/50	280,000
1951/2	300,000
1955/6	242,800
1956/7	275,000
1957/8	267,000

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APPENDIX XIc.Provincial distribution of barley productionfor selected years. (Metric tons).

<u>Year</u>	<u>Tripoli and Western</u>	<u>Eastern</u>	<u>Central</u>
1944/5	29,000	45,000	21,000
1945/6	45,000	15,000	12,000
1946/7	830	870	-
1949/50	35,000	40,000	10,000
1951/2	36,000	23,000	6,000
1952/3	54,811	51,000	9,209
1954/5	22,750	3,000	10,050
1955/6	39,550	18,900	22,070
1956/7	48,076	15,678	12,772
1957/8	18,900	12,200	12,373

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APPENDIX XIa.Provincial distribution of area sown in barley  
for selected years. (Hectares).

<u>Year</u>	<u>Tripoli and Western</u>	<u>Eastern</u>	<u>Central</u>
1944/5	158,000	300,000	100,000
1945/6	94,000	30,000	14,000
1946/7	2,830	6,420	-
1949/50	100,000	150,000	30,000
1951/2	200,000	96,000	40,000
1956/7	105,357	132,708	37,848
1957/8	111,000	96,000	60,000

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APPENDIX XIe.Wheat production in Tripolitania. (Metric tons).

<u>Year</u>	<u>Production</u>
1930/1	3,500
1931/2	2,200
1932/3	4,100
1933/4	6,600
1934/5	8,700
1935/6	1,200
1936/7	6,500
1937/8	13,500
1938/9	5,400
1939/40	2,500
1940/1	3,400
1941/2	7,500
1942/3	3,600
1943/4	9,000
1944/5	12,000
1945/6	8,000
1946/7	1,460
1947/8	2,530
1948/9	8,000
1949/50	8,000
1950/1	6,200
1951/2	7,223
1952/3	13,174
1953/4	2,700
1954/5	9,000
1955/6	17,410
1956/7	22,710
1957/8	12,400
1958/9	6,520
1959/60	4,240

APPENDIX XI f.Area of wheat cultivated in Tripolitania. (Hectares).

<u>Year</u>	<u>Area</u>
1942/3	25,000
1943/4	20,000
1944/5	74,000
1945/6	23,000
1946/7	8,150
1947/8	17,450
1949/50	19,500
1951/2	20,000
1955/6	44,460
1956/7	80,392
1957/8	58,000

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APPENDIX XI g.Provincial distribution of wheat productionfor selected years. (Metric tons).

<u>Year</u>	<u>Tripoli and Western</u>	<u>Eastern</u>	<u>Central</u>
1944/5	8,500	2,500	1,000
1945/6	5,100	1,600	1,600
1946/7	538	508	414
1949/50	4,800	1,600	1,600
1951/2	3,000	1,250	750
1952/3	8,538	4,102	540
1954/5	5,650	1,500	1,750
1955/6	9,600	4,210	3,600
1956/7	11,479	2,927	8,150
1957/8	5,000	5,300	2,200

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APPENDIX XI h.Provincial distribution of area in wheatfor selected years. (Hectares).

<u>Year</u>	<u>Tripoli and Western</u>	<u>Eastern</u>	<u>Central</u>
1944/5	47,500	20,000	6,500
1945/6	16,500	3,000	3,500
1946/7	1,030	7,120	-
1949/50	12,000	4,000	3,500
1951/2	12,000	5,000	3,000
1956/7	27,380	32,943	20,049
1957/8	22,500	20,500	15,000

APPENDIX XII.Monthly barley sales in the Eastern Jebel, 1958-9.

(Quintals).

<u>Month</u>	<u>Cussabat</u>	<u>Tarhuna</u>
June	56	100
July	132	30
Aug.	120	110
Sept.	124	104
Oct.	143	85
Nov.	130	65
Dec.	78	58
Jan.	70	65
Feb.	73	91
March	78	84
April	31	66
May	48	96
<u>Total</u>	<u>1,083</u>	<u>954</u>

Note: This table does not cover the full year, May-April, because figures for May, 1958, are not available. It does provide, with figure 41, an idea of when and how much barley is sold.

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