The olive in Northern Tripolitania: some aspects of agrarian geography

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Fig 2b

GEOLOGICAL SECTION FROM THE GEBEL GARIAN ACROSS THE JEFARA PLAIN

GARIAN GARIAN JEBEL ESCARPMENT 666M FAULTED DOME BIR ES SBEA 115M SUK ES SEBT 97M TAGURA

METRES 0 QUATERNARY TYRRHENIAN MIocene CENOMANIAN ALBIAN WEALDEN JURASSIC TRIAS PHONOLITE
ACQUIFERS OF THE JEFARA
(Cafter Desio, Chiesa, Lipparini, Archambault)

Fig 3

SEA LEVEL

PHREATIC WATER TABLE

INFILTRATION ZONE

A Coastal Phreatic
B Interior
C Sub-Artesian
D Artesian

TYPES OF WELLS

QUATERNARY
TYRRHENHIAN CLAY
MIocene Lst. - Tortonian
CLAY - HELVETIAN
SANDS, GRAVELS - LANGHIAN
CRETACEOUS
TRIASSIC
SELECTED PROFILES ACROSS THE JEFARA & JEBEL
FIG 4b
SELECTED E-W PROFILES ACROSS THE JEBEL

SCARP
TARHUNA PLATEAU
CUSSABAT PLAIN

JEFFREN
WADI ZARET
ASABAA

NALUT

V.E.12.5
Fig 5  DRAINAGE PATTERN OF NORTHERN TRIPOLITANIA

- Fault depressions
- Middle basins
- 200-300ms surface
- 250-350ms
- 350-500ms
- 500-600ms
- 600-750ms (Tigrina)
- 600-750ms (Nafousa)
- 750-900ms
- Southern limit of Miocene
- Jebel scarp
- Small scarps and cuestas
- Major watersheds
- Wadis
- Depressions
- Dunes
- Sebkhas
- Outcrops
- Faults

MORPHOLOGY AND DRAINAGE PATTERN OF NORTHERN TRIPOLITANIA

- Jebel scarp
- Small scarps and cuestas
- Major watersheds
- Wadis
- Depressions
- Dunes
- Sebkhas
- Outcrops
- Faults

Kilometres
FIG 6  WADI PROFILES

NORTH SLOPE CONSEQUENTS

SCARP ZONE WADIS

SOUTH EAST SLOPE WADI
Fig 7  
CLIMATIC REGIONS  
after Fantoli  

0  50  100  
kilometres  

Maritime  
Steppe  
High Plain  
Semi Desert  
Desert
FIG 8

TRIPOLI
TOTAL RAINFALL FOR AGRICULTURAL YEARS
IN MILLIMETRES

YEAR

0 250 500 750

FIG 9

5 YEAR RUNNING MEANS
TRIPOLI

FIG 11

FREQUENCY OF RAINFALL AT TRIPOLI
1913/14 - 1947/48

FIG 10

ACCUMULATED DEFICITS
TRIPOLI (in millimetres)
MEAN ANNUAL RAINFALL IN NORTHERN TRIPOLITANIA
(IN MILLIMETRES)

after Fantoli & Magazzini
FIG 13

RELATIVE VARIABILITY OF ANNUAL RAINFALL

FIG 15

PROBABILITY OF RAINFALL OVER 200mm's per annum
MOVEMENT OF THE 200mm's ISOHYET IN HIGH AND LOW RAINFALL YEARS
Fig 16 DISTRIBUTION OF WATER RESOURCES

0 40
kilometres
Fig 17

FARM TYPES and LAND USE
adapted from BMA. Land Use in Trapsaline

Figures and maps are used to illustrate various land use types and their distribution around the study area. The map shows a variety of land uses including grazing with cereals in wadis, grazing & semi-nomadism, unused land, and escarpment. The grid lines represent a scale of kilometers, indicating the extent and scale of the area depicted.
CROP EXPECTATION OF DRYLAND OLIVES

- **GOOD CROP**: 300mm
- **FAIR**: 250-300mm
- **POOR**: 150-250mm
- **NO CROP**: <150mm

Fig 20

SCARP

25 0 25 KILOMETRES
Fig 21 DISTRIBUTION OF DACUS OLEAE ATTACK ON OLIVES IN 1953

LOCAL VARIETIES - IRREGATED

ITALIAN FRANCOIO - DRY FARMED

ITALIAN FRANCOIO - IRREGATED

0 - 20% injury of total drupes on trees
21 - 49% 50 - 100%
OLIVE CULTIVATION REGIONS

COASTAL PLAIN - 1.A.B.C.D.E.F.G
INTERIOR PLAIN - 2.A.B.C.D.
JEBEL - 3.A.B.C.

200- 200mm's isohyet
-SEDENTARY AGRICULTURE

WESTERN JEFARA

0 50 KILOMETRES
LAND USE ON THE COASTAL PLAIN SOUTH OF ZLITEN & HOMS

- Zliten promontary
- stone house
- DUNE COAST
- INTENSIVE CULTIVATION OF TREE CROPS & ANNUALS
- SHIFTING CEREAL & GRAZING
- SMALL OLIVE GROVES & FALLOW LAND
- ROCK WASTE
- cereals
- rock outcrop
- terraced slope
- VAL DAGO NO
- eucalyptus

TYPICAL LAND USE ON THE LOW HILL ZONE

- Miocen hills
- coastal plain
- WADI SMAARA - MAINLY GRAZING
- rock outcrop
- rock outcrop
- Eroded hillsummits - poor grazing

Olive groves in earth bounded gardens
V - Vegetables, X - Young olives
site of ancient oil press - stone house - tent
SKETCH MAP
LAND USE - NORTHERN JEBEL
(MIDDLE TRACT OF WADI GHERRUN TO THE N.W OF CUSSABAT)

Fig 25
- ain tobi limestone summits
- small village
- gorse & rough grass
- rough grasses
- pasture, cereals, olives
- olives, terraced
- olives, carobs
- olives, carobs, fruit trees
- run off channel
- rock waste, alluvium
- barley, carobs
- run off channel

SKETCH MAP
LAND USE - NORTHERN JEBEL
(UPPER BASIN OF WADI MSABA N. OF TARHUNA)

Fig 26
- garian limestone summits
- garian outcrop
- gr grazing
- ce cereals
- roman wadi
- roman fort
- ii cistern
- well
- run off channels
- terrace, palms, fruit trees
- denuded terraces
Fig 27

DISTRIBUTION OF ROMAN REMAINS
(after GOODCHILD)

- IMPORTANT CITIES
- SMALL TOWNS
- VILLAGES
- VILLAGES
- FORTIFIED FARMS
- FARMS
- FORTS
- MAUSOLEA
- ACUEDUCT
- MAIN ROADS (Known)
- MAIN ROADS (Uncertain)
- 200m's contour
- WADIS

200m's contour

- SABRATHA
- OEA (TRIPOLI)
- LEPCIS MAGNA (HOMS)
- THYBACTIS (MISURATA)
- /Nafusa
- Gribz
- Bu Gnam

KILOMETRES

0 25 50
POPULATION CHANGES 1911-1954
percentage difference

Fig 30

0 miles 30 miles

N

40-80%
20-40%
0-20%
20-40%
40-80%
80-160%
160+
Fig 31 LIBYAN SANIYA - SUK EL GIUMA OASIS

TOTAL AREA - 4 hectares

- OLIVES - 88
- PALMS - 45
- ORANGES - 18
- APPLES - 18
- BANANAS - 2
- BEANS
- PEPPERS
- FODDER

- WELL, PUMP, RESERVOIRS, CANALS
- NURSERY FOR ORANGES
- ROUGH TRACK
Fig 32  LIBYAN DRY GARDEN AT GASR CHIAR

TOTAL AREA  20 hectares

- Olives - 5yrs old & Bare Fallow
- Fruit trees
- Barley
- Young olives
- Beans
- Stone house
FIG 33  PATTERN OF CULTIVATION AT THE HEAD OF THE WADI HASNUN
FIG 35

FARM 80 BREVISLIERI (EL KHADRA)
TOTAL AREA 56 hectares

- Pines & Firs
- OLIVES & ALMONDS in ploughed strips
- BARLEY INTERCULT
- Olives & Almonds in ploughed strips
- WHEAT INTERCULT
- WADIS
- EARTH DAM
- ACACIA & PRICKLY PEAR HEDGES
- ROCK WASTE
- GREEN FALLOW
- Olives
- Almonds
- SPECIALIZED DRY OLIVES
- OLIVES & VINES
- FRUIT TREES
- Shed
- Yard
- House
- BARLEY
- ROAD
- EUCALYPTUS
LAND USE - VALDAGNO ESTATE

- Uncultivated Rock Waste: 243.75 hectares
- Irrigated plots - Olives, Vines, Annuals: 376.50 hectares
- Dry farmed olives 20x10 metres: 159.50 hectares
- Irrigated olives 10x10: 226.0 hectares
- Dry farmed olives irregular: 12.0 hectares
- Eucalyptus, Pine, Cypress
- Development Area: 368.63 hectares
FIG 37

YIELDS PER TREE OF OLIVES
1952/3 - 1955/6

O OLIVETTI
B BIANCHI
H HASCIAN
M MICCA
C CORRADINI

--- IRRIGATED
--- DRY FARMED

KILOGRAMS

1952/3
1953/4
1954/5
1955/6
FIG 38

PRODUCTION OF OLIVE OIL IN THE WORLD AND MEDITERRANEAN

- WORLD
- MEDITERRANEAN

YEAR

1909/10 average
1914/15 average
1919/20 average
1924/5 average
1929/30 average
1934/5
1939/40
1944/5
1949/50
1953/54
100 kgs of olives yields 18 kgs of olive oil and 3 kgs of sansa oil.
FIG 40

DISTRIBUTION OF OIL PRESSES in 1953

- CENTRAL —
- EASTERN —
- TRIPOLI & WESTERN

TOTAL IN TRIPOLITANIA
- IN THE PROVINCES
- MECHANICAL PRESSES
- HAND
- ANIMAL

NUMBER OF PRESSES

0 500 1000
INDIGENOUS OIL MILL - MASARA

PLAN

S - Steps
St - Storage Recesses
C - Crushing Cavern
P - Press

PRESS

B - Wooden beam
D - Distilling bowls
W - Weight
O - Container for olives
FIG 42
MODERN OIL MILL IN TARHUNA—PLAN

1 UNLOADING PLATFORM
2 WASHING MACHINES
3 WEIGHING MACHINES
4 CRUSHING MACHINES
5 OIL PRESSES
6 OIL & WATER Repositories
7 OIL SEPARATORS
8 OIL STORAGE TANKS

FIG 43: COOPERATIVE OIL MILL IN GARIAN—PLAN

DIESAL MOTOR
OIL SEPARATOR
OIL CRUSHER
OIL PRESSES

SANSA HEAP
WASHING MACHINE
OFFICE
WATER TANKS
OIL STORAGE TANKS
FIG 44

TRADE IN EDIBLE OILS

- EXPORTS OF OLIVE OIL
- IMPORTS II
- IMPORTS OF OTHER VEGETABLE OILS

METRIC TONS

PLATE 1

JEJEBEL SCARP AT GARIAN
OVERLOOKING THE PLAIN OF GUASSEM

PLATE 2

JEJEBEL SCARP AT GIADO
note the detrital cones at the foot of the scarp and the horizontal bedding

PLATE 3

MIOCENE FORMATIONS IN THE JEBEL
PLATE 4
QUATERNARY AND RECENT DEPOSITS MASKING THE JEBEL STRATA NEAR GARIAN
note—the distribution of olive and fruit trees coincides with this formation

PLATE 5
QUATERNARY OF THE NORTHERN PLAINS
mobile dunes
miocene outlier

PLATE 6
QUATERNARY OF THE UPPER WADI BASINS
note—the young olives in the foreground, roman fort in the middle distance, eroded interfluves in the background.
PLATE 7

DELTAIC CONES IN THE WADI NEAR GIADO
note - the deltas form small peninsulas of moisture which are terraced and planted to trees

PLATE 8

OLIVES IN SCATTERED PATCHES OF WADI ALLUVIUM

PLATE 9

SOUTHERN JEFARA & JEBEL SCARP
note - wind eroded surface
PLATE 10

UNDULATING PLAIN OF ASSABA

PLATE 11

QUATERNARY OF THE HIGH LEVEL SURFACES
note: the moulded relief dotted with esparto grass

PLATE 12

THE PLAIN OF CUSSABAT
note: the nucleated settlement and high density of olives
PLATE 13

DISSECTED SCIOPRAN SURFACE
note: olives in wadis

PLATE 14

THE SAHEL OF HOMS
note: except for a few olives the deep gullies and pebble surface reflect the consequences of progressive deforestation

PLATE 15

UPPER WADI BASIN - GASR DOGA
note: the eroded terraces
PLATE 16

WIND ERODED SOILS OF THE JEFARA

PLATE 17

DUNE ENCROACHED OLIVES

PLATE 18

ERODED INTERFLUVES OF THE WADI LEBDA
PLATE 19
SILTING UP OF THE WADI MEGENIN
AFTERHEAVY FLOODS

PLATE 20
WADI HIRA DAM

PLATE 21
LIBYAN DALU
2nd ACQUIFER ITALIAN WELL
note—wind pumps are now being replaced
by electric motors

PLATE 22b
ARTESIAN WELL

PLATE 23a
OLIVES IN THE WADI BENI ULID

PLATE 23b
OLIVES BEHIND LATERAL STONE DAMS AT BENI ULID
PLATE 27

INTENSIVE CROPPING IN A LIBYAN GARDEN
note the crumbling tabia enclosing olives and wheat

PLATE 29

RECENT COLONISATION OF STEPPE AREAS SURROUNDING TRIPOLI OASIS

PLATE 30

LARGE ITALIAN OLIVES AT SUANI BEN ADEM
TRIPOLI OASIS AND ITS ENVIRONS

A - Libyan cultivation mosaic, with small gardens and tortuous tracks.
B - Italian private farms are dispersed extensively over undulating sandy areas surrounding the oasis depressions.
C - Afforested zone.
PLATE 32

DRY FARMED OLIVES AT GARI BALDI
note the wide spacing of the trees and clean cultivation either side of the rows. The green fallow in between prevents soil erosion.

PLATE 33  SOUTHERN MARGIN OF CULTIVATION IN THE JEFARA
PLATE 34
SCHECSUICH: A PIEDMONT, SPRINGLINE OASES.

PLATE 35
VILLAGES & OLIVES IN THE JEBEL NEAR JEFREN
PLATE 36a
OLD OLIVES ON THE CUSSABAT PLAIN

PLATE 36b
CUSSABAT

PLATE 37
DISSECTED NORTHERN EDGE OF THE EASTERN JEBEL
PLATE 38 ITALIAN OLIVE PLANTATIONS ON THE CENTRAL TARHUNA PLATEAU

PLATE 39 MARCONI: AN UNFINISHED DEMOGRAPHIC SETTLEMENT

PLATE 40 TIGRINNA PLAIN
note: Italian demographic farms are dispersed amongst former Libyan owned olives
OLIVES DISPERSED OVER THE QUATERNARY OF THE WESTERN JEBEL

CULTIVATION IN THE WADIS OF THE WESTERN JEBEL

SABRATHA
note-coarse vegetation has taken root on wind blown sands which have partially enveloped these magnificent oil cities

LEPTIS MAGNA
PLATE 44

REMAINS OF ROMAN OLIVE FARM IN THE EASTERN JEBEL

PLATE 45

ROMAN MAUSOLEA 'ES SENAMA' (OIL STONE) IN THE CENTRAL JEBEL

PLATE 46

ROMAN OIL PRESSES IN THE EASTERN JEBEL
PLATE 47

WADI EROSION AS A RESULT OF THE DESTRUCTION OF ROMAN DAMS

PLATE 48

BEDOUIN TENT ON THE PLAIN OF ASSABA

PLATE 49

PERIPHERAL DEVELOPMENT ZONES OF ITALIAN FARMS AT BIANCHI
BREVIGLIERI - A TYPICAL ITALIAN DEMOGRAPHIC SETTLEMENT
note the rectangular layout of the farms, the predominance
of tree crops (dots on the photo) and the encroachment
by sand dunes of the southern farms.
PLATE 51

DEMONSTRATION TERRACING AT THE GARIAN STATE NURSERY

PLATE 52

STONE HOUSES REPLACING THE TENT IN THE PLAIN OF ASSABA

wadi garden with olives and fruit trees

PLATE 53

TABIA: TYPICAL BOUNDARY OF AN OASIS GARDEN
note- the sandy track and prickly pears on top of the tabia


NON IRRIGATED LAND PLANTED TO TREES SURROUNDING THE TRIPOLI OASIS
note- sheep and goats are traditionally grazed on the water-consuming green fallow between the olives.
PLATE 57
OLIVES, PALMS & FRUIT TREES IN DRY OASIS GARDENS AT MISURATA

INUNDATED CULTIVATION OF OLIVES

PLATE 58
LIBYAN DRY GARDENS AT GASR CHIAR

X STONE HOUSES

FARM SAMPLE
PLATE 60

INDIGENOUS ARD PLOUGH

PLATE 61

BEATING WITH A STICK: A LIBYAN METHOD OF HARVESTING THE HIGHER OLIVE FRUITS

PLATE 62a

MODERN HARVESTING METHODS (1)

note- the tripod enables the fruit to be handpicked whilst the groundsheets eliminates bruising and wastage
LIBYAN HARVESTING TEAMS ON AN ITALIAN OLIVE PLANTATION
Note: men pick, women gather and bag the fruit

PLATE 62b

(2)

PLATE 62c

(3) 'GUANTES': SHEEP HORNs USED TO STRIP OLIVE BRANCHES OF THEIR FRUITS

SEMI-IRRIGATION OF ITALIAN OLIVES AT ZAVIA
Note: the use of the sprinkler system, strip cropping and the sandy nature of the clean-weeded soils

PLATE 63
PLATE 64
VINES INTERCULTIVATED WITH OLIVES AT BREVIGLIERI

PLATE 65
SPECIALISED OLIVES IN DRYLAND PLANTATIONS ON THE JEBEL

PLATE 66
LIBYAN OLIVE NURSERY (FARM SAMPLE 7)
PLATE 67

BADLY PRUNED OLIVE TREES (FARM SAMPLE 7)

PLATE 68

OLIVES IN 'GEDULA' AT VALDAGNO

PLATE 69

OLIVES & ALMONDS ON THE ITALIAN CONCESSION FONTANA PIACENTE
PLATE 70

OLIVE OVULES READY FOR TRANSPORT FROM SFAX TO TRIPOLI

PLATE 71

LIBYAN METHOD OF REJUVENATING OLD OLIVE TREES

Note: young shoots are allowed to grow from the trunk of the old tree which is being cut away for firewood.

PLATE 72

DARB-EL-ME OIL PRESS AT CUSSABAT

- stone crusher
- distillation tank
PLATE 73
MECHANICAL OLIVE CRUSHER IN A STANDARD LIBYAN MILL

PLATE 74
COOPERATIVE OIL MILL AT GARIAN

PLATE 75
SANSA OIL AND SOAP FACTORY AT HOMS
PLATE 76
MODERN ITALIAN OIL MILL
S.A.F.I.L.

PLATE 77a
PRESSES & DISTILLING BARRELS IN
CLASSIC OIL MILL

PLATE 77b
CENTRIFUGAL OIL SEPARATORS