TRDS

ANNEX 1 (in part)

VEGETATION RESOURCES

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Draft. RTW

ANNEX 1 VEGETATION Resubmit Correction

CONTENTS

LIST OF FIGURES

1. THE NATURAL VEGETATION

1.1 General Introduction and Survey Methods

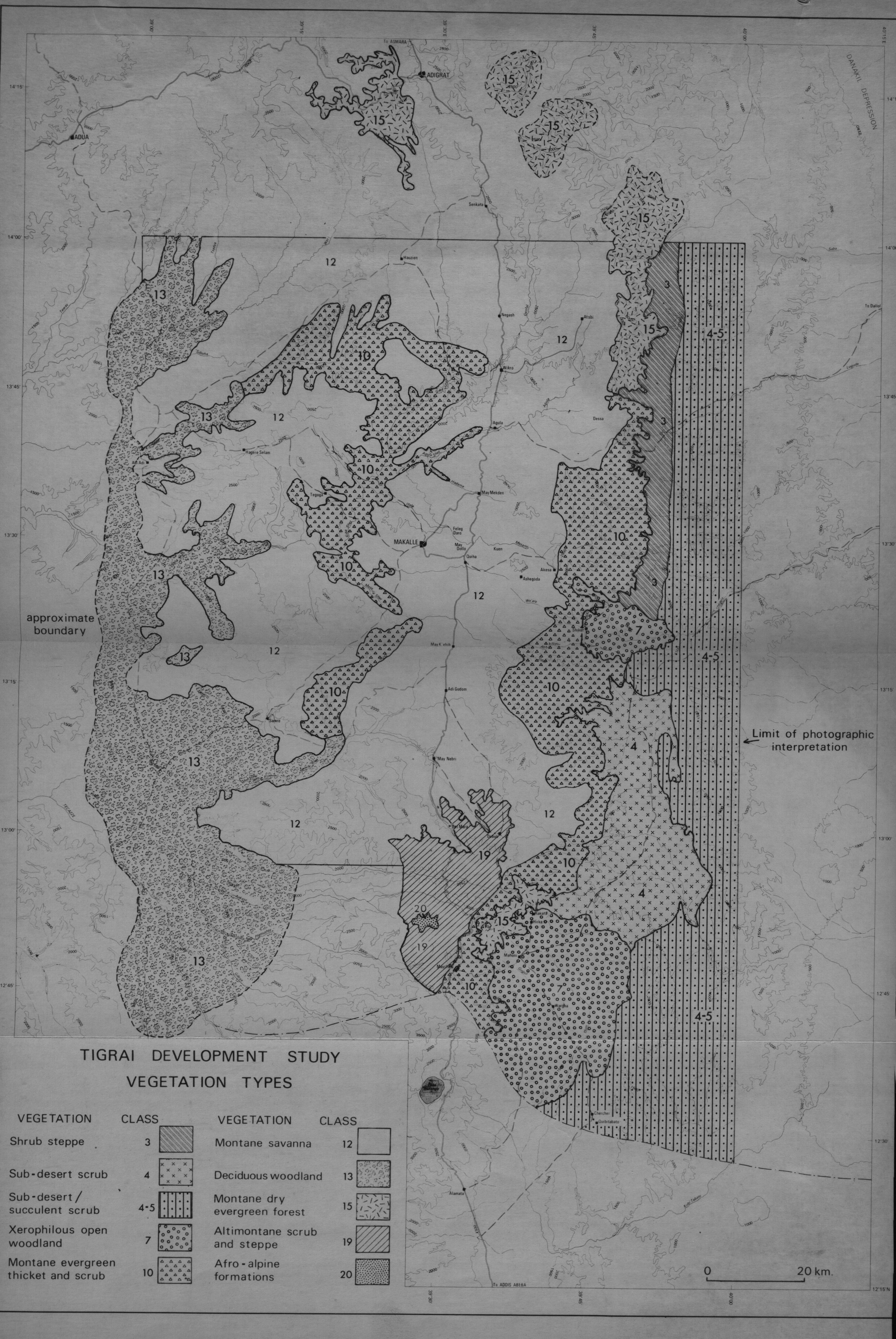
The climax vegetation of an area is the result of the interaction of several natural factors, principal among which are climate, altitude and soil. In areas long and densely settled by man, and Tigrai is an example of this, anthropic factors will also have had a significant effect.

The most obvious human influences are in the highland agricultural areas where little remains of the original vegetation, but even in the rangelands overstocking has probably considerably affected species composition.

Collections of plant material by Schimper in the late 19th century have ensured that north-west Tigrai is fairly well known botanically but central Tigrai does not appear to have been systematically collected. Although many new areas of distribution have been recorded during this study it was not designed as a botanical survey and much remains to be done in this field.

A rapid introductory survey was made to identify natural vegetation communities within and adjacent to the Study Area. These are mapped in Figure 1.1. It has recently been argued (Vesey-Fitz Gerald, 1973) that plant communities should be considered natural under the conditions of the time and the place; this supposition is adopted for this survey. During the whole course of the survey more than 700 specimens were collected for identification purposes, many of which are now either in the Institute of Agricultural Research or National Herbariums of Ethiopia. (Appendix A) Considerable help in identification was obtained from a vernacular glossary (Mooney, 1963) but it has also been possible to add ~~many~~ more than 200 new vernacular names to it. (Appendix B)

As a later stage a more intensive survey was made at representative sites within the natural vegetation zones. The point centred quarter method (Cottam and Curtis, 1956) was used for determining compostion of woody species. In the lists presented in the ~~later~~ second chapters the number following a species represents the relative frequency of the species in the sampled transect. With the exception of a few specific areas the field layer on range and grazing lands and the samples on arable lands were qualitative only: where quantitative analysis


TIGRAI DEVELOPMENT STUDY
VEGETATION TYPES
VEGETATION
CLASS
Shrub steppe
3
Sub-desert scrub
4
Sub-desert / succulent scrub
4-5
Xerophilous open woodland
7
Montane evergreen thicket and scrub
10
Montane savanna
12
Deciduous woodland
13
Montane dry evergreen forest
15
Altimontane scrub and steppe
19
Afro-alpine formations
20
0
20 km.
Limit of photographic interpretation
approximate boundary
DANAKIL DEPRESSION
ADIGRAT
ADUA
MAKALLE
To ASMARA
To ADDIS ABEBA
Senkata
Negash
Atsbi
Wukro
Agula
Dessa
May Mekden
Mauzien
Hagere Selam
Akesa
Ashegoda
Quiha
Feleg Daro
May Doliu
May K'ehili
Adi Godom
May Nebri
Alamata
Chercher
Gurbtabato
TECAZZE
To Dallol
14°15'
14°00'
13°45'
13°30'
13°15'
13°00'
12°45'
12°30'
12°15'N
39°00'
39°15'
39°30'E
39°45'
40°00'
40°15'E

was undertaken the point quadrant method was used (Levy and Maddon 1933).

1.2 Traditional Classification

A classification of the country into three (sometimes four) distict zones has been in use for centuries by the Ethiopians themselves: these terms were sometimes used by early botanists to describe the vegetation. The zones are based primarily on elevation, and hence, temperature, and are little concerned with rainfall. The zones recognised are:

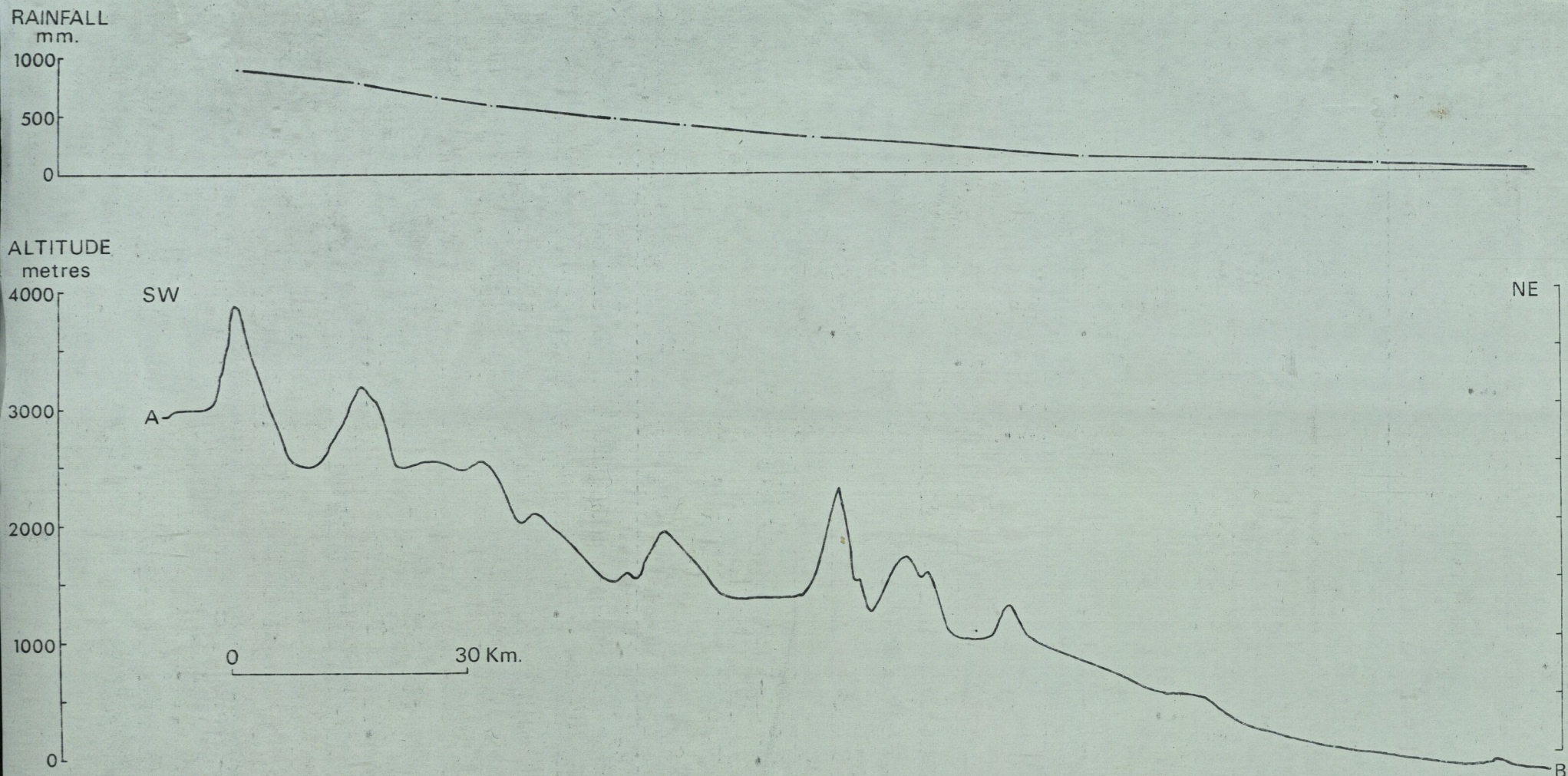
"Kolla". The hot lowlands, usually below 1400 m - 1800 m with average temperatures in excess of 20°C.

"Woyna Dega". Temperate highland areas at elevations from 1400 m - 1800 m to 2400 m - 2600 m. Average temperatures are about 16°C-20°C.

"Dega". Mountain areas above the level of the last zone to approximately 3800 m with temperatures in the region of 10°-16°C. A fourth zone above 3800 m, known as "Urec" is sometimes admitted.

1.3 Ecological Classification of the Natural Vegetative Cover

Little of the original vegetation is evident in much of the area covered by this survey. It is possible however, from relict stands in various places to obtain a reasonable impression of what the various climaxes were. Several accounts and various general systems of classification are available in the literature (Pichi-Sermoli 1957; Breitenbach 1961, 1963; Huffnagel 1961; Brown and Cochemé 1973). A classification based on grass cover is also available (Rattray 1960). It is possible to identify a number of the vegetation types of the quoted authorities varying from desert to alpine zones. The classification which follows (a cross-section showing many of the classes is shown in Figure 1.2), and the numbers prefixed to the types, is based on that of Pichi-Sermoli(1957).



GEOLOGY	Basalts and Sedimentaries			Basalts Metavolcanics Sedimentaries	Alluvium	Sedimentaries and Metavolcanics		Alluvium	Salt
NATURAL VEGET'N	20–19	Edaphic Grassl'd	12	15 – 10	7	5–3	4	1	
LAND – USE	Livestock Grazing Cultivation		Cultivation Livestock Grazing	Livestock Grazing Cultivation Protection Forest	Cultiv'n (Irrigated) Grazing	Extensive Livestock Browsing & Grazing		Occasional Grazing/Wildlife	Salt Mining

FIGURE 1·2

ECOLOGICAL CROSS SECTION AB

The classification in general agrees with the terminology of the Yangombi Conference (Scientific Council for Afric South of the Sahara 1961). A later classification (Pratt, Greenway and Gwynne 1966) concerned only with rangeland rejects the use of certain terms, particularly 'savanna'.

1. Desert Occurs naturally to the north-east of the area at altitudes below 200 m. This area forms part of Rattray's (1960) A.10 group (annual Aristida sp).

3. Shrub steppe This association is limited in extent to a belt running north-south at the foot of the escarpment at an altitude of about 1000 m.

4. Sub-desert scrub Varying in altitude between 200 m and 1500 m, upto 2000 m in places, this type of vegetation runs in a strip along the lower slopes of the eastern escarpment, and on the horsts. The type specimens are Acacia, Commiphora, Zizyphus, Maerua, Cadaba and Boscia with succulents, Euphorbia, Sansevieria and Aloe. Both this, the previous, and the following divisions are included in the area classified as C4 (Chrysopogon plumulosus) by Rattray.

5. Sub-desert succulent scrub In valleys and gorges and occassionally on interfluves at altitudes mainly between 500 m and 1200 m typical associations of this type are found. Main constituents are Dracaena, Euphorbia, Aloe, Sansevieria and Caralluma. Rainfall in this and the two previous classes is less than 400 mm per annum.

7. Xerophilous open woodland Small areas occur in graben valleys along the eastern escarpment probably influenced by edaphic factors as much as by the rainfall of about 450 mm. The type tree is Acacia tortilis with other acacias, Balanites, Dobera and occasional Adansonia digitata on rock outcrops.

10. Montane evergreen thicket and scrub The association occurs in two areas: along the higher slopes of the eastern escarpment at altitudes of 1500 m to the crest, which is often at 2500 m and above; and over large areas on the western half of the plateau at similar altitudes, particularly in river gorges. Two types can be recognised: one, dominated by Euphorbia

candelabrum
~~abyssinica~~, is usually found on shallow soils or rocky outcrops; the other contains a variety of species including Carissa, Euclea, Rhus, Maytenus, Dodonaea and Buddleja. Rattray's classification of these areas is C4 and H30 (Hyparrhenia filipendula).

12. Montane savanna Found over most of the central plateau between 1800 m - 2000 m and 2600 m - 2800 m in areas of 500 mm-700 mm rainfall. Acacias and olive usually predominate, ~~with several species of Echinops occurring~~. Much of this association is allocated to HE2 (Heteropogon contortus) by Rattray, as is the montane dry evergreen forest.

13. Deciduous woodland This vegetation type occurs in the west of the area in river valleys and intermediate ridges below altitudes of about 1500 m, in areas with rainfall of upto 700 mm. Combretum and Terminalia are typical with Boswellia, ~~Angolensus~~ Albizia and Acacia also present. The Rattray classification for this area is H30.

15. Montane dry evergreen forest Often regarded as the typical vegetation of the Ethiopian plateau it is probable that the association occurred only at favourable sites in similar altitude and rainfall conditions as the montane savanna. Juniperus procera and Olea africana are typical either as co-dominants or with one or the other dominating.

19. Altimontane scrub and steppe Small areas occur in the south-west at altitudes in excess of 3000 m. Rainfall in this and the following formation is probably in excess of 800 mm. Erica arborea, Rosa abyssinica and Hypericum lanceolatum are typical.

20. Afro-Alpine formations In a very small area in excess of 3700 m in the south-west typical formations of this type are found. Erica arborea, Lobelia rhyncopetalum and many grass species of Agrostis, Poa, Festuca and Pentachistis as well as Cyperacae and herb species occur.

23. Riparian formations Throughout the area on seasonal as well as perennial rivers riparian type formations occur. Growth is often spectacular compared with adjacent areas. Species include Ficus, Tamarindus, Salix, Syzigium and acacias, often with a dense understorey.

Edaphic grasslands These are not given a separate classification by Pichi-Sermoli but are widespread in areas of impeded drainage and on river terraces. Species composition varies with soil type, extent of waterlogging and altitude, but Andropogon abyssinicus or Cynodon dactylon are often dominant.

2. PRESENT VEGETATION IN RELATION TO LAND USE AND ENVIRONMENTAL FACTORS

2.1 Arable Lands

Natural or secondary vegetation, particularly if it has a local use, is often left on arable lands, species of figs are paramount in this respect, but many other large single trees are also left undisturbed. Two species, Croton machrostachys and Acacia albida, used as type specimens in some classifications (e.g. Breitenbach 1963) are now found in Central Tigrai only on arable lands: the former occurs on sands and heavy black clays and the latter, sometimes in association with Phoenix reclinata, on sands. All three species have high water requirements and act as indicators of the inherently high moisture contents of the soils on which they occur, or of sub-surface impediment of drainage. The fruits and a decoction of the roots of C.machrostachys are used as a medicine for veneral diseases, but the wood is not used for fuel owing to the bad smell and acrid smoke produced when burnt.

Rumex nervosus is ubiquitous on most soil types at altitudes of 1800 m and above, being left within fields as well as at field boundaries where aloes are also either left growing or are planted to effect some measure of erosion control. Dry season ploughing for weed control is not employed against the Mexican poppy, Argemone mexicana, on clay loam soils on limestone; the seeds of this plant are collected and used for oiling the trays on which the unleavened bread of teff ("injera) is baked.

Early colonisers on fallows depend very much on the local environment. On sands Arnebia hispidissima or Cassia occidentale

can cover much of the ground as almost pure stands. Tribulus terestis and Alternanthera purgens are widespread. Successional stages may pass, after about 8-10 years, though a course grass phase, often dominated by either Pennisetum schimperi or P.mezianum before later seral communities give way to climax or sub-climax. At the lower altitudes Calotropis procera, particularly on sands or thin soils overlying rock is a transient coloniser: one specimen growing at 2200 m just north of Makalle is 700 m above the normal altitudinal limits.

Particular crops often have specific weed problems, as well as there being many weeds common to all crops. Among cereal crops grass weeds are important including such world-wide pests as wild oats, Avena fatua and darnel, Lolium temulentum (which is not only important as a carrier of ergot but also acts as an alternate host for stem rust, Puccinia graminis). In linseed as much as 50 per cent of the stand may be composed of the seed of a brassica which is similar to the crop seed: the farmers claim it is not worth their while to either weed it out or separate the seeds.

Several genera of Compositae are among the most important general weeds. Some of these, including many Bidens spp and Coreopsis borianiana, the so-called Maskal or September Daisies, are tolerated as they are used in the religious festivities which supposedly mark the anniversary of the finding of the True Cross. Some of the most common arable weeds, in addition to those mentioned above, collected from several crops in varying localities are given in List 1.

List 1

Achyranthes aspera
Amaranthus angustifolius
Anthemis tigrensis
Anthericum angustifolium
Arthraxon prionodes
Brassica sp. pl.
Caylusea abyssinica
Commelia africana
Convolvulus arvensis
Datura stramonium
Eleusine multiflora
Lactuca capensis
Malva parviflora
Medicago polymorpha
Monordia foetida
Osteospermum vaillantii
Oxalis corniculata
Plantago lanceolata
Rumex bequaertii
Salvia merjamie
Salvia schimperi
Solanum sp. pl.

Eragrostis sp. pl.
Galinsoga parviflora
Guizotia scabra
Heliotropium cinarescens
Justicia schimperi
Snowdenia polystachya
Urochloa panicoides
Verbascum sinaiticum
Vernonia sp. pl.

Immediately after the beginning of the rains the first plants to appear are often mono-cotyledons, including Cyperus blysmoides and other sedges and Anthericum cooperi and other Liliaceae. These are particularly prevalent on the free draining dolerite-derived soils, although they do not persist as does Pelargonium quinquelobatum which is more common on these soils than on other types.

Irrigated crops are grown almost entirely on vertisols ('black cotton' soils) and have their own specific problems. List 2 is a general one of weeds collected from several sites, while List 3 shows the plants most prevalent in the irrigation canals, and which often severely restrict the flow of water. African star or Bermuda grass, Cynodon dactylon is important in both these situations and is also a common weed of dryland agriculture.

List 2

Herbs	Grasses
Abutilon sp.	Agrostis semiverticillata
Anagallis arvensis	Andropogon sp.
Brassica nigra var. abyssinica	
Sonchus sp.	Bothriochloa insculpta
Flaveria trinervia	Echinochloa colona
Ipomea cordofana	Eleusine floccifolia
Medicago polymorpha	Eragrostis paniciformis
Plantago lanceolata	Lintonia nutans
Ranunculus multifidus	Pennisetum bifloris
Rumex bequaertii	Phalaris paradoxa
Scorpiurus muricatus	Polypogon monspeliensis
Solanum sp.	Setaria atrata
Verbena officinalis	Sorghum purpureosericeum
Veronica anagallis-aquatica	

List 3

Herbs	Grasses and Sedges
Ageratum conyzoides	Andropogon sp.
Agoroylobium sp.	Panicum repentellum
Bulbostylus sp.	Pennisetum glabrum
Centaurim sp.	P. salifex
Dicrocephala sp.	Cyperus sp. pl.
Hydroctyle ranunculoides	Scirpus inclinatus
Lotus corniculatus	Juncus oxycarpus
Polygonum salicifolium	
Potamogeton sp.	
Rorippa sp.	

2.2 Grazing and Rangelands

2.2.1 Highland Farming Areas

Much of the highland farming region is a mosaic of cultivated plots interpersed with uncultivated areas. The latter may be areas too steep, rocky or with soils too shallow to cultivate economically. There are also areas of abandoned arable which are in various stages of bush fallow: on these sites there is limited scrubby regrowth of such shrubs as Euclea schimperi, Maytenus senegalensis, the former predominating on the heavier limestone - derived soils and the latter on those derived from igneous rocks, Acacia etbaica, Carissa edulis and Jasminum abyssinicum and a number of climbing and scandent shrubs and herbs including Cissus petiolota, Cyphostemma jatrophoides and Jasminum floribundum. The number of woody shrubs may be as many as 1000/ha after 4 or 5 years fallow, but the effective canopy area is as low as 5 to 10 per cent. A poor regrowth of post cultivation grasses and herbs is usually present which provides a limited amount of grazing.

Steep hillsides and rocky outcrops have been subjected to a long history of abuse. Although the vegetation is more varied in species composition burning, overgrazing and cutting for fuel have resulted in a gross depletion of the former montane savanna or montane dry evergreen forest types of vegetation. In many areas it has become necessary to dig out roots for fuelwood, this process taking a whole day to

provide a donkey load of about 50 kg which is then taken to market the next day. As many as forty woody species can be found in favourable situations but a more typical site contains upto twenty. List 4 was prepared 15 km west of Makalle at an altitude of beween 1700 m and 1900 m comprising the species, and the relative densities, shown:

List 7

	%		%
Euclea schimperi	19.0	Maytenus senegalensis	2.5
Acacia etbaica	17.0	Pterolobium stellatum	2.5
Dodonaea viscosa	11.0	Ehretia cymosa	2.5
Carissa edulis	8.0	Jasminum abyssinicum	2.5
Olea africana	8.0	Albizia schimperana	1.0
Grewia ferruginea	8.0	Clerodendrum myricoides	1.0
Rhus natalensis	5.6	Acokanthera schimperi	1.0
Dichrostachys cinerea	5.6	Buddleja polystachya	0.5
Lannea fruticosa	5.6	Ormocarpum muricatum	0.5

The foregoing list is fairly typical of limestone derived soils. On the free draining dolerite soils, which are often strewn with large boulders upto one metre or more in diameter Maytenus senegalenais and Ormacarpum muricatum may account for upto 50 per cent of all trees and shrubs present. Stands may be fairly dense, in terms of numbers, at upto 2000 plants per hectare but canopy cover rarely exceeds 15 per cent. A sparse field layer comprising such grasses as Bothriochloa insculpta, Chloris pycnothrix, Dactyloctenium aegyptium, Digitaria velutina, Eleusine indica, Eragrostis spp. Harpachne schimperi, Heteropogon contortus, Pennisetum villosum (which is also a common ruderal grass throughout the area), Setaria spp. and Sporobolus spp., and a number of herbs including Asparagus racemosus, Colutea abyssinica, Conyza shimperi, Dyschoriste hildbrandtii, Ferula communis, Gerbera viridifolia, Commiphora Heteromorpha trifoliata, Hibisus aponeurus, Impatiens tinctoria and Oxalis corniculata covers about 20 per cent of the ground and provides some grazing.

Gregarious where it occurs on fine clay limestone soils, the precocious flower stalks of Urginea altissima are very conspicuous in the middle dry season. Although not common this plant has several times been reported as poisonous to cattle. One oddity is which forms a cushion like growth over dolerite boulders. It is apparently restricted to a very small area about 10 km east of Makalle.

Plant identification awanted

Edaphic grasslands form less than two per cent of the highland area but are important in the total ecology on account of the bulk of high quality grazing they provide. Dry matter production is three to six times that of adjacent lands, and is mostly of palatable and nutritions species. Management of these areas is often good, involving closure during the rains, and the making of hay at the onset of the dry season. Regrowth on residual soil moisture is often considerable and provides a prolonged grazing period. Species composition varies, dependant on the extent and depth of flooding and the height of the ground-water table during the dry period. Early growth of sedges is quickly overcome by such species as Cynodon dactylon, Setaria sphacelata, Echinochloa colona, Andropogon abyssinicus, Sorghum purpureosericeum and Paspalidum geminatum. In sharp contrast to nearby dryland grazings ground cover of these edaphic grasslands is often in excess of 70 per cent and is effectively 100 per cent at leaf-table height.

In these highland farming areas the contribution of the non-cultivated lands to livestock fodder is rarely more than 30 per cent, the remainder being provided by crop residues and fallows. In all the following ecological associations the natural vegetation provides most if not all the livestock feed requirements.

2.2.2 Montane evergreen thicket and scrub On the eastern escarpment composition is to some extent affected by altitude and by the generally decreasing rainfall from south to north. Aspect in this situation is generally easterly and soil parent material and soil type probably exert the greatest effect on vegetative composition.

East of Maychew, at an altitude of about 2000-2200 m, rainfall probably 700 mm approximate position 12°47'N, 39°35'E

there is an area of about 32 km^2 of dense scrub on steeply sloping hillsides. There is a good depth of coarse clay-loam soil derived from basalt and this area supports the densest and most varied vegetation found in this association. List 5 is fairly comprehensive for the shrub layer including climbers with a density of 1460 per hectare, and a cover value of about 63 per cent at 1.5 m-2 m height: the commoner plants of the field layer are given in List 6.

List 5

Cadia purpurea	37.5	Maytenus senegalensis	
Rhus natalensis	12.5	Maytenus undatus	
Maytenus ?cymosa	12.0	Olea africana	
Cordia ovalis	8.0	Oputia Ficus-indica	
Carissa edulis	8.0	Otostegia integrifolia	
Acacia etbaica	4.0	Ehretia cynosa	
Acacia abyssinica	3.0	Hibiscus aponeurus	
Rhus glutinosa	3.0	Juniperus procera	
Acokanthera schimperi		Lannea sp.	
Becium obovatum		Pterolobium stellatum	
Clerodendrum myricoides		Rhoicissus tridentata	
Dovyalis verrucosa		Rubus sp.	
Dregea schimperi		Sysimbrium erysimoides	

List 6

Herbs

Achyranthes aspera	Solanum sp. nr. hastifolium
Amaranthus angustifolius	Trichodesma zeylanicum
Cissus quandrangularis	Triumfetta pilosa
Coccinia grandis	Verbascum sinaiticum
Cucumis dipsaceus	Grasses
Euphorbia crotonoides	Andropogon abyssincus
Ferula communis	Andropogon pratensis
Galinsoga parviflora	Eragrostis spp.
Heliotropium cinarcscens	Harpachne schimperi
Kalanchoe cf lanceolata	Michrochloa caffra
Monothecium glandulosum	Sporobolus africanus
Sida cuneifolia	Themeda triandra

Cadia purpurea, which is a major constituent of the association on all soil types on the eastern escarpment, and is also an important under-storey shrub in montane dry evergreen forest, has not been found in the central and western plateau areas where evergreen thicket and scrub also occur.

Further north, approximate position 13°24'N, 39°43'E at a slightly lower altitude of 1800 m - 2000 m, with a lower rainfall of 500 mm - 600 mm on shallow, stony clay-loam derived from limestone the variety and density of shrubs is much less. A density per hectare of 1060, mostly shrubs about 2 m - 3 m tall with a few emergent trees, and a canopy cover of 24 per cent was determined, as shown in List 7.

List 7

Tarconanthus camphoratus	31.0	Carissa edulis	1.0
Cadia purpurea	30.0	Euclea schimperi	1.0
Acacia etbaica	9.5	Grewia erythraea	1.0
Dodonaea viscosa	7.0	Grewia sp.	1.0
Maytenus ?cymosa	6.5	Jasminum abyssinicum	1.0
Olea africana	5.0	Premna cf resinosa	0.5
Achokanthera schimperi	2.5	Rhus natalensis	0.5
Boscia salicifolia	2.5		

One of the co-dominants in this habitat, T.camphoratus, is restricted in its distribution in Tigrai, being largely confined to limestone soils, usually on east or north-east aspects at altitudes between 1800 m and 2300 m. Two shrubs which appear in the list D. viscosa and E. schimperi are found in a variety of associations between 1200 m and 2400 m with no other apparent ecological limitations, although it is possible that D. viscosa survives better at slightly lower altitudes in areas subject to periodic fires and that E. schimperi is best suited to limestone soils, particularly in early successional stages after cultivation or clearing operations.

At this site the field layer is almost completely dominated by aloes. Other species found in the fairly rich but sparse field layer are shown in List 8.

List 8

Herbs	Grasses
Abutilon fruticosum	Aristida adoensis
Aerva persica	Brachiaria glauca
Barleria cf diffusa	Brachiaria jubata
Becium obovatum	Chloris gayana
Commicarpus boisseri	Chyrysopogon plumulosus
Conyza schimperi	Coelachyrum poaeflorum
Cucumis dipsaceus	Cypholepis yemenica
Euphorbia tirucalli	Digitaria velutina
Gomphocarpus fruticosa	Enneapogon schimperanus
Justicia flava	Erogrostis spp.
Heliotropium sp.	Eustachyus paspaloides
Justicia odora	Heteropogon contortus
Lantana sp.	Hyparrnehia hirta
Leucas neuflizeana	Panicum maximum
Lippia sp.	Panicum pusillum
Oxygonum stuhlmanii	Panicum snowdenii
Polygala ohlendorfiana	Pennisetum setaceum
Sansevieria powellii	Sporobolus panicoides
Solanum nigrum	Themeda triandra
Vernonia sp.	Tragus berteronianus

2.2.3 Sub-desert scrub

Within this association in Tigrai it is probably soil type or soil parent material that have the most effect on species composition. This can be illustrated by three examples in very similar altitude and rainfall conditions in the graben valleys in the east of the area.

The first is a steep hillside of southerly aspect at between 1500 m and 1600 m, position 13°19'N, 39°51'E. Soil depth is only a few centimetres, over limestone. Thirty two species including at least three Commiphora were identified in the stand, ten of these showing an occurrence greater than one per cent, the remainder being unimportant numerically. The ten species and their relative occurrence are shown in List 9.

List 9

Commiphora spp.	24.0	Grewia villosa	5.7
Acacia mellifera	18.0	Dobera glabra	4.7

Grewia erythraea	11.7	Plectranthus cf ignarius	2.3
Grewia mollis	9.0	Acacia nubica	2.0
Acacia etbaica	7.0	Premna cf resinosa	1.3

Overall population density was about 490 trees/shrubs per hectare with a canopy cover of about 22 per cent. The only example of Acacia senegal, gum arabic, collected during the whole survey was seen at this site. Ground cover was similar in species composition to that given in List 8.

The second transect was made about 10 km east of the previous one, at an altitude of about 1300 m. The area is a gently sloping alluvial plain of sandy texture subject to rapid sheet erosion. Only seven shrub species were found, of which one was completely dominant. The determined composition is shown in List 10.

List 10

Cadaba rotundifolia	76.0	Acacia seyal	1.0
Salvadora persica	12.0	Calotropis procera	1.0
Dobera glabra	7.0	Ziziphus spina-christi	1.0
Cordia ovalis	2.0		

Shrub density was less than 90 plants per hectare. C. rotundifolia, it is said by the local Afar, grows only in this small fan and is not known by them to occur anywhere else in their tribal area. Euphorbia tirucalli was established in some areas where it had been held up by brushwood or tree branches, and there were occasional patches of Sansevieria powellii. In addition there was a very sparse ground cover of Aerva persica, Cleome brachycarpa, Tribulus terrestris and species of Barleria, Justicia, Lactuca and Ocimum. Only scattered volunteer grasses of the genera Aristida, Eragrostis and Sporobolus were noted.

Southwards from the second site the ground gradually rises. The soil is still sandy, often overlain by gravel and there is a sparse cover of Acacia mellifera and A. nubica with scattered grasses, except in drainage lines where both the number of species and the density is much greater. These drainage

lines also reflect the natural and cultivated plants of the escarpment and plateau, from where seeds have been washed down, the established seedlings surviving for a shorter or longer time. Occasional baobabs, Adansonia digitata and, usually on the banks of seasonal rivers, Delonix elata, grow in the area at altitudes in excess of 1500 m, which is quite high for these species. A. digitata is limited in distribution in Tigrai to areas east of the escarpment, where it grows on rocky outcrops; and to the lower reaches of the Tacazze river valley in the west. Tamarindus indica, Acacia nilotica and A. tortilis occur but are not common in this habitat and are limited to isolated specimens in river beds or on river banks. Occasional large fig trees are also present as are Cadaba farinosa, Maerua angolensis and Sterculia setigera.

About 30 km south of the second transect, at about 1400 m altitude there is an almost abrupt change in the shrub vegetation. This is an area of eroded basaltic hills with little soil and virtually no ground cover. A. mellifera and A. nubica are still present, as is the most ubiquitous of Tigrean acacias, A. etbaica. Acacia polyacantha is dominant and both this species and A. mellifera are gregarious at this site, each occurring in almost separate groups. Seventeen tree/shrub species were identified as shown in List 11 at an overall density of 144 trees per hectare, with a canopy area of under six per cent.

List 11

Acacia polyacantha	35.5	Boscia salicifolia	2.0
A. mellifera	21.0	Dobera glabra	1.5
A. nubica	7.5	Grewia bicolor	1.0
Grewia mollis	7.5	Acacia etbaica	1.0
Grewia Villosa	7.0	Rhus natalensis	1.0
Cordia ovalis	4.0	Commiphora sp.	0.5
Grewia erythraea	3.5	Salvadora persica	0.5
Balanites aegyptiaca	3.0	Ziziphus spina-christi	0.5
Acacia seyal	3.0		

Throughout the sub-desert scrub area the field layer is

sparse. Herbs are poorly represented and in addition to most of those given in List 8, species in the following genera also occur: Abutilon, Astragalus, Barleria, Crotalaria, Leonotis, Plectranthus and Rhyncosia. Alternanthera pungens, Solanum incanum, and Tribulus terrestris are common in some situations. Many of the succulents which occur in the sub-desert succulent scrub are also found in this association. Grasses are well represented with a total of more than 40 species, presented in List 12, having been positively identified and there are undoubtedly many more particularly in the genera Andropogon, Cymbopogon, Digitaria, Eragrostis, Hyparrhenia, Panicum, Pennisetum and Sporobolus.

List 12

Aristida adoensis
A. adscensionis
Bothroichloa insculpta
Brachiaria deflexa
B. eruciformis +
B. leersioides
B. serrifolia x
Cenchrus ciliaris
C. pennisetiformis
Chloris gayana
C. roxburghiana
C. virgata
Chrysopogon plumulosus
Coelachyrum poseflorum
Ctenium concinnum
Cynodon aethiopicus x
C. dactylon
Cyopholepis yemenica
Danthoniopis ~~yemenica~~ barbata
Enneapogon cenchroides
Enteropogon machrostachyus
Harpachne schimperi
Heteropogon contortus
Hyparrhenia anthistirioides
H. hirta
Ischaemum brachyatherum
Leptothrium senegalense
Lintonia nutans +
Panicum sp. aff. massaiense
P. pusillum
Pennisetum biflorus +
P. setaceum
Setaria verticillata x
Sporobolus festivus
S. panicoides
Tetrapogon cenchriformis
T. tenellus
T. villosus
Tragus heptaneuron
Urochloa panicoides
E. schimperanus
Eragrostis aspera

Those in the above list marked + occur only on small areas of heavy black clay and those marked x only in drainage lines. A grass usually considered to be one of alkaline or

saline soils, Sporobolus consimilis, occurs along the banks of the main water courses, where the soil is sandy and neither markedly alkaline nor saline. A number of the grasses listed, Coelachyrum poaeflorum, Cynodon aethiopicus, and Tragus heptaneuron, appear to be endemic to Ethiopia. Brachiaria serrifolia and Leptothrium senegalense, both collected at 1200 m, were respectively 700 m and 300 m above their previously recorded altitudinal limits.

2.2.4 Sub-desert succulent scrub

The dominant visual impression in this unit is of scattered, isolated 3 m - 4 m high specimens of the tree-like agave, Dracaena ombet. In a sampled area at 13°15'N, 40°00°E, at an altitude of about 800 m with rainfall probably less than 300 mm the density of these trees was just over 30/ha. A scattered shrub layer, mainly composed of Grewia mollis was also present with a density of about 500/ha: occasional acacias, Commiphora, Dobera glabra and Dodonaea viscosa also occured. There were scattered groups of Euphorbia candelabrum with other succulents in the shrub and field layers including Adenia venenata, Aloe spp., Caralluma dicapuae, C. russelliana, Cissus quadrangularis, Euphorbia tirucalli, E_____, Hippocratea africana, and Sansevieria powellii. (The fibre of sansevieria is used for making rope by the Afar and when sold in local markets, consitutes almost their total non-livestock income).

Much of the area is a limestone pavement with the result that non-succulents in the field layer are very sparse. Aerva persica and Heliotropium cinarescens were the dominant herbs while Chrysopogon plumulosus and Cymbopogon ?divaricatus were the dominant grasses: other grasses included Aristida spp., Brachiaria deflexa, Dicanthium annulatum (here at a fairly high altitude), Digitaria rivae, Enteropogon machrostachyus, Eragrostis spp., Heteropogon contortus, Sporobolus fimbriatus, Tetrapogon cenchriformis and T. tenellus.

2.2.5 Desert:

There is probably very little true desert in the Study Area but to the north-east is the Danakil Depression which is linked economically with central Tigrai by the salt route. There is

little or no perennial vegetation except along drainage lines where flood water from the highlands spills out onto the desert, or where run-off from the occasional rain may gather and stay sufficiently long for plant establishment. Acacia nubica and Tamarix sp. survive around the edges of the salt lake, where the water table remains high, in conjunction with the halophytic grasses Sporobolus consimilis and S. spicatus. In drainage lines Panicum pinifolium and Tristachya bicrinata are the commonest grasses, the latter being a new record for Ethiopia. Annual species such as Cyperus maritimus and the remains of Aristida spp. are to be found over the general surface of the desert, the former in some abundance, and probably provide some chance grazing, particularly after any rain.

2.2.6 Deciduous woodland.

On the western fringes of the area the dominant influence on the vegetation type is the rainfall of about 600 mm to 800 mm, although the altitude also has considerable influence and the vegetation often bears more relationship to ~~that of~~ parts of the Sudan than to that of the Ethiopian plateau immediately to the east. Except for areas on soils derived from Adigrat sandstone there is little settlement or cultivation and the vegetation in this region is probably nearer to climax than any of the other types. Differences in species composition along this western section can once again be attributed mainly to soil or parent material.

In the south at 13°10'N, 39°00'E at an altitude of 1600 m Pre-Cambrian dolerite outcrops as a large sill. The topography is undulating to rolling with a generally southerly aspect. Because of the large sheets of rock there is little ground cover. List 13, comprising seventeen species, provides a complete inventory of all trees and large shrubs, with an overall density of about 210 trees per hectare. Both Terminalia brownii and Ziziphus spina-christi occurred only in favourable sites along drainage lines.

List 13

Acacia asak	23.0	Acacia seyal	3.0
Maytenus senegalensis	13.0	Ormocarpum muricatum	3.0
Acacia etbaica	11.0	Euclea schimperi	2.0
Cassia singueana	10.0	Boscia angustifolia	1.5
Commiphora?africana	9.5	Acacia abyssinica	0.5
Heeria reticulata	4.0	Cadaba farinosa	0.5
Dodonaea viscosa	4.0	Olea africana	0.5
Lannea fruticosa	4.0	Ziziphus spina-christi	0.5
Terminalia brownii	4.0		

Two conspicuous scandent shrubs at this site were Cyphostemma nierense and Dregea schimperi. Maytenus senegalensis occupies an important position wherever dolerite is found in spite of rainfall and altitudinal differences. Ormocarpum muricatum also appears to be a species principally confined to dolerite soils: although numerically unimportant at this site it is a medium sized tree whereas where it occurs in the highland farming areas it is usually very small and shrubby. Its survival in these latter areas is probably attributable to its unsuitability for use as fuel and its ability to withstand heavy browsing by stock.

On a small area of acidic soils derived from granite, Albizia amara subsp. sericocephala comprised about 70 per cent of numbers of trees with Combretum and Terminalia providing most of the rest.

Further north, at 13°23'N, 38°58'E in very broken hilly country of Basement Complex schists and phyllites, no single species was dominant over large areas. The vegetation is very heterogeneous, with most of the deciduous woodland species mentioned in this section being present. Notable by their absence were Dodonaea viscosa, Euclea schimperi, Ormocarpum muricatum and Maytenus senegalensis. Species which occurred and are not elsewhere recorded under deciduous woodland were Cassia areheh and Euphorbia candelabrum . Boswellia papyrifera the frankincense tree, occurred sporadically, here at its southern most limit in the area, occasionally in association with Sterculia setigera. The latter, where it occurs, often dominates very steep rocky or scree covered hillsides with a westerly aspect. Ground cover is very sparse with scattered

clumps of Hyparrhenia hirta providing a moderate amount of grazing.

On sandstones and sandstone derived soils there is often a dense cover of a wide variety of species. List 14 was prepared just south of Abi Adi at 13°37'N, 39°00'E, where the density of trees and shrubs was 826 per hectare and canopy cover was about 52 per cent.

List 14

Albizia amara	23.0	Acacia nubica
Dicrostachys cinerea	21.0	Acacia seyal
Cassia singueana	11.5	Euclea schimperi
Terminalia brownii	11.0	Heeria reticulata
Securinega virosa	5.0	Ziziphus spina-christi
Grewia ferruginea	3.5	Ehretia cymosa
Lannea sp.	3.5	Stereospermum kunthianum
Ximenia americana	3.0	Erythrina abyssinica
Commiphora ?africana	2.5	Sterculia setigera
Boscia angustifolia	2.0	Capparis decidua
Dodonaea viscosa	2.5	Balanites aegyptiaca
Ormocarpum muricatum	2.0	Ficus daro
Acacia etbaica	1.0	Ficus sycomorus
Maytenus senegalensis	1.0	
Grewia bicolor	1.0	

Stereospermum kunthianum is limited to shallow sandstone soils in Central Tigrai. Milletia ferruginea, an Ethiopian endemic, apparently does not occur naturally in the area: the only specimen seen was given the same local name as S. kunthianum although they have different names in Amharic, and as it was growing at the site of an old Italian encampment it is possible that it was originally planted as an ornamental. Boscia angustifolia is often so heavily parasitized by Tapinanthus globiferus as to be almost unrecognisable.

On abandoned arable fields Calotropis procera is an early and vigorous invader and is usually followed by thicket growth comprising mainly Acacia nubica and Cassia singueana.

In hilly country on Basement metasediments to the north of the Werii river at about 1500 m the vegetation is more typically deciduous being dominated by species of Combretaceae.

Density is very variable, as is composition, but in a fairly typical area List 15 was compiled, the density being 478 trees per hectare.

	List 15	
Combretum molle	29.0	Combretum sp.
Terminalia brownii	13.0	Rhus natalensis
Commiphora sp.	11.0	Grewia bicolor
Cassia singueana	8.0	Ximenia americana
Acacia etbaica	6.0	Gardenia lutea
Dichrostachys cinerea	6.0	Ehretia cymosa
Albizia amara	5.0	Balanites aegyptiaca
Boswellia papyrifera	5.0	Ziziphus spina-christi
Securinega virosa	4.0	Entada abyssinica
Boscia angustifolia	3.0	Capparis tomentosa
Lannea fruticosa	2.0	Acacia tortilis
Ormocarpum muricatum	2.0	Sesbania punctata
Sterculia setigera	2.0	Erythrina abyssinica

Boswellia papyrifera is often gregarious in this vicinity, especially on steep hillsides, but does not grow in the valley bottoms. The gathering of frankincense is an important industry and it has been estimated (Maslekar unpublished) that the trees occur on about 510 1000 ha in Tigrai. Most of this is outside the present study area and at this altitude of 1500 m it is above its normal limit. The total number of trees is estimated at 32 000 000 at varying densities up to greater than 100 trees per hectare. There does not appear to be any natural regeneration and most existing trees are 8 m - 10 m high with a breast height diameter of 200 mm - 300 mm. Planting by live stakes could be carried out to ensure a long term supply of resin which is at present tapped by primitive methods. Total annual yield of frankincense from existing trees could be as high as 5000 metric tons.

There is a number of perennial streams in the deciduous woodland areas and a rich riverine vegetation is often developed. Species of figs and Tamarindus indica are conspicuous: in the river beds Tamarix nilotica is established, often with a dense

and vigorous population of seedlings and such species as Kanahia laniflora, Veronica anagallis-aquatica, Ageratum conyzoides and Bulbostylus sp. also grow in the waterlogged sands.

The whole association could be exploited under controlled conditions for the production of fuelwood and charcoal for the heavily populated central parts of Tigrai.

2.3 State Forest

There can be little doubt that the area designated as state forest was originally the archetypal montane dry evergreen forest comprising mixed stands of cedar, Juniperus procera, and olive, Olea africana. Uncontrolled exploitation for fuelwood and building timber, burning and overgrazing have resulted in vastly depleted stocks of usable timber. There is, at present no natural regeneration of olive and very little of cedar. Many of the cedars are dead or moribund, probably as a result of drying out of the profile and removal of top soil by erosion: a large number are badly infected with the stem parasite Arceuthobium * insert juniperinus. A considerable proportion of the annual precipitation is in the form of mist - the lichen, Usnea, is common — but it is probable that the forest is at present degenerating to evergreen scrub, most of the understorey being a thicket growth of Cadia purpurea and Tarconanthus camphoratus.

2.4 Re-afforestation and Conservation Sites

The programme, part of the general relief and rehabilitation effort, has suffered from lack of continuity, experienced personnel and adequate supervision. Upto the present time only exotic species have been planted, almost invariably without adequate trials. The full list includes Acacia saligna, Casuarina equisetifolia, Caesalpinea spp., Cupressus lusitanica, Eucalyptus camaldulensis, E.globulus, Melia azedarach and Schinus molle. Of these species E.camaldulensis accounted for most of the planting in the first two years. At many sites it has proved unsuitable due, probably, to a variety of causes: it appears not to do well on slopes in excess of 20 per cent (slopes less than this would probably not need to be terraced anyway) or those not * ~~juniperus~~ juniperi-procerae which severely restricts growth and many of the bigger trees suffer from the heart-rot fungus Fomes

facing north-east, does not grow well on limestone soils and is susceptible to, and infected by, the root fungus Ganoderma lucida. Latterly, A.saligna plantings have replaced many of the others and first impressions are that this is most suited for the local environment. It is, however, unpopular with local farmers because of its poor form.

Losses after the third year are often in excess of 50 per cent and in many cases are near total. It is likely that, in the long term, the effects of exclosure will be more significant than the actual planting. Over most of the terraces after the first year there is a vigorous regeneration of indigenous vegetation, particularly Acacia etbaica, while in the early stages the bare ground is rapidly covered with weeds and poineers, as shown in List 16, dominated by Astragalus atropilosus of the woody species and by Bidens borianiana of the herbaceous ones.

List 16

Herbs and shrubs

Abutilon sp.
Acacia etbaica
Achyranthes aspera
Amaranthus angustifolius
Anthericum cooperi
Asparagus racemosus
Astragalus atropilosus
Bidens borianiana
B. schimperi
Brassica carinata
B. rapa
Brassica sp.
Ceropegia cf cufodontii
Chlorophytum tuberosum
Commelina africana
Cyphostemma nierense
Datura stramonium
Excoecaria madagascariensis
Felicia ericifolia
Plantago albicans
Polygala abyssinica
Rumex bequaertii
Salvia merjamie
Silene burchelii
Solanum aculeatissimum
S. incanum
S. nigrum
Tephrosia sp.
Tragia pungens
Tribulus terrestris
Triumfetta pilosa
Volutaria somalensis
Withania somnifera

Grasses and sedges

Anthephora hochstetteri
Aristida adscensionis
Chloris amethystea
Cymbopogon afronardus

Ferula communis
Galinsoga parviflora
Gerbera viridifolia
Grewia ferruginea
Hebenstretia dentata
Heteromorpha trifoliata
Hibiscus sp.
Indigofera arrecta
Lantana trifolia
Launea cornuta
Lotus discolor
Leucas oligocephala
Justicia cf schimperi
Malva parviflora
Medicago polymorpha
Merendera abyssinica
Ocimum canum
Osteospermum vaillantii
Pelargonium quinquelobatum

Cyperus obtusiflorus
C. blysmoides
Enneapogon cenchroides
Eragrostis braunii
E. macilenta
E. tef
Harpachne schimperi
Heteropogon contortus
Hyparrhenia hirta
Michrochloa caffra
P. setaceum ← Penniseturn pedicellatum
P. villosum
Sporobolus discosporus
S. tenuissimus
Themeda triandra
Tripogon montanus

2.5 Church Compounds

It is often said that these areas constitute the only remaining ~~ones~~ areas of the original vegetation of Tigrai. While this may be true of a proportion of them it is probable that the majority of these compounds comprise secondary communities containing a large proportion of the original species. Whatever the case, the density of growth, and the range of species is often spectacular when compared with adjacent areas.

One such area, covering about four hectares on steeply sloping westward facing land at between 1800 m and 1900 m in heavy loam soil over limestone was sampled. List 17 gives the determined compostition of trees over three metres tall.

List 17

Carissa schimperi	40.4	Cordia africana	5.8
Canthium schimperanum	13.5	Rhus natalensis	3.8
Olea africana	11.5	Carissa edulis	3.8
Euclea schimperi	9.6	Other	5.8
Dombeya schimperana	5.8		

Other species included Mimusops kummel, Ehretia cymosa var sylvatica, Grewia ferruginea, Ficus sycomorus, Syzigium guineense (an important honey tree) and Juniperus procera, the latter probably having been planted. Canopy cover at 3 m plus exceeded 80 per cent. The intermediate storey of shrubs and climbers was composed of Adathoda schimperana, especially where light penetrates along path edges and so on, Capparis tomentosa, Calpurnia aurea, Hibiscus ludwigii, Phytolacca dodecandra, Pterolobium stellatum and Clematis simensis.

The blood lily, Haemanthus multiflorus, was conspicuous among the ground flora as were a number of shade tolerant grasses including Andropogon sp. aff. gayanus, Arthraxon prionodes, Digitaria ternata, Sehima nervosum, Setaria acromelaena and Sorghum purpureosericeum. Euphorbia candelabrum occurred in groups on shallower soil and on rocky outcrops. Euphorbia tirucalli and ~~Ficus opuntia~~ Opuntia ficus-indica had been planted as hedges and the bamboo-like grass, Arundo donax had also been introduced. Epiphytes and parasites were present on many of the trees, including Englerina woodfordioides, particularly on the olives, and the root parasitic Cistanche tuberosa. Outside the compound at the top of the catena, on shallow limestone soil, and on what is still considered to some extent to be holy ground, Acacia etbaica was the most common species.

2.6 Urban areas and house compounds

Although small in relation to the overall area, urban lands are interesting for the number of exotic species which have been introduced for ornamental and economic purposes. A wide range of plants from tropical to temperate types are capable of flowering, and setting furit within the area. The species in List 18 have been noted at various sites in Tigrai. The divisions into ornamental and economic are in some respects arbitarary as a number of species obviously fulfil both functions.

List 18

Ornamentals	Economic species
Bougainvillea sp.	Acacia saligna
Casuarina equisetifolia	Carica papya

Cupressus lusitanica
Delonix regia
Euphorbia pulcherrima
Ficus sp. ind.
Grevillea robusta
Hebiscus schizopetalus
Jacaranda mimosaefolia
Lantana camara
Melia azedarach
Nerium oleander
Parkinsonia aculeata
Pinus spp.
Rosa spp.
Schinus molle
Spathodea campanulata

Ceiba pentandra
Citrus spp.
Eucalyptus camaldulensis
E. globulus
Musa sapientum
Passiflora ~~spendis~~ edulis
Prunus persica
Psidium guyava
Rhamnus prinoides
Ricinus communis
Vitis vinifera

Some indigenous species are often left growing, in a manner similar to that adopted on arable lands, particularly if these have some local economic value: examples are Cordia africana, Ficus spp and Ziziphus spina-christi, all of which have edible furits. The former is also used locally as a medicine against tapeworm infestations. Three grasses are also planted: Arundo donax, an Ethiopian endemic, is widely grown to provide housing material, Cymbopogon citratus, an introduced species which is strongly lemon scented and is used for a variety of purposes, and Eleusine floccifolia which is used for basket-work. Wormwood, Artemisia afra, is grown around may houses, the dried leaves of which are used as a perfume. Also grown is Ocimum basilicum var. anisatum, sacred basil, which is used as a condiment in the Ethiopian national dish or to add piquancy to tea or coffee.

Nicotiana glauca, growing to the size of a small tree, is a common plant, probably originally introduced as an ornamental but now much more of a weed. One other plant normally considered a weed, Datura stramonium, is also widespread and has a variety of local uses ranging from fungicidal to pain killer either for toothache or for the saddle sores of pack animals.

An introduced ornamental, Lantana camara, the Curse of India, has the capability of becoming an extremely noxious weed, as it has in other parts of Africa, and can also act as a host for mealy bugs (Pseudococcus spp.)

APPENDIX A

HERBARIUM COLLECTIONS

Only one family of gymnosperms is represented. The collections of Angiospermae have been arranged in families in the modified Bentham and Hooker sequence which is used at the Royal Botanic Gardens, Kew. The position of each family in this sequence is indicated by the number preceding the family name; only those families in which collections have been made being included. Within families the order is alphabetically by genera and species.

The habit of the plant refers to its habit in Tigrai, where environmental factors, including biotic ones, may have more or less severe effects. The following annotation is used:

T, tree, usually single stemmed, in excess of three metres in height;
Sh, shrub or bush, many stemmed, usually 0.5-3.0 m in height;
Cl, climbing or scandent shrubby or herbaceous plant;
H, herb, usually up to about one metre;
G, grass, including members of the families Juncaceae, Cyperaceae and Gramineae;
P, parasites or semi-parasites and epiphytes.
S, succulent

The collection number is that of R.T. Wilson. One complete set of collections has been deposited in the herbarium of the Institute of Agricultural Research at Addis Abeba. Many thanks are due to Mrs Sue Edwards of the Institute and to staff at the National University for their help in identifying the collections.

Plant and Authority		Habit	Collection NO.
GYMNOSPERMAE			
CUPRESSACEAE			
Cupressus lusitanica	Miller	T	655
C. ?lawsonii		T	656
Juniperus procera	Endl.	T	659

Plant and Authority		Habit	Collection No.
	ANGIOSPERMAE		
	DICOTYLEDONS		
1. RANUNCULACEAE			
Clematis simensis	Fres.	Cl	87
Ranunculus multifidus	Forsk.	H	302
7. PAPAVERACEAE			
Argemone mexicana	L.	H	67
9. CRUCIFERAE			
Brassica carinata	A.Br.	H	629
B. nigra	L.	H	114
B. rapa	L.	H	565, 573
Brassica sp.		H	372
Rorippa sp.		H	308
			423
			500
10. CAPPARACEAE			
Boscia salicifolia	Cliv.	T	407
Cadaba farinosa	Forsk.	Sh	263
C. rotundifolia	Forsk.	Sh	415
Cadaba sp.		Sh	412
Capparis decidua (Forsk.)	Edgew	T	455
Cleome brachycarpa	DC.	H	425
Maerua angolensis	DC.	T/Sh	290
			443
11. RESEDACEAE			
Caylusea abyssinica (Fres.)	Fish & Mey.	H	522
14. FLACOURTIACEAE			
Dovyalis verrucosa (Hochst.)	Warb.	Sh	480
16. PITTOSPORACEAE			
Pittosporum viridiflorum	Sims	T	385

17. POLYGALACEAE

Polygala abyssinica	R.Br.	H	570
P. ohlendorfiana	Eckl. & Zeph.	H	537

19. CARYOPHYLLACEAE

Silene burchelli	DC.	H	574

21. TAMARICACEAE

Tamarix nilotica	(Ehrenb.) Bunge	T	150, 465

27. MALVACEAE

Abutilon fruticosum	Guill.&Perr.	H	543
Abutilon		H/Sh	183
Abutilon		H	564
Abutilon		H/Sh	597
Hibiscus aponeurus	Sprague&Hutch.	H	164, 462, 558, 563, 606
Hibiscus micranthus	L.f.	H	512
Malva parviflora	L.	H	160, 634
Sida cuneifolia	Roxb.	H	137, 163
			421
			422
			445

28. BOMBACEAE

Adansonia digitata	L.	T	667
Ceiba pentandra	(L.) Gaertn.	T	666

29. STERCULIACEAE

30. TILIACEAE

Grewia bicolor	Juss.	T	324, 388, 434,
G. erythraea	Schweinf.	Sh/T	393, 411, 438
G. ferrunginea	Hochst. ex Rich.	Sh/T	612
G. mollis	Juss.	Sh/T	275, 414
G. tenax	(Forsk.) Fiori	Sh	495
G. villosa	Willd.	Sh	416
Grewia		Sh	154
Grewia		Sh	191

	Grewia		Sh	408
	Grewia		Sh	419
	Triumfetta pilosa	Roth	Sh	479, 602
34.	ZYGOPHYLLACEAE			
	Tribulus terrestris	L.	H	136, 184, 620
35.	GERANIACEAE			
	Pelargonium quinquelobatum	Rich.	H	598
36.	OXALIDACEAE			
	Oxalis corniculata	L.	H	515
	O. semiloba	Sond.	H	473
37.	BALSAMINACEAE			
	Impatiens rubrumaculata	Warb.	H	554
39.	SIMAROUBACEAE			
	Balanites aegyptiaca	(L.) Del.	T	241
41.	BURSERACEAE			
	Commiphora		Sh	669
	Commiphora		Sh	670
	Commiphora		Sh	671
42.	MELIACEAE			
	Ekebergia capensis	Sparrm.	T	470
	Melia azedarach	L.	T	690
44.	OLACACEAE			
	Ximenia americana	L.	T/Sh	394, 439, 457
49.	CELASTRACEAE			
	Maytenus ?cymosa	(Soland.) Exell	Sh	392
	M. senegalensis	(Lam.) Exell	Sh	392, 356
	M. undatus	(Thunb.) Blakelock	Sh	561
	Maytenus		Sh	403

50. RHAMNACEAE

Ziziphus abyssinica	A. Rich.	T	472
Z. spina-christi	(L.) Willd.	T	641

51. VITACEAE

Cissus petiolata	Hook. f.	Cl	391
C. quadrangularis	L.	Cl	488, 673
Cissus		Cl	390
Cyphostemma jatrophioides	(Wlw.) Desc.	Cl	449, 469
C. nierense	(Th. Fr. jr.) Desc.	Cl	451, 589
C. nivea	Hochst. ex Sch.	Cl	358
Rhoicissus tridentata	(L.f.) Willd.	Cl	478

52. SAPINDACEAE

~~Dodonaea~~ Dodonaea viscosa	(L.) Jackq.	Sh	146

54. ANACARDIACEAE

Heeria reticulata	(Bak. f.) Engl.	Sh/T	395, 453
Lannea fruticosa	(Hochst. ex Rich.)	Sh/T	454
Rhus glutinosa	Hochst.	T	476
R. natalensis	Krauss	T	123, 254
R. vulgaris	Meikle	T	435
Rhus		T	402
Rhus		T	406
Schinus molle	L.	T	653

57. LEGUMINOSAE

CAESALPINIOIDEAE

Cassia areheh	Del.	T	456, 550
C. italica	(Mill.) F.W. Andr.	Sh	147
C. occidentalis	L.	Sh	155
C. singueana	Del.	Sh	69
Delonix elata	(L.) Gamble	T	215
Parkinsonia aculeata	L.	T	291
Pterolobium stellatum	(Forsk.) Brenan	Sh	55

MIMOSOIDEAE

Acacia abyssinica		T	156
A. albida	Del.	T	148
A. asak	Forsk.) Willd.)	Sh/T	75, 158
A. etbaica	Schweinf.	T	319
A. lahai	Benth.	Sh	
A. mellifera	(Vahl) Benth.	T	[illegible]
A. nilotica	(L.) Del.	T	214, 285
A. nubica	Benth.	Sh	145
A. polycantha	Willd.	T	353
A. saligna	Wendl.	T	652
A. senegal	((L.) Willd.	Sh/T	442
A. seyal	Del.	T	144
A. tortilis	(Forsk.) Hayne susp. spirocarpa (Hochst. ex A. Rich.)	T	[illegible] 665, [illegible]
Albizia amara	(Roxb.) Boiv. Subsp. sericocephala (Benth.) Brenan	T	322, 447, 448
A. schimperana	Oliv.	T	354
Dichrostachys cinerea	(L.) Wight & Arn.	Sh	355
Entada abyssinica	A. Rich.	T	471

PAPILIONOIDEAE

Astragalus atropilosus	(Hochst.) Bunge susp. bequaertii Gillett	H/Sh	577
Cadia purpurea	(Picc.) Ait.	Sh	166, 289
Calpurnea aurea	(Ait.) Benth.	Sh	54
Colutea abyssinica	Kunth&Bouche	Sh	562
Crotalaria		H	420
Erythrina abyssinica	DC.	T	657
Indigofera arrecta	A.Rich.	H/Sh	594
Indigofera		H	384
Lotus corniculatus	L.	H	299
L. discolor	E.Mey.	H	578
Lotus		H	177

Medicago polymorpha L.		H	80, 104, 633
Medicago			
Milletia ferruginea (Hochst.) Baker		T	133
Ormocarpum muricatum Chiov.		Sh	92, 286, 464
Rhyncosia		H	190
Scopiurus muricatus	L.	H	108
S. sulcata	L.	H	50, 378
Tephrosia		H	56
Tephrosia		H	568
Trifolium		H	525

58. ROSACEAE

Rosa abyssinica R.Br.		Sh	486
Rubus volkensii	Engl.	Sh	397
Rubus		H/Cl	496

61. CRASSULACEAE

Crassula alba	Forsk.	H	181
Kalanchoe cf lanceolata (Forsk.) Pers.		H	484

68. COMBRETACEAE

Combretum molle	G. Don.	T	467
Combretum		T	458
Combretum		T	468
Terminalia brownii	Fres.	T	320, 459

69. MYRTACEAE

Eucalyptus camaldulensis	Dehnh.	T	649
Syzigium guineense (Willd.)	DC.	T	251

78. PASSIFLORACEAE

Adenia venenata	Forsk.	Sh/Cl	257

80. CUCURBITACEAE

Coccinia grandis (L.)	Voigt.	Cl	463, 499
Cucumis dipsaceus	Ehrenb.	Cl	66
Cucumis		Cl	487
Momordica foetida	Schumach.	Cl	570
		Cl	613

85. UMBELLIFERAE

Ferula communis L.	H	502
Heteromopha trifoliata (Wendl.) Eckl. & Zeph.	Sh	560
Hydrocotyle ranunculoides L.f.	H	306
Steganotaenia araliacea Hochst.	T	386
		309

90. RUBIACEAE

Canthium schimperanum A. Rich.	T	357, 549
Gardenia lutea Fresen	T	323
Pentas	H	387
		436
		557

92. DIPSACACEAE

Scabiosa columberia L.	H	182

93. COMPOSITAE

Ageratum conyzoides L.	H	153, 373
Anthemis tigrensis A. Rich.	H	523
Bidens schimperi Sch. Bip.	H	623
Cinerarea grandiflora Vatke	H	179
Conyza schimperi Sch. Bip.	H	556
Dicrocephala	H	304
Felicia ericifolia (Forsk.) Mend.	H	128, 538,541,57
Flaveria trinervia (Spreng.) Mohr.	H	81, 106, 217
Galinsoga parviflora Cav.	H	508, 630
Gerbera viridifolia (DC.) Sch. Bip.	H	559
Guizotia scabra (Vis.) Chiov.	H	507
Lactuca capensis Thumb.	H	509
Lactuca	H	178
Lactuca	H	429
Launea cornuta (Oliv. & Hiern) C.Jeff.	H	611
L. sp. aff. intebacea (Jackq.) Beauv.	H	72

Osteospermum vailantii (Decne.) Norl.	H	170, 591
Psiadia arabica Jaub. & Spach	Sh	162
Schkuria pinnata (Lam.) O.Ktze.	H	516
Sonchus	H	117
Tarconanthus camphoratus L.	Sh	288
Vernonia cf. jugalis Oliv. & Hiern	H/Sh	68
V. macrocephala	Sh	159
Vernonia	H	71
Vernonia	H/Sh	405
Vernonia	H/Sh	493
Vernonia	H	524
Volutaria somalensis(O.&M.)C.Jeff. ex Cuf.	H	608

98. PRIMULACEAE

Anagallis arvensis L.	H	85, 107

99. MYRSINACEAE

Myrsine africana L.	Sh	555

← Tab back one as far as

100. SAPOTACEAE

101. EBENACEAE

Euclea schimperi (A.DC.) Dandy	Sh	122, 316

102. OLEACEAE

Jasminum abyssinicum DC.	Sh/Cl	
J. floribundum Fres.	Sh/Cl	125, 506
Olea africana Lam.	Sh/T	660

103. SALVADORACEAE

Dobera glabra (Forsk.) Poiv.	Sh/T	276
Salvadora persica L.	Sh	240

104. APOCYNACEAE

Acokanthera schimperi (DC.) Oliv.	T	253, 317
Carissa edulis (Forsk.) Vahl	Sh	165

105. ASCLEPIADACEAE

Calotropis procera (Ait.) Ait. f.	Sh	121
Caralluma dicapuae (Chiov.) Chiov.	S	694
C. russelliana (Brogn.) Cuf.	S	693
Ceropegia cf. cufodontii Chiov.	H/Cl	615
Dregea schimperi (Decne.) Bullock	Cl	452, 475
Gomphocarpus fruticosus (L.) Ait. f.	H	535
Kanahia laniflora (Forsk.) R. Br.	H/Sh	400
Sacrostemma viminale (L.) R. Br.	Sh	404

106. LUGANIACEAE

Buddleja polystachya Fres.	Sh	66, 76, 321
Nuxia oppositifolia (Hochst.) Benth.	Sh/T	658

107. GENTIANACEAE

Centaurium	H	294

109. BORAGINACEAE

Arnebia hispidissima DC.	H	157
Cordia africana Lam.	T	643
C. ovalis DC.	Sh/T	417, 474
Ehretia cymosa Thonn.	Sh/t	74, 325. 460
Heliopropium cinerescens	H	97,485
Heliotropium	H	65
Trichodesma zeylanicum (L.) R.Br.	H	481
Vangelia hispida (Bak, & Wright) Brand.	H	482, 505

110. CONVOLVULACEAE

Convolvulus arvensis L.	H/Cl	514
Ipomea cordofana Choisy	Cl	111
		519

111. SOLANACEAE

Datura stramonium L.	H	593
Discopodium penninervium Hochst.	Sh	161
Nicotiana glauca L.	Sh	642
Physalis	H	371
Solanum ~~sect~~ aculeatissimum		
S. sp. nr. hastifolium Dunal	H	491

	S. incanum L.	Sh	621
	S. nigrum L.	H	380,545,603
	Solanum	H	118
	Withania somnifera (L.) Dunal	Sh	609
112.	SCROPHULARIACEAE		
	Craterostigma plantagineum Hochst.	H	529
	Hebenstretia dentata L.	H/Sh	571
	Verbascum sinaiticum Benth.	H	498
	Veronica anagallis-aquatica L.	H	82,109,151,303, 588
113.	OROBANCHACEAE		
	Cistanche tubulosa (Schenk) Hook. f.	P	631
116.	BIGNONIACEAE		
	Jacaranda mimosaefolia D. Don.	T	654
	Stereospermum kunthianum Cham.	T	140
118.	ACANTHACEAE		
	Adhatoda schimperana Hochst.	Sh	252
	Barleria cf. diffusa (Oliv.) Lindau	H	542
	Barleria	H	192
	Barleria	H	401
	Barleria	H	426
	Barleria	H	428
	Dyschoriste ?hildebrandtii	H/Sh	551
	Justicia flava Vahl	H	173,547
	J. odora (Forsk.) Vahl	Sh	540
	J. schimperi (Hochst.) Dandy	H	511
	J. cf. schimperi (Hochst.) Dandy	H	628
	Justicia	H	230
	Monothecium glandulosum Hochst.	H/Sh	501
			446

120 VERBENACEAE

Clerodendrum myricoides (Hochst.) Vatke	Sh/Cl	466, 503
Lantana camara L.	Sh	646
L. trifolia L.	Sh	616
?Lantana	Sh	51
Lippia	Sh	167
Premna cf. resinosa (Hochst.) Schauer	Sh	409
Verbena officinalis L.	H	120, 300

121. LABIATAE

Becium obovatum (E. Mey.) N.E. Br.	H/Sh	70,129,168,494, 539
Coleus sp. aff. edulis Vatke	H	53
Leonotis	H	427
Leucas neuflizeana Courb.	H	544
L. oligocephala Hook. f.	H	614, 625
Nepeta azurea Benth.	H	492
Ocimum canum L.	H	590
Ocimum	H/Sh	424
Otostegia integrifolia Benth.	H/Sh	88
Otostegia	H/Sh	139
Plectranthus cf. ignarius (Schweinf.) Agnew	Sh	258
Plectranthus	H/Sh	138
Plectranthus	H	169
Salvia merjamie Forsk.	H	450, 569
Salvia schimperi Benth.	H	91
Satureja biflora (D.Don.) Benth.	H	513, 533
Satureja	H	176
Satureja	Sh	287, 418

122. PLANTAGINACEAE

Plantago albicans L.	H	575
P. lanceolata L.	H	298

123. NYCTAGINACEAE

Commicarpus boisseri (Heim.) Cuf.	H/Cl	90, 536
C. pedunculosus (A. Rich.) Cuf.	H/Cl	100,626
C. plumbagineus (Cav.) Standl.	H/Cl	73
Commicarpus	Cl	135

125.	AMARANTHACEAE		
	Achyranthes aspera L.	H	379,396,477,504, 528, 624
	Aerva persica (Burm.f.) Merrill	H	4, 64
	Alternanthera pungens H.B.K.	H	172
	Amaranthus angustifolus Lam.	H	637
128.	PHYTOLACCACEAE		
130.	POLYGONACEAE		
	Oxygonum stuhlmanii Dammer	H	548
	Oxygonum	H	381
	Polygonum ?pulchrum Blume	H	82A
	P. salicifolium Willd.	H	131, 310
	Rumex bequaertii de Wild.	H	301, 635
	R. nervosus Vahl	H/Sh	126, 531
140.	PROTEACEAE		
	Grevillea robusta Conn.	T	651
142.	LORANTHACEAE		
	Loranthus	P	444
	Tapinanthus globiferus (A.Rich.) v. Tg.	P	124
146.	EUPHORBIACEAE		
	Clutia	Sh	52
	Euphorbia		
	E. crotonoides Boiss.	H	483
	Excoecaria madagascariensis (Baill) Mull. Arg.	Sh	618
	E. tirucalli L.	Sh	672
	E. pulcherrima L.	Sh/T	650
	Ricinus communis L.	Sh	645
	Securinega virosa (Willd.) Pax. & K. Hoffm.	Sh/T	461
	Tragia pungens (Forsk.) Mull. Arg.	C.	617
148.	MORACEAE		
	Ficus ?hochstetteria (Miq.) A. Rich.	T	437

	F. sycomorus L.	T	668
	Ficus sp. ind.	T	647
151.	CASUARINACEAE		
	Casuarina equisetifolia L.	T	648
152.	SALICACEAE		
	Salix subserrata Willd.	T	318
	MONOCOTYLEDONS		
166.	AGAVACEAE		
	Dracaena ombet	T	664
	Sansevieria	H	663
169.	LILIACEAE		
	Aloe	H	662
	Anthericum angustifolium A. Rich.	H	517,534
	A. cooperi Bak.	H	532
	Asparagus racemosus Willd.	H	552
	Chlorophytum tuberosum Bak.	H	581
	Urginea altissima (L.f.) Bak.	H	216
	Urginea	H	134
173.	COMMELINACEAE		
	Commelina africana L.	H	510,553
	Cyanotis arachnoidea C.B.Cl.	H	518
175.	JUNCACEAE		
	Juncus oxycarpus Kunth	G	314,329
184.	POTAMOGETONACEAE		
	Potamogeton	H	305
	Potamogeton	H	307
187.	CYPERACEAE		
	Cyperus blysmoides C.B.C.l	G	587,627
	C. dichroostachyus Hochst.	G	327
	C. maritimus Poiv	G	61
	C. obtusiflorus Bahl	G	579

C. renschii Boeck ex Desc. G 77
C. rotundus L. G 328
Cyperus G 132
Cyperus G 326
Scirpus inclinatus (Del.) Aschers & Schweinf. G 313

188. GRAMINEAE
Agrostis semiverticillata (Forsk.) C.Christ. G 110,119,256,312
Andropogon sp. nr. abyssinicus R.Br. ex Fres. G 343
A. sp. aff. gayanus Kunth G 30
A. sp. nr. pratensis Hack. G 344
Andropogon G 227
Andropogon G 231
Andropogon G 297
Andropogon G 342
Anthephora hochstetteri Nees G 26, 566, 595
Aristida adoensis Hochst. G 2, 222, 582, 599
A. adscensionis L. G 24, 242
Aristida G 200
Aristida G 249
Aristida G 431
Arthraxon prionodes (Steud.) Dandy G 22, 365
Arundo donax L. G 376
Avena fatua L. G 640
Bothriochloa insculpta (A. Rich.) A. Camus G 44, 209
B. radicans (Lehm.) A. Camus G 185, 351
Bothriochloa G 142
Brachiaria deflexa (Schumach.) C.E. Hubbard ex Robyns G 221, 238, 273
B. eruciformis (J.E. Sm.) Griseb. G 223
B. glauca Stapf. G 681
B. jubata (Fig. & de Not.) Stapf. G 687
B. leersioides (Hochst.) Stapf. G 7
B. serrifolia (Hochst.) Stapf G 13
Brachiaria G 377
Cenchrus ciliaris L. G 8, 27, 143, 201, 239

E. schimperanus (A. Rich.) Renv.	G	141, 202, 679
Enteropogon machrostachyus (A. Rich.) Benth.		237, 267
Eragrostis aspera (Jacq.) Nees	G	245
E. braunii Schweinf.	G	584, 607
E. sp. aff. chapelieri (Kunth.) Nees	G	282
E. cilianensis (All.) Lut.	G	49
E. macilenta (A. Rich.) Steud.	G	281, 331, 583,604,638
E. paniciformis (A. Br.) Steud.	G	526, 546
E. tef (Zucc.) Trotter	G	78, 632
E. teniufolia (A.Rich.) Steud.	G	219,339,362
E. tremula (Lam.) Steud.	G	33, 675
Eragrostis	G	127
Eragrostis	G	188
Eragrostis	G	274
Eragrostis	G	336
Eragrostis	G	338
Eragrostis	G	382
Eragrostis	G	430
Eustachys paspaloides (Vahl) Lanza & Matter	G	684
Harpachne schimperi A. Rich.	G	341, 567
Heteropogon contortus (L.) Roem& Schult.	G	16, 266, 605
Hordeum vulgare L.	G	
Hyparrhenia anthistiriodes (A.Rich.) Stapf	G	20
H. hirta (L.) Stapf	G	1, 25, 261, 332, 333 601
H. rudis Stapf	G	46
Hyparrhenia	G	235
Hyparrhenia	G	259
Hyparrhenia	G	262
Ischaemum brachyatherum (Hochst.) Hack.	G	197
Leptothrium senegalense (Kunth) Clayton	G	12, 212
Lintonia nutans Stapf	G	186, 226
Lolium temulentum L. var. temulentum	G	103, 360
Lolium	G	383
Michrochloa caffra Nees	G	337

Panicum sp. aff. massaiense Mez	G	10
P. maximum Jacq.	G	413
P. pinifolium Chiov.	G	58
P. pusillum Hook. f.	G	677
P. repentellum Napper	G	311
P. snowdenii C. E. Hubbard	G	685
Panicum	G	210
Panicum	G	248
Panicum	G	349
Paspalidium geminatum (Forsk.) Stapf.	G	279, 283
Pennisetum biflorus	G	225
P. glabrum Steud.	G	295
P. mezianum Leeke	G	187
P. pedicellatum Trin.	G	619
P. polystachyon (L.) Schult.	G	174
P. salifex Stapf. & C.E. Hubbard	G	296
P. schimperi A. Rich.	G	19
P. setaceum (Forsk.) Chiov.	G	3, 31, 600
P. squamulatum Fres.	G	28
P. villosum Fres.	G	36
Pennisetum	G	232
Phalaris paradoxa L.	G	116
Polypogon monspeliensis (L.) Desf.	G	115, 315
Sehima nervosum (Willd.) Stapf	G	23
Setaria acromelaena (Hochst.) Dur. & Schinz	G	32, 366
Setaria aptata Hack.	G	112
S. pallidifusca (Schumach.) Stapf. & C.E. Hubbard	G	42, 361, 363
S. pheiodes Stapf.	G	45
S. verticillata (L.) Beauv.	G	5, 224, 278
Snowdenia petitiana (A. Rich.) C.E. Hubbard	G	689
S. polystachya (Fres.) Pilger	G	35
Sorghum bicolor (L.) Moench	G	701
S. purpureosericeum (Hochst.) Ascherss.	G	40
Sporobolus africanus (Poiv.) Robyns & Tournay	G	334, 527

S. consimilis Fres.	G	250
S. discosporus Nees	G	592
S. fimbriatus(Trin.) Nees	G	271
S. iocladus (Trin.) Nees	G	17
S. panicoides A. Rich.	G	688
S. pyramidalis Beauv.	G	39
S. tenuissimus (Shrank) Kuntze	G	585
Sporobolus	G	194
Sporobolus	G	199
Sporobolus	G	208
Sporobolus	G	244
Sporobolus	G	346
Sporobolus	G	432
Tetrapogon cenchriformis (A. Rich.) Clayton	G	268, 676
T. tenellus (Roxb.) Chiov.	G	15, 234,243, 269
T. villosus Desf.	G	14, 228
Themeda triandra Forsk.	G	335, 340, 580
Tragus berteronianus Schult.	G	284
T. heptaneuron Clayton	G	359
T. racemosus (L.) All.	G	280, 364
Tripogon montanus Chiov.	G	576
Tristachya bicrinata (Phipps)W.D.Clayton	G	59, 60
Triticum dicoccum	G	700
Urochloa panicoides Beauv.	G	18, 521
U. trichopus (Hochst.) Stapf.	G	34, 678, 699
Zea mays L.	G	702

NOT DETERMINED

57, 62, 63, 79, 83, 84, 86, 89, 93, 95, 96, 97, 98, 99, 101, 105, 130, 149, 152, 171, 175, 189, 233, 293, 368, 399, 410, 433, 440, 441, 489, 490, 497, 674, 686.

APPENDIX B

VERNACULAR NAMES

A glossary of Ethiopian plant names containing approximately 2 000 vernacular names in various Ethiopian languages and dialects is already in existence (Mooney, 1963). The list which follows contains some 220 words, and is meant to supplement the earlier glossary.

The list comprises local names not included in Mooney, those which are in Mooney but have been difficult to find because of spelling differences and some names which appear but have not previously been ascribed to Tigrigna. In addition, Tigrignan cultivated crop names have been included, many of which - and this must be an oversight - are not to be found in Mooney!

The usual difficulties in transliteration were encountered and thanks are expressed to
who checked the Roman spelling and suggested a number of corrections.

With the exception of those marked (Af), which are in the northern Afar dialect current in the Tigrean lowlands, all the names are those used in the central plateau areas of Tigrai.

Vernacular Name		Name and Authority
Abtere	ኣብተር	Ziziphus abyssinica Hochst. ex A. Rich. No. 443
Adidahira	ኣዳዳሂራ	Ficus hochstetteri (Miq.) A.Rich.
Aftekanto	ኣፍተካንቶ	Tribulus terrestris L.
Akak umo	ኣኻኽ ዑሞ	Solanum
Alimo	ኣሊሞ	Solanum nigrum L.
Alemo	ኣለሞ	Solanum sp. nr. hastifolium Dunal
Alemo zibi	ኣለሞ ዝቢ	Combretum molle C. Don.
Alenkoza	ኣለንኮዛ	Vicia faba L. var. abyssinica No. 97
Alkuay	ኣልኩኣይ	Cassia italica (Mill.)F.W. Andr. (more normally applied to C. singueana Del.)
Amamagemel	ኣመማገመል	
Amba ambo	ኣምባ ኣምቦ	

Ambeba ardgi	ኣምበባ፡ኣርዲ	Flaveria trinervia (Spreng.) Mohr
Ancheh tabib	ኣንጀህ፡ጠቢብ	Cassia areheh Del.
Ankebeh	ኣንከበህ	Acacia nubica Benth.
Aras	ኣራስ	Triticum dicoccum Schr.
Areghazana	ኣርገዛና	Milletia ferruginea (Hochst.)Baker
Asabere	ኣሳብሬ	Vicia sativa L. (Vetch)
Aserkuko	ኣሰርኩኾ	Cyphostemma nierense (Th. Fr. Jr) Desc.
Ashenda ef	ኣሽንዳ፡እፍ	Chlorophytum tuberosum Bak.
Atame	ኣታመ	Maytenus ?cymosa (Soland.)Exell
Atori (Af)	ኣቶሪ	Plectranthus cf. ignarius (Schweinf.) Agnew
Atsats	ኣፅ፡ፃፅ	Grewia tenax (Forsk.) Fiori
Au	ኣው	Bosicia salicifolia Oliv.
Aulia	ኣውሊኣ	Olea africana Lam.
Ayuka	ኣዩካ	No. 441
Azina	ኣዚና	Gardenia lutea Fres.
Beherir	በሄሪር	No.697
Belah dirk	በለህ፡ዲርክ	No.105
Beles	በለስ	Opuntia ficus-indica(L.) Mill. (The fruit)
Bernihigo	በርኒሂጎ	Achyranthes aspera L.
Biro (Af)	ቢሮ	Setaria verticillata (L.) Beauv.
Bobaita (Af)	ቦባይታ	Premna cf resinosa (Hochst.) Schauer
Burkburko	ቡርክቡርኩኾ	Cyanotis arachnoidea (C.B.Cl.)
Bursn	ቡርስን	Lens esculenta Moench.
Buwak	ቡዋክ	Abuliton sp.
[illegible]		[illegible] L.
Chaochawo	ጫውጫዎ	Felicia ericifolia (Forsk.) Mend.
Chelikana	ጬሊካና	A. nubica Benth.
Chiaa	ጭኣ	Used of a variety of acacias including A. seyal Del.
Chigagwahit	ጭጋጋዋሂት	Anagallis arvensis L.

Dagusha	ዳጉሳ	Eleusine coracana (L.) Gaertn.
Dakanek'a	ዳካንክ	N. 674
Dat hara (Af)	ዳጥሃራ	Cadaba farinosa Forsk.
Dawaito (Af)	ዳዋይቶ	Grewia bicolor Juss.
Dikhala	ዲኽላ	Loranthus sp.
Dindir ardgi	ዲንዲር፡አርጊ	Argemone mexicana L.
Dintu(Af)	ዲንጡ	Grewia mollis Juss.
Ditti (Af)	ዲጢ	Grewia mollis Juss.
Dumfuta (Af)	ዱምፉጣ	Chrysopogon plumulosus Hochst.
	← ጎዳዳ	
Edini		Eleusine floccifolia (Forsk.) Spreng.
Elgana	ኤልጋና	Felicia ericifolia (Forsk.)Mend.
Embabo	ኤምባቦ	Flaveria trinervia (Spreng.)Mohr
Embeba abeba	ሃንበባ አበባ	No. 93
Embeba gereb	ሃንበባ፡ገረብ	Veronica anagalis aquatica L.
Embeba nehby	ሃንበባ፡ነህቡ	Salvia merjamie Forsk.
Engule	ሃንጉሌ	Solanum incanum L.
Engure	ሃንጉር	~~Barleria~~ sp. Rubus volkensii Engl.
Erreh	ኧሬህ	Aloe spp.
Eshok kenfis	ሃሾክ፡ቀንፊስ	~~Eleusine floccifolia (Forsk.)Spreng~~ Barleria sp.
Fa aberari	ፋ፡አበራሪ	Harpachne schimperi A. Rich.
Fenkhana	ፈንኻና	No. 149
Galgudayi (Af)	ጋልጉዳይ	No. 410 NO!
Gama herstay	ጋማ፡ሕርስቲ	Convolvulus arvensis L.
Gaqa	ጋቃ	Rubus volkensii Engl. (More commonly applied to Rosa abyssinica R. Br.)
Gej'a	ጎጃ	Bulbostylus sp.
Gemtel	ገምጠል	Dregea schimperi (Decne.)Bullock
Girbia	ግርብያ	Monothecium glandulosum Hochst.
Gomoro	ጎሞሮ	Acacia tortilis (Forsk.) Hayne, ~~ssp~~ subsp spirocarpa (Hochst. ex. A. Rich.) Brenan
Gumgumo	ጉምጉሞ	Dregea schimperi (Decne.) Bullock

Gurdumakio	ጉርዱማኪዮ	Medicago polymorpha L.
Gurshit	ጉርሽት	Impatiens rubromaculata Warb.
Guwie	ጉዌ	Capsicum sp.
Hamat kolkal	ሃመት ቆልቋል	Cistanche tubulos (Schenk.) Hook. f.
Hamhadi (Af)	ሐምሐዲ	Cenchrus ciliaris L.
Hamhaitu (Af)	ሐምሐይቱ	Cypholepis yemenica (Schweinf.) Chiov.
Hamli adri	ሐምሊ ድረ	Brassic ?rapa L.
" "	ሐምሊ ድረ	Brassica carinata A. Br.
Harag	ሐረግ	Cyphostemma nivea Hochst.ex. Sch. (but also a general term for a number of climbing plants)
Hatumtumo	ሐቱምቱሞ	Clutia
Hazo	ሐዞ	Clematis simensis Fres.
Hebelle (Af)	ሐበለ	Grewia villosa Willd.
Himbashaziby	ሕንባሻዚቢ	Malva parviflora L.
Hissawis	ሕሳዊስ	No. 399
Hungulita	ሑንጉሊታ	No. 588
Iznita'awa	ኢዝኒታዓዋ	A number of Commicarpus spp. including C. pimbagineus (Cav.) Standl. C. boisseri (Heim.) Cuf. C. pedunculosus A. Rich.) Cuf.
Kakito	ካኪቶ	Oxygonum stuhlmanii Dammer
Kakito	ካኪቶ	Tribulis terrestris L.
Kakume	ካኩመ	Lotus discolor E. Mey.
Kabjali K'abjali	ካብጃሊ	No. 171
Kalalinko	ካላሊንኮ	Maytenus sp.
Kalkwal	ቃልቋል	Euphorbia candelabrum Kotschy
Kalkwal bahri	ቃልቋል ባሕሪ	Opuntia ficus-indica (L.) Mill.
Kanchab	ካንጫብ	Euphorbia tirucalli L.
Karamoyta (Af)	ካራሞይታ	Acacia nubica Benth.

Karatatumo	ቀረጠጡሞ	Grewia erythraea Schweinf.
Karkahal	ቀርቀሐል	Arundo donax L.
Kasal	ኻሣል	Acacia nilotica (L.) Del.
Kateita (Af)	ቀጠይጣ	No. 439
Kebkeb	ቀብቀብ	Maytenus senegalensis (Lam)Exell
Kelchim agam	ቆልጭም፡ኣጋም	No. 489
Kenteve	ቀንጠፈ	Entada abyssinica A. Rich.
Kilyau	ቁልያው	Euclea schimperi (A.DC.) Dandy
Kosli agau	ቆጽሊ፡ኣገው	Justicia cf schimperi
Kosli auhi	ቆጽሊ፡ኣውሒ	Cissus jatrophoides (Welw.) Dest.
Krawe	ቁራዌ	Ehretia cymosa Thonn.
Kuenti	ኍኤንቲ	Cyperus blysmoides C.B.Cl.
Kukh	ቈኹ	Prunus persica (L.) Stokes
Kwiha	ቀዊሓ	Salix subserrata Willd.
Lancha	ላንጫ	Hibiscus aponeurus Sprague & Hutch.
Lekwa	ለቋ	Sorghum bicolor (L.) Moench(This refers to the sweet red variety)
Leminbaita	ለሚን፡ባይታ	Coccinia ?grandis (L.) Voigt
Lukufto	ሉኩፍቶ	Alternanthera pungens H.B.K.
Ma'aligo	ማዓሊጎ	No. 410
Madertu	ማደርቱ	No. 440
Maeger/be'erai	ማእገር፡ብዕራይ	Polygala abyssinica R. Br.
Mai awalia	ማይ፡ኣዋልያ	No. 389, 402
Maitaro	ማይታሮ	Cordia ovalis DC.
Makarto	ማቀርቶ	Acacia senegal (L.) Willd.
Mandah (Af)	መንዳሕ	Acokanthera schimperi (DC) Oliv.
Manderta	ማንደርታ	Scorpiurus muricatus L.
Maraqatu (Af)	ማርቀቱ	Acacia mellifera (Vahl) Benth.
Maraz	መርዝ	Acokanthera schimperi (DC) Oliv.
Masagu	መሳጉ	No. 287
Masahayit	መሳሓይት	No. 89
Mashandadu	መሻንዳዱ	Salvia schimperi Benth.
Mashilla	ማሽላ	Sorghum bicolor (L.) Moench
Mashila hebei	ማሽላ፡ሐበይ	Polygonum salicifolium Willd.
Mederre	መደረ	Cordia ovalis DC.

Mengi	መንጊ	Rhus glutinosa Hochst.
Merissa	መሪሳ	Heeria reticulata (Bak.f.) Engl.
Merkwah cf	መርቋሕ	Cerropegia cf cufodontii Chiov.
Meshelvere	መሸልበሪ	Conyza schimperi Sch. Bip.
Mezerbaa	መዘርባዕ	Datura stramonium L.
Momona	ሞሞና	Acacia albida Del.
Mullau	ሙላው	Ximenia americana L.
Murk~~usvi~~ izzbe	ሙርቂ ዝብኢ	Heteromorpha trifoliata (Wendl.) Eckl. & Zeyl.
Muror	ሙሮር	Anthephora hochstetteri Nees
Naguli marat (Af)	ናጉ መሬት	Adenia venenata Forsk.
Oilaitu (Af)	ኦላይቱ	Aerva persica (Burm.f.) Merill
Rai	ራዪ	Hordeum distichon L.
Rambo	ራምቦ	No. 613
Randa (Af)	ራንዳ	Cynodon dactylon (L.) Pers.
Ra'raito (Af)	ራእራይቶ	No 695
Reghe	ርገ	Pennisetum setaceum (Forsk.) Chiov.
Reway	ርዋይ	Grewia bicolor Juss.
Sa'ari	ሳዕሪ	A generic term for a number of grasses.
Sa'ari bait	ሳዕሪ፡ባይታ	Hyparrhenia hirta (L.) Stapf.
Sa'ari chechewa	ሳዕሪ፡ጨጨዋ	Aristida adoensis Hochst.
Sa'ari ~~[illegible]~~bukaria	ሳዕሪ፡ ቡካርያ	Sporobolus tenuissimus (Shrank) Kuntze
Sa'ari wefe'	ሳዕሪ፡ወፈ	Cymbopogon afronardus Stapf.
Sada khozli	ፀዳ፡ ቆጽሊ	No. 84
Saenihibei	ሳዕኒ፡ሕበይ	Kalanchoe cf lanceolata (Forsk.) Pers.
Sasaka	ሳቓ	Maytenus sp.
Saluwa	ፀለቀ	Acacia asak (Forsk.) Willd.
Sansaloma	ፀንጸለማ	Arundo donax L.
Sari ntchwa	ሳዕሪ፡ኣንጨዋ	Verbena officinalis L.
Sariwetis	ሳዕሪ፡ወጠስ	Hyparrhenia hirta (L.) Stapf.

Sasa	ሳሳ	Lippia or Lantana
Sasile	ሳሳሌ	Impatiens tinctoria A. Rich.
Sassa	ሳሳ	Hordeum distichon L.
Segem	ሰገም	Hordeum vulgare L.
Selit	ሰሊጥ	Sesamum indicum L.
Senetra	ሰንጥራ	Triumfetta pilosa Rothy
Sensele-maya	ሰንሰለማያ	Veronica anagallis-aquatica L.
Senti	ሰንጠ	Cyperus ?renschii Boeck ex Desc.
Serau	ሰራው	Acacia etbaica Schweinf.
Seseg bukria	ሰሰግ፡ቡክሪያ	Ocimum canum L.
" "	ሰሰግ፡ውንዶ	Becium obovatum (E.Mey.) N.E.Br.
Shankuk	ሻንቁክ	Dregea schimperi (Decne.)Bullock
Shasalo	ሻሌ	Cyperus sp.
Shashata	ሻሻጣ	Cassia occidentalis L.
Shilane	ሹላን	Cadia purpurea (Picc.) Ait.
Shimbara gwaset	ሽምብራ፡ጓሳ	No. 95
Solah	ሰላህ	No. 406
Shiq	ሺቅ	Plectranthus sp.
Showa	ሾዋ	Clerodendrum myricoides (Hochst.) Vatke
Showa	ሾዋ	Hordeum distichon L. var. tetrastichon
Shuf	ሹፋ	Carthamus tinctorius L.
Shumba ba'ata	ሽምባ፡በጣጣ	Salvia merjamie Forsk.
Shungurti zwi	ሹንጉርጥ፡ዝዊ	Urginea altissima (L.F.) Bak. p/c
Sibkhana	ሲብኻና	Albizzia amara Roxb.) Boiv. subsp. sericocephala (Benth.) Brenan
Simeja	ሰምኤጃ	Adathoda schimperana Nees
Sindai	ሰንዳይ	Triticum aestivum L.
Sogon	ሰጎን	Tamarix nilotica (Ehrenb.) Bunge
Sokoi	ሰኾይ	Pennisetum setaceum (Forsk.) Chiov.
Solah	ሰላህ	No. 406
Sugoat hamat	ሰጎጅ ሐማት	Hibiscus micranthus L.f.
Sugothamat	ሰጎጥሐማት	Abutilon
Sukuto	ሰኩቶ	Acacia polycantha Willd.
Suwa kharni	ሰዋ ቀርኒ	Leucas oligocephala Hook. f.
Suwa kharni	ሰዋ፡ቀርኒ	No. 101

Ta'ara	ተዓራ	Caralluma ruselliana (Brogn.) Cuf.
Tabeba	መበባ	Becium obovatum (E.Mey) N.E. Br.
T'af	ጣፍ	Eragrostis tef (Zucc.) Trotter
Taftafo	ጣፍጣፎ	Applied to a number of Eragrostis species
Tahag	ተሐግ	Cathium schimperanum A.Rich
Tahag	ተሐገ	Cynodon dactylon (L.) Pers.
T'amamu	ጠማሙ	Ormocarpum sp.
Tatara (Af)	ታጥራ	Cadaba sp.
Tebeb	ተበበ	Becium obovatum (E.Mey)N.E.Br.
Tefraria	ተፍራርያ	Sida cuneifolia Roxb.
Tekelbe	መክልበ	Acacia mellifera (Vahl)Benth.
Teneg	መነገ	Bidens schimperi Sch. Bip.
Ternaka	ጥርናካ	Verbascum sinaiticum Benth.
Teteko ef	ተቴክዕፍ	Hibiscus aponeurus Sprague & Hutch.
Tetera	መመራ	Ekbergia capensis Sparrm.
Tetibo	መመጦ	Cissus quadrangularis L.
Tetowahu	መመዉሀ	Hibiscus sp.
Tiklulhamli	ጥቅልልሀምሊ	Brassica oleracea L.
Togtogta	ቶግቶግታ	Colutea abyssinica Kunth.&Bouche
Tsada shungurti	ጸዳ ሸንጉርጥ	Allium ursinum L.
Tsahiay shiwa	ፀሃይ ሸዋ	Galinsoga parviflora Cav.
Tsatse	ፀፀ	Myrsine africana L.
Tselimo	ፀለሞ	Maytenus undatus (Thunb.) Blakelock
Tseva dimu	ፀአዳሙ	No. 98
Tsilim berbere	ፀለሞ በርበሬ	Piper nigrum L.
Tunkuruwa	ቱንኩሩዋ	Jasminum floribundum Fres.
Tu-umtenay	ቱዑመተናይ	Dovyalis verrucosa (Hochst.) Warb.
Tushbahalti	ሙሽ.በሓልጢ	Pentas sp.
Ulaga	ኡላጋ	Rhus vulgaris meikle
Ungure	ኡንጉረ	Rubus volkensii Engl.
Ungule	ኡንጉሌ	Solanum incanum (L.) and other Solanum spp.)

Wacho	ዋቻ	Acacia Abyssinica (Benth.)
Yallue	ያሉ	No. 436
Zezogo	ዝዝጎ	Triumfetta pilosa Roth.
Zepheri neberi	ዝፈሪ ነብሪ	Anthephora hochstetteri Nees

APPENDIX C
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