

WOSSAC: 185
631.4
(595)



Sime Darby Services

OF THE
Series
Series
Series
Series
Series

SEMI-DETAILED SOIL SURVEY OF
THE 1800 HA TELABIT EXTENSION BLOCK



NATURAL RESOURCES LIBRARY
 COMMONWEALTH DEVELOPMENT CORPORATION
 33 HILL STREET, LONDON W1A 3AR

Sime Darby Services

Sime Darby Plantations

6TH FLOOR, WISMA SIME DARBY, JALAN RAJA LAUT, 50350 KUALA LUMPUR.
 POSTAL ADDRESS: G.P.O. BOX 10157, 50909 KUALA LUMPUR. TEL: 03-2936333 (20 Lines)
 TELEGRAPHIC ADDRESS: "SIMDARB" TELEX: SDPHO MA 33503

ACCESSION No.

004837

LOCATION

SURVEYS: MALAYSIA
 SARAWAK SIM

CONTENTS

Page

SUMMARY AND CONCLUSION

1. ENVIRONMENT

- 1.1 Location and Extent
- 1.2 Geology
- 1.3 Landform
- 1.4 Vegetation
- 1.5 Climate

2. SOILS OF THE SURVEYED AREA SEMI-DETAILED SOIL SURVEY OF

- 2.1 Merit Series
- 2.2 Bekenu Series
- 2.3 Kabuloh Series
- 2.4 Binatang Series
- 2.5 Ajoh Series
- 2.6 Bijat Series
- 2.7 Mandai Series

THE 1800 HA TELABIT EXTENSION BLOCK

3. SUITABILITY OF OIL PALM CULTIVATION IN THE SURVEYED AREA

- 3.1 Merit/Bekenu Association
- 3.2 Kabuloh/Binatang Association
- 3.3 Ajoh/Bijat Association
- 3.4 Mandai Series

Maps

Prepared for
 SARAWAK OIL PALMS SDN. BHD.

August 1986

**CDC LIBRARY AND
 INFORMATION CENTRE**

C O N T E N T S

The surveyed area is the extension of Sg. Telabit area and covers of 1,800 ha.

SUMMARY AND CONCLUSION

Page

i

1. ENVIRONMENT

1.1 Location and Extent

1

1.2 Geology

1

1.3 Landform

1

1.4 Vegetation

1

1.5 Climate

4

2. SOILS OF THE SURVEYED AREA

2.1 Merit Series

6

2.2 Bekenu Series

9

2.3 Kabuloh Series

10

2.4 Binatang Series

12

2.5 Ajoh Series

13

2.6 Bijat Series

13

2.7 Mundai Series

14

3. SUITABILITY OF OIL PALM CULTIVATION IN THE SURVEYED AREA

3.1 Merit/Bekenu Association

15

3.2 Kabuloh/Binatang Association

15

3.3 Ajoh/Bijat Association

15

3.4 Mundai Series

16

Maps

SUMMARY AND CONCLUSION

1. The surveyed area is the extension of Sg. Telabit area and consists of 1,800 ha.
2. Logged-over forest is the dominant vegetation. Secondary forest occupies some 330 ha (18%) and is scattered throughout. About 155 ha (9%) are currently under shifting cultivation.
3. The terrain ranges from nearly level to very steep hills. They are generally dissected and broken with occasional steep escarpments. About 342 ha (19%) are very steep with slope exceeding 25 degrees. The low-lying flats are poorly to imperfectly drained and consist of 144 ha.
4. Dominant soils are the Merit and Bekenu Series on sedimentary shale and they constitute about 1,494 ha (83%). The low-lying flats and valley floors are mainly of Mundai, Ajoh and Bijat Series. Collectively, they constitute about 144 ha (8%). The alluvial soils of Binatang and Kabuloh Series are found on the 162 ha (9%) of the old river bed.
5. It is estimated that about 1,224 ha (68%) are suitable for oil palm cultivation. The 162 ha (9%) on old river bed are also considered suitable but the rocky exposure of this area (estimated 20%) may pose some management problems. The remaining 414 ha (23%) are either too steep or too poorly drained with shallow soil depth for oil palm cultivation.

1. ENVIRONMENT

1.1 Location and Extent

The surveyed area consists of 2,000 ha and abounds in water and carbonic materials with Sp. Indica and the area vegetatively. The hill road abounds the surveyed area and Sp. Indica trees.

Fig. 1 indicates the location of the area.

1.2 Geology

The geology of the area is similar to that reported for the district.

1.3 Land Use

The area is primarily used for agriculture and is characterized by a high degree of fragmentation. The area is mostly used for growing rice and other crops. The area is also used for grazing and is subject to frequent flooding. The area is also used for the collection of water for the district. The area is also used for the collection of water for the district. The area is also used for the collection of water for the district. The area is also used for the collection of water for the district.

Fig. 2 shows the distribution of the area.

1.4 Vegetation

Major vegetation consists primarily of lowland forest and is characterized by a high degree of fragmentation. The area is also used for grazing and is subject to frequent flooding. The area is also used for the collection of water for the district. The area is also used for the collection of water for the district.

1. ENVIRONMENT

1.1 Location and Extent

The surveyed area consists of 1,800 ha and shares its western and northern boundaries with Sg. Telabit area and Sg. Sepupoh area respectively. The BLD road divides the surveyed area and Sg. Telabit area.

Map 1 indicates the location of the area.

1.2 Geology

The geology of the area is similar to that as reported for Sg. Telabit area.

1.3 Landform

It is estimated that about 72 ha (4%) of the extension area consist of low-lying flats with very poor drainage. The valley floors are narrow and occupy about 72 ha (4%) with imperfect to poor drainage. They are subject to frequent flooding. The old river bed, which is very common in Sg. Sepupoh area (north of the extension area), extends to the upper periphery of the Sg. Telabit extension. It consists of some 162 ha (9%) of level land with common rock outcrops. The remaining 1,494 ha (83%) consist of nearly level to very steep hills, of which 342 ha (19%) are steeper than 25 degrees.

Map 2 and Table 1 represent the distribution of the various landforms.

1.4 Vegetation

Major vegetation consists primarily of logged forest with some riverine forests along the narrow valley floors. The poorly-drained low-lying areas are characteristically covered with sedges, with isolated areas cultivated with wet padi.

MAP 1

LOCATION MAP OF SURVEYED AREA

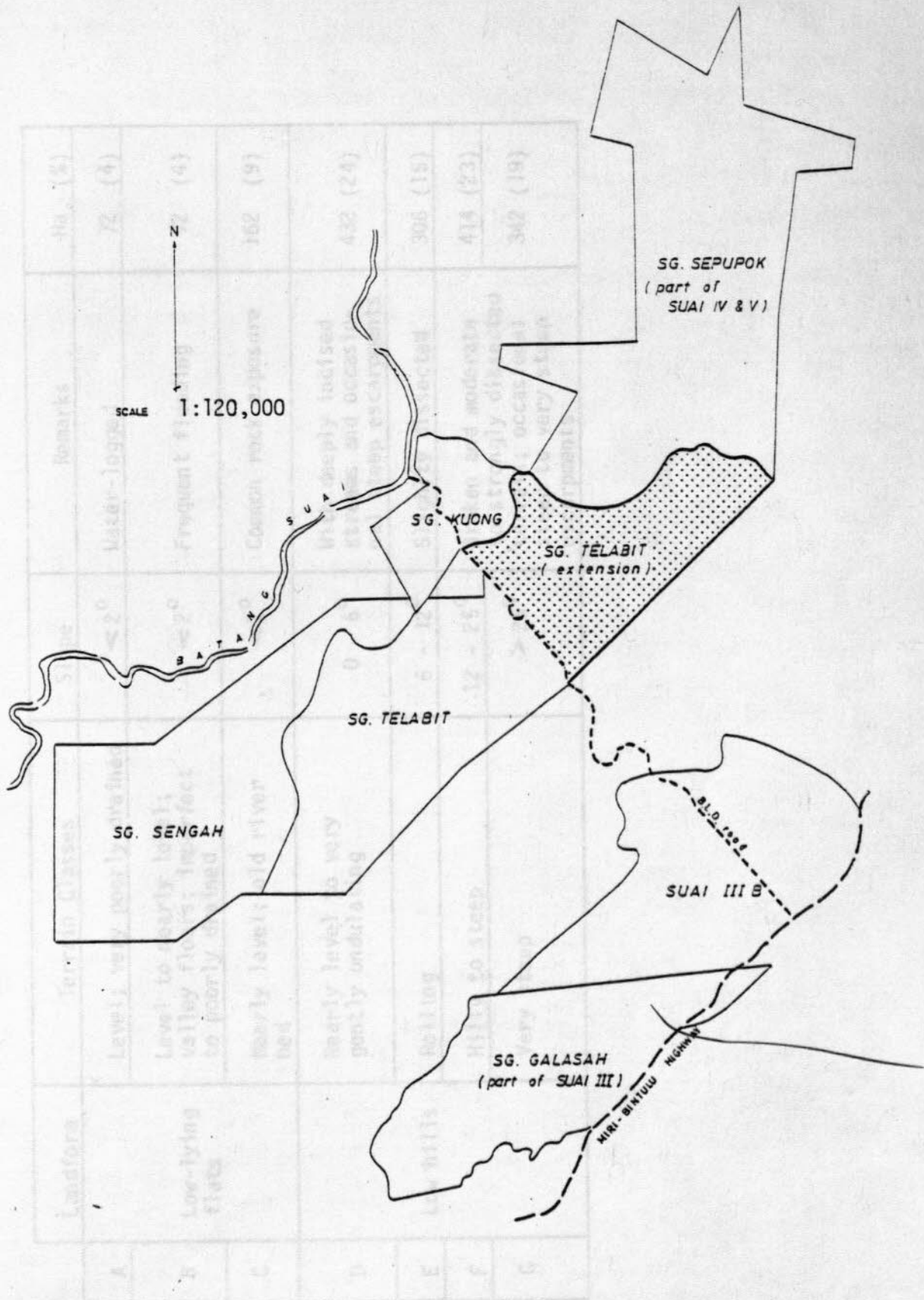


Table 1 : Estimated discharges of the various landforms and terrain classes

Table 1 : Estimated hectarages of the various landforms and terrain classes

Landform	Terrain Classes	Slope	Remarks	Ha (%)
A	Level; very poorly drained	< 2°	Water-logged	72 (4)
	Level to nearly level; valley floors; imperfect to poorly drained	< 2°	Frequent flooding	72 (4)
	Nearly level; old river bed	< 2°	Common rock exposure	162 (9)
D	Nearly level to very gently undulating	0 - 6°	With deeply incised streams and occasional steep escarpments	432 (24)
	Rolling	6 - 12°	Slightly dissected	306 (15)
E	Hilly to steep	12 - 25°	Broken and moderate to strongly dissected terrain; occasional steep to very steep escarpments	414 (23)
	Very steep	> 25°		342 (19)

Present shifting cultivation constitutes about 155 ha (9%) and is scattered throughout. It is mainly padi, pepper, maize and other cash crops.

Map 3 and Table 2 represent the generalised distribution of the various types of vegetation.

1.5 Climate

The climate of the area is similar to that as reported for Sg. Telabit area.

Primary Vegetation

Regenerated forest	320 ha	18%
--------------------	--------	-----

Riverine forest with former rice field and sedges	72 ha	4%
---	-------	----

Mainly sedges and some rice fields	72 ha	4%
------------------------------------	-------	----

Under Cultivation

Rice, pepper and other cash crops	155 ha	9%
-----------------------------------	--------	----

NATURAL RESOURCES LIBRARY
COMMONWEALTH DEVELOPMENT CORPORATION
33 HILL STREET, LONDON W1A 3AR

Table 2 : Estimated hectarages of the various vegetation
in the surveyed area

VEGETATION TYPES

Primary Vegetation

Logged forest	1,171 ha	65%
---------------	----------	-----

Secondary Vegetation

Regenerated forest	330 ha	18%
--------------------	--------	-----

Riverine forest with former rice field and sedges	72 ha	4%
--	-------	----

Mainly sedges and some rice fields	72 ha	4%
---------------------------------------	-------	----

Under Cultivation

Rice, pepper and other cash crops	<u>155 ha</u>	<u>9%</u>
--------------------------------------	---------------	-----------

	<u>1,800 ha</u>	<u>100%</u>
--	-----------------	-------------

2. SOILS OF THE SURVEYED AREA

A detailed soil survey was carried out on various sites at intervals of 1 km apart (Map 1). A total of seven different soil series were identified and described. Map 2 is the semi-detailed soil map of the surveyed area.

2.1. Horiz Series

This is the first dominant soil series in the surveyed area. The soil is classified as red-yellow podzolic soil and has a fine clay particle-size class. Clay content for the whole soil is between 25 - 35% (25% - 28% and 30% in the upper part of the B horizon). It is developed from non-calcareous igneous rocks on gently undulating to steep topography. The soil is characterized by the presence of a well-developed yellowish-brown well-sorted clay with well-developed blocky structure. It is moderately deep to deep with no regular surface rock occurring within 100 cm depth.

The superficial surface layer consists of decomposed and decomposed loose leaf litter and organic debris. This is underlain by a humus-rich mineral layer (A horizon) which is about 5 cm thick. It consists of yellowish-brown to dark brown friable sandy clay loam to clay loam. Structures are moderately developed, fine and medium subangular blocky. Crumbs are present and are more prominent in the upper part of the horizon, where the soil surface is exposed and not covered with organic debris. The thickness of the top soil becomes very thin or even absent. The sub-surface soil (B horizon) lies immediately underneath the top soil and averages about 15 cm thick. It consists of friable sandy clay loam to clay loam with moderate to somewhat strongly developed coarse subangular blocky structures. A prominent feature of this horizon is the presence of many organic acid-saturated soil ped surfaces. The colour of these ped surfaces varies from the soil matrix colour of the overlying top soil. Small pieces of iron concretions (iron concretions) are scattered throughout the horizon and are very porous and greyish-brown to dark brown in colour. The B1

2. SOILS OF THE SURVEYED AREA

2. SOILS OF THE SURVEYED AREA

A semi-detailed soil survey was carried out on rentices cut at intervals of 1 km apart (Map 4). A total of seven dominant soil series were identified and demarcated. Map 5 is the semi-detailed soil map of the surveyed area.

2.1 Merit Series

This is the most dominant soil series in the surveyed area. The soil is classified as red-yellow Podzolic soil that has a fine clayey particle-size class. Clay content for the whole soil is between 35 - 60%. CEC is >24 meq per 100 g clay in the major part of the B horizon. It is developed from non-calcareous argillaceous shale on gently undulating to steep topography. The soil is characterised by the brownish yellow to yellowish brown well-drained clay with well-developed blocky structures. It is moderately deep to deep with no impervious parent rock occurring within 100 cm depth.

The superficial surface layer consists of both undecomposed and decomposed loose leaf litters and organic debris. This is underlain by a humus-rich mineral layer (Ah horizon) which seldom exceeds 5 cm thick. It consists of yellowish brown to dark brown friable sandy clay loam to clay loam. Structures are moderately developed, fine and medium subangular blocky. Crumbs are present and are more prominent in the upper part of the horizon. Where the soil surfaces are exposed and not covered with organic debris, the thickness of the top soil becomes very thin or even absent. The sub-surface soil (B1 horizon) lies immediately underneath the top soil and averages about 15 cm thick. It consists of friable sandy clay loam to clay loam with moderate to somewhat strongly developed coarse subangular blocky structures. A prominent feature of this horizon is the presence of many organic acid coatings on soil ped surfaces. The colour of these coatings resembles the soil matrix colour of the overlying top soil. Faunal pedoturbations are evident in the form of fine (\pm 20 mm) scattered "krotovinas" which are very porous and are yellowish brown to dark brown in colour. The B1

horizon has the maximum illuvation of organic acid from the surface horizon and the soil matrix colour is paler brownish yellow. The Ah and B1 horizons together have the maximum concentration of both fine and coarse roots (<1 mm and >5 mm in diameter). Pores are many and range from very fine to coarse sizes.

The horizon with maximum clay content occurs below the B1 horizon. Most profiles have >35% clay in this horizon. Structures are somewhat strongly developed coarse and very coarse subangular blocky and consistency is friable. There is little variation in soil colour amongst profiles and is mainly brownish yellow or reddish yellow to strong brown. Faunal activities are less prominent and krotovinas are found mostly in the upper layer of this horizon. Cutans are common on most of the ped surfaces. They are somewhat continuous, moderate to well-developed and are paler in colour than the interior of the soil peds. Although both fine and coarse roots are present, their concentrations are generally lower.

A common feature of some of the Merit Series is the presence of concretions in the lower part of the B horizon. These concretions are mainly iron-coated shale, though very few laterites are also present. They are soft and can easily be broken between the fingers. Most of them are platy in shape and still retain their original sedimentary rock nature. They are about 5 to 30 mm wide on their widest axis. Some profiles have higher concentration of up to 50% by volume. They are, however, not thick compact and in many of the profiles studied, fine roots have been found to penetrate through this horizon. It is not likely that this concretionary layer will pose any serious limitation to root penetration.

Very common, a BCR layer may occur, usually at the lower depth of the B horizon. This consists of about 10 to 40% of the stony undecomposed parent rock. The stones are about 10 to 20 cm in size and are spaced at about 15 to 40 cm apart. The interstices are filled with clay of the overlying horizon. Roots are present and the layer poses no limitation to root penetration.

A transitional layer is present between the B horizon sub-soil and the underlying parent rock. This constitutes the BC or C horizon in which the structures are weakly developed and, in some cases, tending towards massive. Their soil colours are variegated and mottled with grey - a dominant colour of the underlying parent rock. Micro-bio activities are practically absent and the root concentration is usually very low to nil. Underneath this variegated horizon lies the parent rock - shale, with varying degree of weathering and hardness. This impervious layer is not penetrable by roots. It is noted that in many of the profiles and soil auger examinations, the continuous impervious parent rock is not met within 100 cm from the soil surface, even on some of the steeper slopes. Only very few auger examinations have encountered shallower soil depth on slope >33 degrees.

The geomorphic age of the soils of Merit Series is considerably young. This is shown by some of the very steep slopes on low elevation. True laterites are few and gravels are mainly iron-coated parent materials. Pedimentation process is still in its very early stage. These conditions therefore favour the formation of the deeper soils in the surveyed area.

Merit Series soils are acidic with pH ranges from 3.8 to 4.9. Organic carbon is highest in the Ah horizon with values ranging from 2.2 to 5.0%. This is followed by the B1 illuviated horizon with values ranging from 0.8 to 2.1%. There is an abrupt decrease of organic carbon in the underlying B horizon where most values are below 0.8%. Total exchangeable bases (TEB) are highest in the Ah horizon and lowest in the B horizon. The organic rich Ah horizon has TEB values ranging from 1 to 5 meq/100 gm. The sub-soil B horizon has lower TEB and has values of less than 1 meq/100 gm. Except for the Ah horizon, base saturation of most sub-soils is below 5%. Cation exchange capacity (CEC) for the whole soil is, however, high at >24 meq/100 gm clay.

2.2 Bekenu Series

The Bekenu Series is classified as red-yellow Podzolic soil that has a fine loamy or fine silty particle-size class with 18 to 35% clay content for the whole soil. It is developed on fine sandy shale and occurs mainly on the steeper terrain in the surveyed area. It is mapped in association with soils of the Merit Series.

The superficial surface layer consists of both undecomposed and decomposed loose leaf litters. Underneath this Ao horizon is a humus-rich thin Ah mineral layer, usually less than 5 cm thick. It consists of yellowish brown to dark brown very friable fine sandy clay loam. Structures are moderately developed, fine and medium subangular blocky and some crumbs. The B1 horizon lies immediately underneath the top soil and consists of brownish yellow fine sandy loam to fine sandy clay loam. Structures are moderately developed with medium and some coarse subangular blocks and very friable consistency. Coatings of organic acid are common on most of the ped surfaces. Both the Ah and B1 horizons have the highest concentrations of fine to coarse roots.

Sub-soil B2 horizon is usually deep, extending to below 100 cm deep. It consists of brownish-yellow to reddish-yellow to strong brown fine sandy clay loam to fine clay loam. Structures are moderately developed with coarse subangular blocks and friable to very friable consistency. Faunal activities are present and krotovinas are common up to the upper layer of the B2 horizon. The structures are less developed as compared to the corresponding horizons in the associated Merit Series. Structures are easily broken down into fine, medium or coarse subangular blocky. Micro-bio activities are present and krotovinas are observed up to the upper part of the B2 horizon. Cutans are common, and pores and roots are concentrated more towards the upper B horizon and decrease with depth.

Gravels of laterite and platy laterised (iron-coated) shale and undecomposed stony parent rocks may be present, usually in the lower part of the B horizon. Their occurrences are similar to those of the Merit Series in terms of their amount, distribution and compactness. They are considered not a serious limitation to root penetration.

The major part of the B2 horizon constituted at about 15 to 30 cm

The major chemical properties of Bekenu Series are quite similar to those of the Merit Series. The soils are strongly to extremely acidic. Organic acid is highest in the Ah horizon and decreases abruptly in the B horizon. Total cations are lower than those of the Merit Series. Total exchangeable bases are very low at below 0.5% in most of the sub-soil. The CEC for the whole soil is more than 24 meq/100 gm clay.

2.3 Kabuloh Series

Kabuloh Series is classified as red-yellow Podzolic soil that has a calcareous or non-acid reaction class and a hue of 2.5Y within a depth of 50 cm or throughout the control section.

The soil is formed on flat, somewhat extensive old river beds and is moderately well-drained.

A thick layer of leaf litters and organic debris has been observed in soils of Kabuloh Series. It is usually about 6 to 8 leaves thick and is in various stages of decomposition. The mineral top soil is about 8 cm thick and is generally thicker than those of the upland soils. It consists of dark brown to yellowish brown moderately-developed medium and fine subangular blocky and crumb structures. Texture varies from loam to silty loam to sandy loam. Clay content is less than 20% while silt and very fine sand contribute to between 40 to 50%. Roots are many and are fine to coarse sizes (1 - 20 mm diameter). The underlying B1 horizon consists of olive brown to light yellowish brown loam to clay loam with a higher clay content of 23 to 33%. Structures are well-developed with very coarse and coarse subangular blocks, easily breaking down into well-developed coarse and medium subangular blocks. Consistency is friable and

uniform in all the profiles studied. Coatings of organic acid are found on many of the ped surfaces and krotovinas are present. This horizon has less roots as compared to the overlying Ah horizon. They are mainly fine roots with 1 - 5 mm diameter.

The major part of the B2 horizon commences at about 15 to 30 cm from the soil surface. The dominant colours are pale yellow, light yellowish brown and light olive brown (of 2.5Y hue) with many blotches of brownish yellow, yellowish brown, reddish yellow and strong brown. Textures are mainly clay loam to clay and clay content in the horizon is highest at 35 to 40%. Structures are well-formed with coarse and very coarse subangular and angular blocks and consistency is friable to slightly firm. Coatings of organic acid are very few and very weakly developed. They are mainly found in the upper layer of the horizon. Few krotovinas are present throughout the B2 horizon. Well-formed cutans are common features on most of the ped surfaces. They appear to be "waxy" and are mainly of 2.5Y hue colours.

Towards the lower part of the B horizon, the soil colours of 2.5Y hue become more dominant and distinct. These horizons have been designated as B3 or BC horizons. Structures are weakly developed and tending towards massive. In some of the profiles and soil auger examinations, a BCg or Cg gleyed horizon has been encountered at depth around 75 cm from the soil surface. It is likely that water-table is met at this horizon at some parts of the year, especially during the rainy period. Microbio activities are absent and roots are nil.

Pitted and rounded boulders of limestone can be found both on the soil surfaces and in the soil profiles. When present on the soil surfaces (estimated at $\pm 20\%$ of this soil unit), the boulders are distributed haphazardly without any definite pattern of spacing.

Kabuloh Series has a similar soil-nutrient distribution within profile as soils of the Merit and Bekenu Series. The Ah horizon has the highest organic carbon, nitrogen and total exchangeable bases and these decrease abruptly in the sub-soil. Values for organic carbon, nitrogen, total phosphorus and exchangeable potassium are similar to those of the upland soils while slightly higher values are observed in available phosphorus. Values for total cations (except for Ca which is higher) are similar to those of Merit Series but are higher than those of Bekenu Series. The major differences are the soil pH and total exchangeable bases. Soil pH values are between 5.0 to 6.6 and are generally less acidic as compared to soils of Merit and Bekenu Series. Values for total exchangeable bases are higher, ranging from 10 to 29 meq/100 gm with higher exchangeable Ca.

2.4 Binatang Series

Binatang Series is classified as Sketal soil that has developed in alluvium.

The organic Ao horizon is about 4 to 6 leaves thick and consists of loose leaf litters and organic debris. The underlying Ah mineral horizon is brown to yellowish brown loam with moderately developed fine and medium blocky with well-developed coarse and medium structures. Consistency is friable and krotovinas are present. Most of the roots are concentrated in the Ah and B1 horizons and are fine to coarse (1 to 15 mm in diameter). This soil has a thin B2 sub-soil which is brownish yellow in colour and clay-textured. Structures are well-developed coarse subangular blocky and well-formed cutans are found on many ped surfaces. An impervious continuous bedrock layer is met within 50 cm from the surface. This layer is not penetrable by roots.

The soil is acidic with soil pH between 4.8 to 5.3. Total cation values are similar to those of Merit Series but are higher than those of Bekenu Series. Exchangeable Mg and Ca are generally higher than most of the sedimentary soils but are lower than the calcareous Kabuloh Series.

2.5 Ajoh Series

Ajoh Series is classified as grey-white Podzolic soil with clayey particle-size class and has abundant (>20%) mottles within 100 cm soil depth. The soil is imperfectly drained and occurs on flat valley floors.

The top soil consists of very dark greyish brown to dark brown friable clay loam to silty clay loam with moderately developed medium and fine structures. Sub-soil colour changes abruptly to light grey to grey with prominent brownish and yellowish mottles of about 5 to 15 mm diameter. Consistency is friable to slightly firm, becoming more massive and plastic with depth. Structures are moderately developed coarse and very coarse subangular blocky, becoming weakly developed and prismatic with depth. Soft manganese mottles may be present at the lower depth of the sub-soil.

Ajoh Series has an acidic top soil with pH between 5.4 to 6.0 while the sub-soil is strongly acidic with pH between 4.1 to 5.0. Exchangeable cations for the top soil are medium to high while for the sub-soil are generally very low to low.

2.6 Bijat Series

Bijat Series is classified as Gley soil that has developed on riverine alluvium from non-calcareous sedimentary rocks and has a clayey particle-size class. The soil is characterised by its poor drainage and has white to grey massive clay within 50 cm of the soil depth.

The top soil is thin and consists of dark reddish brown clay loam intermixed with some organic debris. Structures are moderately developed with fine blocks and granules. Underneath the top soil is the characteristic gleyed horizon with massive to structureless clay sparsely mottled with yellowish brown or strong brown. Water-table is usually met within 50 cm from the soil surface. In some localities stagnant water on the soil surface is common.

2.7 Mundai Series

Mundai Series is classified as Gley soil that has developed in accreting riverine alluvium from calcareous sedimentary rocks and has a clayey particle-size class.

It occurs on flat low-lying broad valley floors in the upper portion adjoining Sungei Sepupoh block and is water-logged in most parts of the year.

The organic horizon is thin with debris of sedges - a vegetation which is closely associated with poorly drained gley soil. The top soil consists of dark reddish grey clay loam with moderately developed fine subangular blocky and granular structures. Underneath this Ah horizon a characteristic gley horizon occurs. This consists of weakly developed to massive light grey clay to silty clay mottled with strong brown or yellowish brown. Towards the lower depth the mottles decrease and the soil is massive. Water-table is met within 25 cm from the soil surface and on many occasions stagnant water on the soil surface is common. The soil is poorly to very poorly drained.

Mundai Series is found in closer proximity to the Subis Limestone. The chemical characteristic, like that of the Kabuloh Series, is therefore influenced by the calcareous rocks of the surrounding area. The soil is slightly acidic, with higher pH values at 6.3 to 6.6. Although the total cation values are similar to those of non-calcareous soil, their total Ca and Mg are higher. There are distinct differences in the total exchangeable bases which have high values for exchangeable Ca and Mg.

2. SUITABILITY OF OIL PALM CULTIVATION IN THE SURVEYED AREA

2.1. Soil texture and structure

The soil is deep to moderately deep well-aerated soil with clay to silty clay loam texture. The soil is subject to erosion and is very fertile and is productive and is suitable for oil palm cultivation.

The soil is deep to moderately deep well-aerated soil with clay to silty clay loam texture. It is subject to erosion and is very fertile and is productive and is suitable for oil palm cultivation.

The soil is deep to moderately deep well-aerated soil with clay to silty clay loam texture. It is subject to erosion and is very fertile and is productive and is suitable for oil palm cultivation.

2.2. Soil fertility and structure

The soil is deep to moderately deep well-aerated soil with clay to silty clay loam texture. It is subject to erosion and is very fertile and is productive and is suitable for oil palm cultivation.

The soil is deep to moderately deep well-aerated soil with clay to silty clay loam texture. It is subject to erosion and is very fertile and is productive and is suitable for oil palm cultivation.

The soil is deep to moderately deep well-aerated soil with clay to silty clay loam texture. It is subject to erosion and is very fertile and is productive and is suitable for oil palm cultivation.

2.3. Soil fertility and structure

The soil is deep to moderately deep well-aerated soil with clay to silty clay loam texture. It is subject to erosion and is very fertile and is productive and is suitable for oil palm cultivation.

3. SUITABILITY OF OIL PALM CULTIVATION IN THE SURVEYED AREA

The soil is deep to moderately deep well-aerated soil with clay to silty clay loam texture. It is subject to erosion and is very fertile and is productive and is suitable for oil palm cultivation.

3. SUITABILITY OF OIL PALM CULTIVATION IN THE SURVEYED AREA

3.1 Merit/Bekenu Association

This is deep to moderately deep well-drained soils with clay to sandy clay loam texture. They occur on nearly level to very steep terrain and are widespread in the surveyed area.

Terrain with slope exceeding 25 deg is considered unsuitable for oil palm cultivation. It is subject to severe soil erosion and is likely to encounter many management problems including those of harvesting and field maintenance.

This soil unit comprises 1,494 ha (83%), of which 342 ha (19%) are steeper than 25 deg.

3.2 Kabuloh/Binatang Association

This soil unit is formed on old river bed, on alluvium with deep to shallow soil depth. It is moderate to well-drained. Scattered outcrops of rocks and boulders constitute about 20% of the area.

The shallow soil of the Binatang Series and the presence of rock outcrops will affect crop performance and pose management problems.

This soil unit comprises about 162 ha (9%).

3.3 Ajoh/Bijat Association

This soil unit is confined to the narrow valley floors and consists of deep to moderately deep mottled clay. The soil is imperfectly to poorly drained and is subject to frequent flooding after continuous rain. However, it can be easily drained.

This soil unit comprises about 72 ha (4%).

3.4 Mundai Series

This alluvial soil is found on low-lying flats with very poor drainage and shallow soil depth. The massive clay horizon is encountered at within 25 cm depth and is considered a limitation to oil palm cultivation.

This soil unit comprises about 72 ha (4%).

Map 6 represents the oil palm suitability of the area. Table 3 represents the estimated hectarages of the various soil units. Table 4 represents the estimated hectarages of land suitability.

Table 3 : Estimated hectarages of the various soil units

<u>Soil Unit</u>	<u>Slope</u>	<u>Ha</u>	<u>%</u>
Mundai	<2 ^o	72	4
Ajoh/Bijat	<2 ^o	72	4
Kabuloh/Binatang	<2 ^o	162	9
Merit/Bekenu	<6 ^o	432	24
	6 - 12 ^o	306	17
	12 - 25 ^o	414	23
	> 25 ^o	<u>342</u>	<u>19</u>
		<u>1,800</u>	<u>100</u>

Table 4 : Hectarage statistics of land suitability
for oil palm cultivation

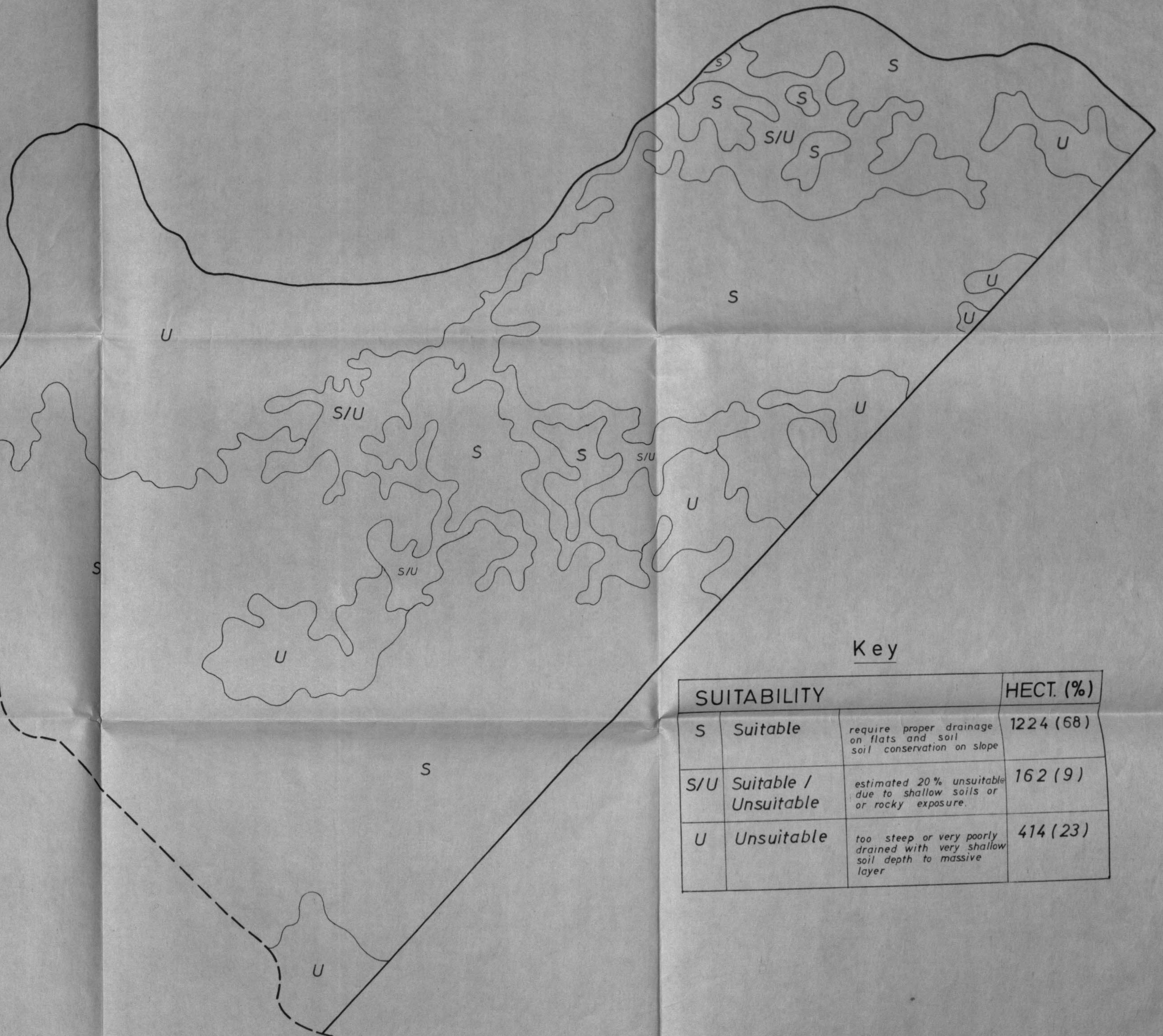
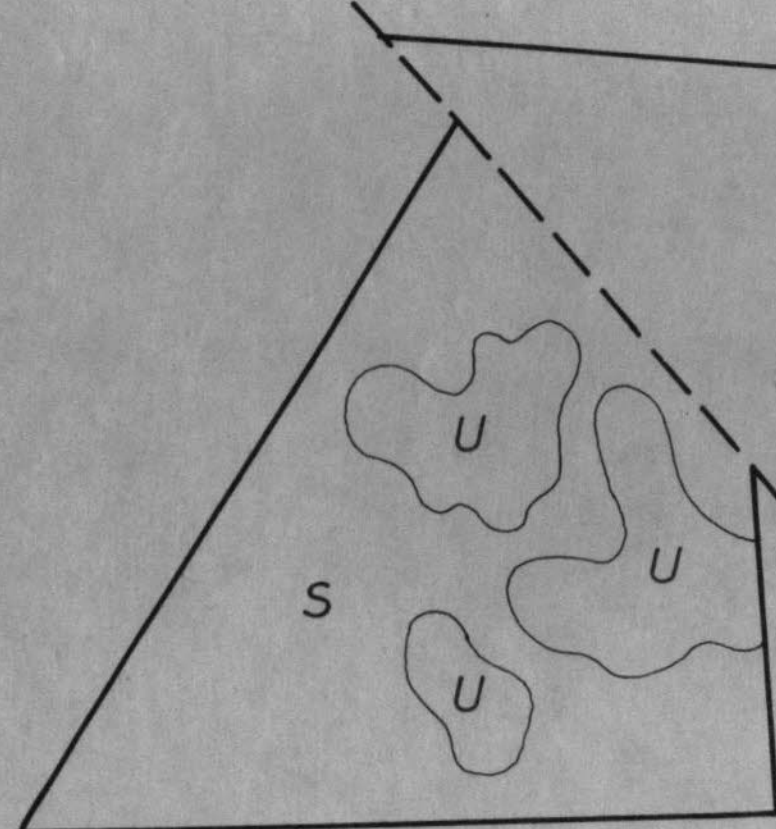
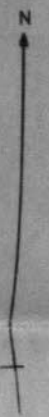
Suitability

Suitable	1,224 ha	68%
Suitable/unsuitable	162 ha	9%
Unsuitable	<u>414 ha</u>	<u>23%</u>
	<u>1,800 ha</u>	<u>100%</u>

MAPS

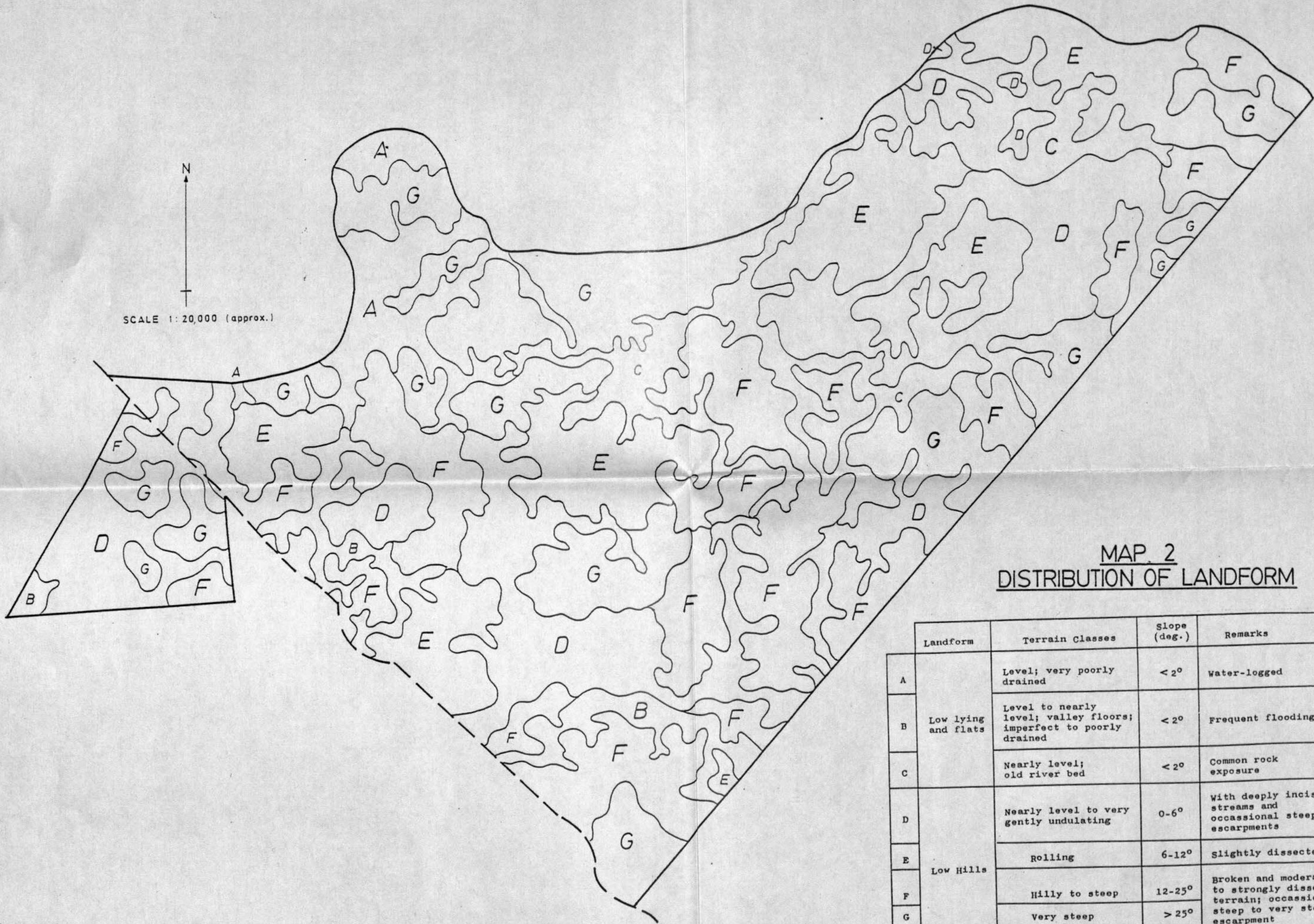
MAP 6
 OIL PALM SUITABILITY MAP
 SG. TELABIT (extension)
 SUAI - SARAWAK

SCALE 1:12,500



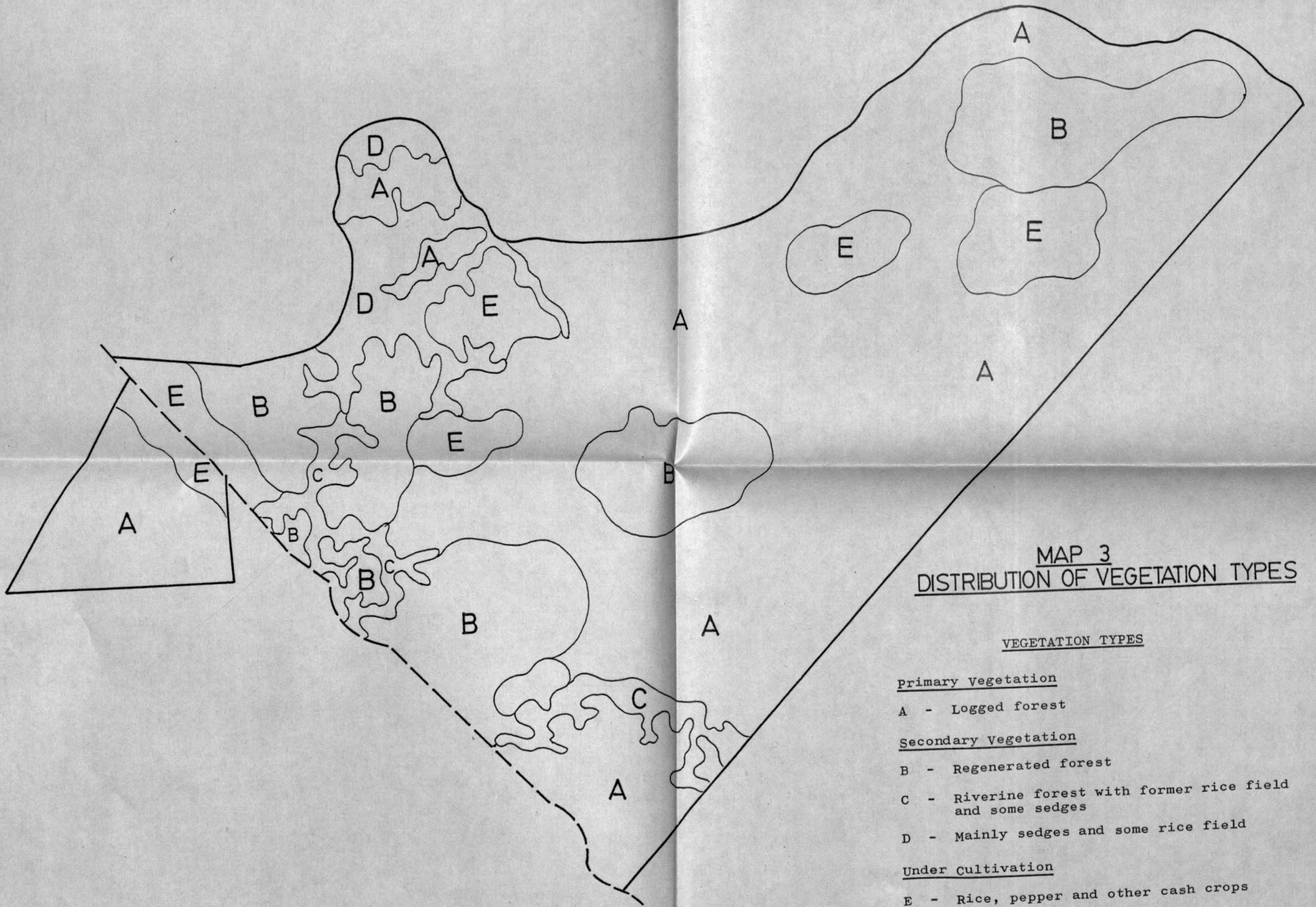
Key

SUITABILITY			HECT. (%)
S	Suitable	require proper drainage on flats and soil soil conservation on slope	1224 (68)
S/U	Suitable / Unsuitable	estimated 20% unsuitable due to shallow soils or or rocky exposure.	162 (9)
U	Unsuitable	too steep or very poorly drained with very shallow soil depth to massive layer	414 (23)



MAP 2
DISTRIBUTION OF LANDFORM

Landform	Terrain Classes	Slope (deg.)	Remarks
A	Level; very poorly drained	< 2°	Water-logged
B	Low lying and flats	< 2°	Frequent flooding
C	Nearly level; old river bed	< 2°	Common rock exposure
D	Nearly level to very gently undulating	0-6°	With deeply incised streams and occasional steep escarpments
E	Rolling	6-12°	Slightly dissected
F	Hilly to steep	12-25°	Broken and moderate to strongly dissected terrain; occasional steep to very steep escarpment
G	Very steep	> 25°	



MAP 3
DISTRIBUTION OF VEGETATION TYPES

VEGETATION TYPES

Primary Vegetation

A - Logged forest

Secondary Vegetation

B - Regenerated forest

C - Riverine forest with former rice field and some sedges

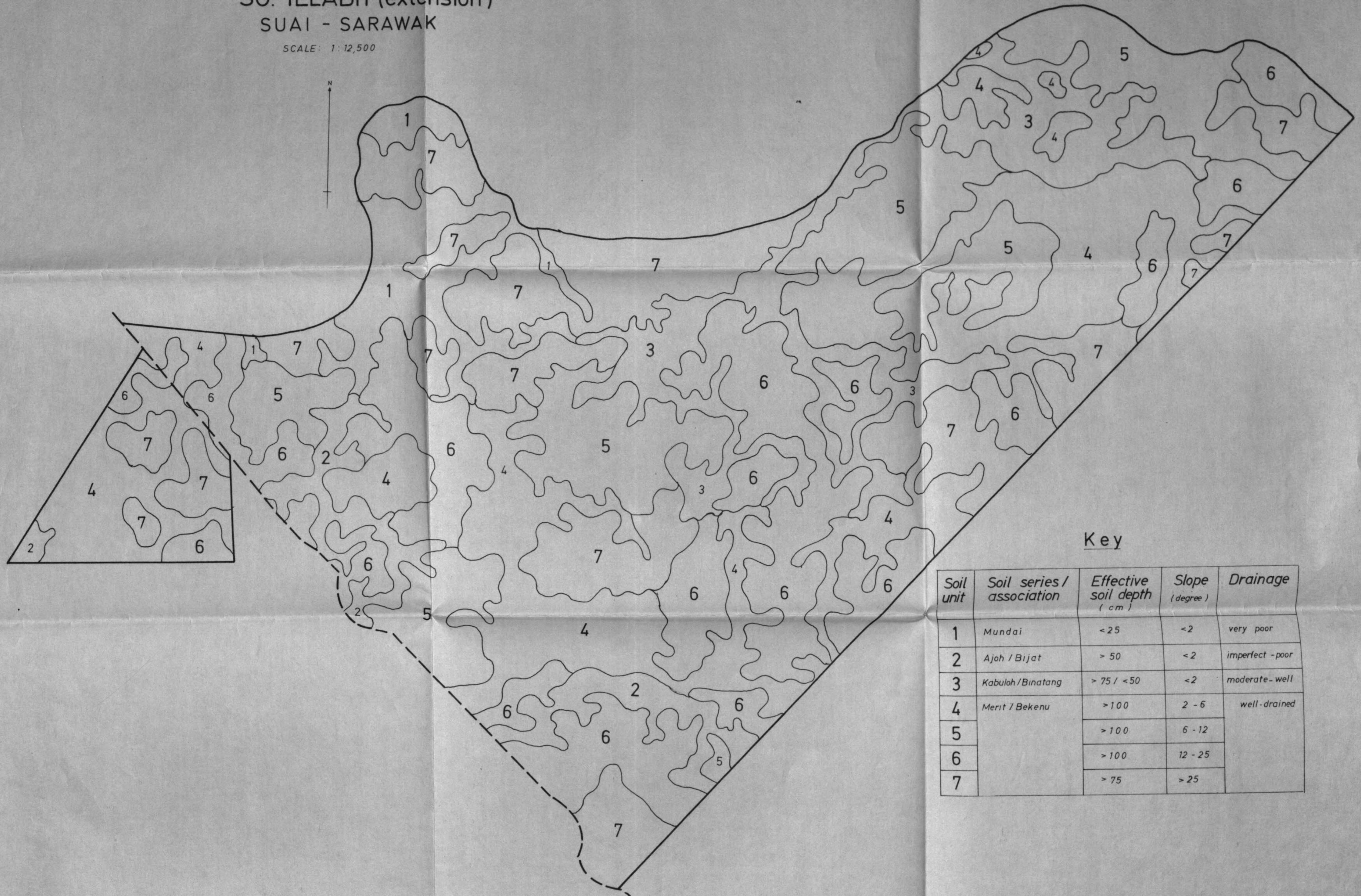
D - Mainly sedges and some rice field

Under Cultivation

E - Rice, pepper and other cash crops

MAP 5: SEMI DETAILED SOIL MAP
 SG. TELABIT (extension)
 SUAI - SARAWAK

SCALE: 1:12,500



Key

Soil unit	Soil series / association	Effective soil depth (cm)	Slope (degree)	Drainage
1	Mundai	< 25	< 2	very poor
2	Ajoh / Bijat	> 50	< 2	imperfect - poor
3	Kabuloh / Binatang	> 75 / < 50	< 2	moderate - well
4	Merit / Bekenu	> 100	2 - 6	well - drained
5		> 100	6 - 12	
6		> 100	12 - 25	
7		> 75	> 25	