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**Report on**  
**Detailed Soil Survey of Proposed ICAR Complex**  
**Farm at Sangaipat, Akampat & Mamangpat**  
P. S. Imphal, Central District, Manipur State

Regional Centre  
Calcutta

National Bureau of Soil Survey & Land Use Planning  
Indian Council of Agricultural Research  
NAGPUR - 440006

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Detailed soil survey of proposed I.C.A.R. Complex  
Farms at Sangaipat, Akampat and Mamangpat, P.S. -  
Imphal, Central District, Manipur State.

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1.. INTRODUCTION :

Detailed soil survey of the proposed sites for establishing experimental farms in the I.C.A.R. Complex for North Eastern region at Sangaipat, Akampat and Mamangpat <sup>had</sup> ~~were~~ carried out at the request of the Project Director, North Eastern Research Complex of the Indian Council of Agricultural Research, Shillong, by the Regional Centre, Calcutta of National Bureau of Soil Survey and Land Use Planning (ICAR), during the month of April, 1976. The objectives of the survey were to survey and map the soils, characterize them and assess their potentiality for producing food, fodder and fiber crops suited to the region and conduct such experiments to bring about the socio-economic improvement in the region.

2.. LOCATION:

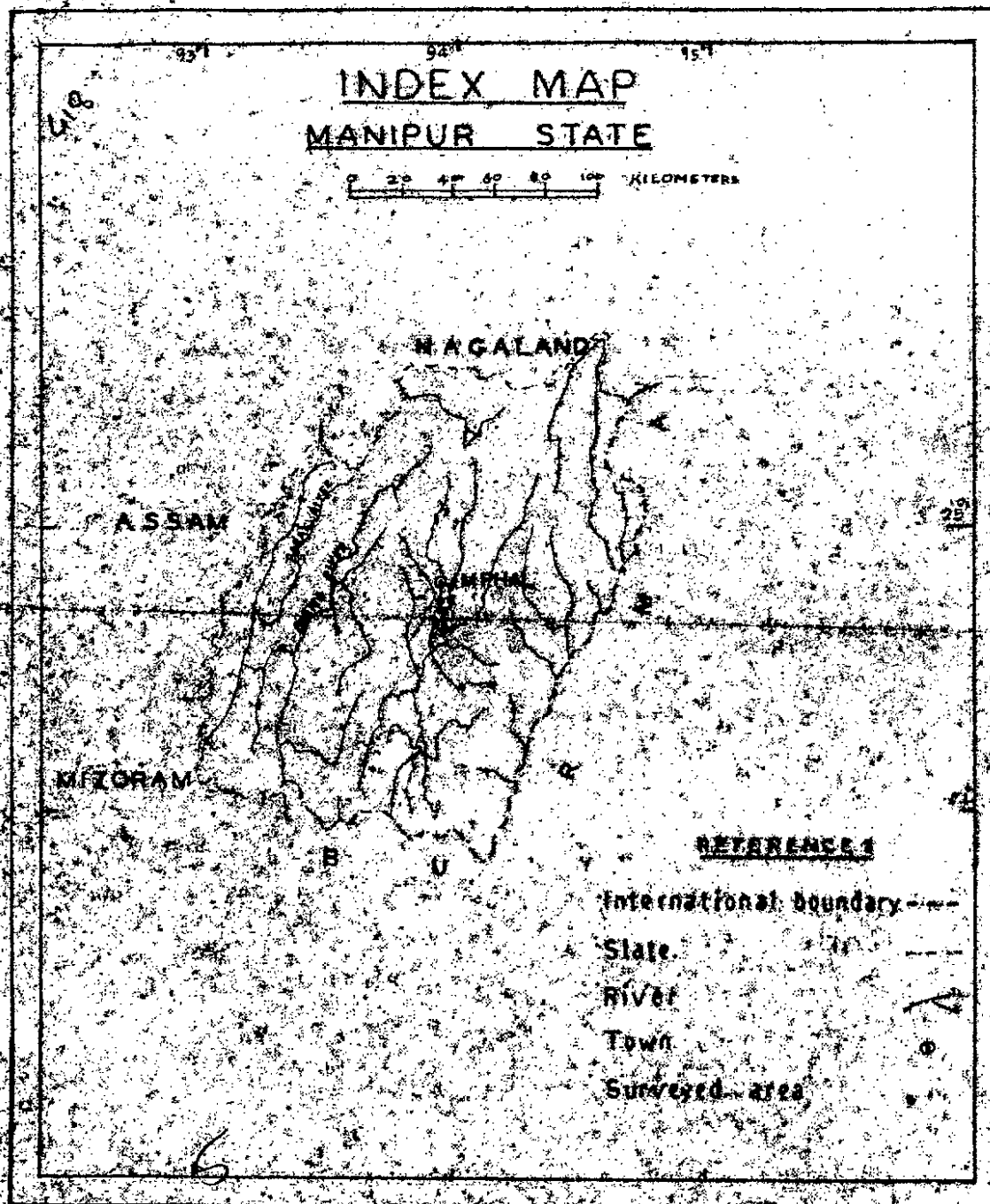
The proposed site is situated at a distance of nearly 2 km. south of Imphaltown, between east longitudes  $93^{\circ}36'$ - $93^{\circ}58'$  and north latitudes  $24^{\circ}47'$ - $24^{\circ}50'$ . The total area of the three farms comprises 41 hectares.

3.. PHYSIOGRAPHY, RELIEF AND DRAINAGE :

Physiographically the farm area <sup>is</sup> ~~parts~~ a part of the flood plain of Imphal river and its tributaries which by itself forms a part of the central valley of Manipur State.

The farm area is drained by the Imphal river flowing north-south, following a winding course. The meandering flood plain configuration is due to seasonal high flood and

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disposition of eroded materials in the river bed. Lack of drainage facilities result in stagnation of flood waters resulting in swampy patches ~~locally~~ known as 'Pat' in local language.

4.. GEOLOGY:

The rocks consist of argillaceous sandstones and shales. The soils in the farm area are developed on alluvial deposits.

5.. CLIMATE:

The climate is humid tropical with almost complete absence of frost except on higher hill tops. The mean annual rainfall is 1350 mm. spread over the months of June to October during which 75% of rain is received. November to February is comparatively dry with bright sunny days reaching a minimum temperature of about 8°C. The hot months are March to May with considerable amount of precipitation and maximum temperature of 38°C.

6.. AGRICULTURE AND PRESENT LAND USE :

Sangaipat and Akarpat areas are partly cultivated and partly remain water logged. Mamangpat area is cultivated to rainfed paddy. The natural vegetation consists of trees viz. neem, silver oak, Ficus sp., bamboo, etc.

7.. SOILS :

Soils are developed from alluvial material deposited by the rivers coming from the adjacent hill ranges.

Brief descriptions of the soil series identified and mapped are given below :-

Akampat Series (A) :

Comprises very deep, imperfectly drained, dark gray soils with heavy mottled, occurring on nearly level to very gently sloping swampy low lands. Surface texture varies from silty clay to clay and subsoils from silty clay to silty clay loam. The soils are slightly eroded and kept fallow under grass cover as they are inundated for significant part of the year. (Typic Ochraqualfs).

Uchekkol Series (U) :

Comprises very deep, imperfectly drained, dark grayish brown soils with faint to prominent mottles, occurring on nearly level swampy low lands. The surface texture is silty clay loam and subsoils are silty clay loam to clay. Ground water-table is met at depths of 100 to 110 cm. The soils are terraced for paddy cultivation (Typic Fluvaquents).

Mamangpat Series (M) :

Comprises very deep, poorly drained, dark grayish brown soils with prominent mottles, occurring on very gently sloping swampy low lands. The surface texture varies from silty clay loam to silty clay and subsoil from silty clay to clay. The soils are mostly terraced for paddy cultivation. (Typic Ochraqualfs).

Sangaipat Series (S) :

Comprises very deep, imperfectly drained, dark gray soils, with faint mottles, occurring on nearly level swampy low lands. Surface texture is clay and subsoils are clay to

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silty clay loam. The soils are slightly eroded and kept fallow under grass cover as they remain inundated for a significant part of the year. (Typic Fluvaquents).

Wangkhoi Series (W) :  
~~Sangkhoi Series (S)~~ :

Comprises very deep, poorly drained, dark gray to very dark gray soils with distinct mottles and underlain by black coloured loamy soils with gleyed condition. They occur on nearly level marshy low lands. The surface texture is silty clay followed by clay on clay loam soil in the bottom. The lands kept idle due to water logging for most part of the year. (Typic Haplaquents).

#### 8.. MAPPING UNITS :

Geomor- phic unit.	Mapping unit.	Soil Series.	Description.	Pre- sent use.	Land capa- bility class & sub- class.	Area (ha)
1.	2.	3.	4.	5.	6.	7.

Meander  
Flood  
plain :

Akapat:  
(A)

Very deep, imper-  
fectly drained, dark  
gray soils, domi-  
nantly fine clayey  
in control section  
(25-100 cm.) on  
A(0-1%) to B(1-3%)  
slopes.

A1A1		Same as above with silty clay surface on A(0-1%) slopes and slightly eroded.	W <sub>1</sub>	IIIw	1.0
A1B1		Same as above with silty clay surface on B(1-3%) slopes and slightly eroded.	W <sub>1</sub>	IIIw	0.2

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1.	2.	3.	4.	5.	6.	7.
	AmB1		Same as above with clay surface on B(1-3%) slopes and slightly eroded.	W <sub>1</sub>	IIIw	2.0
	<u>Uchekkol:</u>					
	(U)		Very deep, imperfectly drained, dark grayish brown soils, dominantly fine clayey in control section (25-100 cm.) on A(0-1%) slopes.			
	UjA1		Same as above with silty clay loam surface on A(0-1%) slopes and slightly eroded.	C <sub>1</sub> (P)	WIw	2.0
	<u>Mamangpat:</u>					
	(M)		Very deep, poorly drained, dark grayish brown soils dominantly fine clayey in control section (25-100 cm.) on B(1-3%) slopes.			
	MjB1		Same as above with silty clay loam surface on B(1-3%) slopes and slightly eroded.	C <sub>1</sub> (P)	IIw	2.0
	MLB1		Same as above with silty clay surface on B(1-3%) slopes and slightly eroded.	C <sub>1</sub> (P)	IIw	1.0
	<u>Sangaipat:</u>					
	(S)		Very deep, imperfectly drained, dark gray soils dominantly clayey			

1.	2.	3.	4.	5.	6.	7.
			in control section (25-100 cm.) on A(0-1%) slopes.			
	SmA1		Same as above with clay surface on A(0-1%) slopes and slightly eroded.	W <sub>1</sub>	IIIw	8.0
		<u>Wangkhoi :</u>				
		(W)	Very deep, poorly drained, dark gray to very dark gray soils, dominantly fine clayey in con- trol section (25- 100 cm.) on A(0-1%) slopes.			
	W1A1		Same as above with silty clay surface on A(0-1%) slopes and slightly eroded.	W <sub>1</sub>	IVw	2.0

#### 9.. INTERPRETATION OF SOIL ANALYSIS DATA :

The analytical data are presented in Appendix - II. By and large soils are heavy in texture. Clay content in the surface ranges between 31 and 51% and in the subsoil between 16 and 61%. In Akampat and Mamangpat series, there is a tendency for the clay fraction to increase with depth; whereas remaining three soil series, it decreases. pH values of soil vary from very strongly acid to strongly acid. Soil acidity however decreases with depth.

Base saturation percentage and cation exchange capacity are low to medium, varying from 53 to 65% and 11 to 26 m.e. per 100 gm. of soil respectively.

Organic carbon in the surface layer ranges between 1.08 and 2.35%. The soils have sufficient reserve of nitrogen for good crop yield. Phosphate status is rather low which necessitates the application of phosphatic fertilizers for improving crop yields.

Further rainfall being high and most of the soils remain under waterlogged condition for a considerable period during the year, effective disposal of excess water through protected drainage channels should be adopted to prevent permanent waterlogging.

#### 10.. INTERPRETIVE GROUPINGS OF SOILS :

Land is evaluated according to potentialities and limitation for sustained production of crops. The interpretive grouping is based on various characteristics that influence the use and management of soils. The soils of the farm area have been grouped under land capability classes and subclasses recognised according to the kind and degree of limitation. The limitations are - risk of erosion (e), wetness, drainage or overflow (w) and root zone limitation (s).

Soils grouped in class I to IV are capable of producing commonly cultivated crops under proper and specific management. Soils under class V to VII are not suitable for agricultural crops but suitable for plantation crops, pasture, farm forestry, etc. Class VIII lands should be kept under permanent vegetation, forest or used for wild life, etc.

The surveyed areas of the farm qualify for capability classes II, III and IV.

Sub-class IIw :

This consists of very deep, imperfectly to poorly drained, fine textured, nearly level to very gently sloping lands. Water accumulates during monsoon. The soil needs protection from possible overflow and out-wash. Soil units UjA1, MjB1 and MlB1 of Uchekkol and Mamangpat series come under this capability unit.

Sub-class IIIw :

Consists of very deep, imperfectly drained fine textured soils occurring on nearly level swampy lands. Cultivation is restricted to crops of semiaquatic nature. Soils have good organic matter in the surface. Drainage and protection from possible overflow at times may be taken care of.

Soil units AlA1, AlB1, AmB1 of Akampat series and SmA1 of Sangaipat series come under this capability unit.

Sub-class IVw :

Consists of very deep, poorly drained fine textured soils occurring on ~~an~~ nearly level ~~many~~ lands. The lands remain under water logged condition for most part of the year. Efficient drainage system to eliminate accumulated water and protection from possible overflow may be taken care of.

Soil unit WjA1 of Wangkhol series is included in this capability unit.

11.. USE AND MANAGEMENT OF SOILS :

Sl. No.	Soil Series.	Mapping unit.	Description.	Present land use.	Land capability class.	Problems and suggested land use, soil conservation measures and cropping pattern, etc.
1.	2.	3.	4.	5.	6.	7.
1.	<u>Akampaty</u> (A)		Very deep, imperfectly drained, dark gray soils dominantly fine clayey in control section (25-100 cm.) on A(0-1%) to B(1-3%) slopes.			
		AlA1	Same as above with silty clay surface on A(0-1%) slopes and slightly eroded.	W <sub>1</sub>	IIIw	1) Water logging, (2) High water table.  Effective drainage system is required to eliminate the accumulated water to reclaim the area. Field terracing with safe disposal drains, cultivation of semi-aquatic crops may be taken up. Caution may be taken in devising cropping patterns due to high water-table. Application of manures and fertilizers depending on the crops is necessary. Soils may respond to liming.

1.	2.	3.	4.	5.	6.	7.
		AlB1	Same as above with silty clay surface on B(1-3%) slopes and slightly eroded.	W <sub>1</sub>	IIIw	Same as in AlA1.
		AmB1	Same as above with clay surface on B(1-3%) slopes and slightly eroded.	W <sub>1</sub>	IIIw	Same as in AlA1.
2.	<u>Uchakkol</u> <del>Vakkol</del> (U)		Very deep, imperfectly drained, dark grayish brown soils, dominantly fine clayey, in control section (25-100 cm.) on A(0-1%) slopes.			
		UjA1	Same as above with silty clay loam surface on A(0-1%) slopes and slightly eroded.	C <sub>1</sub> (P)	IIw	1) Susceptible to flooding.  Elimination of excess run off during monsoon season through safe disposal drains and an effective drainage system to reclaim the waterlogged areas may be considered. Field terracing may also be done. Suitable for

1.	2.	3.	4.	5.	6.	7.
						semi-aquatic crops like, paddy, jute, etc. during kharif and pulses, oil seeds, spices, vegetables, etc. during rabi season. Application of fertilizers and plant protection methods may be followed depending on the type of crops and the nature of pest incidence.
3.	<u>Sanenapat:</u> (S)	Very deep, poorly drained dark grayish brown soils, dominantly fine clayey in control section (25-100 cm.) on 3(1-3%) slopes.				
	MjBt	Same as above with silty clay loam surface on B(1-3%) slopes and slightly eroded.	C <sub>1</sub> (F)	IIw		Same as UjA1. above with slightly intensive soil conservation measures by proper field terracing and safe disposal system for excess runoff and to prevent soil wash.
	WjBt	Same as above with silty clay surface on B(1-3%) slopes and slightly eroded.	C <sub>1</sub> (F)	IIw		Same as in UjA1.

1.	2.	3.	4.	5.	6.	7.
4.	<u>Sangapat:</u> (S)	Very deep, imperfectly drained, dark gray soils, dominantly clayey in the control section (25-100cm.) on A(0-1%) slopes.				
	SMA1	Same as above with clay surface on A(0-1%) slopes and slightly eroded.	W <sub>1</sub>	IIIw		1) Same as ARA1 2) Slightly elevated land in lowlying area. Protect the land by terracing : provide diversion channel to prevent over-flow. Cropping pattern may be rice/jute, etc. during kharif and pulses, oil-seeds, etc. in rabi.
5.	<u>Wangthoi:</u> (W)	Very deep, poorly drained, dark gray to very dark gray soils, dominantly fine clayey in the control section (25-100 cm.) on A(0-1%) slopes.				
	WIA1	Same as above with silty clay surface on A(0-1%) slopes and slightly eroded.	W <sub>1</sub>	IVw		1) Water logging. Efficient drainage system to eliminate accumulated water for reclaiming the land for better use. Semiaquatic crops may be grown with caution.

A E G E E D :

<u>Soil Series</u>	<u>Symbol:</u>	<u>Slope :</u>
Akempat	A	A - Nearly level.
Uch&kkol	U	B - Very gently sloping.
Mamangpat	M	<u>Soil texture :</u>
Sangaiipat	S	j - silty clay loam.
Wangkhol	W	l - silty clay.
		m - clay.

Erosion :

1 - Slight erosion.

Present land use :

W<sub>1</sub> - Waste land fit for cultivation.  
 C<sub>1</sub>(P)- Single cropped - paddy cultivation.

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APPENDIX-I :

## Description of Soil Series.

AKAMPAT SERIES (A) :

Comprises very deep, imperfectly drained heavy soils with high water-table and slow permeability. These are found to occur on nearly level to very gently sloping swampy low lands. The pedons have dark gray fine textured A horizon grading to gray to dark gray fine textured B horizon underlain by gray coloured C horizon. Subsoils are severely mottled. These soils are slightly eroded and kept fallow.

Akampat series comprises members of fine clayey mixed hyperthermic family of Typic Ochraqualfs.

Typifying Pedon : Akampat silty clay.  
( colours are for dry soils unless otherwise noted).

<u>Horizon:</u>	<u>Depth:</u> (cm.)	<u>Description:</u>
A1	0-16	Dark gray (10YR 4/1 a) silty clay; weak medium subangular blocky; moist firm, wet sticky and plastic; few micro pores; common yellowish brown (10YR 5/8) rusty specks; plentiful thin vertical cracks; plentiful fine and few coarse roots; pH 4.7; gradual smooth boundary.
B1	16-52	Gray to dark gray (10YR 4/1, 5/1 a) silty clay; moderate medium angular blocky; moist firm, wet very sticky and very plastic; many medium faint yellowish brown (10YR 5/6) mottles; plentiful thin vertical cracks up to 20 cm. from surface; very few fine roots; pH 4.8; clear wavy boundary.



<u>Horizon:</u>	<u>Depth:</u> (cm.)	<u>Description:</u>
B2tg	52-100*	Dark gray (10YR 4/1 m) silty clay; moderate, medium angular blocky; moist firm, wet very sticky and very plastic; thin continuous clay films on ped faces; many fine faint brownish yellow (10YR 6/8 ) mottlings; many fine roots; pH 4.8; clear smooth boundary.
C1	100-150+	Gray (2.5Y 5/0 m) silty clay loam; massive; moist friable, wet slightly sticky; and slightly plastic; common coarse prominent mottles of yellowish red (5YR 5/8); pH 5.2.

Range in characteristics :

The thickness of the solum is very deep and ranges between 90 to 100 cm. Within the depth from 15 cm. to 100 cm. The clay content varies from 53 to 68%. It is of mixed mineralogy.

The texture of the fine earth in A horizon is silty clay. The colour of the soil in A horizon ranges from dark gray (10YR 4/1) to gray (2.5YR 5/0). The soil colour normally ranges in hues of 10YR and 2.5Y with medium to high value and low chroma for moist soil.

The texture of the fine earth in B horizon varies from silty clay to clay. The clay pick up in form of clay films on ped faces is noticed from the depth of 50 cm. The colour of the soil in B horizon varies from gray to dark gray in hue 10YR with value 4 to 6 and chroma 1 or less. B horizon is heavily mottled with specks of yellowish brown (10YR 5/6) to brownish

yellow (10YR 6/8) colour. The structural development is moderate and major portion of the argillic horizon remains saturated with water for a long period.

Competing series and their differentia :

The competing series is Mamangpat Series. Both the soils are very deep. Coarser fragments larger than 2 mm. within depth of 15 cm. to 1 m. are absent in both the soils. Clay variation in Akampat Series is from 48 to 53 to 68 percent, whereas in Mamangpat Series it is of the order of 48 to 65%. Mamangpat soil is silty in surface and subsurface horizons while Akampat Series is clayey throughout. The colour of the argillic horizon in Akampat soil is in hue of 10YR with medium moist value and low chroma whereas Mamangpat soil, the hue is 2.5Y. Both Akampat and Mamangpat soils are distinctly mottled.

Distribution and extent :

Fairly extensive soil and occupies 16% of the total area.

Drainage and permeability :

Imperfectly drained with slow to very slow permeability.

Use and vegetation :

Under grass cover and occasionally fallow.

Type location :

Sangapat farm area at P.S. Imphal, Central District, Manipur State.

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UCHEKKOL SERIES (U) :

Comprises very deep, imperfectly drained soils found to occur on nearly level swampy low lands. The soil profile exhibits dark grayish brown moderately fine textured A horizon underlain by gray to very dark gray moderately fine to fine textured C horizon with lithological discontinuity. The organic carbon decreases regularly with depth but maintaining at 0.4% at a depth of 1.0 m.

Uchekkol series comprises members of fine clayey mixed hyperthermic family of Typic Fluvaquents.

Typifying Pedon: Uchekkol silty clay.  
(colours are for dry soil unless otherwise noted).

<u>Horizon:</u>	<u>Depth:</u> (cm.)	<u>Description:</u>
Ap	0-12	Light gray (10YR 7/2), dark grayish brown (2.5Y 4/2 m) silty clay loam; puddled; dry very hard, moist firm, wet sticky and plastic; rusty specks of decomposed roots; common fine roots; pH 5.2; gradual smooth boundary.
C1	12-32	Gray (2.5Y 5/0 m) silty clay loam; weak to moderate medium subangular blocky; moist firm; wet sticky and plastic; common coarse prominent mottles of yellowish brown (10YR 5/8) colour; very few fine roots; pH 5.3; smooth boundary.

v

<u>Horizon:</u>	<u>Depth:</u> (cm.)	<u>Description:</u>
G2	32-56	Dark gray (10YR 4/1 m) silty clay loam (gritty); massive, tending to angular blocky; moist firm, wet sticky and plastic; common coarse faint mottles of yellowish brown (10YR 5/6) colour; very soft and small Fe. nodules; very few and fine roots; pH 5.0; gradual smooth boundary.
II G3	56-115+	Very dark gray (10YR 3/1 m) clay (Heavy); massive; moist very firm, wet very sticky and very plastic; pH 5.3.

Range in characteristics :

Soils are very deep. Clay content varies from 29 to 61% within depth 15 cm. to 100 cm. The texture of fine earth in A horizon varies from silty clay loam to silty clay and the colour for moist soil is normally in hue 2.5Y with value from 4-5 and chroma 1-2. The soil colour at some places may come hue 5Y with medium value and low chroma.

The texture of fine earth in C horizon varies from silty clay loam to clay and colour from gray (2.5Y 5/0 m) to very dark gray (10YR 3/1 m). Organic carbon content of C horizon varies from 0.65% to 0.40% and does not decrease below 0.35% at a depth of 1.0 m.

Competing series and their differentia :

The competing series is Sangaipat series. Both the soils are very deep with decreasing clay content. Clay within

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15 cm. to 1 m. depth in Uchekkol series varies from 28 to 61% and from 27 to 44% in Sangaipat series. Silt content in Uchekkol series is relatively higher (26-43%) than the silt content (18-37%) in Sangaipat series. The colour of soil in both cases is normally of 10YR hue with medium moist value and low chroma. Subsoil of Uchekkol series is distinctly mottled whereas the subsoils of Sangaipat series are faintly mottled.

Use and vegetation :

Under paddy cultivation.

Drainage and permeability :

Imperfectly drained with slow to very slow permeability.

Distribution and extent :

Fairly extensive and occupies 10% of the total area.

Type location :

Mamangpat farm area, P.S. Imphal, Central District, Manipur State.

MAMANGPAT SERIES (M) :

Comprises very deep, poorly drained soil developed on alluvium. These are found to occur on very gently sloping swampy low lands, which are mostly terraced for paddy cultivation. The ground water stands very near to the surface. The internal drainage is impeded due to low hydraulic conductivity of the subsoil horizon leading to severe mottlings with low chroma.

The soil pedons have dark grayish brown moderately fine textured A horizon grading to dark gray to gray fine textured B horizon which is severely mottled.

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Mamangpat series comprises members of fine clayey mixed hyperthermic family of Typic Ochraqualfs.

Typifying Pedon: Mamangpat silty clay loam.  
(colours are for dry soil unless otherwise noted).

<u>Horizon:</u>	<u>Depth:</u> [cm.]	<u>Description:</u>
Ap	0-16	Dark grayish brown (10YR 4/2 m) silty clay loam; puddled; moist firm, wet sticky and plastic; 20% decomposed roots of paddy and grass common; pH 4.6; gradual smooth boundary.
B21tg	16-36	Dark gray (2.5Y 4/0 m) clay; massive; <del>massive</del> moist; firm, wet sticky and slightly plastic; many coarse prominent mottles of brownish yellow (10YR 6/8) colour; few fine, few medium roots; thin patchy clay films on ped faces; pH 4.8; gradual smooth boundary.
B22tg	36-86	Gray (2.5Y 5/0 m) clay; massive; moist firm, wet very sticky and very plastic; many coarse prominent mottles of brownish yellow (10YR 6/8) colour; very few, very fine roots; thin patchy clay skin on ped faces; pH 4.8; difused boundary.
B23t	86-114+	Dark gray (2.5Y 4/0 m) clay heavy; <del>massive</del> moist very firm, wet very sticky and very plastic; many coarse prominent mottles of

<u>Horizon:</u>	<u>Depth:</u> (cm.)	<u>Description:</u>
		yellowish red (5YR 4/6) colour; thin continuous clay skins on ped faces; pH 5.2.

Range in characteristics :

The thickness of the solum is very deep and ranges from 110-150 cm. Within the depth of 15 cm. to 1.0 m., <sup>Clay clay</sup> content varies from 42 to 56%. The surface texture of fine earth in A horizon varies from silty clay to clay and the colour in hue of 10YR to 7.5YR with medium value and low chroma.

B horizon is fairly thick and severely mottled with brownish yellow to yellowish red in colour. The texture of the soil in B horizon varies from silty clay to clay and the colour in hue of 5Y to 2.5Y with value from 4 to 5 and chroma 1 or less. The ground water stands at a higher level for longer period of the year.

Competing Series and their differentia :

The competing series is Akampat series. Both the soils are very deep. Coarser fragments larger than 2 mm. within the depth of 15 cm. to 1 m. in both the soils are absent. Clay content varies from 53 to 68% in Akampat soil whereas in Mamangpat soil it varies from 48 to 65%. Mamangpat soil is silty in surface and subsurface horizons and Akampat series remains clayey throughout. The colour of the argillic horizon in Akampat soil is in hue of 10YR with medium moist value and low chroma while in Mamangpat soil, it is in hue of 2.5Y. Both Akampat and Mamangpat soils are distinctly mottled.

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Use and vegetation :

Under paddy cultivation.

Drainage and permeability:

Poorly drained with slow to very slow permeability.

Distribution and extent :

Fairly extensive soil. Covers 15% of the total area surveyed.

Type location :

Manangpat farm area, P.S. Imphal, District Central, State Manipur.

SANGAIPAT SERIES (S) :

Comprises very deep, imperfectly drained soil occurring on nearly level marshy low lands locally known as 'Pat' lands. The pedons have dark gray fine textured A horizon followed by dark gray to gray, fine to medium textured C horizon. Clay content decreases gradually with soil depth. The soils are faintly mottled throughout. The soils are kept fallow under grass cover as they are inundated for significant part of the year.

Sangaipat series comprises members of fine clayey mixed hyperthermic family of Typic Fluvaquents.

Typifying Pedon : Sangaipat clay (fallow).

(colours are for dry soil unless otherwise noted).

<u>Horizon:</u>	<u>Depth:</u>	<u>Description:</u>
	(cm)	
Ap	0-22	Dark gray (10YR 4/1 m) clay; weak medium, subangular blocky; moist firm, wet sticky and plastic; thin vertical cracks, common

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x

<u>Horizon</u>	<u>Depth</u> (cm.)	<u>Description</u>
		fine, prominent mottles of strong brown (7.5YR 5/8) colour; plenty fine roots; pH 4.7; gradual smooth boundary.
C1g	22-65	Dark gray (10YR 4/1 m) clay; weak to moderate medium subangular blocky; moist firm, wet very sticky and very plastic; thin vertical cracks upto 25 cm. depth; common medium faint mottles of yellowish brown (10YR 5/6); plenty fine roots; pH 4.9; gradual smooth boundary.
C2g	65-110	Dark gray (10YR 4/1 m) clay loam; massive to subangular blocky on drying; moist friable, wet slightly sticky and slightly plastic; many coarse faint mottles of brownish yellow (10YR 6/8) colour; few very fine roots; pH 5.0; gradual smooth boundary.
C3g	110-150+	Dark gray (10YR 4/1 m) silty clay loam; massive, tending to subangular blocky on drying; moist friable, wet slightly sticky and slightly plastic; many coarse faint mottles of yellowish brown (10YR 5/8) colour; few very fine roots; pH 5.1.

Range in characteristics :

Soils are very deep. Within the depth from surface to 100 cm. <sup>clay</sup> Clay content ranges between 31% to 58%. The soils are of mixed mineralogy.

The texture of fine earth in A horizon is clay and the colour varies from gray to dark gray in hue 10YR and 2.5Y with medium value and low chroma.

Clay decreases in the depth. The colour of the soil in C horizon is dark gray in hue 10YR with medium value and low chroma. The soil pedons remain moist throughout the year.

Competing series and their differentia :

The competing series is Uchekkol series. Both the soils are very deep with decreasing clay content. Clay in <sup>Uchekkol</sup> Mamangpat series within the depth of 15 cm. to 1.0 m. varies from 28 to 61% whereas in Sangaiapat series it varies from 27 to 44%. Silt content in Uchekkol series is relatively higher (26-43%) than the silt content (18-37%) in Sangaiapat series. The colour of soil in both cases is normally in hue of 10YR with medium moist value and low chroma. Subsoils of Uchekkol series is distinctly mottled while the subsoil of Sangaiapat series is faintly mottled.

Use and vegetation :

The soils are left fallow under grass cover as they are inundated for significant part of the year.

Drainage and permeability :

Imperfectly drained with slow permeability.

Distribution and extent :

Occupies only 34% of total surveyed area.

Type location :

Sangaiapat farm, P.S. Imphal, District Central,  
State Manipur.

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WANGKHOI SERIES (W) :

Comprises very deep, poorly drained gleyed soil developed under hydromorphic condition on nearly level marshy low lands locally known as 'Pat' land. There are mottlings throughout the pedon and the clay content after having a little increase in B2g horizon decreases with depth. The soil pedons have dark gray to very dark gray fine texture A horizon grading to black fine textured B horizon underlain by olive gray to gray medium to moderately coarse textured C horizon. The soils are slightly eroded and remain idle as they are under waterlogged condition for most part of the year.

Wangkhoi series comprises members of fine clayey mixed hyperthermic family of Typic Haplaquepts.

Typifying Pedon : Wangkhoi silty clay.

(colours are for dry soil unless otherwise noted).

<u>Horizon:</u>	<u>Depth:</u> (cm.)	<u>Description:</u>
A1	0-16	Dark gray to very dark gray (5Y 4.5/1 m) silty clay; weak medium subangular blocky; moist firm, wet slightly sticky and slightly plastic; mostly specks of reddish brown (5YR 4/4) colour; plenty fine roots; pH 4.9; gradual smooth boundary.
B2g	16-52	Black (2.5Y 5/0 m) clay; weak to moderate medium subangular blocky; moist firm, wet sticky and plastic; many fine mottles of reddish brown (5YR 5/4) colour; plenty very fine roots; pH 5.1; gradual smooth boundary.

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<u>Horizon:</u>	<u>Depth:</u> (cm.)	<u>Description:</u>
B3g	52-90	Black (2.5Y 5/0 m) clay; weak to moderate medium subangular blocky; moist firm; wet very sticky and very plastic; many fine prominent mottles of reddish brown (5YR 5/4) colours; few very fine roots; pH 5.2; gradual smooth boundary.
C1g	90-121	Olive gray (5Y 5/2 m) loam; weak medium subangular blocky; moist friable, wet slightly sticky and slightly plastic; many fine distinct mottles of yellowish brown (10YR 5/4) colour; root nil; pH 5.2; clear smooth boundary.
C2g	121-150+	Gray (5Y 5/1 m) sandy loam; massive, moist friable, wet nonsticky and nonplastic; few fine faint mottles; pH 5.1.

Range in characteristics :

The thickness of the solum ranges from 90 to 100 cm. Clay content throughout the depth of 15 to 100 cm. ranges from 49 to 58%. The structural development of the solum is moderate and it is very distinct in B2g horizon.

The texture of the fine earth in A horizon varies from silty clay to clay. The soil colour is in the hue of 5Y with value #4-5 for moist soil and chroma 1 or less.

The texture of the fine earth in B2g horizon is clay with moderately developed structure. The colour of the soil is

in hue of 2.5Y with medium moist value  $m\dot{a}$  and low chroma. B2g horizon is severely mottled with distinct mottlings of reddish brown colour. The texture of the underlying C horizon varies from loam to sandy loam with colour in hue of 5Y having value 4 to 5 and chroma 1 to 2. C1g horizon is severely mottled with distinct mottlings of yellowish brown colour.

Competing series and their differentia :

Nil.

Distribution and extent :

Not a very extensive soil; occupies 10% of the total area surveyed.

Drainage and permeability :

Poorly drained with slow permeability.

Use and vegetation :

Waste lands as they are under waterlogged condition for most of the year.

Type location :

Sangaipat farm area, District Central, Imphal, Manipur State.

APPENDIX II :  
ANALYTICAL DATA OF SOIL SERIES:  
Percentage constituents on oven dry basis.

Sl. No.	Soil Series.	Depth (cm.)	Gravel 2mm. (1:2.5)	pH	Organ. carbon.	Mech. Composition Sand.	Silt.	Clay.	C.E.C. m.e.	T.E.B. m.e.	Base saturation.	W.H.C.	Moist equiv- alent.	Av. Nutrient N. P <sub>2</sub> O <sub>5</sub> K <sub>2</sub> O		
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.
1.	<u>Akumpat:</u>	0-16	Nil.	4.7	2.35	29.9	28.9	50.2	21.04	11.2	53.2	60.98	26.96	M	L	M
		16-52	"	4.8	1.40	10.9	35.9	53.2	24.80	13.2	53.2	63.11	29.72			
		52-100	"	4.8	1.14	4.9	27.9	67.2	26.08	14.4	55.2	48.15	22.20			
2.	<u>Uohekkoi:</u> <u>Mauangpatat:</u>	0-12	Nil	5.2	1.08	22.2	42.1	35.7	16.80	10.08	60.0	45.13	20.27	M	L	M
		12-32	"	5.3	0.68	33.2	37.1	28.7	13.60	8.40	61.7	40.87	17.42			
		32-56	"	5.0	0.60	35.2	36.1	28.7	15.68	8.80	56.1	39.61	17.06			
		56-115+	"	5.3	0.40	12.2	27.1	60.7	25.60	15.20	59.3	66.23	31.19			
3.	<u>Mauangpat:</u>	0-16	Nil	4.6	2.26	21.4	47.4	31.2	14.40	7.20	50.0	41.42	18.53	M	L	M
		16-36	"	4.8	1.14	15.4	36.4	48.2	18.68	10.08	53.3	60.14	27.91			
		36-86	"	4.8	0.72	26.4	27.4	46.2	19.20	10.56	55.0	58.34	26.57			
		86-140	"	5.2	0.42	12.4	23.4	64.2	26.08	15.60	59.8	65.82	30.08			

ANALYTICAL DATA OF  
SOIL SERIES:

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.
4.	<u>Sangaiat:</u>	0222	Nil	4.7	1.80	24.2	18.1	57.7	24.80	13.60	54.8	63.72	30.17	M	L	M
		22-65	"	4.9	0.63	19.2	37.1	44.7	20.80	11.60	55.7	57.81	28.25			
		65-110	"	5.0	0.30	55.2	19.1	30.7	11.20	7.20	64.2	34.68	14.30			
		110-150	"	5.1	0.23	37.2	36.1	26.7	12.80	7.68	60.0	42.28	18.52			
5.	<u>Wangkhai:</u> <u>Sangaiat:</u>	0-16	Nil	4.9	2.67	21.9	28.9	49.2	21.04	11.60	55.1	59.57	27.28	H	L	M
		16-52	"	5.1	1.08	17.9	23.9	58.2	25.20	14.80	54.8	64.80	31.12			
		52-90	"	5.2	0.40	27.9	21.9	50.2	22.40	13.60	60.7	61.44	28.09			
		90-121	"	5.2	0.22	60.9	13.9	25.2	11.20	7.20	64.2	30.39	13.52			
		121-150	"	5.1	0.21	2.9	10.9	16.2	10.40	6.80	65.4	25.88	10.62			

C.E.C. = Cation exchange capacity. T.E.B. = Total exchangeable bases.  
H - High, M - Medium, L - Low. W.H.C. = Water holding capacity.

PARTICIPANTS:

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|-------------------------|--|
| 1. Sri S. Digar         | Chief Scientist (Soil<br>Correlation). |
| 2. Sri Arun Kumar Dutta | Scientist S-2 (Soil<br>Correlation).   |
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| 6. Sri K.C. Dutta       | Jr. Soil Surveyor.                     |

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CENTRAL DISTRICT.

MANIPUR STATE.

