

No. : 21



# technical bulletin

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DEPARTMENT OF AGRICULTURE,  
GUJARAT STATE, AHMEDABAD-6

**Soil survey of  
Palsana Taluka  
District Bulsar.**

SEMI - DETAILED SOIL SURVEY OF PALSANA TALUKA  
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DISTRICT BULSAR.  
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Object

Semi-detailed soil survey in Palsana taluka was undertaken with a view to study the soil characteristics in details and classify the areas into land capability classes of potential irrigable areas and the rest in a general way i.e. Reconnaissance survey and to show their boundaries and extent on map. The data helps in locating potential areas for Intensive Agriculture as well as problematic areas for taking up varied developmental programmes viz. irrigation management, drainage and soil and moisture conservation.

Chapter - 1

General description of the Area

1.1. Location and extent :

Palsana taluka is located in the East of Surat with an elevation ranges of 10-29 mtrs. from West to East. The area lies between 73° - 0' to 73° - 5' E Longitude and 21° - 1' to 21° -11' N Latitude. The area of the taluka is 19,845 hectares having a population of 41,807 ( 1961 census ) covered in 50 villages. The principal crops grown are Cotton, Paddy, Banana, Sugarcane, Jowar and vegetables.

1.2. Physiography, relief and drainage :

Physiographically the area reviewed can be broadly divided into lower (piedmont) plain, valley floor and natural levees of the river Mindhola. The lower piedmont plain generally runs with a very gentle slope (1-3%) being intervened with local depressions and moderately undulating eroded natural levees along the river Mindhola. The valley floor is almost flat (0-1%) to very gently sloping 1-3% comprises of local and sporadic depressions infilled with recent and old deposits by the aggradation processes of river on old marine as well as river terraces. Mindhola flows sluggishly right to left across its valley floor to meet the Arabian sea. The natural levees along the bank of the river are usually undulating to rolling (3-8%) suffering from severe erosion hazard. The water table normally remains 8-10 mtrs. below the surface but due to introduction of canal irrigation the water table at present remains 2-3 mtrs. during the major part of the year.

The general relief of the major part of the area is normal and sub-normal on mildly sloping up lands on uniform flat areas respectively.

The general drainage pattern of the streams and rivulets feeding Mindhola is of dendritic to sub-dendritic.

1.3. Geology of the area :

The Geology of the area comprises of sedimentary deposits of Deccan trap (Basalt) material of lower cretaceous period brought down from the upper reaches by the rivers and streams. Although the rock bed is not observed in the area however the flow is characterised by amygdales varying from rounded in shape and infilled with secondary minerals like quartz, mica flakes, zeolite and calcite etc.

Inter-trappean partings of two to ten feet thickness representing lacustrine or fluviatic deposits may have been formed in the depressions in the then configuration of trappean land during the intervals of time lapsing between eruptions of successive lavas.

Net works of dykes varying in thickness are found intruding the different lave flows.

Overlaying the traps, rocks of tertiary age are spread in gentle undulating over a large portion in the west. They comprise sandy, impure, numulitic fossiliferous lime stone resting on lateritic clays and are concealed by alluvium. Gravels, grift, sandy clays, shales and white to brown coloured sand stones are commonly observed.

1.4. Climate :

The climate of the area is tropical monsoonic type characterised by three well defined seasons viz. Monsoon, Winter and Summer. The month wise distribution of rainfall in mm. and monthly temperature data average of five year are reproduced below (Recorded at Palsana, 1963-1967).

Table No. 1

	Jan.	Feb.	March.	April.	May.	June.	July.
Rainfall (mm).	-	1.0°	5.5°	-	-	171.15	613.25
	Aug.	Sept.	Oct.	Nov.	Dec.	Total.	
	283.5°	153.5°	5.0°	6.8°	-	1239.70 (49.60")	

The distribution of Rainfall is indicated in the following Table.

	March to May	June to Sept.	Oct. to Nov.	Dec. to Feb.
Rainfall in (mm).	5.5°	1221.4°	11.8°	1.0°

It is observed from the above table that 97.1% of the mean annual rainfall is received in monsoon season extending from June to September, the showers received during a span of 65 to 67 days. There is a wide variation in the distribution of rainfall and total number of rainy days but half of the total precipitation is received in the month of July and August.

Table No. 2 ( in °F )

January.		February.		March.		April.		May.		June.	
Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
91	53	89	64	97	67	99	67	101	71	96	77
July		August		September		October		November		December	
Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
87	75	86	75	87	71	96	70	93	64	87	53

<u>Average in °F</u>		
Max.	Min.	Min.
92.0 or 33°C	68.0 or 20°C	

From the Table No.2, it is observed that the temperature begins to rise onwards from March month; April and May months are the hottest months of the year. The mean maximum temperature in these months ranges from 99°F to 101°F and above. With the onset of the monsoon in the month of June (second week of June), there is a considerable fall in temperature which continues till September. Again the temperature considerably shoots up in the month of October. With the onset of winter, there is again a fall in temperature and remains same till February. A mean minimum temperature ranging from 52°F to 64°F and mean maximum temperature from 87°F to 91°F are recorded during December to February months. Generally December and January are the coldest months of the year with a mean minimum temperature of 53.0°F.

The diurnal variation of temperature is maximum in the winter months, the mean being 32°F. While the diurnal variation in temperature is less in Monsoon months the mean being 14°F.

#### 1.5. Natural vegetation :

There is no natural forest area in Palsana Mahal, however the present natural vegetation consists of tropical moist deciduous species viz. *Ficus bengalensis* (Banyan tree); *Ficus religiosa* (Pipal); *Tamarindus indica* (Amali); *Mangifera indica* (Mango); Besides there are many Biotic species like *Acacia arabica* (Dabul); *Azadirragta indica* (Neem) etc. Among the grasses the following are observed extensively *Cynadon dactylon* (Dharo); *Sachharam spontaneum* (Dabha); *Cyperus rotandus* (Chido); *Dicanthium annulatum* (Zinzavo); *Cenchrus ciliaris* (Mosi) etc. Most of them are of Bio-edaphic nature.

### Chapter - 2

#### Present land use and Socio economic features.

2.1. Present land use :- In the surveyed area of 19,109 hectares about 75% of the total land is under cultivation whereas the rest under permanent grass and waste land under canal, road, and village site etc. Distribution of land under different uses in the Mahal is given as below :-

<u>Sr.No.</u>	<u>Land use</u>	<u>Area in hectares</u>	<u>%</u>
1	cultivated land	15,100	75
2	Permanent grass	3,900	16
3	Fallow and miseleneous (Roads, canal, villages site etc.)	0,845	09
	Total...	19,845	

Broad distribution of cultivated crops in the area are as under in hectares.

<u>Name of crop.</u>	<u>Kharif</u>	<u>Rabi</u>	<u>Premonial</u>
Cotton	4,098.00	-	-
Jowar	2,519.00	202.00	-
Paddy	1,629.00	-	-
Banana	2,394.00	-	-
Groundnut	1,167.00	-	-
Sugarcane	710.00	-	-
Pulses	430.00	-	-
Vegetables	-	185.00	-
Horticultural crops	-	-	202.00
Wheat	-	525.00	-
Beans	-	933.00	-
Castor	-	49.00	-
Fodder crops	-	60.00	-
Species and condiments	-	77.00	-
	<u>12,947.00</u>	<u>2,031.00</u>	<u>202.00</u>

2.2. Revenue classification of lands :- Revenue classification of lands in the Mahal is given in Table No.3 below :-

Revenue classification of soils and land use  
(District Gazetteer of Surat, Revised edition).

<u>Sr. No.</u>	<u>Revenue classes.</u>	<u>Description</u>	<u>Land use</u>
1	Kali jamin or Black Cotton soil	Dark brown to very dark greyish brown, high clay and silt contents, very retentive of moisture and cracks very heavily in winter and summer, mostly flat, lime nodules present (calcareous soil). These soils are generally not ploughed every year, but are harrowed twice or thrice.	Mainly under kharif crops viz. Paddy in low lands, Cotton, Jowar and Sugarcane, Banana on uplands. Rabi crops viz. Beans, Wheat & vegetables.
2	Gorat land or Goradu jamin.	Occurs mostly on the banks of the river approximately one half to one mile on both the sides, deep, fertile and have less clay and silt. Lime nodules present (calcareous soil).	Mainly suitable for cereals, Banana, Sugarcane, Horticultural crops and Oil seeds. Eroded natural levees are suitable for permanent grasses.

2.3. Irrigation :- The major area is irrigated by Kalrapar irrigation system and about 2000 hectares are irrigated annually through canal. Wells and ponds which comes to about 2000 of the total cropped area.

## 2.4. General Agriculture :

### 2.4. (i) Agronomic practices, Main crops :-

**Cotton** :- Cotton occupies the maximum area under cultivation by virtue of favourable climate and suitable soil conditions. The land is prepared by summer harrowing 3-4 times and application of F.Y.M. at 20-25 cart loads per hectare. The cotton seed is sown at the rate of 8-12 kgs. per hectare with a wooden seed drill with the onset of rains i.e. in June. The distance between two rows is kept at 2-1½ mtrs. When the crop is about a month and half old and when the rains are not severe thinning is carried out and the space between two plants is kept about 1 meter, 3-4 weedings followed by interculturing with wooden blade harrow are carried out. The harrowing ceases by October end or first week of November and pickings commence from February. The crop is over by March end in 3-4 pickings recurring after every fortnight. The average yield of seed cotton is about 500 kgs. per hectare. Among the pests, weedy mites is a common occurrence and gets rid off under clear weather. The attack of spotted and pink boll worms is periodical. Progressive cultivators apply Super Phosphate and Nitrogenous fertilizers at a doze of 60 kg. N<sub>2</sub> and 40 kg. P<sub>2</sub>O<sub>5</sub> per hectare. Atleast one irrigation by October and or first week of November is given where irrigation facility is available.

**Jowar** :- Jowar is a staple diet of the taluka and is grown in kharif season. The land for Jowar is harrowed twice or thrice with a wooden harrow during summer in May and June. F.Y.M. at the rate of 12 cart loads per hectare is applied and the land is harrowed. Prior to sowing green manuring with sann (*crotalaria juncea*) is also followed. The seed rate of sann seed is 75 kgs. per hectare. The crop is ploughed under by August 15th and Jowar is sown subsequently. Jowar is sown in lines about 1 metre apart with the help of wooden drill in the month of August. When the crop is about a ½ or ¾ metres in height it is thinned out and spacing between the plants is maintained upto ½ metre. During the growth 2-3 weedings and 3-4 interculturings are attended. No serious pest and disease are observed except Mites in isolated patches which turn the leaves red. The crop is ready for harvest by January end or first week of February. Watching from sparrows and other birds is the main operation when the crop is ripening. The progressive cultivators apply a doze of Urea 25 kgs. Nitrogen per hectare. The yield is 825-1000 kgs. per hectare. Fodder is relished by cattle.

**Paddy** :- Transplanted paddy is raised in the Kyaries already prepared. Seedlings are raised in a seed bed, well cleaned, pulverised and manured with 20-25 cart loads of F.Y.M. per hectare and the seed rate used is 35 kgs. per hectare and is broadcasted during June. The seedlings are top dressed with fertilizer like Urea when the rainfall is adequate. The seedlings are ready for transplanting in about three weeks. The field meant for planting is applied with 20-25 cartloads of F.Y.M. and harrowed with wooden harrow to mix the manure prior to transplanting then it is puddled with a deshi plough and transplanting of seedlings is carried out with 4-6 seedlings in one bunch with a spacing of 20 cms. apart either in lines 25 cms. apart or at random by hand. Some of the progressive cultivators apply Super-Phosphate before puddling and Sulphate of Ammonia or Urea as top dressing. The doze advocated is 60 kgs. N<sub>2</sub> and 40 kgs. P<sub>2</sub>O<sub>5</sub> per hectare. 3-4 weedings are carried out during the period of growth. If the monsoon break is prolonged irrigation from pond or canal or well is resorted to. The crop is ready for harvest from middle of October to 2nd week of November. The average yield of paddy is 1250-1500 kgs. per hectare. No serious pest or disease occur except army worms or gallfly

and insecticides are sprayed to control the same. High yielding varieties viz. Massori, I.A.R.8 and Formosa-3 are also raised. With increased facility of irrigation more lands are brought under paddy.

Groundnut :- The crop is grown in kharif season as a rotational crop with cotton and Jowar in light soils as a cash crop and to check soil erosion. The land is prepared by 2-3 harrowings with a wooden blade harrow. F.Y.M. at the rate of 12 cartloads per hectare is applied and harrowed. The seed is sown in July with the help of wooden seeddrill at a metre apart. The seed rate adopted is 60 kgs. per hectare. During the growth 2-3 weedings followed by interculturing are attended to. It is a leguminous crop and enriches the soil. The fodder is very much relished by cattle.

Sugarcane (Saccharum officinarum) :

Sugarcane crop was raised scattered for gul making previously. With the introduction of Kalrapar canal irrigation the crop is widely grown and occupies an eminent position as a cash crop under the nurture of the co-operative Sugar factories commissioned in the area, as evidenced by the increased area.

Sugarcane crop is grown on fertile heavy as well as medium heavy to lighter soils. For heavy soils, drainage is a prerequisite. Shallow soils are not suitable for the crop. The climate of the area is suitable being sub-tropical humid and the normal rainy season is not prolonged. In the South Gujarat where the rainfall is heavy the crop is likely to fall in yield and quality. The dry warm climate with mild winter favours the crop growth and sugar buildings. In November when the kharif crop is harvested the land is prepared by deep ploughing frequently 7-8 times with country plough or tractor to obtain a good tilth and furrows are opened with the ridger at a distance of 1.25 metre apart and 0.25 to 0.40 metre deep to plant the canes for winter plantation (preseasonal). F.Y.M. at the rate of 50 tons per hectare and Super phosphate 750 kgs. and 250 kgs. of muirate of Potash is applied in furrows and ploughed under followed by light irrigation. Generally the plantation is carried out from January to March and extended upto April also, however the plantation period is fixed from November to March so as to keep the factory running from December to April. The popular mill cane is co.419. The cane setts having three healthy eye buds  $1\frac{1}{2}$ ' long previously dipped in insecticidal solution of lime and andrex are planted in furrows alongwith irrigation and 250 kgs. Sulphate of Amonia per hectare. The germination takes place within 20-25 days. About 30,000 setts are required per hectare. The fertilizers are scheduled as follows :-

- (1) 75 kgs. of  $N_2$  - after  $1\frac{1}{2}$  to 2 months of plantation.
- (2) 50 kgs. " - after 3 to 4 " "
- (3) 87.5 " - at the time of earthing up operation.

Three to four weedings are necessary and sound earthing up operations are necessary to keep the cane erect. During the monsoon care should be taken not to develop waterlogged conditions. About 20 irrigations are necessary. The crop is ready for harvest in about 11 to 13 months. The crop yield varies from 50 to 80 tons per hectare. No serious pests occur except shoot borers in April and Pyrilla in monsoon and for their control andrex and sevin are used. Ratoon crop yields  $\approx$  30 to 40 tons per hectare, one year ratoon is favourable.

**Banana** :- Banana occupies a favourable position as a cash crop under irrigated conditions. Sub-tropical humid climate of the area is conducive for the growth of the area. The soils most suited are loam, sandy loam and clay loam however in clay soils with adequate drainage facilities the crop is also grown. The crop yields highest in well drained loam soils which is fertile. The land is manured with the application of F.Y.M. 75 tons per hectare and is thoroughly ploughed under with country or a tractor plough. The variety grown in this tract is Basrai and the healthy suckers are imported from West Khandesh and planted of 2 x 2 metres apart with the onset of rains. About 2000 suckers per hectare are required. During the rainy season the crop is intercultured with wooden harrow to smother the weeds and gap filling is attended. After the rains, the adjacent daughter suckers are removed, beds prepared and fertilizers and cakes, Super Phosphate and muriate of potash are applied followed by irrigation. Approximately 200 kgs. of N<sub>2</sub>, 200 kgs. of P<sub>2</sub>O<sub>5</sub> and 400 kgs. of K<sub>2</sub>O per hectare are applied. Except periodical removal of daughter suckers and dry leaves and two to three weeding there are no other operations. In all about 20 to 22 irrigations are required, practically one irrigation every week. The crop is ready for harvest from 11 to 13 months of plantation and yield varies from 20,000 kgs. to 40,000 kgs. per hectare.

#### 2.5. Socio Economic features :

2.5.(i) Occupation :- The main occupation of the population in Palsana Mahal is farming supplemented by dairying. Majority of the rural population depends on Agriculture. The cultivated crops viz. Cotton is grown extensively while Jowar, Paddy and Groundnut come next in kharif season while Beans, Wheat and vegetables are grown in rabi season in lesser extent. Banana crop occupies a remarkable area in the Mahal i.e. about 13% of the total area. Marketing of Agriculture produce is done through Co-operative sale and Purchase union. Agriculture finance, fertilizers, pesticides and improved seeds are catered through the Co-operative societies.

There are nearly 2,210 cultivators possessing land upto 2 hectares, 1,457 cultivators have 2 to 6 hectares, 370 cultivators have 6 to 10 hectares, 321 cultivators have 10 to 40 hectares and 5 cultivators have 40 to 200 hectares of land. In all 4,373 cultivators possess either khalasa or inam lands in the Mahal.

2.5.(ii) Communication and Transport :- The Palsana being the Mahal H.Q. is connected by a pucca road only. Eastern Railway passes through the Mahal. Chalthan, Bagumara and Gangadhara are the railway stations. National High way No.8 (Bombay-Delhi Road) and Eastern High Way (Surat-Dhulia Road) passes through the Mahal. Generally Buses ply in fair weather only, as most of the interior link roads are unmetalled.

2.5.(iii) Industries :- In the surveyed area, there is no major industry, but Dimond cutting and facing, Saw mills, Paper mill, Lathe industries, Rice mills, Cotton ginning factories and Bone crusing mill are developed at Gangadhara and Chalthan. Recently at Chalthan Co-operative Sugar factory and cattle feed factory have come up and they will help a good deal in engaging the rural population.

2.5.(iv) Health service & Education facility :- Medical facilities are available only at Taluka H.Q. and fairly big villages. All the villages have Primary schools and few have Secondary schools. College education is only available at Surat/Navsari and Bardoli.



Chapter - 3Soils of the Area3.1. Method of Soil Survey :

Detailed Reconnaissance Soil Survey of the area was conducted as per instructions laid in the Soil Survey manual to map the soils of the area partly by Detailed Soil survey and the rest of the area by Reconnaissance soil survey using cadastral maps and toposheets No.46 C116 & G114 of 1" = 1 mile as base maps respectively for different survey methods.

For detailed soil survey field study includes deep bores and profile pits for classification into soil series level on the basis of similarities in the profile characteristics, texture, structure, colour, consistency the presence of concretions and other morphological features were noted. Soil series are further sub-divided into soil types on the basis of difference in the texture of the surface soils. The mapping units on the cadastral maps are however "soil phase" which are sub-division of soil types. Each mapping unit is shown on the map by a symbol indicative of soil series namely surface texture, depth, slope and erosion. For example Jal C-d5/B-e1 stands for Jalalpur (Jal) series with clay(c) surface texture, very deep(d5) soil occurring on very gently sloping (B) and very slightly eroded(e1) land. Cadastral maps in the scale 8"=1 mile were used as base maps. Boundries of different phases of soil types in the area were drawn by systematic traverses of 1/8 to 1/4 km and examination of soil by frequent auger bores and profile pits at every 200 to 300 acres. The location of different kinds of soils in the surveyed villages can be read on the soil maps supplied in the original scale with village wise data of the area of various types of soil classified and delineated their extent and boundries. While the remaining area is covered under Reconnaissance soil survey conducted as per all India standard soil survey. Traverses were made along the available roads according to variation of topography and contour interval following the permanent reference points such as tanks, temples, sharp bends of road and river etc. as indicated on the base map. During the traverses auger bores were taken for spot sampling which were examined at frequent intervals. Profile pits were dug upto 6' depth following the change in morphological characteristics. At the site of the pit important features viz. slope, depth of soil, erosion, water table were noted for probable soil unit for series. Soil profiles thus examined were grouped into soil series or associations according to the morphological characteristics and delineated their extent and boundries on the map.

3.2. Soil Classification :

The overhead climate and vegetation remaining more or less same, change in the topography modifying soil climate and also variation in the depth of water table according to toposequences and also the parent materials seem to have influenced differential soil development in the area as evinced by variagated profile expressions. According to physiography in relation to drainage pattern and the same parent material the soils are classified into the following geomorphic units and sub-units.

- I. Soils of the lower piedmont plain with - Older alluvium, -alluvial clay. local shallow depressed topography.
- II. Flood plain -
- |  |  |
|--|--|
| (i) old aggraded flood plain   | -(i) Recent alluvium, -alluvial clay.            |
| (ii) valley floor of Mindhola river & moderately undulating eroded natural levees. | -(ii) Recent alluvium, -alluvial loam. ....9.... |

Table - 3  
Classification of soils of Palsana Taluka

Sr. No.	Soil series	Soil family	Sub-group	Great group	Sub-order	Order
1	Jalalpur	Jalalpur (deep, fine, montmorillonitic slightly alkaline, slowly to very slowly permeable, hyperthermic) Vertic ustochrepts.	Vertic-ustochrepts	Ustochrepts	Ochrepts	INCEPTISOLS
2	Sisodra	Sisodra (deep, fine montmorillonitic, slowly permeable neutral to slightly alkaline, hyperthermic), Deep vertic ustochrepts.	Vertic-ustochrepts	Ustochrepts	Ochrepts	INCEPTISOLS
3	Kabilpur	Kabilpur (deep, montmorillonitic, calcareous, moderately alkaline, ruptic, hyperthermic) Deep vertic ustochrepts.	Vertic-ustochrepts	Ustochrepts	Ochrepts	INCEPTISOLS

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The soils of the above geomorphological units are described as below:

I. Lower piedmont plain :-

(a) Older alluvium - Alluvial clay :

The soils of the lower plain are generally older alluvium underlain by yellowish coloured calcareous material commonly known as 'Black cotton soils of India', generally run on a very gentle slope (1 to 3%). The colour ranges from very dark brown, dark brown, and very dark greyish brown. The soils are deep and below 90 to 150 cms. yellow soils with carbonates are met indicative of the soils laid on marine terraces. The soils are clayey and shrinks and cracks widely upto 2 to 5 cms. and deep upto 100 to 150 cms. resulting in gilgai micro relief and local shallow depressions with the changes in moisture. Under this group clay, clay loam, and silty clay are met in plain areas and are grouped under alluvial clay. Jalalpur series occur in this unit.

II. Flood plain :-

(i) Soils of old aggraded flood plain - Recent alluvium - alluvial clay.

These soils are deep, moderately drained dark brown to brown soils formed in new alluvium laid along marine terraces by river Mindhola. These soils are found to occur near river or Nala banks on flat to very gently sloping midlands and aggraded flood plain or river terraces with gradient 0 to 1 and 1 to 3%. The soil is heavy in upper part but medium in lower part. The soils crack vertically upto 120 cms. Under this group, silty clay, clay and clay loam are met and are grouped under alluvial clay in plain areas. Sisodra series occur in this unit.

(ii) Soils of valley floor and natural levees - Recent alluvium - alluvial loam.

Along the river Mindhola these soils are formed on the valley floor and natural levees and nala banks which are of recent alluvium and inter-layered with fine sand, gravels etc. at a variable depth. The colour of these soils is dark yellowish brown. These soils do not crack much as these are permeable soils. These soils occur on moderately undulating, rolling topography (3 to 8 % slope) and severely eroding clay loam, silty loam and loam are met in this physiography and grouped under alluvial loam. Kabilpur series occur in this unit.

3.3. Soil Series : -

The following series/associations are tentatively identified and mapped as per their physiographic situation and their distribution in hectares run as below :-

<u>Physiography</u> Geomorphological units and sub- units.	Description	Mapping unit.	Name of soil series.	Area in Reconn- aissance Soil survey	hectare Detail- led soil survey	% of total
I Lower Piedmont plain	Plain to concave relief & local basin type topo- graphy - older alluvium.	Jal. Jalalpur		10,147.00	2,433.00	65
II Flood plain & Natural levees	i) Very gently sloping old aggraded flood plain. Recent alluvium.	Sdn. Sisodra		201.00	1,769.00	10
	ii) Natural levees representing undulating valley floor- recent alluvium	Kbw. Kabilpur		2,907.00	1,923.00	23
	Miscellaneous land use (Detailed soil survey) viz. village site, roads etc...	-	-	-	0,465.00	02
	Total...			13,265.00	6,590.00	100

Tentative SeriesJALALPUR SERIES.

Jalalpur series includes deep to very deep moderately drained clayey soils occurring on nearly to very gently sloping mid land situated with gradient ranging from 1 to 3 percent developed on old alluvium laid on marine terraces. The colour changes from very dark grayish brown to dark yellowish brown throughout the profile. Lime concretions, ferruginous concretions and basalt gravels are found and increases along with the depth of the profile. The ground water table is fairly high near canal area and fluctuates considerably during wet and dry season affecting soil conditions. These soils had been classified as "deep black soils" in India. The climate is subhumid having annual temperature ranging from 20°C to 33°C with mean annual precipitation of 1239.70 mm. received as monsoonic rains.

The associated soils are Eru soils which are deep vertisols. Mandir and Bodali soils are deep Entisols developed on new alluvium laid on marine terraces.

These soils crack vertically upto the depth of 120 to 140 cms. Jalalpur series comprises members of very fine, montmorillonitic, hyperthermic vertic ustrocrept (INCEPTISOLS).

Typifying pedon:- Jalalpur clay in cultivated fields

(colour notations are for dry soils unless otherwise noted).

- Ap. 0-32 cms Dark brown (10 yR 3/3M) and very dark grayish brown (10 yR 3/2M); clay; coarse columnar blocky breaks into medium subangular blocky peds; lime concretions (1-2 mm) few giving slight to moderate effervescence with dil. HCl; dry hard, moist firm wet sticky; fine roots plentiful clear and smooth boundary; pH 8.0.
- B1 32-107 cms Very dark grayish brown (10 yR 3/2M); clay; medium moderate subangular blocky peds with shining ped faces; lime concretions (1-2 mm) few giving slight to moderate effervescence with dil. HCl; dry hard, moist firm, wet sticky and plastic; few fine dark ferruginous concretions clear and smooth boundary; pH 8.2.
- B2 107-122 cms Dark brown (10 yR 3/3M); clay; medium moderate subangular blocky peds with shining slickenside ped faces; lime concretions (1-2 mm) few, giving slight to moderate effervescence with dil HCl dry very hard, wet sticky and plastic, moist firm gravels of basalt 1-2 mm few fine dark ferruginous concretions; clear and smooth boundary; pH 8.2.
- B2 2 122-146 cms Dark brown (10YR 3/3M) gravelly clay; medium moderate subangular blocky peds with shining slickenside ped faces; lime concretions (1-2 mm) few, giving slight to moderate effervescence with dil HCl; dry very hard, wet sticky and plastic, moist firm; gravels of basalt 1-2 mm. few fine dark ferruginous concretions; clear and smooth boundary; pH 8.2.
- B2 2 122-146 cms Dark brown (10yR 3/3M); gravelly clay; medium moderate subangular blocky peds with shining slickenside ped faces; lime concretions (2 to 5) many, with strong to violent effervescence with dil HCl dry very hard, moist firm, wet sticky and plastic; few fine dark ferruginous concretions difference and smooth boundary PH 8.2.
- B1 148-182 cms Dark yellowish brown (10yR 3/4 D and M) clay; massive lime concretions (2 to 5 mm) abundant; violent effervescence with dil. HCl dry hard, wet sticky, moist firm, pH 8.5

Range in characteristics

Solum thickness ranges from 120 to 150 cms. The dominant soil types are clay, silty clay and clay loam. The clay content in the control section ranges from 45 to 55 per cent predominantly of montmorillonitic mineralogy with low O.M. The content of the CaCO<sub>3</sub> increase along with the depth and in C horizon comprising more than 20 to 25 per cent in matrix. Ap is underlain with clear and smooth lower boundary by B horizon which is compact having medium moderate subangular wedge shaped blocky peds with shining faces, clay ranging from 55 to 65 per cent along with the depth. The colour of the B horizon is very dark grayish brown to dark brown of the hue 10 YR with value from 3 to 4 when dry and 2 to 3 when moist while chroma both in dry and moist conditions ranging from 2 to 4. Gravels and

ferruginous concretions (1-2 mm) are spread throughout the profile and increasing along the depth with lime carbonates. C horizon is less compact and texture is clay having 40 to 50% clay content. The mean annual soil temperature ranges from 22°C to 35°C with difference between mean summer and mean winter temperature 5°C or less. Soil moisture upto the depth of 30 cm. below surface is at wilting point while in subsequent horizon upto the base of control section it is at or below wilting point for 90 cumulative days or more in each year and cracks extending upto the B horizon remaining open more than 120 days in a year. The soil reaction in Ap and B horizon is mildly alkaline with pH 7.9 to 8.0 while it abruptly changes to strongly alkaline in C horizon.

Competing series:- Jal (Chhinam)

Drainage and permeability:- Moderately drained soils with slow to very slow permeability in wet conditions.

Use and vegetation:- These are cultivated soils and crops are raised both in kharif and Babi seasons. Important crops are Jowar, Cotton paddy, wheat, Beans, Sugarcane and Banana.

Distribution and extent:- Jalalpur series is one of the bench mark soils in avsari taluka and extensively occurs in neighbourhood talukas viz. Pal sana Bardoli, Mahuva, Gandevi, Olpad, Amrej and Chorasi etc. These series occurs in villages like Palsana, Bhutpor, Baleshwar, Soyani, Gangapur, Dastan, Kareli, Begumra, Chalthan, Tantithaia, Sankari, Devadh, Karan, Lingad, Erthan, Tatizagada, Niyol, Sedhav, Antroli, Varoli, Haripura, Karara, Talodra, Chalthan, Vadadla, Isroli, Tumdi, Runi, K Lakhanpur, Pardipeta, Ambhati, Italva; Ema and Galuda covering about 65 percent of the surveyed area.

Type location:- Experimental Plot No.1 in Agriculture experimental centre Chalthan, Taluka Palsana, District Surat.

#### Tentative series

#### SISODRA SERIES

Sisodra series include deep to very deep moderately drained dark brown, brown, brown to dark grayish brown soils formed in new alluvium laid along with the marine terrace by river Mindhola. These soils are found to occur near river or nala banks on plain to very gently sloping mid lands with gradient 0-1 and 1-3 per cent. The soil is heavy on upper part of the profile depth but medium in lower part. These soils are mostly free of lime concretions in the control section but gravels are present throughout the profile. These soils crack vertically upto the depth of 100 to 120 cms. during dry period. These soils had been classified as "deep black soil s" earlier in India. The climate is sub-humid having mean annual temperature ranging from 18°C to 33°C with mean annual preceptation of 1239.70 mm. The associated soils are Bodali, Kabilpur and Onjal-II soils which are deep and moderately deep Entisols developed on new alluvium laid over marine terraces by river Purna.

Sisodra series comprises members of fine, montmorillonitic, hyperthermic deep vertic ustochrepts deep inceptisol.

Typifying pedon :- Sisodra clay- cultivated land.  
(Colour notations are for dry soils unless otherwise noted).

AP 0-13 cms Dark grayish brown (10 yR 3/2) & dark brown (10 yR 3/3M); clay medium moderate sub-angular blocky; dry

hard, moist firm, wet sticky, fine few black ferromanganese concretions; abundant fine roots, abrupt smooth boundary pH 7.4

- B1 13-87 cms Very dark grayish brown (10yR 3/2M); clay loam to clay, medium moderate sub-angular blocky wedge shaped peds with shining faces; dry hard, moist firm, wet sticky; very few calcinated gravels; few fine black ferromanganese concretions; diffuse and smooth boundary pH 7.7.
- B2 87-125 cms Dark yellowish brown (10yR 4/4M); clay loam to clay; medium prismatic structure breaks into fine to medium subangular blocky peds with slickenside ped faces close enough to intersect dry slightly hard, wet sticky; moist friable; calcinated gravels (1-2mm) very few; localized effervescence with dil. HCL; diffuse smooth boundary pH 7.8.
- C1 125-150 cms Dark yellowish brown (10 y<sup>h</sup> 4/4M); silty loam to silty clay loam; massive on drying breaks into fine subangular blocky peds; wet slightly sticky; moist friable lime concretions (2 to 3) few present localized effervescence with dil. HCL; diffuse and smooth boundary pH 7.9.
- C12 150-182 + Dark yellowish brown (10yR 4/4M); loam; massive; wet slightly sticky and plastic; moist friable lime concretions (1-2 mm) few giving localized effervescence with dil. HCL only on concretions pH 7.6.
- C12 150-182 + Dark yellowish brown (10 yR 4/4M) loam; massive wet slightly sticky and plastic moist friable; lime concretions (1-2 mm) few giving localized effervescence with dil. HCL only on concretions; pH 7.6.

Range in characteristics

Thickness of the solum ranges from 90 to 130 cms which is the control section of the series. The content of clay and silt in the control section ranges from 35 to 40 per cent and 20 to 25 per cent respectively. The C.E.C. ranging from 90 to 100 m.e. per 100 gms. of clay in A and B horizons indicates that the clay is of montmorillonitic mineralogy. The principal soil type is clay but silty clay and clay loam are also met at places. B horizon is compact having medium prismatic structure breaking into fine to medium sub-angular blocky peds with shining ped faces. The matrix colour of Ap is dark grayish brown in upper part and dark yellowish brown in lower part. The colour of the C horizon is also dark yellowish brown. The soil reaction is neutral in the upper part while mildly alkaline in the lower part. The mean annual soil temperature varies from 22°C to 35°C and difference between mean annual soil temperature and winter varies from 22°C to 35°C and difference between mean summer and mean winter is 5°C. Soil moisture within depth ranges from 15 to 50 cms is at wilting point and at a depth below 50 cms within control section the moisture regime is at or below wilting point for 90 cumulative days or more in most of the years. The vertical cracks open during winter and remain open till the onset of the first rains i.e. open more than 120 days.

Drainage and permeability;- Moderately drained, permeability is moderately slow to slow alongwith the depth.

Use and vegetation;- These soils are extensively under cultivation. The important crops both in kharif and rabi seasons are Paddy, Cotton Jowar, Groundnut, wheat, Banana, Beans etc.

Distribution and extent;- These soils limitedly occur in surveyed area and are distributed in the following villages like Italva, Tundi, Galudia, Ema, Vanisa, Pisad, Dhamrod, Soyani, Barasadi, Jespore, Gangpur and Ambheti etc.

Type location;- Sisodra clay, Profile No.17 in village Itarva, Taluka Palsana in west of the village about 1 km.

Tentative Series

KABILPUR SERIES

Kabilpur series includes deep to very deep well drained dark yellowish brown soils occurring in undulating to rolling levees of river Minahola. These soils are formed by alluvial deposits of river along with its banks subject to moderate to severe erosion hazard. The soil texture generally varies from clay loam to loam and gravelly sandy loam to loamy sand along with the depth. The substratum is unconsolidated massive matrix of pyroclastic rock materials viz. quartz, mica and loamy materials. The lime concretions and gravels are distributed through out the profile but pockets of their accumulation are prominent in subsoil horizons. These soils had been classified earlier as "alluvial soils" in India. The climate is subhumid having mean annual temperature ranging from 20°C to 33°C with mean annual precipitation of 1239.70 mm. The associated soils are Bodali and Onjal-II soils which are moderately deep and deep Entisols and Sisodra are deep Inceptisols.

Kabilpur series comprises members of fine, montmorillonitic, hyperthermic, deep vertic ustochrepts (INCEPTISOLS)

Typifying pedon;- Kabilpur clay loam- cultivated.  
(Colour notations are for dry soils, unless otherwise noted).

- Ap 0-20 cms Dark yellowish brown (10yR 3/4) and dark brown (10 yR 3/3M) clay loam, medium blocky breaks into fine subangular blocky to weakly crumb; dry slightly hard, moist friable, wet slightly sticky; few to common lime concretions (1-2 mm) and gravels few slight effervescence with dil. HCL; abundant fine roots, clear and smooth boundary; PH 7.5 permeability moderate.
- A1,1 20-70 cms Dark yellowish brown (10yR 4/4M); loam, weak crumb to single grain dry slightly hard, moist friable, wet slightly sticky lime concretions 2 to 5 mm. many; few gravels; violent effervescence with dil HCL; few quartz and mica flakes; diffuse and smooth boundary; pH 8.4 few fine roots.
- A12 ca 70-102 cms Dark yellowish brown (10 yR/4/4M) loam, weak crumb to single grain; dry slightly hard; moist friable, wet slightly sticky lime concretions (5-10 mm) many, in form of streak and pocket few gravels violent effervescence with dil HCL; diffuse smooth boundary; pH 7.4 pyroclastic materials present.



C1 ea 102-182 + cms Dark yellowish brown (10yR 4/4M); loamy sand; single grained; dry loose, moist friable, wet nonsticky, lime concretions (2-5 mm) many, in form of streak and few gravels; strong effervescence with dil HCl; pyroclastic materials viz. quartz, mica flakes etc present pH 7.4

Range in characteristics;

The solum thickness ranges from 100 to 120 cms. The clay content in the control section ranges from 30 to 12 per cent decreasing along with the depth indicating illitic mineralogy as evinced by C.E.C ranging from 40 to 30 m.e. per 100 gms of soil. The soil reaction is mildly alkaline to neutral in different horizons. Lime concretions and calcinated rock gravels are found to have deposited in subsoil below 20 cms. either in form of a streak or as sporadic pockets. Thin layer (1-2 cms) of coarse sand is also met with in different profiles below 80 cms. depth. The contents of CaCO<sub>3</sub> varies from 7- 15% between 20 and 120 cms. below surface in the control section. The colour of the soil varies from dark yellowish brown of hue 10yR with values 4 and chrome 4. clay loam is the principal soil type but silt loam and loam soil types are also met at places. The distinctive feature of these soils is that the texture gets lighter along with depth. The soil temperature ranges from 22°C to 35°C with difference of mean summer and mean winter temperature 5°C or more. While the moisture range remains at or below wilting point in the control section in some horizons, more than 90 cumulative days after monsoonic rains.

Competing series;- The control section of Mandir soil is comparatively shallower with free lime not exceeding 2 percent. The soil reaction gets alkaline throughout the profile.

Drainage and permeability;- Well drained. The soil permeability is moderate to moderately rapid along with the profile depth.

Use and vegetation;- Soils are partly under Kharif and rabi crops. The important crops are Jowar, Cotton, Groundnut, Wheat and Banana etc. The natural vegetation comprises Acacia arabica sh ch and grasses like Cenchrus ciliaris Dicanthium annulatum etc.

Distribution and extent;- These soils are distributed mostly along the river Mindhola in villages Analsadi, Malekpur, Lakhanpur, Puni, Pardi Pata, Palsama, Ambheti, Tundi, Bhatpur, Lingad, Bhimara, Seod, Kamav, Dhamrod, Vanisam, Pinsad, Gotia, Vinzotia, Isroli, etc. in Palsama taluka.

Type location;- Kabilpur clay loam was studied in cultivated field located in village Siyod in South-West about 1 km on the right side of cart tract from Siyod to Lakhanpur.

3.4 Analytical data;

Jalalpur series;- These soils are very deep, fine montmorillonitic clay containing 50 to 70 per cent clay fractions, calcareous, very difficult to work, wide cracking in dry season. Slow to very slow permeability. Soil reaction is neutral to mildly alkaline on surface soils and strongly alkaline in sub-soil with normal conductivity. The soils are low in Nitrogen (in form of O.C.) P2O<sub>5</sub> and high in K<sub>2</sub>O. The soils possess high C.E.C. calcium being a dominant exchangeable cation followed by maintaining a balance Ca, Mg ratio. Due to very high percentage of clay, the drainage is not good resulting in high water table, water logging and development of salinity in irrigated areas. Provision of

surface drains at suitable distance ploughing and sowing crops along the slope and increase of O.M. will help to keep off the hazard. Balanced fertilization is recommended.

Sisodra series;- The soils are deep to very deep, fine montmorillonitic clay containing 35 to 45 per cent clay fraction, non calcareous in nature, Clay percentage decreases along with the depth followed by medium soil layers. Slow to moderate permeable soils. Wide cracks in dry season. Soil reaction is neutral on top soils and mildly alkaline in sub-soil with normal conductivity. The soils are low in Nitrogen (in form of O.C.) medium P2O5 and high in K2O. The soils possess high water holding capacity and high C.E.C. Calcium being the dominant exchangeable cation followed by Magnesium maintaining balanced Ca, Mg ratio. The soils are suitable for intensive irrigated farming due to moderate drainage. Conservation farming prescribed for slight erosion and balanced fertilisation are recommended.

Kabilpur series;- The soils are deep montmorillonitic clay, calcareous easily workable, moderately rapid to rapid permeable soils. The soil reaction is neutral to mildly alkaline along with the depth. The soils are low in Nitrogen (in form of O.C.) medium in P2O5 and high in K2O. These soils possess high water holding capacity and high C.E.C. Calcium being the dominant cation. These soils are suitable for irrigated farming provided measures are adopted to guard against soil erosion and to increase the water holding capacity of soil such as green manuring and supplying F.Y.M. Compost etc. Balanced fertilisation is recommended.

P.S. Please refer the schedule for fertilizer recommendations.

#### Chapter 4

##### Land use capability classes and recommendations

Capability grouping is a system of interpretation to show the relative suitability of soils for crops, grazing, forestry and wild life. It is hypothetical grouping based on the need, limitations and risks of damage to the land and also response to management. The land capability class is identified by roman numbers. There are eight classes. All the lands in one class have limitations and management problems of about the same degree but of different kinds as shown by sub-class "e" for erosion susceptibility and past erosion damage, "w" for poor soil drainage, wetness and high water table, "s" for shallowness of rooting zone, low moisture holding capacity and salinity and alkalinity and "c" for climate limitations viz frost, hailstorms, draught etc.

The lands under I, II and III are generally suitable for short and long duration crops. The class IV lands should be recultivated occasionally and should be under very careful management. The lands covered under class V, VI and VII should be kept under pasture forest or wild life. Class VIII lands should be valued as watershed, wild life preservation or recreations.

In the land capability maps of the 14 villages of Palsana taluka, only the following classes and sub-classes are recognized and mapped. The details of the limitations in each class and sub-class and their management practices are as under;-

Class IIw;- This class of land comprises of 1,907 hectares or nearly 31 percent of the surveyed area. It consists level to very gently sloping land with very deep, clayey soils of Jalalpur series mostly. The limitations are poor drainage, temporary high water table during monsoon and high water table nearly the canals. The lands of this

Table No.6  
Analytical data of Palsana Taluka

Sr. No.	Name of series	Depth in cm.	Mechanical Analysis					Physical constant					
			Graval %	Clay %	Silt %	Coarse sand%	Fine %	Mois- ture %	W.H.C. %	Pore space %	Sp.Gr.	Vol. exp. %	App. density.
1.	Jalalpur (Jal)	0.32	0.5	50.12	14.71	0.50	34.50	6.3	64.82	51.56	2.3	-	1.2
2.	"	32-107	1.5	48.81	12.74	29.54	10.06	6.5	68.66	51.79	2.1	-	1.2
3	"	107-122	6.9	67.69	3.36	24.82	6.20	6.5	67.97	50.53	2.1	-	1.1
4.	"	122-148	14.0	64.06	4.66	25.11	10.31	6.2	62.46	57.33	2.1	-	1.1
5.	"	148-182+	17.7	57.69	5.46	30.20	10.84	5.4	55.51	57.11	2.2	-	1.2
6	Sisodra (Sda)	0-13	0.0	40.52	20.26	1.58	38.69	7.4	53.77	55.87	2.1	25.52	1.2
7 "	"	13-87	5.0	35.37	25.00	1.48	36.81	7.6	53.29	52.36	2.2	27.75	1.3
8 "	"	87-115	2.5	38.88	24.31	0.53	35.77	11.1	66.85	58.21	2.1	24.28	1.1
9 "	"	115-150	1.0	25.36	29.77	1.11	43.48	8.0	63.72	60.02	2.1	19.31	1.1
10"	"	150-182 +	0.0	18.05	13.46	19.39	43.90	7.1	49.88	54.09	2.2	11.64	1.1
11	Kabilpur (Kbr)	0-20	10.0	26.05	19.53	11.20	41.70	7.1	56.89	55.97	2.2	14.84	1.1
12 "	"	20-50	18.5	12.06	11.21	11.85	64.81	5.6	50.29	51.52	2.3	9.77	1.1
13 "	"	50-82	38.0	13.90	21.92	3.82	59.33	5.5	56.93	49.46	2.2	14.68	1.2
14 "	"	82-182 +	21.0	4.62	11.57	2.50	77.53	5.5	53.42	47.48	2.2	6.19	1.2

\*18\*

Contd

pH 1;2;5	Elec. cond. mhos/cm.	Org. carbon %	Organic matter %	N2 %	Av. K2O5	Av. P2O5 %	Caco equ. %	Exch m.e./100 gms of soil			C.E.C. m.e./100 gms of Soil	T.S.S. %	E.S.P. ratio
								Ca	Mg.	Na.			
8.0	0.13	0.28	0.49	0.022	0.026	0.0	0.46	29.8	13.2	2.7	44.6	0.17	6.0
8.0	0.33	0.28	0.49	0.030	0.016	0.0	1.46	34.2	14.2	2.3	-	0.05	-
8.2	0.26	0.35	0.60	0.025	0.014	0.0009	3.06	32.8	17.2	3.3	-	0.04	-
8.2	0.16	0.30	0.52	<del>0.016</del> 0.016	0.017	0.0108	6.66	31.2	17.0	2.6	-	0.03	-
8.5	0.11	0.23	0.39	0.025	0.027	0.0	10.86	27.6	14.8	4.5	-	0.15	-
7.4	0.85	0.24	0.41	0.039	0.027	0.0031	0.86	22.0	12.6	1.9	40.7	0.08	4.6
7.7	0.79	0.26	0.45	0.030	0.032	0.0033	0.06	26.0	13.4	3.0	41.0	0.06	7.3
7.8	0.91	0.12	0.21	0.019	0.046	0.0022	0.26	28.0	10.0	3.8	48.0	0.07	7.9
7.9	0.85	0.14	0.24	0.019	0.047	0.0017	1.06	27.0	12.8	3.7	44.5	0.11	8.3
7.6	0.48	0.03	0.05	0.019	0.050	0.0022	0.00	25.2	12.2	3.8	40.0	0.08	9.5
7.5	0.16	0.29	0.50	0.021	0.017	0.0059	0.26	35.0	4.8	2.1	40.5	0.08	5.1
7.4	0.18	0.23	0.40	0.021	0.012	0.0003	0.26	27.4	2.4	1.8	30.0	0.08	6.0
7.4	0.22	0.23	0.40	0.11	0.010	0.0086	14.26	27.0	4.2	1.8	31.3	0.09	6.0
7.4	0.19	0.29	0.50	0.010	0.007	0.0059	7.46	28.46	2.2	1.4	30.0	0.09	4.6

\*19\*

mip/21/3/

..20...

Fertilizer schedule as per series in Kgs per hectare & in cart loads per hectare.

Sr. No.	Name of crop.	Jalalpur series (LII)			Sisodra series (IMII)			Kabilpur series (IMII)				
		F.Y.M. Cart loads per hectare.	N <sub>2</sub>	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	F.Y.M. cart loads per hectare.	N <sub>2</sub>	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	F.Y.M. cart loads per hectare.	N <sub>2</sub>	P <sub>2</sub> O <sub>5</sub>
1.	Paddy (Hassouri)	25	200	100	-	25	200	75	-	-	-	-
2.	Formosa-3 & Z-31	25	135	60	-	25	135	50	-	-	-	-
3.	Cotton (irrigated)	25	75	37	-	25	75	25	-	25	75	25
4.	Cotton (non-irrigated).	12	37	37	-	12	37	25	-	12	37	25
5.	Jowar (Rainfed)	12	75	37	-	17	37	25	-	17	37	25
6.	Wheat.	25	160	85	-	25	160	60	-	25	160	60
7.	Sugarcane.	50	425	200	125	50	425	125	125	50	425	125
8.	Banana.	100	350	174	75	100	350	125	175	100	350	125
9.	Vegetable.	25	135	60	-	25	135	50	-	25	135	50

\*20\*

class are however most suitable for Paddy, Sugarcane and other irrigated crops. Most of the Kyaries are well protected. While up lands are unbunded. Ploughing and sowing of crops along with the direction of slope and provisions of open drains at an approximate distance of 300' apart with 2' to 3' deep are required. Moreover for maintaining the workability and fertility green manuring, application of F.Y.M. or compost at the rate of 15 to 20 cart loads per hectare are recommended. Suitable fertilizer mixture at the rate of 45kgs. N<sub>2</sub>, 20kgs. P<sub>2</sub>O<sub>5</sub> and 25 kgs K<sub>2</sub>O per hectare are prescribed for paddy crop under Japanese method of Paddy cultivation.

Class IIe;- This class comprises of 2,520 hectares or nearly 41 per cent of the total surveyed area consists of nearly level to very gently sloping land with very deep loam to clayey soils of Kabilpur, Sisodra and Jalalpur series. Slightly eroded. The limitations are low moisture holding capacity and low fertility (Kabilpur series) and moderate erosion in Sisodra, Jalalpur series. Most of the fields are unbunded. Soil and water conservation measures are recommended. Application of F.Y.M. or compost at the rate of 15 to 20 cart loads per hectare and green manuring and balanced fertilisation recommended.

Class IIIe;- This class comprises of 698 hectares or nearly 11.5 percent of the total surveyed area consists of very gently sloping to gently sloping land with deep to very deep loam to clayey soils of Kabilpur series and few hectares under Sisodra and Jalalpur series moderately eroded. The limitations are low moisture holding capacity, low fertility (for Kabilpur) and moderate erosion hazard as the fields are unbunded. Soil and water conservation measures are recommended. Application of F.Y.M. or compost of the rate of 10 to 15 cart loads per hectare and green manuring and balanced fertilisation are recommended.

Class IVe;- This class of land comprises of 475 hectares or nearly 8 per cent of the total surveyed area includes gently sloping to moderately sloping and rolling and moderately dissected gullied land with deep loam and clay loam soils of Kabilpur series. The main limitations are susceptibility to erosion (Kabilpur) and poor drainage (Jalalpur), fields are unbunded and the major are under native grasses, Private grass lands. Closure and suitable management practices for better grass production and provision of drainage are recommended.

Class VIe;- This class of land comprises of 504 hectares or nearly 7.5 per cent of the total surveyed area includes moderately sloping and rolling, highly dissected gullied land with severe erosion hazard of Kabilpur series. The limitations are severe erosion and excessive slope. Most of the fields are unbunded and are under native grass (private grass land); suitable management practices and complete closures, gully ploughing and shaping of land are recommended.

#### Summary

From the soil survey report it is summarised that the soils of Palsana Mahal are identified into three soil series studying the geomorphological characteristics. The study will help in predicting their behaviour under irrigated Agriculture and balance fertilization for higher production as per map indicating fertility status of different soil, the hazards in different areas and thus form an integrated part for planning for reclamation of these areas.

TABLE .5.

Distribution of the area of the Soil Series under various depth, slope & erosion village wise.

Name of village.	Name of Soil series.	Depth in hectare d <sub>5</sub> %age.	Slope classes								Erosion classes.							
			A %age	B %age	C %age	D %age.	e1 %age	e2 %age	e3 %age	e4 %age.								
Palsana	Jal.	478.57 100.00	331.96	69.00	123.71	26.00	22.90	5.0	-	-	239.05	50.00	213.36	45.00	26.16	5.00	-	-
Bhutpor.		332.62 "	170.77	51.35	143.97	43.28	17.88	5.37	-	-	280.05	84.20	34.69	10.42	-	-	17.88	5.38
Galuda.		73.61 "	51.40	69.83	22.21	30.17	-	-	-	-	73.61	100.00	-	-	-	-	-	-
Ena.		13.35 "	13.35	100.00	-	-	-	-	-	-	13.35	100.00	-	-	-	-	-	-
Tundi.		163.03 "	127.03	77.50	27.42	16.72	9.48	5.78	-	-	131.04	80.48	22.51	13.74	-	-	9.48	5.78
Vanisa.		248.75 "	205.49	82.60	28.97	11.65	14.29	5.75	-	-	205.49	82.60	28.07	11.65	-	-	14.29	5.75
Sanki.		354.52 "	265.82	74.99	82.27	23.20	6.43	1.81	-	-	232.47	65.53	115.62	32.61	6.43	1.81	-	-
Jetpur.		40.46 "	40.46	100.00	-	-	-	-	-	-	40.46	100.00	-	-	-	-	-	-
Gangapur.		97.69 "	-	-	55.44	56.76	42.25	43.24	-	-	-	-	55.44	56.76	42.25	43.24	-	-
Pisad.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dhamrod.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Soyani.		300.94 100.00	235.22	78.16	65.72	21.84	-	-	-	-	235.22	78.16	65.72	21.84	-	-	235.22	78.16
Barasadi.		20.80 "	20.80	100.00	-	-	-	-	-	-	20.80	100.00	-	-	-	-	-	-
Chalthan.		307.66 "	268.90	87.41	38.76	12.59	-	-	-	-	268.90	87.41	26.04	8.46	12.72	4.13	-	-
Total:-		2432.90 100.00	1731.20	71.15	588.47	24.19	113.23	4.66	-	-	1741.34	71.58	562.35	23.11	87.56	3.60	41.65	1.71

contd....

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9.23...

Palsana Sda	63.43	100.00	-	-	63.43	100.00	-	-	-	-	63.43	100.00	-	-	-	-	-	-
Hutpor.	36.77	"	-	-	36.77	100.00	-	-	-	-	36.77	100.00	-	-	-	-	-	-
Galuda.	19.83	"	19.83	100.00	-	-	-	-	-	-	19.83	100.00	-	-	-	-	-	-
Ena.	273.17	"	260.27	95.24	-	-	12.90	4.76	-	-	260.27	95.24	-	-	-	-	12.90	4.76
Tundi.	250.09	"	174.24	69.68	75.85	30.32	-	-	-	-	174.24	69.68	75.85	30.32	-	-	-	-
Vanisa.	241.53	"	200.24	82.91	41.29	17.09	-	-	-	-	136.36	56.46	105.17	43.54	-	-	-	-
Sanki.	102.99	"	-	-	80.94	78.60	22.05	21.40	-	-	69.59	67.57	11.35	11.03	22.05	21.40	-	-
Jetpur.	103.08	"	78.89	76.54	18.05	17.51	6.14	5.95	-	-	78.89	76.54	6.05	5.87	12.00	11.64	6.14	5.95
Gangapur.	139.20	"	54.66	39.26	84.54	60.74	-	-	-	-	139.20	100.00	-	-	-	-	-	-
Pisad.	134.89	"	134.89	100.00	-	-	-	-	-	-	134.89	100.00	-	-	-	-	-	-
Dhamrod.	104.80	"	81.39	77.67	23.41	22.33	-	-	-	-	81.39	77.67	-	-	23.41	22.33	-	-
Soyani.	47.10	"	38.93	82.66	8.17	17.34	-	-	-	-	47.10	100.00	-	-	-	-	-	-
Barasadi.	252.24	"	233.74	92.67	18.50	7.33	-	-	-	-	233.74	92.67	-	-	18.50	7.33	-	-
Ghalthan.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total:-	1769.12	100.00	1277.08	72.19	450.95	25.49	41.09	2.32	-	-	1475.70	83.42	198.42	11.22	75.96	4.29	19.04	1.07



Palsana Kbr.	87.35	100.00	-	-	84.00	96.80	-	-	2.75	3.14	-	-	47.71	54.62	30.89	42.24	2.75	3.14
Bhutpor.	221.06	"	-	-	90.16	40.78	130.90	59.22	-	-	20.40	9.23	69.76	31.55	130.90	59.22	-	-
Galuda.	58.29	"	-	-	14.37	24.65	-	-	43.92	75.35	-	-	-	-	14.37	24.65	43.92	75.35
Ena	289.37	"	72.04	24.90	178.06	61.54	9.45	3.26	29.80	10.30	47.85	107.93	37.29	3.72	1.28	39.25	13.58	
										138.47								
Tundi.	432.10	"	85.52	25.00	120.76	35.30	135.82	39.70	-	-	85.52	25.00	76.01	22.22	50.55	14.73	30.02	38.00
Vanisa	658.92	"	13.43	2.04	280.17	42.52	17.82	2.70	347.50	13.43	2.04	228.72	34.71	69.27	10.51	347.50	52.74	
										52.74								
Sanki.	125.18	"	-	-	22.34	17.85	83.05	67.35	19.79	915.80	-	-	91.57	73.16	-	-	33.61	26.84
Jetpur.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gangapur.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pisad.	2.14	100.00	-	-	2.14	100.00	-	-	-	-	-	-	2.14	100.0	-	-	-	-
Dhamrod.	138.11	"	56.55	40.95	60.95	44.13	-	-	20.61	14.92	40.95	55.28	40.02	5.67	4.11	20.61	14.92	
											56.55							
Soyani	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barasadi.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chalthan.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total:-	1922.52	100.00	227.54		853.57	44.39	377.04	19.62		24.15	16.35	35.33		16.19	617.66			
			11.84					404.37		314.37	679.12		311.37		32.13			

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SMP/22372/

T A B L E .6.

Distribution of the area of the Soil Series under various land capability classes (villagewise).

Name of Village.	Name of Soil Series.	Depth in hectare. dg	Land capability classes.										
			%age.	IIw	%age.	IIe	%age	IIIe	%age	IVe	% Age	VIe	%age.
Palsana.	Jal	478.57	<del>100.00</del> 100.00	331.96	69.00	92.47	19.00	50.88	11.00	3.26	1.00	-	-
Bhutpor.	"	332.02	"	280.05	54.20	34.69	10.42	-	-	17.88	5.38	-	-
Galuda.	"	73.61	"	73.61	100.00	-	-	-	-	-	-	-	-
Ena.	"	13.35	"	13.35	100.00	-	-	-	-	-	-	-	-
Tundi	"	163.93	"	127.03	77.50	27.42	16.72	-	-	9.48	5.78	-	-
Vanisa.	"	248.75	"	205.49	82.60	28.97	11.65	-	-	14.29	5.75	-	-
Sanki.	"	354.52	"	171.16	48.28	176.93	49.91	-	-	6.43	1.81	-	-
Jetpur.	"	40.46	"	40.46	100.00	-	-	-	-	-	-	-	-
Gangapur.	"	97.69	"	-	-	55.44	56.70	-	-	42.25	43.24	-	-
Fisad.	"	-	"	-	-	-	-	-	-	-	-	-	-
Dhamarod.	"	-	"	-	-	-	-	-	-	-	-	-	-
Soyani.	"	300.94	100.00	235.22	78.16	65.72	21.84	-	-	-	-	-	-
Barasadi.	"	20.80	"	20.80	100.00	-	-	-	-	-	-	-	-
Chalthan.	"	307.66	"	298.94	96.87	-	-	12.72	4.13	-	-	-	-
Total :-		2432.90	100.00	1794.07	73.75	481.64	19.80	63.60	2.61	93.59	3.84	-	-

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S/P/22/3/72/

Palsana Sda.	63.43	100.00	-	-	63.43	100.00	-	-	-	-	-	-
Bhutpor.	36.77	"	-	-	36.77	100.00	-	-	-	-	-	-
Galuda.	19.83	"	-	-	19.83	100.00	-	-	-	-	-	-
Ena.	273.17	"	-	-	260.27	95.24	-	-	-	-	12.00	4.76
Tundi.	250.09	"	130.32	55.71	<del>110.77</del> 110.77	<del>110.77</del> 44.29	<del>44.29</del>	-	-	-	-	-
Vanisa.	241.53	"	-	-	241.53	100.00	-	-	-	-	-	-
Sanki.	102.99	"	-	-	80.64	78.60	-	-	22.5	21.40	-	-
Jetpur.	103.08	"	-	-	84.94	82.41	12.00	11.64	6.14	5.95	-	-
Gangapur.	139.20	"	-	-	139.20	100.00	-	-	-	-	-	-
Pisad.	134.89	"	-	-	134.89	100.00	-	-	-	-	-	-
Dhamrod.	104.80	"	-	-	81.39	77.67	23.41	22.33	-	-	-	-
Sorani.	47.10	"	-	-	47.10	100.00	-	-	-	-	-	-
Barasadi.	252.24	"	-	-	233.74	92.67	18.50	7.33	-	-	-	-
Chalthan.	-	-	-	-	-	-	-	-	-	-	-	-
Total:-	1769.12	100.00	139.32	7.87	1534.80	86.76	53.01	3.05	28.19	1.59	<del>12.90</del> 12.90	0.73

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Palsana Khr.	87.35	100.00	-	-	30.67	35.11	53.93	61.75	-	-	2.75	3.14
Bhutpor.	221.06	"	-	-	90.16	40.78	-	-	130.90	59.22	-	-
Galuda.	58.29	"	-	-	-	-	-	-	14.37	24.65	-	-
Ena.,	289.37	"	-	-	138.47	47.84	11.65	38.58	-	-	39.25	13.58
Tundi.	342.10	"	-	-	85.52	25.00	120.76	35.30	135.82	39.70	-	-
Vanisa.	658.92	"	-	-	32.31	4.90	261.26	39.65	-	-	365.32	55.45
Sanki.	125.18	"	-	-	22.34	17.85	13.82	11.05	69.23	55.30	19.79	15.80
Jetpur.	-	-	-	-	-	-	-	-	-	-	-	-
Gangapur.	-	-	-	-	-	-	-	-	-	-	-	-
Pisad.	2.14	100.00	-	-	2.14	100.00	-	-	-	-	-	-
Dhamrod.	138.11	"	-	-	101.09	73.19	16.41	11.89	-	-	20.61	14.92
Soyani.	-	-	-	-	-	-	-	-	-	-	-	-
Barasadi.	-	-	-	-	-	-	-	-	-	-	-	-
Chalthan,	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total :-</b>	<b>1922.52</b>	<b>100.00</b>	<b>-</b>	<b>-</b>	<b>502.70</b>	<b>26.15</b>	<b>577.86</b>	<b>30.05</b>	<b>350.32</b>	<b>18.22</b>	<b>491.64</b>	<b>25.58</b>

\*27\*

T A B L E . 7 .

Problems of soils in the area and Recommendations.

----- Physiographic unit. -----	Soils of the Geomorphologic units.	Present land use & soil phases.	Soil condition.	Problems.	General recommendations.
Piedmont plain.	Jalalpur Series.	Cultivated kharif & rabi crop viz. Cotton Groundnut, Paddy, Banana, Sugarcane Wheat etc.	Soil reaction is tending towards alkaline water holding capacity of these soils varies from 64 to 68 % on surface soil while in sub-soil it decreases gradually Clay percentage increases in the middle horizons.	Poor drainage is the main problem, resulting in high water table during monsoon, as well as salinity in some low lying spots.	Opening of deep drain deep ploughing, supply of organic manures & green manures are useful for improving drainage & physical conditions of soils. Balanced dose of fertilizer is recommended as N, P2O5 are low.
Flood plain old aggraded plain.	Sisodra series.	-do-	Soil reaction neutral to mildly alkaline, water holding capacity varies from 55 to 60 on surface and decreases gradually in sub-soil. Clay percentage 30 to 34 on surface soil while decreases in sub-soil.	High water table during monsoon.	In monsoon canal flow should be completely stopped and removing of excess water of canal should be done by proper way. P2O5 is moderate Nitrogen is low. Organic manures are prescribed, Balance dose of fertilizer is recommended.
Flood plain under natural levees.	Kabilpur Series.	Kharif & Rabi (Irrigated crops) groundnut, Cotton, sugarcane, Banana Orchards, of Mango Chiku etc.	Soil reaction neutral to mildly alkaline. Water holding capacity varies from 50 to 55 on surface and decreases gradually in sub-soil. Clay percentage about 25 on surface soil and gradually decreases in subsoil.	Due to undulating and slopy land. Soil erosion is the main problem.	Soil conservation measures viz. bunding, gully plugging required. P2O5 is moderate. Nitrogen is low. Organic manures are prescribed. Balanced dose of fertilizer is recommended.

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TABLE 8.  
SOIL UNIT LIST

Sr. No.	Soil Unit.	Location village.	Area of soil unit in hectare.	Predomi- nant slope %	Physiogra- phic position.	Terraced or bunded.	Present land use.	Land capability classes & sub-Class.
1	2	3	4	5	6	7	8	9
1.	Jal <u>C-d5</u> A-e1	Palsana.	51.63	0-1	Low land.	Bunded.	C <sub>1</sub> & C <sub>2</sub>	IIw
2.	" <u>Sic1-d5</u> B-2 e2	"	48.18	1-2	Mid "	Unbunded.	C <sub>1</sub>	IIe
3.	" <u>Sic-d5</u> A-e1	"	179.70	0-1	Low land	Bunded.	Paddy	IIw
4.	" <u>C1-d5</u> B-e2	"	27.98	1-2	Mid "	Unbunded.	C <sub>1</sub> *	IIIe
5.	" <u>C1-d5</u> A-e2	"	92.91	0-2	Low "	Bunded.	C <sub>1</sub> & Irre.Crop.	IIw
6.	" <u>C1-d5</u> C-e3	"	22.90	3-5	Up "	unbunded.	Grassland	IIIe.
7.	" <u>C1-d5</u> A-e1	"	7.72	0-1	Low "	Bunded.	Paddy	IIw
8.	" <u>C1-d5</u> B-e2	"	44.29	1-3	Mid "	Bunded.	C <sub>1</sub> & irre.crop	IIe
9.	" <u>C1-d5</u> B-e3	"	3.26	1-3	Mid "	Unbunded.	Grass land.	IVe
10.	" <u>C1-d5</u> B-e1	"	63.43	1-3	Mid "	"	C <sub>1</sub>	IIe
11.	" <u>C1-d5</u> B-e2	"	17.04	1-3	Mid land.	"	C <sub>1</sub> & Grass land	IIIe
12.	" <u>L-d5</u> B-e2	"	30.67	1-2	Mid land.	"	C <sub>1</sub>	IIe
13.	" <u>L-d5</u> B-e3	"	36.89	1-3	"	"	C <sub>1</sub>	IIIe

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1	2	3	4	5	6	7	8	9	
14.	Jal	<u>C-d5</u> D-e4	Falsana.	2.75	5-10	Up land	Unbunded	Waste land.	VIe
15.	"	<u>C-d5</u> B-e1	Bhutpor.	40.33	1-3	Mid land	Bunded.	Paddy	IIw
16.	"	<u>C-1-d5</u> B-e2	"	34.69	1-3	"	Unbunded.	C <sub>1</sub> & Irre.crops	IIe
17.	"	<u>Sic-d5</u> A-e1	"	20.07	0-1	"	Bunded	C <sub>1</sub>	IIw
18.	"	<u>C1-d5</u> B-e1	"	68.95	1-2	"	"	C <sub>1</sub>	IIw
19.	"	<u>C-d5</u> A-e1	"	49.30	0-1	Low "	"	C <sub>1</sub> & Irre.crops	IIw
20.	"	<u>C-d5</u> D-e4	"	17.88	5-10	Up "	"	Grass land.	IVe
21.	"	<u>C1-d5</u> A-e1	"	101-40	0-1	Mid "	Unbunded.	C <sub>1</sub> & Irre.crops.	IIw
22.	"	<u>L-d5</u> C-e3	"	130.90	3-5	"	"	C <sub>1</sub>	IVe
23.	Kbr.	<u>L-d5</u> B-e2	"	45.60	1-3	Mid land.	Bunded.	C <sub>1</sub>	IIe
24.	"	<u>L-d5</u> B-e2	"	20.40	1-3	"	"	C <sub>1</sub>	IIe
25.	"	<u>Sic1-d5</u> B-e3	"	7.72	1-3	"	unbunded.	C <sub>1</sub> & C <sub>2</sub>	IIe
26.	"	<u>Sic1-d5</u> B-e2	"	16.44	1-3	"	"	C <sub>1</sub>	IIe
27.	"	<u>C1-d5</u> B-e1	"	30.77	1-3-	"	"	C <sub>1</sub>	IIe
28.	"	<u>C-d5</u> A-e1	Ghaluda.	11-17	0-1	Low land	Bunded	C <sub>1</sub> & Paddy land.	IIe

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1	2	3	4	5	6	7	8	9
29.	Sda <u>C1-d5</u> A-e1	Galuda.	8.66	0-1	Low land.	Bunded	C <sub>1</sub> & Banana	IIe
30.	JM1 <u>C-d5</u> A-e1	"	51.40	0-1	Mid "	"	C <sub>1</sub> & Irre.crop	IIw
31.	Jal. <u>C-d5</u> B-e1	"	22.21	1-3	"	"	"	IIw
32.	Kbr. <u>S1-d5</u> D-e4	"	14.37	1-3	Mid "	"	"	IVe
33.	" <u>S1-d5</u> D-e4	"	43.92	5-10	Up "	Unbunded	Grass land	VIe
34.	Jal <u>C-d5</u> A-e1	Ena.	13.35	0-1	Low "	<del>xxxx</del> Bunded.	Paddy	IIw
35.	Sda. <u>C1-d5</u> A-e1	"	74.42	0-1	"	" & unbunded	" & C1 irre. crop.	IIe
36.	Sda <u>C1-d5</u> A-e1	"	62.95	0-1	"	Bunded	Paddy	IIe
37.	Sda <u>Sic-d5</u> A-e1	"	122.90	0-1	"	"	Paddy	IIe
38.	Kbr. <u>L-d5</u> B-e1	"	128.58	1-3	Mid "	"	C <sub>1</sub> & irre.crop	IIe
39.	Kbr. <u>S1-d5</u> B-e3	"	3.72	1-3	"	Unbunded	C <sub>1</sub>	IIIe
40.	Kbr. <u>S1-d5</u> B-e2	"	67.11	1-3	"	"	C <sub>1</sub>	IIIe
41.	Kbr. <u>L-d5</u> B-e2	"	39.82	1-3	Mid "	"	C <sub>1</sub>	IIIe
42.	Sda <u>C1-d5</u> C-e4	"	12.90	3-5	Up "	"	Grass land	VIe

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1	2	3	4	5	6	7	8	9
43.	Kbr <u>C1-d5</u> D-e4	Ena	29.80	5-10	Up land.	Unbunded	Grass land	VIe
44.	Kbr <u>S1-d5</u> C-e4	"	9.45	3-5	Up land.	"	Grass land	VIe
45.	Jal <u>C1-d5</u> B-e2	Tundi	22.51	1-3	Mid land.	"	C <sub>1</sub>	IIe
46.	Jal <u>C1-d5</u> A-e1	"	65.29	0-1	"	"	C <sub>1</sub>	IIw
47.	Kbr <u>Sic1-d5</u> A-e1	"	36.67	0-1	Low land	Bunded	C <sub>2</sub>	IIe
48.	Kbr <u>L-d5</u> A-e1	"	48.04	0-1	"	Unbunded	C <sub>2</sub>	IIe
49.	Kbr <u>L-d5</u> B-e3	Tundi	44.75	1-3	Mid land	Unbunded	C <sub>2</sub>	IIIe
50.	Jal <u>C1-d5</u> C-e4	"	123.68	3-5	Up "	"	C <sub>1</sub>	IVe
51.	Jal <u>C-d5</u> A-e1	"	61.74	0-1	Low "	"	C <sub>2</sub>	IIw
52.	Jal <u>C1-d5</u> B-e1	"	4.91	1-3	Mid "	"	C <sub>2</sub>	IIe
53.	Kbr. <u>Sic1-d5</u> B-e2	"	17.73	1-3	"	"	C <sub>1</sub>	IIIe
54.	Sda <u>C-1-d5</u> B-e2	"	75.85	1-3	"	Bunded	C <sub>2</sub> & Irre.crop	IIe
55.	Sda <u>C1-d5</u> A-e1	"	34.92	0-1	Low "	Unbunded	C <sub>1</sub>	IIe
56.	Kbr. <u>L-d5</u> D-e2	"	58.28	1-3	Mid "	"	C <sub>2</sub>	IIIe
57.	Kbr. <u>S1-d5</u> C-e3	"	5.80	3-5	Up "	"	C <sub>1</sub>	IVe

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...33...

1	2	3	4	5	6	7	8	9
58.	Kbr. <u>S1-d5</u> C-e4	Tundi	15.82	3-5	Up land	Unbunded	C <sub>1</sub>	IVe
59.	Sda <u>C-d5</u> A-e1	"	139.32	0-1	Low "	Bunded & unbunded	C <sub>2</sub> & Irrc.crop	IIw
60.	Kbr <u>Sic-d5</u> A-e1	"	0.81	0-1	Low "	Unbunded	C <sub>1</sub>	IIe
61.	Kbr. <u>S1-d5</u> B-e3	Vanisa	39.53	1-3	Mid land	"	C <sub>2</sub> & irre.crop	IIIe
62.	Kbr <u>S1-d5</u> D-e4	"	347.50	5-10	Up "	"	Grass land	VIe
63.	" <u>S1-d5</u> C-e3	"	17.82	3-5	Up "	"	"	VIe
64.	" <u>L-d5</u> B-e2	"	208.33	1-3	Mid "	"	"	IIIe
65.	Sda <u>Sic1-d5</u> B-e3	"	25.85	1-3	" "	"	"	IIe
66.	" <u>Sic1-d5</u> A-e1	"	13.43	0-1	Low "	"	C <sub>1</sub>	IIe
67.	" <u>C1-d5</u> B-e2	"	15.44	1-3	Mid "	"	C <sub>1</sub>	IIe
68.	Jal <u>C1-d5</u> C-e4	"	14.29	3-5	Up "	"	C <sub>1</sub>	IVc
69.	Jal <u>Sic1-d5</u> B-e2	"	28.97	1-3	Mid land.	"	C <sub>1</sub>	IIIe
70.	Sda <u>S11-d5</u> A-e1	"	55.20	0-1	Low land	Bunded	C <sub>2</sub> Irreecrop	IIe
71.	Kbr. <u>S1-d5</u> B-e2	"	20.39	1-3	Mid "	"	"	IIe
72.	Sda <u>C1-d5</u> A-e1	"	20.83	0-1	low "	"	"	IIe.

\*33\*

1	2	3	4	5	6	7	8	9
73.	Sda	<u>C1-d5</u> A-e2	Vanisa	89.73	0-1	Low land.	Bunded C <sub>2</sub> & irre.Crop	IIe
74.	Jal	<u>C1-d5</u> A-e1	"	205.49	0-1	"	"	IIw
75.	Kbr.	<u>L-d5</u> A-e1	"	13.43	0-1	Low "	"	IIIe.
76.	Sda	<u>C1-d5</u> A-e1	"	20.96	0-1	Low "	"	IIe
77.	Kbr.	<u>L1-d5</u> B-e3	"	11.92	1-3	Mid "	"	IIe
78.	Jal	<u>C-d5</u> A-e1	Sanki	120.06	0-1	Low land	<del>Unbunded</del> C <sub>1</sub> & Paddy	IIw
79.	Jal	<u>Sic-d5</u> A-e1	"	112.41	0-1	Low "	" C <sub>1</sub> & Paddy	IIw
80.	Jal	<u>Sic1-d5</u> B-2e2	"	63.65	1-3	Mid land.	Unbunded C <sub>1</sub>	IIe
81.	Jal	<u>C-d5</u> A-e2	"	33.35	0-1	Low land.	" C <sub>1</sub>	II2
82.	Jal	<u>C1-d5</u> B-e2	"	18.62	1-3	Mid "	" C <sub>1</sub>	IIe
83.	Jal	<u>Sic-d5</u> C-e3	"	6.43	3-5	Up "	" C <sub>1</sub>	IVe
84.	Sda.	<u>C1-d5</u> B-e2	"	11.35	1-3	Mid "	" C <sub>1</sub>	IIe
85.	Sda	<u>Sic1-d5</u> B-e1	"	69.59	1-3	"	" C <sub>1</sub>	IIe
86.	Sda	<u>C1-d5</u> C-e3	"	22.05	3-5	Up land	" C <sub>1</sub>	IVe
87.	Kbr	<u>L-d5</u> B-e2	"	22.34	1-3	Mid "	" C <sub>1</sub>	IIe

\*34\*

1	2	3	4	5	6	7	8	9
88.	Kbr. <u>L-d5</u> C-e2	Sanki.	69.23	3-5	Up land.	Unbunded	C <sub>1</sub>	IVe
89.	Kbr. <u>L-d5</u> D-e4	"	19.79	5-10	Up land.	"	Grass land	IVe
90.	Kbr. <u>L-d5</u> C-e4	"	13.82	3-5	"	"	C- 1	IIIe
91.	Jal <u>C-d5</u> A-e1	Jetpur.	40.46	0-1	Low land.	Bunded	C <sub>1</sub> & C <sub>2</sub>	IIw
92.	Sda. <u>C-d5</u> A-e1	"	62.46	0-1	"	"	"	IIe
93.	Sda <u>C1-d5</u> B-e3	"	12.00	1-3	Mid land.	Unbunded	C <sub>1</sub>	IIIe
94.	Sda <u>C1-d5</u> A-e1	"	16.43	0-1	Low "	Bunded	C <sub>1</sub> & C <sub>2</sub>	IIe
95.	Sda <u>C-d5</u> B-e2	"	6.05	1-3	Mid "	Unbunded	C <sub>1</sub>	IIe
96.	Sda <u>C1-d5</u> C-e4	"	6.14	3-5	Up "	"	C <sub>1</sub>	IVe
97.	Jal <u>Sic1-d5</u> C-e3	Gangapur	42.25	3-5	Up "	"	Grass land	IVe
98.	Jal <u>C1-d5</u> B-e2	"	55.44	1-3	Mid "	"	C <sub>1</sub>	IIe
99.	Sda <u>C-d5</u> A-e1	"	54.66	0-1	Low "	Bunded	Paddy & C <sub>1</sub>	IIe
100.	Sda <u>C-d5</u> B-e1	"	42.80	1-3	Mid "	"	"	IIe
101.	Kbr. <u>L-d5</u> A-e1	Ena	4.89	0-1	Low "	Unbunded	C 1	IIe
102.	Sda <u>Sic-d5</u> B-e1	Gangapur.	41-74	1-3	Mid "	Bunded	C <sub>1</sub> & Paddy	IIe

\*35\*

1	2	3	4	5	6	7	8	9
103.	Sda <u>C1-d5</u> A-e1	Pisad	75.23	0-1	Low Land.	Bunded	C <sub>1</sub> & Paddy	IIe
104.	Sda <u>Sic1.d5</u> A-e1	"	24.74	0-1	Low "	"	"	IIIe
105.	Sda <u>C-d5</u> A-e1	"	234.92	0-1	"	"	"	IIIe.
106.	Kbr <u>C1-d5</u> B-e2	"	2-14	1-3	Mid "	"	"	IIIe
107.	Sda <u>C-d5</u> A-e1	Dhamrod.	64.49	0-1	Low "	"	"	<del>IIIe</del> IIe
108.	Sda <u>Sci-d5</u> A-e1	"	16.00	0-1	"	"	C <sub>1</sub> & irre.crops	IIIe
109.	Sda <u>C1-d5</u> B-e3	"	23.41	1-3	Mid "	Unbunded	C <sub>1</sub>	IIIe
110.	Kbr. <u>L-d5</u> A-e1	"	56.55	0-1	Low "	Bunded	C <sub>1</sub>	IIIe
111.	Kbr. <u>L-d5</u> B-e2	"	85.28	1-3	Mid "	"	$\frac{1}{2}$ C <sub>1</sub>	IIIe
112.	Kbr. <u>L-d5</u> D-e4	"	20.61	5-10	Up "	Unbunded Grass land.		VIe
113.	Kbr. <u>C1-d5</u> B-e3	"	5.67	1-3	Mid "	"	C <sub>1</sub>	IIIe
114.	Jal <u>C-d5</u> B-e2	Soyani	6.31	1-3	Mid "	"	C <sub>1</sub>	IIIe

\*36\*

...37...

1	2	3	4	5	6	7	8	9	
115.	Jan	<u>C1-d5</u> A-e1	Soyani	73.82	0-1	Low Land	Bunded	C <sub>1</sub> & Paddy	IIw
116.	"	<u>C1-d5</u> B-e2	"	59.41	1-3	Mid "	Unbunded	C <sub>1</sub>	IIe
117.	"	<u>C-d5</u> A-e1	"	161.40	0-1	Low "	Bunded	C <sub>1</sub> & Paddy	IIw
118.	Sda	<u>C1-d5</u> A-e1.	"	38.93	0-1	"	"	Paddy	IIe
119.	Sda	<u>C-d5</u> B-e1	"	8.17	0-1	"	Unbunded	C <sub>1</sub>	IIe
120.	Sda	<u>C-d5</u> A-e1	Barasadi	207.66	0-1	"	Bunded	C <sub>1</sub> , C <sub>2</sub> & Paddy	IIe
121.	Sda	<u>Si-c1-d5</u> A-e1.	"	26.08	0-1	"	"	C <sub>1</sub>	IIe
122.	Jan.	<u>C-d5</u> A-e1.	"	20.80	0-1	"	"	C <sub>1</sub> & C <sub>2</sub>	IIw
123.	Sda	<u>C1-d5</u> B-e3	"	18.50	0-1	"	"	"	IIIe
124.	Jan	<u>C-d5</u> A-e1	Chaitlan	268.90	0-1	"	"	C <sub>2</sub>	IIw
125.	Jan	<u>C-d5</u> B-e2	"	26.04	0-1	"	"	C <sub>1</sub>	IIw
126.	Jan	<u>C-d5</u> B-e3	"	12.72	0-1	Mid "	"	Grass land.	IIIe.
Total :-				6124.54					

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A P P E N D I X - I.

Legend for Soil and Land Capability maps :-

i) Soil Series.

Jal - Jalalpur.

Sda - Sisodra

Kbr - Kabilpur.

ii) Surface texture :

C - Clay

Cl - Clay loam

Sic - Silty clay.

Sicl - Silty clay loam

Scl - Sandy clay loam.

L - Loam

Sl - Sandy loam.

iii) Soil depth (solum depth) :

d<sub>5</sub> - More than 90 cm/more than 36" (very deep)

iv) Slope of the land :

A - 0-1 % (Nearly level).

B - 1-3 % (very gently sloping)

C - 3-5 % (Gently sloping)

D - 5-10% (Moderately sloping).

v) Soil erosion :

e<sub>1</sub> - Slight or no erosion.

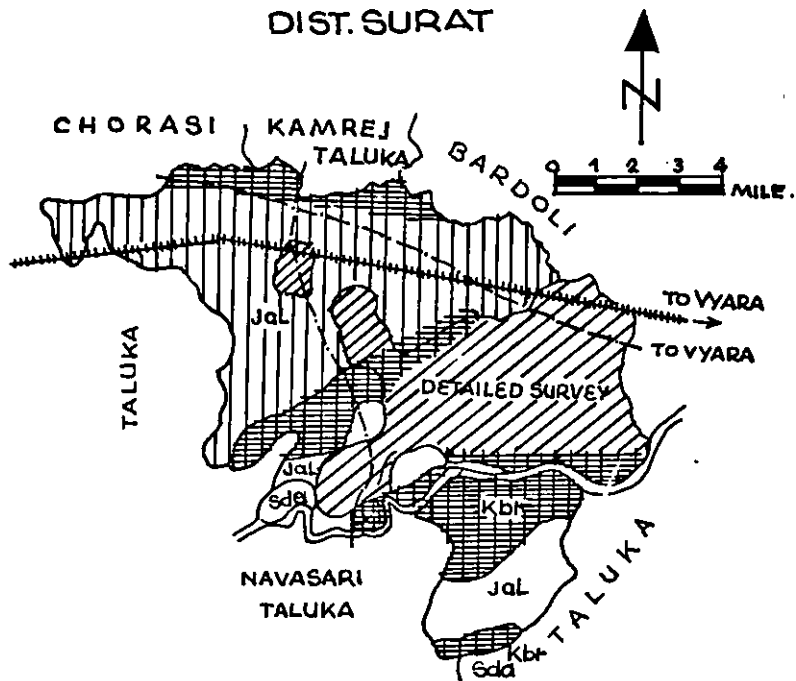
e<sub>2</sub> - Moderate erosion.

e<sub>3</sub> - Severe erosion.

e<sub>4</sub> - Very severe erosion.

\*\*\*\*

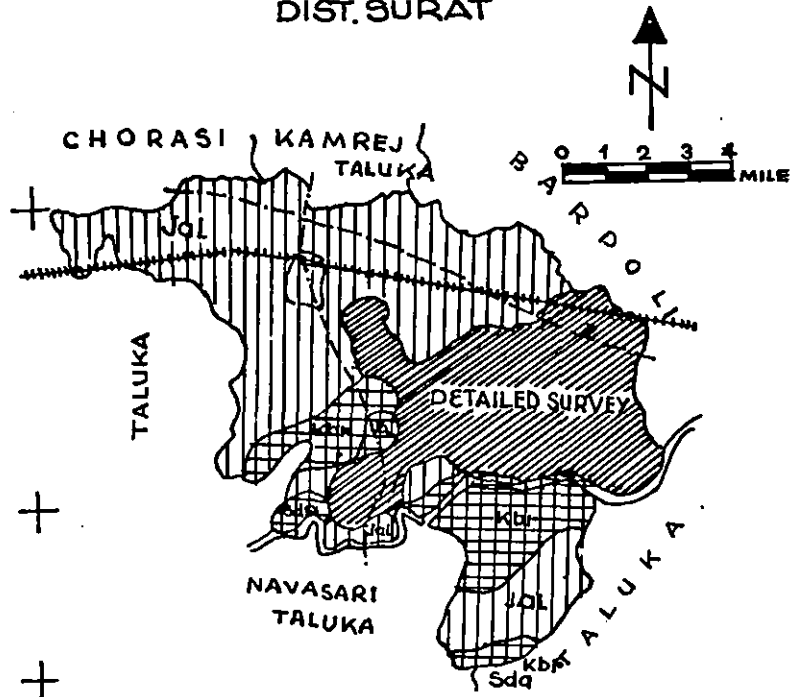
## HAZARD MAP OF DALSANATALUKA DIST. SURAT



SYMBOLS.	LEGEND.
SOIL BOUNDRY	SOIL SERIES
NATIONAL HIGH WAY	JALALPUR JAL
OTHER ROADS	KABILPUR Kbp
TALUKA PLACE	SISODARA Sda
VILLAGE SITE	EROSION HAZARD
RYLINE WITH ST	POOR DRAINAGE
RIVER	AREA COVERED UNDERED DETAILED SOIL SURVEYED
KOTAR	
TEMPLE	
PROFILE	
TANK	

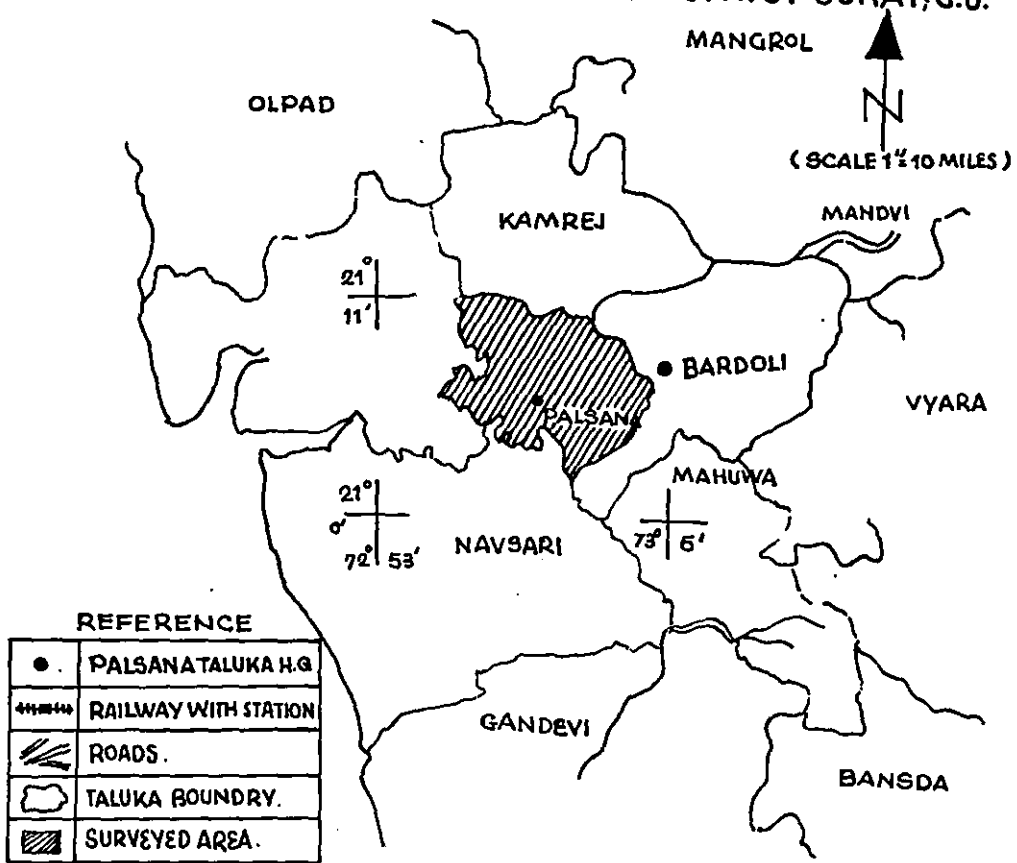


# FETILITY MAP OF PALSANA TALUKA DIST. SURAT

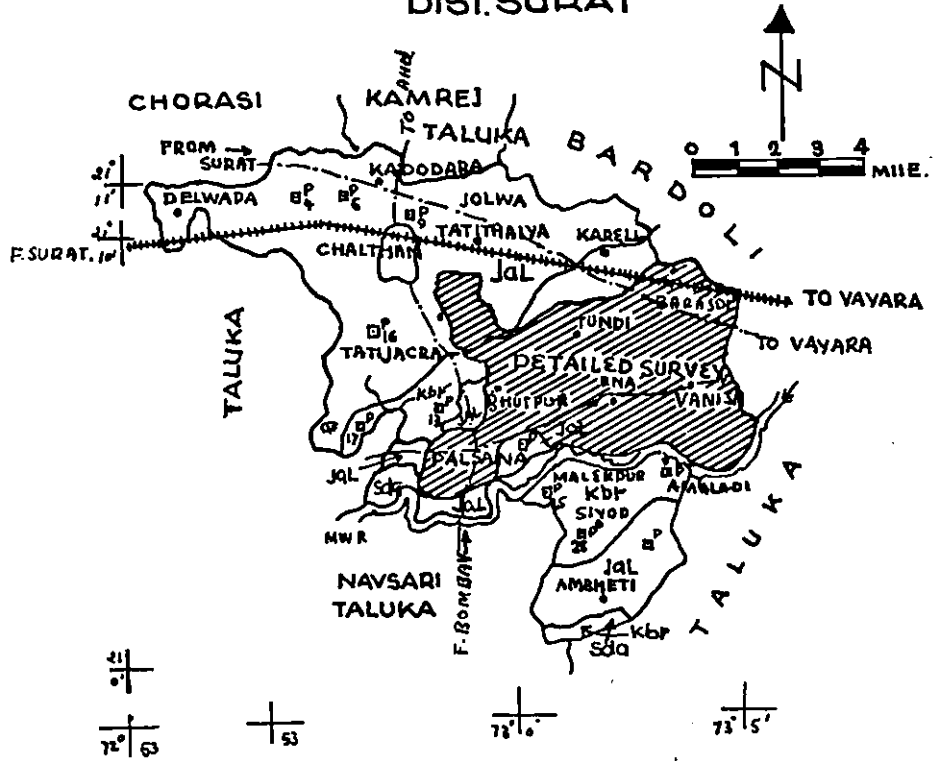


SYMBOLS.		LEGEND.		
SOIL BOUNDRY		SOIL SERIES		
NATIONAL HIGHWAY		JALALPUR	JAL	
OTHER ROADS		KABILPUR	Kbr	
TALUKA DLACE		SISODARA	Sda	
VILLAGE SITE		AREA COVERED UNDER DETAILED SOIL SURVEY		
RLY LINE WITH ST				
RIVER				
KOTAR				
TEMPLE				
PROFILE				
TANK				
	N2	P2 O5	K2 O5	
Jal	LOW	LOW	HIGH	
Kbr-Sda	"	MEDIUM	"	

# INDEX MAP OF PALSANA TALUKA DISTRICT SURAT, G.S.

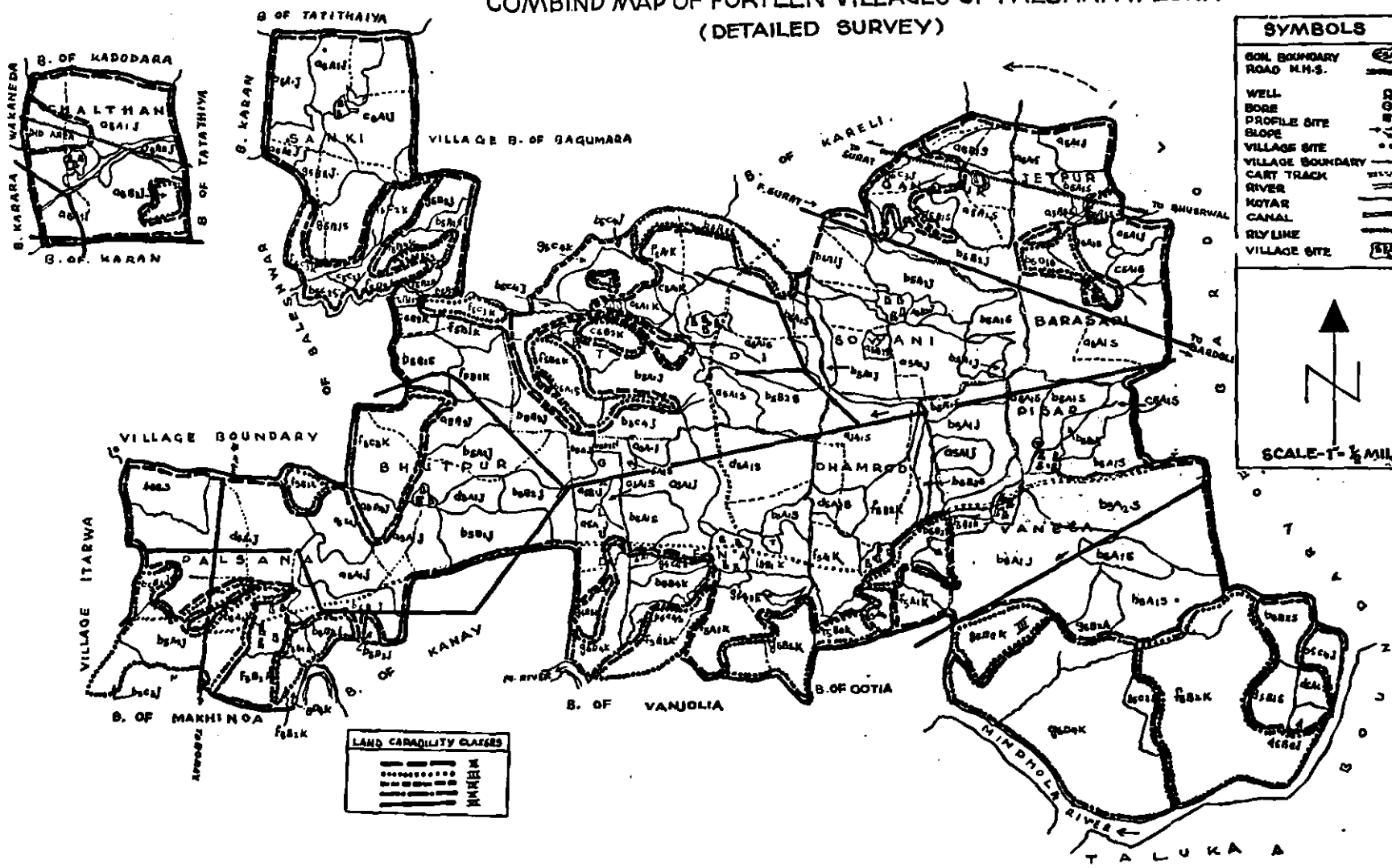


# SOIL MAP OF DALSANA TALUKA DIST. SURAT



SYMBOLS.	LEGEND.
SOIL BOUNDRY	SOIL SERIES
NATIONAL HIGHWAY	JALALPUR            JAL
OTHER ROADS	KABILDUR        Kbp
TALUKA DLACE	SISODARA        Sda
VILLAGE SITE	AREA COVERED UNDER DETAILED SOIL SURVEY
RLY LINE WITH ST	
RIVER	
KOTAR	
TEMPLE	
PROFILE	
TANK	

# COMBIND MAP OF FORTEEN VILLAGES OF PALSANA TALUKA (DETAILED SURVEY)



SYMBOLS		LEOND	
SOIL BOUNDARY		<b>TEXTURE</b>	
ROAD M.H.S.		CLAY	Q
WELL		CLAY LOAM	D
BORE		SILTY CLAY LOAM	C
PROFILE SITE		SILTY CLAY	d
SLOPE		SANDY CLAY LOAM	e
VILLAGE SITE		LOAM	P
VILLAGE BOUNDARY		SANDY LOAM	9
CART TRACK		SANDY CLAY LOAM	h
RIVER		SOIL SERIES	
KOTAR		JALALOUR	u
CANAL		SHODADA	s
RLY LINE		KABILPUR	k
VILLAGE SITE		ERU	E
 SCALE - 1/2 MILE		<b>EROSION</b>	
		SLIGHT OR NO EROSION	1
		MODERATE	2
		SEVERE	3
		VERY SEVERE	4
<b>SLOPE CLASSES</b> 0 TO 1% ..... A 1 TO 3% ..... B 3 TO 5% ..... C 5 TO 10% ..... D depth VERY DEEP ..... E			

LAND CAPABILITY CLASSES	
	I
	II
	III
	IV
	V
	VI
	VII
	VIII
	IX
	X