

No. 19

technical bulletin



DEPARTMENT OF AGRICULTURE,
GUJARAT STATE, AHMEDABAD-6

**Survey of
Agronomic research
Station Umarala**

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SOIL SURVEY AND LAND USE OF MODEL AGRONOMIC RESEARCH
STATION UMRALA, DISTRICT BHAVNAGAR, GUJARAT STATE

I. Introduction:

Model Agronomic research station Umralla is situated 5 kms. away from Dhola Station, Ahmedabad-Bhavnagar Railway line of the Saurashtra Division of Gujarat State. The State highway No. 39 i.e. Bhavnagar to Ahmedabad passes nearby the farm.

The survey was undertaken at the instance of the Director of Agriculture, Gujarat State, Ahmedabad. The survey work was carried out by the Soil survey officials of Gujarat State in the month of June 1969 covering an area of 84 Acres (33.92 hectares).

The survey work was undertaken with a view to know the potentiality of the farm land for scientific land use as per I and capability classification.

II. General description of the area:

2. 1. Locations:

The area under report falls under Umralla Taluka, Bhavnagar District of Gujarat State. It has a total area of 33.92 hectares. It is on the State highway No. 39 towards NW side. The taluka headquarters Umralla is about 5 kms. East from the Centre. Geographically the area lies appx. bet. 21°-52" N Latitudes & 71°-48" E Longitudes.

2. 2. Physiography, relief and drainage:

Physiographically the soils are located under the flood plain of river Kalubhar with an elevation of above 51 metres above M.S.L. The flood plain is grouped under Alluvial clay underlain by older alluvium organic-slope- Soils away from river bed.

Plain to very gently sloping land with slight to moderate erosion. The three parallel open drains running along the farm road, North West to South East drain the surplus water from the area in a natural Nala.

The general slope of the farm is from West to South east. All the fields are banded, except on the nala side (i.e. on the S. E. end of farm) where moderate erosion is observed. The soils possess moderate drainage.

2. 3. Geology:

The farm soils comprise of sedimentary deposits of basaltic rocks. The soils are commonly known as "Regur" or Black to Brown soils. The soils are very deep and below 87.5 cms, yellow soils are met. The surface soils are dark in colour.

.....2.

2. 4. Climates

The climate of the area is tropical monsoonic type with a precipitation of 599.05 mms. Characterised by three well defined seasons viz. Monsoon, Winter and Summer. Please refer index No.1. The maximum temperature rises upto 112°F in May. The maximum rainfall recorded in month of July ranges upto 466 mm. Please refer index No.2.

2. 5. Natural Vegetation

Trees:

Grasses:

Azadirregta indica -Limdo.
Terminalia indica -Amali.
Acacia arabica -Babul.
-Kerda.

2. 6. General Agriculture:

Jowar, Bajari, Wheat are the ~~main~~ Major crops of the farm under Kharif and Rabi seasons. Groundnut, Maize, Cotton and Sesamum crops are also raised.

2. 7. Water Supply:

Seasonal irrigation is catered by Rangola Canal No.9 only and (50 Acres) 20 hectares of the total area of the farm is irrigable.

III. Technique of Soil Surveys

The Detail Soil Survey of farm was conducted to map the soils of the farm and to know the possibility for the Agriculture Development using available farm map as based map according to instructions contain in the All India standard Soil Survey manual. This involved field study of the soil by profile pits and classification of soils into soil series on the basis of similarities in the profile characteristics. Each mapping unit shown on the map by a symbol indicative of soil series, surface texture, depth, slope and erosion e.g. Jal=C-d₅/ B-e, stands for Jalalpur (Jal) series with Clay (c) texture, very deep (d₅), soil occurring on gently sloping (B) and practically uneroded or slightly (e) land. The actual location of different soils (designated by soil mapping unit) in surveyed farm area can be read on the soil map annexed herewith.

3. 1. Soils of the farm are very deep, heavy (clay texture) throughout the depth of profile pit (pit of 180 Cms.), common gravels of Basalt present upto 66 Cms. while conca of 5-10 mms. size are many throughout the depth. Considering the geomorphological and chemical characteristics, drainage etc. viz. Texture, colour, PH, Conductivity, depth, ~~xxxxx~~ concretion etc., the soil of the farm is grouped under the already tentatively fixed series-Jalalpur under soils of older alluvium on flood plain-Alluvial clay. The colour of the order alluvium varies from dark brown to very dark greyish brown.

3. 2. Soil Classifications

The soils of the area is developed by transported material. The soils are heavy throughout the profile depth. The soil is locally known as black soil i.e. heavy in texture.

I. Jalapur series

A typical profile in farm in plot No.C/3 is described below:

<u>Depth (in Cm.)</u>	<u>Description.</u>
0-10	Dark greyish xx brown (10YD 4/2D); very dark greyish brown (10YR 3/2M) clay; fine slightly hard sub-angular blocky; dry loose; sticky and plastic when wet; moist friable; few basalt and conca present; slight effervescence with dil.HCl; clear and smooth boundry; abundant fine roots; PH 8.4.
10-30	Very dark greyish brown (10YR 3/2M); gravelly clay; a moderate, slightly hard subangular blocky; wet sticky and plastic; moist very friable; few conca 1-2 mm size present; strong effervescence with dil.HCL basalt 5 mm. size present; abrupt and smooth boundry; few fine roots; PH 8.6.
30-65	Dark greyish brown 10YR (10YR 4/2M) gravelly silty clay; medium moderate, sub angular blocky; wet sticky and plastic; moist friable; common lime conca having 2-5 mm. size present; strong effervescence with dil.HCL; basalt gravels present; clear and smooth boundry; very few fine roots present; PH 8.9.
65-90	Dark greyish brown (10YR 4/2M) silty clay; medium moderate; sub angular blocky structure; wet very sticky very plastic; moist friable; common lime conca having 2-5 mm. size present; strong effervescence with dil. HCL. Diffuse and irregular boundry; PH 9.2.
90-180	Dark yellowish brown (10YR 4/4) silty clay; massive; wet sticky and plastic; moist friable; many lime conca x 5-10 mm. present; violent effervescence with dil.HCL; PH 8.8.

Range in characteristics

The colour of the surface soil varies from very dark greyish ~~xx~~ brown (10YR 3/2,3/3) while in the subsoil the colour tends towards yellow varying from dark yellowish brown to yellowish brown (10YR 3/4,5/4). Heavy textare of clay, throughout the profile. Occasionally silty clay silty clay loan and clayloan soil types are also observed atplaces4.

....where the subsoil texture varies from silty clay, silty clay loam, clay loam, medium ~~xx~~ moderate to strong angular blocky structure is observed on the surface soil, while in subsoil fine weak blocky to massive the firm ~~xxx~~ when moist, conca 2-15 mms. irregular, white many on top and increasing in lower horizons. In some cases lime pockets are observed in lower horizons. Conspires are observed upto 100 cm. Basalt gravells are present throught the profile, quartz are observed in subsoil. Violent effervescence with dil.HCL with PH landing from 8.4 to 9.2 alongwith depth and conductivity is normal on top as well as subsoils. permeability varies from very slow to slow. Common fine roots upto 38 cms. and then few.

Relief:

Plain to gently sloping area having normal slope of 1 to 3% Erosion ~~x~~ hazard slight to moderate.

xxxx Vegetation:

Azadirregta indica	-Lindo.
Tomar iades	-Amali.
Acanin arabica	-Babul.

Present land uses:

Cultivated Kharif Jowar and Rabi, crops viz. wheat.

Land capability classes and recommendations

To show the relative suitability of soils for planned land use, land capability classes are formed.

Most of the farm soils fall under Class II and little area falls under Iie *e* shows hazards for erosion.

Class II comprises 15.33 hectares 64.74 % of the total area. It consists of ~~xx~~ nearly level to very gently sloping land having slight or no erosion with very deep clayey soils with moderately well drainage. This class requires conservation farming practices.

Class Iie comprises 8.35 hectares 35.36 % of the total area. It consists of nearly levelled land with moderate erosion. It required levelling of land to check sheet erosion and uniform spread of irrigation water.

Discussion on analytical data:

From the analytical data it is concluded that the PH of the soils is moderately high in top as well as in sub soil. Conductivity is normal. Soils are medium in Nitrogen, poor in available (p2 O₅) and available (K₂O).

Re commandations

Organic manures 10 to 25 cart loads per hectare and balanced inorganic phosphatic and potashic complex slightly fertilizers are advocated for increasing the fertility status of the soils. Green manuring at a interval of 1 to 2 years are also advised to improve the physical properties of soils. For drainage suitable open drains are advised. Judicious irrigation with lesser duty is advised.

APPENDIX NO. * 1 *

Temperature data maximum and minimum 1964-1968 in (F°) Umrula farm.

Year	January		February		March		April		May		June		July		August		September		October		November		December		Mean of Maxi.	Mean of Mini.			
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.					
1965	80	16	83	19	78	23	99	24	90	60	98	72	99	79	90	71	92	78	105	62	98	54	92.5	44	92.4	50.2			
1966	94	44	102.2	46	104	54	107.6	54	110	60	107.5	52	106	64	98	38	100.4	58	105.8	62	92	42	91	49	101.5	53.6			
1967	86	45	100	48	103	61	109	62	112	71	107	76	95	70	94	72	97	70	104	60	91	71	92.6	54	100.0	63.1			
1968	86	42	92	48	102	50	108	56	110	72.5	51	10	62	102	76	94	74	100	68	100	68	102	54	92.8	42	99.2	59.3		
									Max.		Mini.																		
									Average of four year....		98.3		56.5																

APPENDIX No.2.

Year.	January.	February.	March	April.	May.	June.	July	August	Sept.	October.	Novr.	Decr.	Yearly Total rainfall.
1	2	3	4	5	6	7	8	9	10	11	12	13	14.
1964	6-00	-	-	-	-	71-00	486-00	75-00	335-00	-	-	-	953-00
1965	70-00	-	-	-	-	122-00	193-00	97-00	28-00	-	-	-	388-00
1966	-	-	-	-	-	-	255-00	-	110-00	-	-	-	365-00
1967	-	-	75-00	6-00	-	104-50	216-00	79-75	23-00	-	-	15-00	519-25
1968	-	-	6-00	-	-	-	118-00	27-00	16-00	3-00	2-00	-	470-00

Total Rainfall of last 5 years 2695.25 mms.

Average yearly Rainfall of 5 years ... 539.05 mms.

APPENDIX NO. 3 :

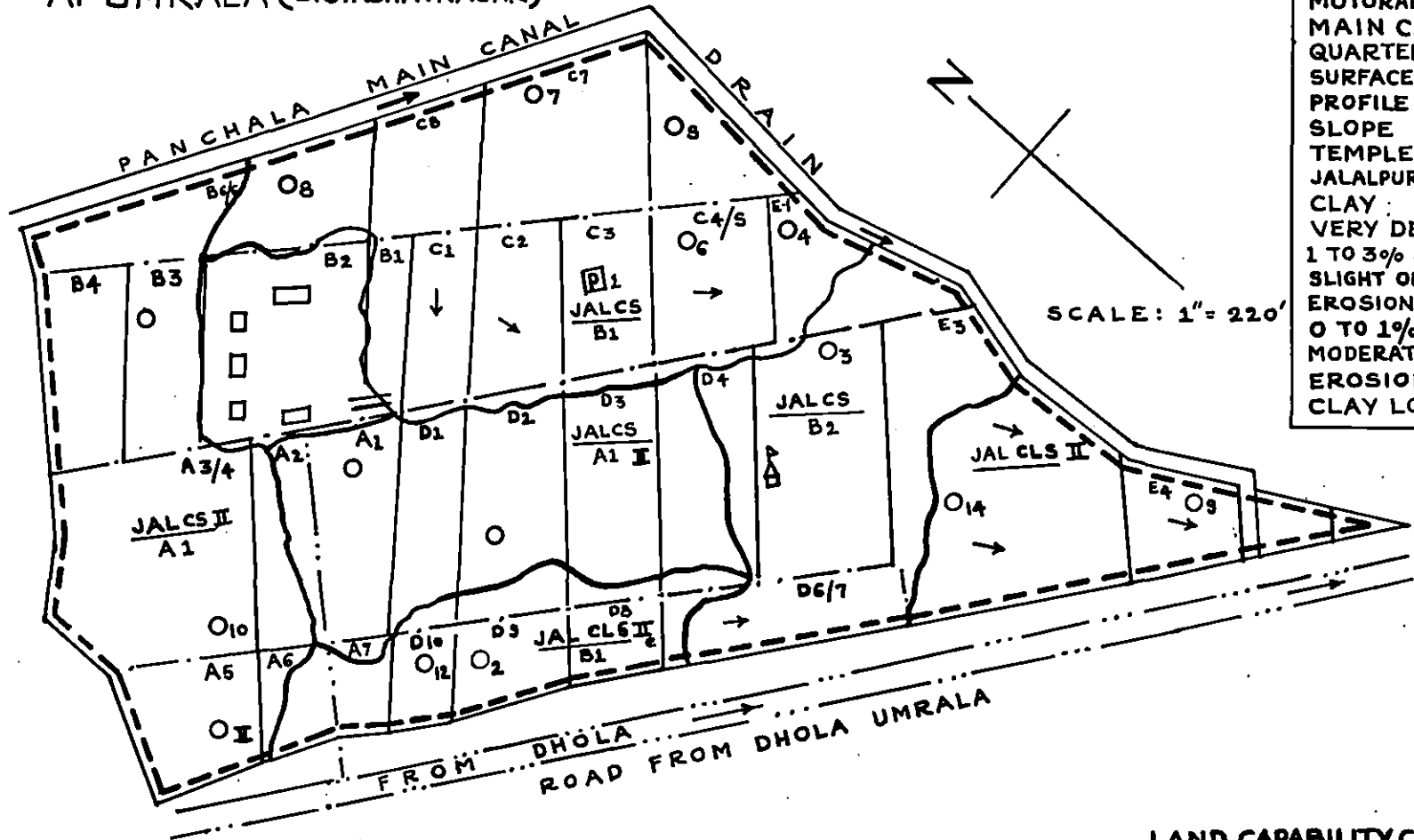
SOIL UNIT LIST

Sr. No. (1)	Soil Unit. (2)	Area of Soil unit in ha ctars. (3)	Land capability classes. (4)	Land capability class.	Area in ha ctars.
1.	Jal C B ₂ 5	2.75	II _e	II	15.33
2.	Jal C B 2 5	3.36	II _e	II _e	8.35
3.	Jal C B 2 5	6.60	II		
4.	Jal C A ₁ 5	3.74	II		
5.	Jal C B 2 5	2.24	II _e		
6.	Jal C A ₁ 5	4.99	II		
		<u>23.68</u>			
	Misc...	1.21			
		<u>24.89</u>			

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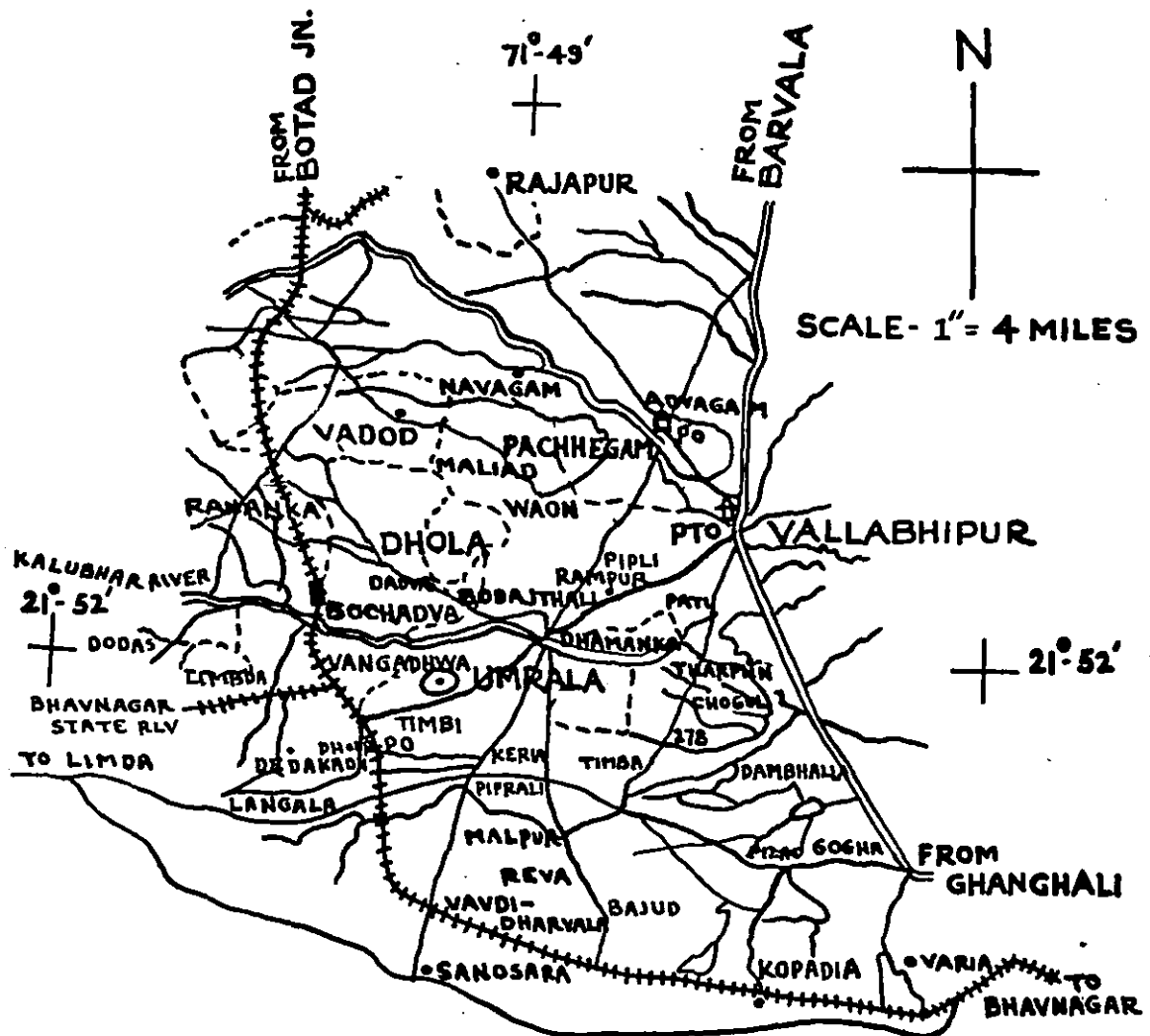
SOIL MAP OF THE IRRIGATION DEMONSTRATION FARM AT UMRALA (DIST. BHAVNAGAR)



REFERENCE	
CART ROAD	--- ---
MOTORABLE ROAD	====
MAIN CANAL	====
QUARTERS	□□□
SURFACE SAMPLE	○
PROFILE SITE	⊠
SLOPE	— —
TEMPLE	△
JALALPUR SERIES	JAL
CLAY :	C
VERY DEEP	S
1 TO 3% SLOPE	B
SLIGHT OR NO - EROSION	1
0 TO 1% SLOPE	A
MODERATE - EROSION	2
CLAY LOAM	CL

LAND CAPABILITY CLASS-  

INDEX MAP OF VILLAGE UMRALA (DIST. BHAVNAGAR)



71°-48'

REFERENCE	SIGN
RLY. WITH STATION	+++■++++
CONTOURS	⊖
TEMPLE	⌞
VILLAGES	••
RIVER	≡
SURVEYED AREA	○
ROAD	≡≡