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technical bulletin

DEPARTMENT OF AGRICULTURE,
GUJARAT STATE, AHMEDABAD-6

**Survey of Fallow Land
in Bhavnagar and Kutch
districts.**

EXTENT AND CAUSES OF FALLOW AREAS IN BHAVNAGAR

AND KUTCH DISTRICTS OF GUJARAT STATE.

1. INTRODUCTION.

1.1 A sample survey to ascertain the extent and

fallow areas was undertaken in Gujarat State in all the districts except Dangs district. The whole programme was phased so as to cover two districts every year starting from 1961-62.

1.2 Three reports covering six districts viz: (i) Surendranagar and Mehsana, (ii) Surat and Bulsar, (iii) Ahmedabad and Kaira have been already published by the Directorate of Agriculture Gujarat State, Ahmedabad and the present report is the fourth in the series and covers Bhavnagar and Kutch districts of the State.

2. OBJECT.

2.1 The object of the study were (i) to obtain the reliable estimates of the total area under fallow in the districts under study and to classify it under three categories viz: (a) current fallow (b) other fallow (c) culturable waste (ii) to ascertain the causes of the land remaining fallow.

3. ORGANIZATION.

3.1 The survey as usual was carried out in Bhavnagar and Kutch districts under the technical control of the Directorate of Agriculture, Gujarat State, Ahmedabad in Co-ordination with the Superintending Agricultural Officer, Rajkot division, Rajkot. The field work was carried out by three Agricultural Assistants working under the scheme.

3.2 For ensuring the reliability of the data, the supervision was also carried out by the supervisory staff consisting of Junior Statistical Assistant and an Assistant Statistician stationed at Divisional Head quarter.

4. COVERAGE.

4.1 In Bhavnagar district the survey was undertaken in the year 1964-65. The total area under fallow for the whole of Gujarat State reported during this year was of the order of 32,09,100 acres out of this area 2,02,633 acres i.e. about 6.31% of the total fallow area was reported in Bhavnagar district.

4.2 In case of Kutch district the survey was carried out during the year 1965-66 and total fallow area reported in the State during this year was of the order of 31,56,800 acres. Out of this area, the fallow area reported in Kutch district was 10,49,818 acres which worked out to be 33.26% of the total fallow area in the State.

5. DESIGN OF THE SURVEY.

5.1 The design of the survey was one of stratified unistage random sampling with taluka as stratum and a village as an ultimate unit of sampling.

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5.2 A sample of 100 villages in a district under the survey was selected. Allocation of number of villages in all the talukas of these districts was done approximately in proportion to the fallow area reported with a minimum of three villages in each taluka. The villages were selected by simple random sampling in each taluka with equal probability and about 33 to 35 villages were allocated to each of the Agricultural Assistant.

5.3 The information about the extent of total fallow area in each selected village was obtained by way of complete enumeration. The area cultivable but not cropped during the year was recorded by spot inspection after rough measurement of such survey numbers in the selected villages. The survey number wise area under fallow as reported by 'Talati' was also recorded from revenue records. The fallow area was further classified in 3 main categories viz: (i) current fallow (ii) other fallow (iii) culturable waste on the basis of following definitions:

- (i) Current fallow : Land which is kept fallow for the current year only, i.e. fallow for one year only.
- (ii) Other fallow:- Land which is kept fallow for a period of two to five years.
- (iii) Culturable waste: Land which is kept fallow for a period of more than five years.

5.4 The total fallow area in each of the survey numbers was recorded to facilitate checking correctness of area and correct classification.

5.5 To ascertain the causes for the land being kept fallow a sub-sample of 50 survey numbers under fallow was chosen in each selected village. The reasons for keeping land fallow were recorded by interviewing the concerned cultivators. The fallow area recorded in each of the survey numbers was further classified on the basis of depth of soil, soil profile, and extent of soil erosion into four categories, viz: A, B, C and D as per criteria followed in the waste land survey conducted by the Department of Agriculture. These four categories of land are defined as under :-

Category -A:- Slope of this type of land is not more than one percent and can be brought easily under plough without any special soil conservation measures.

Category -B:- Slope of this type of land does not exceed 8 percent and intensive soil conservation measures are required to bring it under cultivation.

Category - C:- This type of land is highly eroded and is having a slope of more than 8 percent. It may be near about forest and is not suitable for cultivation.

Category + D:- This type of land is away from forest and is not suitable for cultivation but can be successfully used for growing grass.

6. TRAINING.

6.1 Training was imparted to the field staff and the supervisory staff in the conduct of the survey. A practical field demonstration was also given as to how to record survey number wise fallow area from the land records in the prescribed schedules.

(Appendix-A). The training was imparted by the Assistant Statistician at divisional headquarter, Rajkot.

7. SUPERVISION AND SCRUTINY.

7.1 The field work of the Agricultural Assistant was supervised by the Statistical Assistant and the Assistant Statistician. While the scrutiny of the schedules received from the Agricultural Assistant was done by the Statistical Assistant and it is revealed that the information was mostly collected as per the instructions.

8. METHOD OF ESTIMATION:

8.1 The survey number wise total fallow area as recorded by Talaties in the land records and collected by the Agricultural Assistants on the basis of spot inspection was obtained from the selected villages of Bhavnagar and Kutch districts. For obtaining estimated total fallow area using the official fallow area in the year of reference as auxiliary variate the ratio method of estimation was employed. The procedure adopted for estimation is explained in brief as under :-

8.2 In column No.5 of the statements No.1.1 and 1.2 the taluka wise ratio of inspected fallow area and official fallow area was worked out. Taluka wise estimated fallow area was obtained by multiplying the ratio with the official fallow area in respective talukas. These taluka-wise estimated fallow areas are presented in col.No.7 of the statement-1.1 and 1.2. Summation of the taluka wise estimated fallow area gives the estimated total fallow area of the district. The formula used for estimating variance is as under :-

$$V(YR) = \frac{N(N-n)}{n} (S_y^2 + Rn^2 S_x^2 - 2 RnS_{xy})$$

9. DISCUSSION OF RESULTS.

9.1 The survey was carried out in all the talukas of Bhavnagar and Kutch districts during the year 1964-65 and 1965-66 respectively. Table No.1 as mentioned earlier gives a comparative idea of estimated total fallow area with that of corresponding official fallow area for both the districts.

Table No.1.

(Area in acres)

District	Official total fallow area	Estimated total fallow area	Difference
Bhavnagar (1964-65)	2,02,633	1,96,831	5802
Kutch (1965-66)	10,49,818	10,49,527	291

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9.2 In case of Bhavnagar district it appears from the above that the official total fallow area is exagrated by 5802 acres. It is thus more by 2.9% while such a difference in case of Kutch district is only 291 acres i.e. 0.03 %. In other words it can be stated that the official fallow area is excess to the extent of 2.95% and 0.03% for Bhavnagar and Kutch districts respectively.

9.3 From statement No.1 it is observed that the total fallow area is estimated at 1,96,831 acres with a sampling error of 0.02 % for Bhavnagar district while in case of Kutch district it is estimated at 10,49,527 acres with a sampling error of 0.005 %.

9.4 Further it can be seen that the sampling error of the stratum varies from 0.05% to 8.95 % in Bhavnagar district while in Kutch district it varies from 0.02 % to 0.37 %.

9.5 It is thus revealed that the estimated total fallow area in respect of both the districts viz: Bhavnagar and Kutch closely agree with the official fallow area with a very small sampling error.

10. CLASSIFICATION OF TOTAL FALLOW AREA.

10.1 The total fallow area, estimated for Bhavnagar and Kutch districts as further classified into three categories, for comparison with the corresponding official area as per season and crop report is shown in table No.2.

		<u>Table No.2.</u>			
District	Categories of fallow area.	According to survey		Official fallow area	
		Acres	%	Acres	%
Bhavnagar (1964-65)	1.Current fallow.	625.775	9.57	70139	34.61
	2.Other fallow	1932.150	29.50	43709	21.57
	3.Culturable waste.	3990.325	60.93	88785	43.82
	Total:-	6549.250	100.00	202633	100.00
Kutch (1965-66)	1.Current fallow	2061.625	28.26	436536	41.58
	2.Other fallow.	1441.650	19.76	213710	20.36
	3.Culturable waste.	3791.425	51.98	399572	38.06
	Total:-	7294.700	100.00	1049818	100.00

10.2 It can be seen from the above table that as per sample survey as high as 60.93% and 51.98% of the total fallow area is under culturable waste in Bhavnagar and Kutch districts respectively as against 43.82% and 38.06% respectively as recorded by talaties as official area. It is interesting to note that other fallow area as estimated on the basis of sample survey and the official area under other fallow agree closely. In Bhavnagar district the estimated other fallow area is higher to the extent of 7.93% while in Kutch district it is less by 0.60% only. Further on the basis of sample survey it is observed that out of the total fallow area current fallow accounts for 9.57% of the area in Bhavnagar and 28.26% of the area in Kutch district. While in the State Season and Crop Report area under this head of current fallow reported is of the order of 34.61% and 41.58% in Bhavnagar and Kutch district respectively.

10.3 Thus it is revealed that the official fallow area under current fallow appears to be exaggerated in both the districts. Unlike area under current fallow and area under culturable waste appears to be under estimated in case of official area in both the districts.

11. CLASSIFICATION OF FALLOW AREA ACCORDING TO DIFFERENT TYPES OF SOIL GROUPS.

11.1 The estimated fallow area is further classified according to different types of soil groups viz: A, B, C and D which are used in waste land survey. The land under A & B have a gentle slope with a sufficient depth of soil and these types of soil could be brought under cultivation by soil conservation measures. While the land under soil groups 'C' and 'D' is considered unsuitable for cultivation being highly eroded and having a slope of more than 8%. This land is suitable for afforestation and grazing purpose.

11.2 The following table gives soil group wise classification of the fallow area on the bases of sample survey.

Table No.3.

District	Soil Groups	Area under fallow in acres.	Percentage.
Bhavnagar (1964-65)	A	763.250	11.65
	B	1685.675	25.74
	C	551.850	8.43
	D.	3548.475	54.18
Total :-		6549.250	100.00

District	Soil Group	Area under fallow in acres.	Percentage
Kutch (1965-66)	A	1450.025	19.88
	B	2036.175	27.91
	C.	950.650	13.03
	D.	2857.850	39.18
Total:-		7294.700	100.00

11.3 It is revealed from table No.3 that about 54.18% and 39.18% of the total fallow area in Bhavnagar and Kutch districts respectively is classified as 'D' type of land. Such type of land is highly undulating with thin layer of soil and is not suitable for cultivation. This type of land falls under culturable waste and it can be used for grazing purpose only. About 9.43% and 13.03% of the total fallow area is found to be under soil group 'C' i.e. suitable for afforestation in Bhavnagar and Kutch districts respectively. Most of this land falls under culturable waste. It is interesting to note that about 25.74% and 27.91% of the total fallow area is classified under soil group 'B' in Bhavnagar and Kutch districts respectively. This type of land can be brought under cultivation after adopting intensive soil conservation measures. This finding indicates that there is considerable scope for soil conservation activity in both the districts in years to come. About 11.65% and 19.88% of the total fallow area fall under soil group-A- in Bhavnagar and Kutch districts respectively. Such type of land can be put under cultivation without any special soil conservation measures.

12. CLASSIFICATION OF FALLOW LAND IN TO DIFFERENT TYPES OF SOILS AND DIFFERENT CATEGORIES OF FALLOW LAND.

12.1 Classification of fallow land into different types of soils and different categories of fallow land is shown in statement No.2. It can be seen that the entire land under soil group 'A' comes from category, current fallow and other fallow in both the districts. In case of Bhavnagar district category other fallow accounts for as high as 82.06 % of the total area falling under soil group 'B'.

12.2 Such type of land cannot be used for cultivation unless necessary soil conservation measures are adopted. While in Kutch district category current fallow accounts for 58.48% of the total area falling under soil group 'B'. Further it can also be seen that about 41.78% and 78.94% of the total area under soil group 'C' happen to be from category culturable waste in Bhavnagar and Kutch districts respectively. Such type of land is suitable for afforestation only.

13. CAUSES OF LAND REMAINING FALLOW.

13.1 Statement -3 indicates the reasons for keeping land fallow in all the categories viz: current fallow, other fallow and culturable waste. These reasons are ascertained by interviewing the cultivators in the selected villages and are broadly grouped in this statement.

13.2 The survey revealed that about 28.87% and 25.74% of the total fallow area of Bhavnagar district was kept fallow for grazing purpose and due to uneven condition of land respectively. Out of total fallow area kept for grass about 72.44% of the land falls under category culturable waste. Out of the total land which is fallow due to uneven condition about 95.22% of land falls under categories other fallow and culturable waste. Further it is seen that 21.98% of land is kept fallow due to thin layer of soil and most of these area falls under category culturable waste.

13.3 In Kutch district it is observed that most of the fallow land is kept fallow only due to thin layer and uneven condition of land (34.54% and 22.91% respectively). Land kept fallow due to thin layer of soil falls under culturable waste only while most of the land kept fallow due to uneven condition of land falls under the category other fallow.

13.4 Statement-4 describes the classification of land and reasons for keeping it fallow. In Bhavnagar district 28.87% and 25.74% of the total fallow land, is kept fallow for grazing purpose and due to uneven condition respectively. The entire area kept fallow for grazing fall under soil group 'D' while in the entire area kept fallow due to uneven condition of land fall under soil group 'B'. While fallow area is kept 21.98% of the total fallow due to thin layer of soil and this entire area falls under soil group 'D' only.

13.5 In case of Kutch district it is revealed that 4.64% of the fallow land is kept fallow for grazing and this land falls in soil group 'D'. While 34.54% of the fallow land is kept fallow due to thin layer of soil and this land also falls under the category of soil group 'D'.

14. SUMMARY.

14.1 The data collected under the survey indicates that there is very little difference between - the fallow area estimated under survey both in Bhavnagar as well as Kutch districts. The official fallow area is larger by only 2.86% in Bhavnagar district while in case of Kutch district it is larger by only 0.03%. Further it is revealed that the official area recorded in the different categories i.e. current fallow, other fallow and culturable waste is also found to be defective. This appears to be due to wrong classification i.e. actual fallow area belonging to one category classified in to other category.

It is necessary to ascertain correct reasons for such wrong classification of fallow area by primary reporting and take corrective steps.

14.2 In Bhavnagar district about 37% of the total fallow area i.e. 72827 acres is kept fallow mostly due to uneven condition of land poverty of cultivators saline and less retentive nature of soil, while in Kutch district about 48% of the fallow land is kept fallow (i.e. 503773 acres) is kept due to similar reasons. If necessary soil conservation and other suitable soil corrective measures are taken such areas may possibly be brought under cultivation.

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APPENDIX - 'A'.

Scheme for ascertaining the extent and causes of fallow area in Gujarat State.

TABLE -A.

District.		Taluka.		Circle.		Village.					
Name of the Agricultural Assistant.:-		Geographical area of the village:				Acre	Guntha	Date of visit.			
Head Quarter:		Cultivable area of the village:									
Sr No.	Survey No. and pot-hissa number.	Name of Khatedar.	Details of area of survey number and pot hissa number mentioned in Col.No.2.						Culturable waste or permanent fallow (more than five years.)		
			Total area	Cultivable area	Fallow land as per VII, XII village record.		Current fallow (for one year)			Other fallow (for two to three years)	
			A.	G.	A.	G.	A.	G.	A.	G.	
1	2	3	4	5	6	7	8	9			

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Fallow area as per spot inspection.	Details of area of survey number and pot hissa number mentioned in Col.No.2 (for the last five years)					Remarks.
	Before one year	Before two years	Before three years.	Before four years	Before five years.	
(10)	(11)	(12)	(13)	(14)	(15)	(16)

Date:-

Signature:
Agricultural Assistant.

APPENDIX -'B'.

Scheme for ascertaining the extent and causes of fallow area in Gujarat State.

Reasons for fallow land in the selected survey and pot-hissa number.

TABLE #B.

District: _____ Taluka : _____ Circle: _____ Villages: _____

Name of Agricultural Assistant: _____

Date of visit:- _____

Head quarters:- _____

Sr. Survey No.& No. pot-hissa	Cultivable area-	Name of Katedar.	Details of area of survey numbers and pot hissa numbers mentioned in Col.No.2.					
			Fallow area as per tala ties records	Fallow area as per spot inspection	Current fallow	Other fallow	Culturable waste or permanent fallow	
1	2	3	4	5	6	7	8	9

Classification of fallow area of survey numbers and pot hissa numbers mentioned in Col.No.2

A-Class	B-Class	C-Class	D-Class	Remarks
10	11	12	13	14

Date:-
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Signature:
Agricultural Assistant.

STATEMENT - 1.1

Statement showing taluka wise fallow area as recorded by talaties and estimated fallow area based on sample survey.

(Figures in acres)

District	Taluka	Area recorded under fallow in sample villages		Ratio $\frac{R-Y}{X}$	Official fallow area as per S.C.R.	Estimated fallow area	Standard error.	Percentage standard error
		Talaties X	Agri.Asstts. Y					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Bhavnagar (1964-65)	Botad	160.350	140.950	0.8790	12947	11380.41	252.48	2.22
	Bhavanagar	992.700	997.700	1.0050	40273	40474.37	18.51	0.05
	Gadh-ada	208.150	185.825	0.8927	14289	12755.79	47.39	0.37
	Gariadhar	61.100	55.475	0.9079	966	877.03	78.50	8.95
	Ghogha	2719.950	2719.950	1.0000	5009	5009.00	-	-
	Savar-kundla	286.250	282.425	0.9866	12907	12734.05	129.69	1.02
	Mahuva	483.125	504.125	1.0435	12633	13182.54	399.08	3.03
	Palitana	1097.850	1097.850	1.0000	34605	34605.00	-	-
	Sihor	391.650	371.100	0.9475	20993	19890.87	331.33	1.67
	Talaja	1155.675	1155.675	1.0000	36725	36725.00	982.70	2.68
	Umrals	119.225	116.600	0.9780	3424	3348.67	788.55	-
	Vallabhi-pur.	76.350	56.800	0.7439	7862	5848.54	172.06	2.94
Total:-		7752.375	7684.475	0.9912	202633	196831.27	33.45	0.02

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STATEMENT - 1.2

Statement showing taluka wise fallow area recorded by talaties and estimated fallow area based on sample survey.

(Figures in acres)

District	Taluka	Area recorded under fallow in sample villages.		Ratio $R = \frac{Y}{X}$	Official fallow area as per S.C.R	Estimated fallow area.	Standard error	Percentage
		Talaties X	Agri.Asstts. Y					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Kutch (1965-66)	Abdasa	3603.325	3600.625	0.9993	245568	245396.10	109.59	0.04
	Anjar	183.300	183.300	1.0000	46019	46019.00	-	-
	Bhachau	572.350	578.350	1.0104	148416	149959.53	31.67	0.02
	Bhuj	172.275	165.075	0.9582	73061	70007.05	64.63	0.09
	Lakhapat	569.000	550.000	0.9666	100406	97052.45	189.04	0.19
	Mandvi	1232.600	1140.600	0.9254	52367	48460.42	164.27	0.34
	Mundra	236.075	231.725	0.9816	42555	41771.99	55.81	0.13
	Nakhatrana	268.450	259.750	0.9676	46090	44596.68	165.10	0.37
Rapar	1163.175	1206.175	1.0370	295336	306263.43	146.62	0.05	
Total:-		8000.550	7915.600	0.9894	1049818	1049526.65	47.46	0.005

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STATEMENT-2.

Classification of fallow land according to different soil groups (Figures in acres)

District	Category of / soil fallow land / Group	A	B	C	D	Total	Percentage
Bhavnagar	Current fallow	454,975	91,100	80,700	-	625,775	9.57
	Other fallow	308,275	1383,275	240,600	-	1932,150	29.50
	Culturable waste	-	211,300	230,550	3548,475	3990,325	60.93
	Total:-	763,250	1685,675	551,850	3548,475	6549,250	100.00
	Percentage:	11.65	25.74	8.43	54.18		
Kutch	Current fallow	804,575	1190,750	66,300	-	2061,625	28.26
	Other fallow	645,450	662,300	139,900	-	1441,650	19.76
	Culturable waste	-	183,125	750,450	2857,850	3791,425	51.98
	Total:-	1450,025	2036,175	950,650	2857,850	7294,700	100.00
	Percentage:	19.88	27.91	13.03	39.18		

A = This class of land does not require any special soil conservation practices to bring them under cultivation. Slope of such land should not be exceeding one percent.

B = This class of land requires intensive soil conservation measures to bring it under cultivation. Slope of such land should not be exceeding 8 percent.

C = This class of land is near the forest and not suitable for cultivation. Slope is more than 8 percent and highly eroded. This land is suitable only for afforestation.

D = This class of land is away from the forest and not suitable for cultivation but it is suitable for vegetation. The land can give good yield of grass only.

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STATEMENT - 3.

Classification of fallow land according to reasons and different categories of fallow land
(Figures in acres)

District	Category of fallow land	Reasons for keeping land fallow				
		A ₁	A ₂	A ₃	A ₄	A ₅
Bhavnagar	Current fallow	-	80.575	108.775	-	-
	Other fallow	521.150	722.175	161.275	-	27.300
	Culturable waste	1369.750	882.925	-	-	190.600
	Total :-	1890.900	1685.675	270.050	-	217.900
	Percentage:-	28.87	25.74	4.12	-	3.33
Kutch	Current fallow	-	594.525	504.250	-	-
	Other fallow	-	1441.650	-	-	-
	Culturable waste	338.050	-	-	-	-
	Total:-	338.050	2036.175	504.250	-	-
	Percentage:-	4.64	27.91	6.91	-	-

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Statement No.3 contd...

District	Category of fallow land	Reasons for keeping land fallow	A ₆	A ₇	A ₈	A ₉	Total	Percentage
Bhavnagar	Current fallow	-	308.275	48.450	80.700	626.775	9.57	
	Other fallow	21.725	-	98.950	379.575	1932.150	29.50	
	Culturable waste	1417.950	-	37.525	91.575	3990.325	60.93	
	Total:-	1439.675	308.275	184.925	551.850	6549.250	100.00	
	Percentage:-	21.98	4.71	2.82	8.43	-	-	
Kutch	Current fallow	-	300.325	645.450	17.075	2061.625	28.26	
	Other fallow	-	-	-	-	1441.650	19.76	
	Culturable waste	2519.800	-	-	933.575	3791.425	51.98	
	Total:-	2519.800	300.325	645.450	950.650	7294.700	100.00	
	Percentage:-	34.54	4.12	8.85	13.03	-	-	

A₁ = Land kept fallow for grazing purpose.

A₂ = Uneven condition of the land.

A₃ = Poverty of cultivators.

A₄ = Malarious climate.

A₅ = Growth of sever weeds

A₆ = Thin layer of soil

A₇ = Saltish nature of soil.

A₈ = Less retentive nature of soil

A₉ = Other reasons.

STATEMENT - 4.

Classification of fallow land according to reasons and different soil groups of land.
(figures in acres)

District	Soil Groups	Reasons for land keeping fallow	A1	A2	A3	A4	A5	A6	A7	A8	A9	Total	Percentage.
Bhavnagar	A	-	-	270.050	-	-	-	308.275	184.925	-	-	763.250	11.65
	B	-	1685.675	-	-	-	-	-	-	-	-	1685.675	25.74
	C	-	-	-	-	-	-	-	-	-	551.850	551.850	8.43
	D	1890.900	-	-	-	217.900	1439.675	-	-	-	-	3548.475	54.18
Total:-			1890.900	1685.675	270.050	-	217.900	1439.675	308.275	184.925	551.850	6549.250	100.00
Percentage:-			28.87	25.74	4.12	-	3.33	21.98	4.71	2.82	8.43	-	-
Kutch	A	-	-	504.250	-	-	-	300.325	645.450	-	-	1450.025	19.88
	B	-	2036.175	-	-	-	-	-	-	-	-	2036.175	27.91
	C	-	-	-	-	-	-	-	-	-	950.650	950.650	13.03
	D	338.050	-	-	-	-	2519.800	-	-	-	-	2857.850	39.18
Total:-			338.050	2036.175	504.250	-	-	2519.800	300.325	645.450	950.650	7294.700	100.00
Percentage:-			4.64	27.91	6.91	-	-	34.54	4.12	8.85	13.03	-	-

A₁ = Land kept fallow for grazing purpose.

A₂ = Uneven condition of the land

A₃ = Poverty of cultivators

A₄ = Malarious climate.

A₅ = Growth of sever weeds

A₆ = Thin layer of soil

A₇ = Saltish nature of soil

A₈ = Less retentive nature of soil

A₉ = Other reasons.

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