

Department of Agriculture, Bombay

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IMPROVEMENT OF MANAT LANDS IN THE NORTH KONKAN

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APPENDIX I.

Statement showing areas of Manat lands and total areas under cultivation in the Thana and Kolaba Districts of the Bombay Presidency.

Serial No.	Name of Taluka	Area under Manat lands in acres					Total area under cultivation	Percentage of Manat land to total area under cultivation.	
		Grass in acres	Rice in acres	Rabi crops in acres	Irrigated crops in acres	Total in acres			
<i>Thana District</i>							Acres.		
1	Umbergaon (Petha).	40,000	9,000	2,000	400	51,400	142,583	65	
2	Dahanu ..	31,000	8,500	1,300	500	41,300		87,350	47
3	Palghar ..	28,000	12,000	750	400	41,150		41,573	22
4	Bassein ..	5,000	4,000	125	25	9,150		36,931	15
5	Salsette (South).	3,000	2,100	..	500	5,600		27,083	26
6	Salsette (North).	4,000	2,700	25	200	6,925		77,849	0
7	Kalyan ..	4,500	2,000	625	275	7,400		58,751	15
8	Bhivandi ..	5,500	3,000	400	100	9,000		57,658	3
9	Wada ..	1,000	200	300	..	1,500		62,518	3
10	Murbad ..	1,100	300	400	..	1,800		44,469	0
11	Shahapur ..	..	..	..	..	..
	Total ..	123,100	43,800	5,925	2,400	175,225	636,760	27	
<i>Kolaba District</i>									
1	Karjat ..	1,200	600	250	200	2,250	81,801	5	
2	Panvel ..	4,000	2,000	500	500	7,000		47,379	5
3	Uran (Petha)	100	50	10	30	190		57,935	7
4	Pen ..	1,000	500	100	150	1,750		26,923	11
5	Nagothana ..	400	100	100	25	625		58,534	8
6	Alibag ..	3,000	1,000	..	200	4,200		67,134	2
7	Roha ..	2,000	700	250	..	2,950			
8	Mangaon ..	2,500	1,200	800	200	4,700			
9	Mahad ..	800	250	250	225	1,525			
	Total ..	15,000	6,400	2,260	1,530	25,190	383,215		
	Grand Total	138,100	50,200	8,185	3,930	200,415	1,019,984	19	

APPENDIX II.

Physical Composition.

(Kindly determined for the authors by the Agricultural Chemist to the Government of Bombay.)

I. MANAT SOIL.

Sample No. 1 collected at Warsoli Manat Station on 17th June 1919.

	No. 1 Depth 1"—1½"	No. 2 Depth 1½"—4½"	No. 3 Depth 4½"—10½"	No. 4 Depth 10½"—22½"	No. 5 Depth 22½"—40½"
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Coarse sand	6.89	18.40	3.75	17.42	23.18
Fine sand	11.10	11.00	11.10	9.80	8.00
Coarse silt	19.35	32.00	26.60	34.20	19.40
Medium silt	34.20	6.00	26.20	6.90	18.20
Fine silt	11.82	9.20	8.20	8.48	8.20
Finest silt	16.64	23.40	24.15	23.20	23.02

Sample No. 2 collected at Warsoli Manat Station on 29th August 1918.

	No. 1 Surface soil up to 3"	No. 2 Soil below 3" up to 9"	No. 3 Soil below 9" up to 27"
	Per cent.	Per cent.	Per cent.
Coarse sand	9.55	8.60	8.37
Fine sand	61.04	68.78	64.78
Coarse silt	11.94	9.20	11.20
Medium silt	3.72	2.83	3.19
Fine silt	7.83	5.29	6.96
Finest silt and clay	5.92	5.21	5.50

Sample No. 3 collected at Tendhare, Panvel Taluka on 30th April 1921.

	No. 1 Depth 0"—3"	No. 2 Depth 3"—9"	No. 3 9"—21" depth
	Per cent.	Per cent.	Per cent.
Coarse sand including stones	47.32	52.20	42.25
Fine sand	34.62	32.85	40.93
Coarse silt	4.29	3.82	6.15
Medium silt	3.49	2.93	4.17
Fine silt including finest silt	10.28	8.11	6.50

II. ORDINARY RICE SOIL.

Sample No. 1 collected from the Alibag Farm on 15th January 1912.

	No. 1 Depth 0"—6"	No. 2 Depth 6"—8"
	Per cent.	Per cent.
Coarse sand	38.81	41.65
Fine sand	35.21	29.13
Coarse silt	11.60	18.30
Medium silt	2.35	2.62
Fine silt	1.98	1.79
Finest silt	10.5	6.61

Sample No. 2 collected from the Alibag Farm on 15th January 1912.

	No. 1 Depth 0"—6"	No. 2 Depth 6"—18"
	Per cent.	Per cent.
Coarse sand	49.39	22.91
Fine sand	32.54	40.91
Coarse silt	7.74	17.23
Medium silt	1.91	7.69
Fine silt	1.52	2.05
Finest silt	6.90	9.21

Sample No. 3 collected from the Alibag Farm on 15th January 1912.

	No. 1 Depth 0"—6"	No. 2 Depth 6"—18"
	Per cent.	Per cent.
Coarse sand	14.22	39.64
Fine sand	45.37	33.07
Coarse silt	24.60	13.06
Medium silt	2.31	2.34
Fine silt	3.85	1.93
Finest silt	6.95	9.96

Sample No. 4 collected from the Alibag Farm on 15th January 1912.

	No. 1 Depth 0"—6"	No. 2 Depth 6"—18"
	Per cent.	Per cent.
Coarse sand	43.12	36.53
Fine sand	33.31	38.14
Coarse silt	9.23	11.01
Medium silt	2.45	2.63
Fine silt	1.98	2.16
Finest silt	9.84	9.23

APPENDIX III.

Chemical Composition.

(Kindly determined for us by the Agricultural Chemist to the Government of Bombay.)

I. MANAT SOIL

Sample No. 1 collected at Warsoli Manat Station on 17th June 1919.

	No. 1 Depth 1"-1½"	No. 2 Depth 1½"-4½"	No. 3 Depth 4½"-10½"	No. 4 Depth 10½"-22½"	No. 5 Depth 22½"-40½"
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Loss on ignition ..	15.6	15.2	16.24	16.24	16.52
Sand ..	58.4	59.72	60.56	59.92	59.23
Lime as Cao ..	1.08	1.075	1.26	.70	1.12
Potash ..	.361	.34	.28	.44	.38
Phosphoric acid ..	.085	.0403	.13	.062	.078
Nitrogen ..	.074	.082	.091	.061	.084

Sample No. 2 collected at Warsoli Manat Station on 29th August 1918.

	No. 1 Surface soil up to 3"	No. 2 Soil below 3" up to 9"	No. 3 Soil below 9" up to 27"
	Per cent.	Per cent.	Per cent.
Loss on ignition ..	11.60	13.66	13.92
Insoluble silicates ..	68.38	62.36	63.66
Lime as Cao ..	.168	.448	.224
Potash ..	.252	.329	.291
Phosphoric acid ..	.111	.111	.059
Nitrogen ..	.103	.098	.093

Sample No. 3 collected at Tendhare, Panvel Taluka on 30th April 1921.

	No. 1 Depth 0"-3"	No. 2 Depth 3"-9"	No. 3 Depth 9"-21"
	Per cent.	Per cent.	Per cent.
Stones ..	37.90	43.30	40.00
Moisture ..	3.90	3.90	4.15
Loss on ignition ..	5.62	4.50	4.71
Sand ..	38.07	33.89	36.17
Lime (Cao) ..	.31	.23	.27
Phosphoric acid ..	.07	.07	.06
Potash ..	.20	.18	.20
Nitrogen ..	.05	.04	.04

II. ORDINARY GOOD RICE SOIL.

Sample No. 1 collected from the Alibag Farm on 15th January 1912.

	No. 1 Depth 0"-6".	No. 2 Depth 6"-18".
	Per cent.	Per cent.
Organic matter	1.84	1.00
Lime	0.24	0.67
Potash	0.38	0.58
Phosphoric acid	0.06	0.04
Nitrogen	0.06	0.04

Sample No. 2 collected from the Alibag Farm on 15th January 1912.

	No. 1 Depth 0"-6".	No. 2 Depth 6"-18".
	Per cent.	Per cent.
Organic matter	2.04	1.35
Lime	0.50	0.89
Potash	0.74	0.54
Phosphoric acid	0.07	0.04
Nitrogen	0.06	0.01

Sample No. 3 collected from the Alibag Farm on 15th January 1912.

	No. 1 Depth 0"-6".	No. 2 Depth 6"-18".
	Per cent.	Per cent.
Organic matter	2.24	2.19
Lime	1.4	0.89
Potash	0.12	0.54
Phosphoric acid	0.94	0.05
Nitrogen	0.01	0.29

Sample No. 4 collected from the Alibag Farm on 15th January 1912.

	No. 1 Depth 0"-6".	No. 2 Depth 6"-18".
	Per cent.	Per cent.
Organic matter	2.55	1.75
Lime	0.28	0.89
Potash	0.12	0.31
Phosphoric acid	0.04	0.06
Nitrogen	0.04	0.09

APPENDIX IV.

Composition of well water in Manat Land.

Sample collected from the well at the Warsoli Manat Station on 17th June 1919.

Name.	Parts per 100,000 parts.
Total salts	65.00
Containing—	
Calcium carbonate	29.88
Calcium sulphate	5.19
Magnesium sulphate	0.91
Magnesium chloride	23.08
Sodium chloride	0.49
Sodium carbonate	5.30
Nitrates	Nil.

APPENDIX V.

Results of crops tried on Burnt or heated soil, for which yield data are not available.

Serial No.	Name of crop.	Observations on growth.	
		Unburnt.	Burnt.
	1920-21.		
1	Chavali	1½-2½ feet (fair)	2½-3 feet (virgorous).
2	Sann hemp	Failed	Fair growth.
3	Maize	Poor	Tolerable.
4	Gowar	Do.	Do.
	1921-22.		
1	Bhenti (Vegetable)	3-3½ feet (very fair)	4-4½ feet (vigorous).
2	Chavali	Poor growth	Vigorous.
3	Castor	1½-2 feet (poor)	2½-3 feet (fair).
4	Maziy	10-11 inches (very poor).	12-14 inches (poor).
5	Gowar	5-8 inches (poor)	1-1½ feet (poor).
6	Tephrosia candida	1-1½ feet (tolerable).	4-4½ feet (very fair).

APPENDIX VI
Detailed Results of Fair Weather Crops

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Detailed Results of Fair Weather Crops.

Name of crop.	Area in acres.	Years of trial.	Time of sowing.	Time of final harvesting.	Average yield per acre.		Remarks.
					Quantity in lbs.	Value at average rates during the period of trial.	
<i>A. Dry Crops</i>							Rs. a. p.
Castor ..	.. 4 to 1.75	1916-22 (6)	September (middle).	April (end) ..	275 grain ..	16 10 8	
Shalu ..	.. 2 to 1.75	1917-22 (5)	Do. ..	Do. ..	358 grain ..	40 14 0	Grain damaged by birds to a fairly large extent due to small area.
Tur ..	.. 2 to .8	1920-22 (2)	Do. ..	Do. ..	2,776 straw. 240 grain 300 stalks.	24 0 0	
Cotton— <i>Different time of sowing</i> Bourbon variety—							
Beginning of monsoon ..	.. .01	1920-21 (1)	September (middle).	May (beginning)	60 Seed-Cotton	6 5 0	77 per cent. of the plants died.
August ..	.. .01	Do.	Do. ..	Do. ...	100 "	10 8 5	51 per cent. do.
September (middle)— First year ..	.. .01	1919-20 (1)	Do. ..	Do. ..	190 "	20 0 0	44 per cent. do.
Second year ..	.. ..	Pruned in May 1920.	Do. ..	May 1921 ..	1,337 "	140 11 9	
September end ..	.. .01	1919-21 (2)	Do. ..	May (beginning)	225 "	23 10 11	35 per cent. do.
N.R. Variety— Beginning of monsoon ..	.. .01	1920-21 (1)	Do. ..	Do. ..	40 "	4 3 4	90 per cent. do.

August .. ..	..	..	.01	1	Do. ..	Do. ..	105	..	11 0 10	76 per cent. do.
September (middle) .. ..	..	..	.01	1	Do. ..	Do. ..	200	..	21 0 10	54 per cent. do.
September (end)	01 to	05	1919-21 (2)	Do. ..	Do. ..	Do. ..	295	..	31 0 10	41 per cent. do.
<i>Varieties—</i>										
Bourbon .. ..	..	..	.01	Do.	September (end)	Do. ..	225	..	23 10 11	
N. R. .. ..	..	01 to	05	Do.	Do. ..	Do. ..	205	..	31 0 10	
Cambodia .. ..	..	..	.01	1019-20 (1)	Do. ..	Do. ..	210	..	22 1 8	
Dharwar-American .. ..	..	..	.01	Do.	Do. ..	Do. ..	205	..	21 9 3	
F. 4 .. ..	..	..	.01	Do.	Do. ..	Do. ..	42	..	4 6 9	
Dharwar No. I .. ..	..	..	.01	Do.	Do. ..	Do. ..	14	..	1 7 7	
Sea Island .. ..	..	..	.01	Do.	Do. ..	Do. ..	11	..	1 2 6	
<i>Different methods of propagation (with Bourbon variety)—</i>										
From seed .. ..	..	..	.01	Do.	June 1919 ..	May (beginning) 1920.	60	..	6 5 0	
By cuttings .. ..	..	..	.01	Do.	Do. ..	Do. ..	141	..	14 13 6	
<i>Different manures (with Dharwar-American variety)—</i>										
Sulphate of potash 5 cwts. per acre. .. ..	..	..	.01	Do.	September (end)	May (beginning)	385	..	40 8 5	
Sulphate of potash and superphosphate 5 cwts. each per acre .. ..	..	..	.01	Do.	Do. ..	Do. ..	455	..	47 14 4	
Superphosphate 5 cwts. per acre .. ..	..	..	.01	Do.	Do. ..	Do. ..	371	..	39 0 10	
No manure .. ..	..	..	.01	Do.	Do. ..	Do. ..	205	..	21 9 3	
Tobacco .. ..	..	..	.05	Do.	September (middle).	March (middle).	200	..	40 0 0	Watered only for about two weeks after planting.
<i>B. Under Irrigation</i>										
<i>Sugarcane—</i>										
Burning with dry cowdung 24,000 lbs. per acre.	0.05 to	0.075	1920-22 (2)	February	..	January	..	20½ tons of cane ..	600 0 0	
Addition of 24,000 lbs. of dry cowdung (unburnt).	0.025 to	0.0375	Do.	Do.	..	Do.	..	20½ do	600 0 0	

APPENDIX VII.

A note on the best Manipulation of Manat Land for dry cropping in the Fair Season.

It has been noted that certain new crops have been found to thrive well on these lands. It is intended to describe in this note, therefore, the methods of preparation and cultivation, which, it has been found, should be followed in the successful production of these crops in general and the dry crops in the fair season in particular.

The land, if fallow and foul, should first be cleared of shrubs and trees and should then be opened with a heavy turnwrest iron plough (say Ransomes C. T. 2 or D. T.), going 8" to 10" deep soon after the close of the monsoon. At this time the soil being neither too dried out nor too wet can be opened with comparatively less difficulty. The clods in the ploughed soil should be allowed to weather in the sun throughout the fair season during which they are found to crumble sufficiently. During the rainy season whenever there are breaks sufficiently long so as to render the soil accessible, the blade harrow should be worked so that the clods may be further pulverised and the weeds removed. At the close of the monsoon, i.e. the end of September, castor or *tur* should be sown in the first season. Unlike the usual practice in the Konkan, the crops should be sown in rows made by a light plough, 2 feet apart, in order to facilitate the interculturing operation. After 15 days the crop should be thinned out and gaps filled in. The interculturing operation should also be started at this time and repeated at intervals so as not to allow any cracks to form. The Gujarat bullock-hoe has been found to work well for this operation. During the advanced stages of the crop, if it be found that the hoe is too light to break the hard crust the ordinary Konkan plough should be used. These crops are ready for harvest by March.

During the following rainy season whenever there are breaks in the monsoon the stumps should be removed and the land harrowed and prepared for sowing in the forthcoming rabi season. This year *shalu jowar* should be grown and the land should be treated in the same way as for castor or *tur* for subsequent operations. In this way rotation of castor, *tur* or cotton (N.R. variety) in one year and *shalu jowar* in the other should be followed.

After some 3 to 4 years, a dose of farm yard manure or town sweepings at the rate of 5 cart loads per acre should be given. Addition of any form of organic material such as rice hulls, green or dry vegetation, coal residues, etc., is helpful in reducing the stiffness of the soil to some extent, and if any of these are available at a cheap rate they may be incorporated into the soil before the beginning of the rainy season in the same way as described in this bulletin. When it is not possible to get any form of organic material from outside a thick crop of *tur* (*Cajanus Indicus*) may be grown in the *kharif* season for green manuring purposes; when it is three months' old it should be pruned and the green material incorporated into the soil. The pruned crop will put forth new foliage which should be cut again after a lapse of another three months and buried below the surface. Whatever further tender growth may be obtained by the end of July in the next monsoon should be ploughed under and the stumps removed. The land should then be prepared for rabi sowing.