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APPENDICES.

APPENDIX I.

NOTES ON GUL-MAKING FROM BRAB, COCOANUT AND BHERLI (*caryota urens*)
 PALMS BY MR. P. C. PATIL WHEN OFFICIATING AS EXTRA DEPUTY
 DIRECTOR OF AGRICULTURE, KONKAN.

*Brab or Palmyra Gul.**Palmyra Gul Industry in Madras.*

It is mostly in the hands of professional tappers—Shanars, Ezavas and Thandars—who are at the same time peasant cultivators and small farmers. In some cases palms belong to these men but in the majority of cases these people hire Palmyra trees from the land-lords. The tappers have to get a license from the Excise Department but it is simply formal. The application is made on one anna stamp and license is issued free of charge (for using the sweet toddy as beverage and for making jaggery). Government does not make out anything from the trees. They only get the assessment of the land and since such trees grow on poor soils as well a regular payment of assessment is a significant matter.

2. Towards Palghat owners of Palmyra trees get about two annas annually for every tree. (1) In one case the contract was two annas a tree. (2) In another case a man was paying Rs. 8 for 150 trees. The land and the trees were poor. Towards Tinnevely some of the owners claim about half the quantity of jaggery obtained from their trees.

3. The tapping season extends from February to May (about 90 days) There are male and female Palmyra trees. Both of these yield saccharine juice. The methods of tapping male and female trees differ. In the case of male trees the flowering shoots which look like finger growths given out by the principal stalk at the top of the tree, are to be worked out. These fingerlike shoots are bruised by rubbing between two wooden sticks (looking something like a pair of compasses). After a couple of days these are scraped with a tapping knife and their tips pared off daily. Within a week from the first operation juice begins to drop. They bring several fingers together and bend in one pot. (Bombay Method is different.)

4. The spathes of female trees have also to be worked while the nuts are very small. Only the tip ends are squeezed and beaten. The ends are pared off as in the case of male trees. As the paring approaches the thicker part of the shoot, the shoot has to be beaten all round between the nuts with the thick edge of the paring knife and the fruit near the tip removed. I have seen number of large nuts on spathes yielding juice.

5. Towards Palghat and Coimbatore, tappers climb twice a day, in the morning between 6 and 8 a.m. and in the afternoon at 5 p.m. Towards Tinnevely some climb twice and some thrice a day (especially at the close of the season).

6. In the morning the tapper gets on with a spare pot (for bringing the sweet toddy down) besides a lime pot and a brush. After he empties the juice in the spare pot, he dresses the cut by paring off a slice, limes the pot and replaces it. In the evening juice is not lowered. The cut, however, is dressed and the pot is given a shake.

7. A good tapper can look after about 20 to 25 trees working from 6 to 10 and again 5 to 7. Tapping season lasts from February to May. From the beginning of May field work compels them to give up jaggery-making. It may be remembered that from February to April end, these people have not got much work in the field and tapping Palmyra trees and making jaggery gives them remunerative employment.

Jaggery making from sweet toddy in Madras.—After once the sweet toddy is lowered (either from Palmyra or from Coconut palm) it is dealt with the same way of making jaggery. There are some local differences in the construction of the ovens on which the juice is boiled but no difference in the ovens and boiling pots is made for Coconut and Palmyra juices.

Ovens.—There are two principal types of ovens specially constructed for jaggery-making though sometimes jaggery is made in the kitchen on the ordinary *chul*. Generally jaggery ovens are built outside the cottage either in a *kacha* shed or under the shade of a tree near the cottage.

It will be seen from the sketch Plate VIII B that the oven is built in a rectangular mound 3' x 3' raised about 1½' above the ground level. There is no ash pit nor exit for smoke provided. The smoke escapes by the sides of the pots. It is a compound oven with three mouths but fed only through one common feeding hole. After a time when the juice thickens the contents are transferred to only one pot where it is finally made into jaggery.

Oven II.—At and round about Palghat single ovens are in common use. As at Coimbatore these are built in a raised mound either in a shed or under a tree. Besides feeding hole the ovens are provided with exits for smoke to escape

Here generally the boiling is not completed in one stretch. As they get juice it is boiled to a certain consistency and stored till sufficient quantity is collected when it is boiled down to jaggery.

Fuel.—Palmyra leaves and dry leaves of shed trees and waste grass is used as fuel. I do not expect that they worry about fuel. Boiling juice is a daily routine like cooking and moreover it admits of any kind of fuel, leaves, grass, waste fodder, branches, twigs, &c. The fuel has to be fed continuously in small quantities.

Utensils.—For making jaggery they use wide mouthed earthen pot (see the picture of oven attached). For removing scum the kitchen "*pali*" is used. For stirring the juice a ladle is made by putting a handle to a Coconut shell. When jaggery is nearly ready, it is stirred and rubbed with a thick end of the frond of Palmyra and when it begins to set, it is transferred to a number of moulds or empty Coconut shells.

Boiling the juice to jaggery.—I have already under the heading of ovens stated that in some parts the operation of boiling is finished in one stretch while in other places they evaporate two-thirds of the quantity and collect the comparatively thicker saccharine solution till it accumulates into a fairly large quantity and then boiled to jaggery. This finishing boiling is important and is attended to carefully. Almost everywhere in the Madras Presidency, jaggery-making is entrusted to women. The male members deliver the juice at home to their females and are then free for their field work. If there be no female in the family, the male folks will engage a woman on wages at least for the second or final boiling.

When the juice is received ants and dirt are removed by the hand and the juice slowly transferred to boiling pot. The residue, generally lime, left at the bottom is not generally taken in. After about 15 to 20 minutes, whitish scum rises to the surface which is removed and when it begins to heave up, few castor beans are crushed and put in. Oil has got remarkable effect in allaying frothing. After putting crushed castor beans the juice is well stirred. It then does not require much attention except attending the fire and occasionally removing the scum that comes up. It takes about two hours to finish boiling. As it approaches completion the fire in the oven is lowered and the contents of the pot stirred. The woman then wets her fingers in cold water and takes off a little of the syrup from the stirring frond by her thumb and feels it in cold water. If it is ready it hardens quickly. The feel is the same for cane gul and I could without difficulty strike several boilings.

When jaggery was ready, the pot was taken off the oven and kept on hot cinders and ashes. The attending woman then rubs a part of the inside of the boiling pot with the stirring frond till jaggery begins to set hard. Meanwhile the mould planks or coconut shell are washed with cold water. Before the moulds get dried the jaggery has to be transferred to these moulds. It sets there soon and in about 15 to 20 minutes perfect moulds are taken out. The moulds leave a little treacle or molasses in the holes of the plank. The percentage of jaggery to sweet toddy varies from 13 to 18. In a test at Tinnevely I got 14.5 palms of jaggery from 84 palms of sweet toddy thus giving about 17 per cent. jaggery (it is perhaps exceptionally good juice). It almost tallies with Brix reading.

One man generally attends about 25 trees and gets time to look after the field work (he generally has got few rice fields) and his wife turns the juice into jaggery and sells it. Supposing he hired 32 trees to be sure of getting juice from 25 trees throughout the season, he has to pay Rs. 4 (at annas 2 per tree). Trees yield from $\frac{1}{2}$ to 2 gallons and some fail earlier. It is therefore difficult to get average. Mr. S. Ramalingam Pillai gives 54 gallons per tree per season. Madras Bulletin No. 25 gives 48 gallons (it gives 6 maunds which means about 48 gallons).

Taking therefore 40 gallons as the average yield per tree, the man who taps 25 trees a day gets 1,000 gallons or 10,000 lbs. of sweet toddy and this at 16 per cent. yields 1,600 lbs. of jaggery. Taking the rate (at the Parry's shop) at 25 lbs. this quantity fetches about Rs. 64 for his labour. As said above he has to pay Rs. 4 to 5 to the owner of the trees. He any how makes Rs. 60.

Scope for Palmyra Industry in the Thanai District.

In the beginning of the report I have given the rough distribution of this palm and have given rough idea of the prospective business. Here I will limit myself to the yields of toddy per tree and the percentage of gul in the juice and will try to show what a family working about 25 trees can expect to make.

It is difficult to get fair average of toddy per tree in the absence of extensive trials. The soil in which the trees grow have considerable effect on the yield. The yield varies in the different seasons of the year. The sex of the tree has influence on the yield. Female trees yield more. There are two seasons in the Thanai District, Shalu (September to December) and Bharkala (February to May end), the latter being more important. In

November 1913 tests were taken by the Abkari Department and as a result they got 968 gallons of toddy from 41 trees in 31 days. The gul-making season may be reckoned from December to May (about 120 days). In Madras they get about 90 days only. (It may be remembered that they get two rainy seasons.) From the data supplied by these tests the average per tree in a season comes to 91 gallons. While conducting experiments at Bassein I took some tests and my average comes to only 53 gallons per tree per season. Excise Manual gives 90 to 111 gallons. This yield being taken for both the seasons of the year cannot be accepted for gul season. In Bengal according to the Excise Manual the yield is 43 gallons for male and 57 gallons for female trees. I, therefore, will take 50 gallons as the average yield per tree for gul-making season.

Percentage of gul.—Composite samples of fresh juice as well as samples from individual trees were tested. The reading of average (fresh) sample can be taken as 12 Brix. Gul was made several times (it is comparatively easy to make gul from Palmyra juice and we found no difficulty). The average of several trials comes to 10. The juice seems to be poorer than in Madras. Brix readings indicate the same thing. From each tree therefore about 50 lbs. of gul can be got which at 25 lbs. will fetch Rs. 2 per tree or Rs. 50 for 25 trees. If a man gets trees at 3 annas he will have to pay Rs. 4-11-0. He will thus get Rs. 45 from his subsidiary industry of making gul from Palmyra Juice.

Possibilities of Making Gul from Cocoanut Toddy in Konkan and North Kanara.

In the Konkan and North Kanara together there are about 20,729 acres of land under Cocoanut growing about 1,450,000 trees; about 25,000 of those are tapped either for toddy or for distilling arrack. In Thana, Kolaba and large part of Ratnagiri where they give regular waterings, the average yield of nuts per tree is about 60 (or when tapped, about 80 gallons of fermented toddy). In the North Kanara where cocoanut trees are not irrigated the yield of toddy is about the same but the average number of nuts is much low being 25.

The averages of toddy per tree for shops and for gul-making will necessarily be different. For shops and booths, toddy is drawn for about 120 to 150 days. Only molasses can be made in the monsoon, but it will not pay for rice farmers to make molasses. We may therefore take 50 gallons as the average per tree.

The percentage of sugar varies in different samples (the reading of Brix varies from 12 to 20. I could record 15.50, 16.40, 17.00, 15.18, 14.43, 15.93, 14.63). Taking 16 per cent as the available gul, a family working 20 trees will get 1,000 gallons (or 10,000 lbs.) juice or 1,600 lbs. gul which at 20 lbs. (it is sold at 17 lbs. in the South Kanara and Coimbatore) will fetch Rs. 80. Supposing he pays Rs. 25 for the 20 trees to the owner he makes Rs. 55 from his secondary industry.

There are a large number of professional tappers in Kanara and this industry will suit them best. In the adjoining District (South Kanara) they enjoy this privilege and the people in the North Kanara are very keen on this industry.

Cocoanut gul industry seems to suit Kanara alone. In the Konkan where the yield of nuts is better it is not profitable to go in for gulmaking.

In the several Districts of Madras, gul is made from cocoanut sweet toddy. In my tour I could see this industry at and near Coimbatore. The industry is pursued by tapper class who side by side cultivate some lands as well. They pay about a rupee to the land-lord (Mr. Vellingiri of Vellaikner gets Rs. 480 a year for 400 trees. Mr. Raju of Coimbatore gets Rs. 25 besides 175 cocoanuts for his 39 trees). As a rule trees are tapped for two years and then allowed to bear nuts for two years alternately. In my trials at Coimbatore I got 16.4 and 17.8 gul and gul could be sold at 16 lbs. a rupee. The process of making gul is exactly the same as described under Palmyra gul in Madras.

Jaggery-making from Kitul (Bherli Mad, Caryota urens) in Ceylon.

In Ceylon these trees are numerous. It is said they might occupy over 3,000 acres. They are tapped both for toddy and for making jaggery and sweets. Large quantity of this jaggery is consumed in Ceylon and some exported out of the island.

Toddy.—The spathe has to be worked before it bursts and thin slices trimmed morning and evening. For toddy they use the same chatties without adding anything or smoking those.

Jaggery-making.—The process for trimming is the same as for toddy. They however put some bark of "Ball" (*Veteria accuminata*) leaves of Aukenda (*Acronychia laurifolia*) to prevent fermentation. The average quantity of juice from a tree per day is one gallon. The percentage of solids (or for rough purposes jaggery) is about 11 per cent. Tapping season of Kitul lasts for eight months. They therefore make about 260 lbs. of jaggery from each tree. The percentage of gul in Kitul juice in Bombay is about the same as in Ceylon (Brix reading being 14).

The process of making gul is easy. They simply boil the fresh juice till a syrup of right consistency is got when the boiling pot is taken off the fire. When jaggery becomes sufficiently cool it is put in shells to make small moulds.

We have not got much scope for Kitul-gul. We have got a few thousand trees in Nagothna Petha, Alibag and Roha Talukas. These are tapped for toddy. It is however worth-while trying the vegetable preservatives in making gul from Palmyra and Date. I have written to the Forest and Botanical Departments about it and if these be available in our Presidency, I will try these sometime.

APPENDIX II.

OBSERVATIONS BY MR. P. C. PATIL ON THE QUANTITY PER TREE,
CHEMICAL COMPOSITION, DETERIORATION IN KEEPING, EFFECT
OF DIFFERENT PRESERVATIVES, OF THE JUICES AND
GULS OF PALMS.

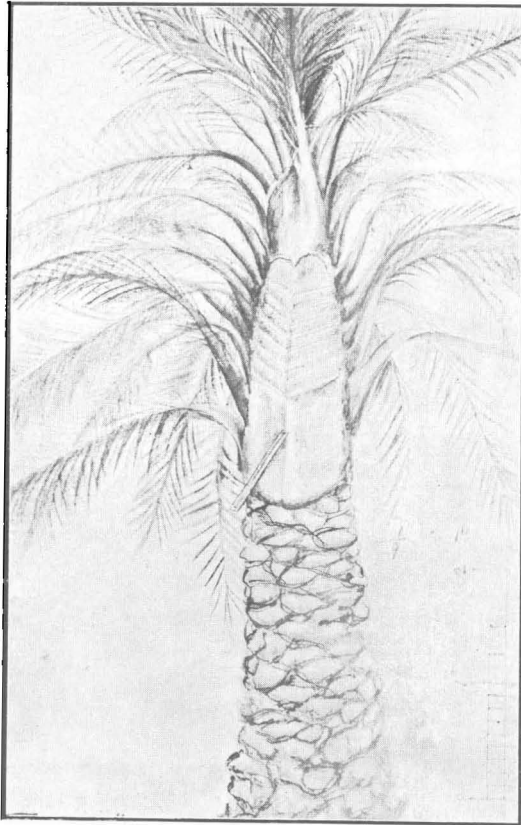
A.

*Quantities of juice obtained from Palmyra per tree during one night
(12 hours).*

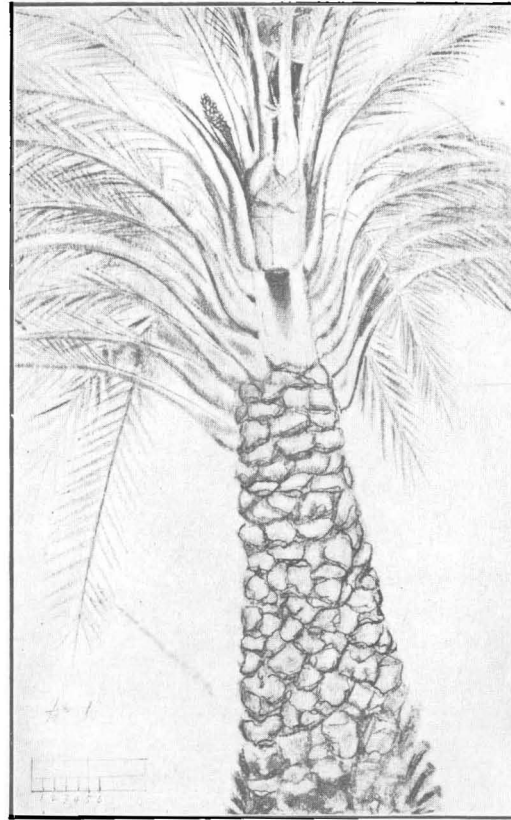
Observations taken - Dassein, 6th and 7th March 1915.

Mark on the tree.	Mark on the pot.	Quantity in lbs.	Brix reading corrected for temperature.	Mark on the tree.	Mark on the pot.	Quantity in lbs.	Brix reading corrected for temperature.
1	2	3	4	5	6	7	8
1 {	a	3.5	10.58	1 {	a	4	10.58
	b	2.5	10.58		b	2	10.58
2	a	2.5	13.09	2 {	a	1	
					b	2.5	
3 {	a	2	12.08	3 {	a	3	
	b	3.5	15.59		b	3	
5 {	a	2	11.58	4 {	a	2.5	11.08
	b	2	12.59		b	4	10.08
6 {	a	2	10.58	5 {	a	2.5	11.58
	b	3.5			b	3	10.58
7 {	a	1.5		7 {	a	2	9.58
	b	2.5	10.58		b	3	10.58
8 {	a	3	11.08	8 {	a	3	11.58
	b	1.5			b	2	10.58
9	a	3	13.59	9	a	2.5	13.58
8 Trees.	14 Pots.	35 lbs.	Percentage of gul by actual trial.	9 Trees.	15 Pots.	40 lbs.	Percentage of gul by actual trial.

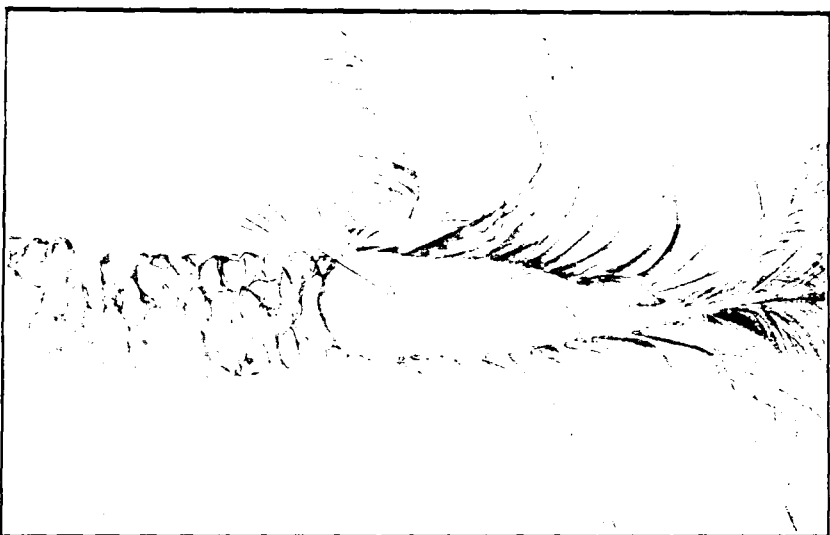
This works out at about 4.4 lbs. per tree per day or 53 gallons per season of 120 days.



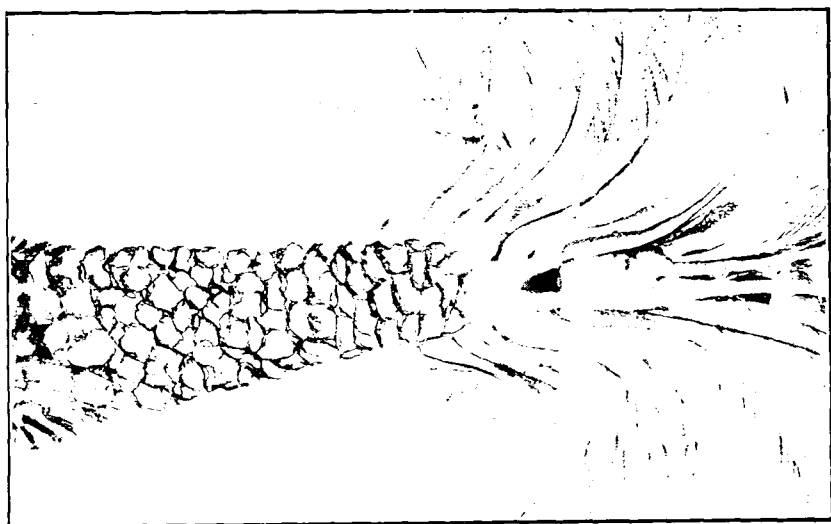
APPEARANCE OF THE TAPPED SURFACE SHOWING SEVERAL STEPS AS WILL BE OBTAINED AT THE END OF THE SEASON IN THE BENGAL METHOD.



APPEARANCE OF THE CUT AT THE END OF THE SEASON IN THE THANA METHOD.



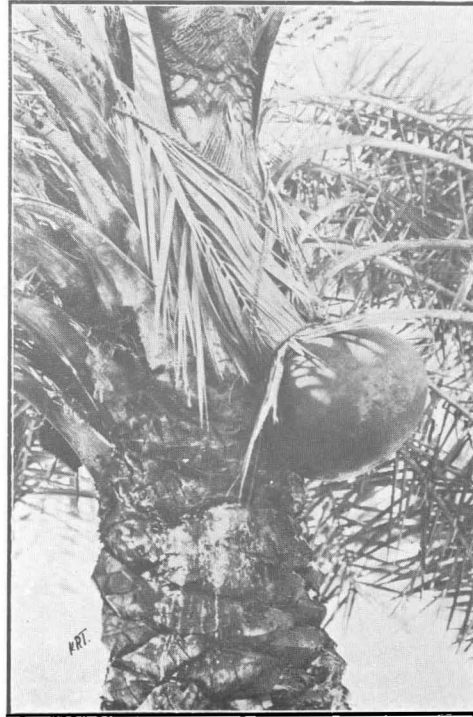
APPEARANCE OF THE TYPED STEMGE SHOW-
ING SEVERAL STES AS WILL BE OBTAINED AT
THE END OF THE SEASON IN THE
BENGALI METHOD.



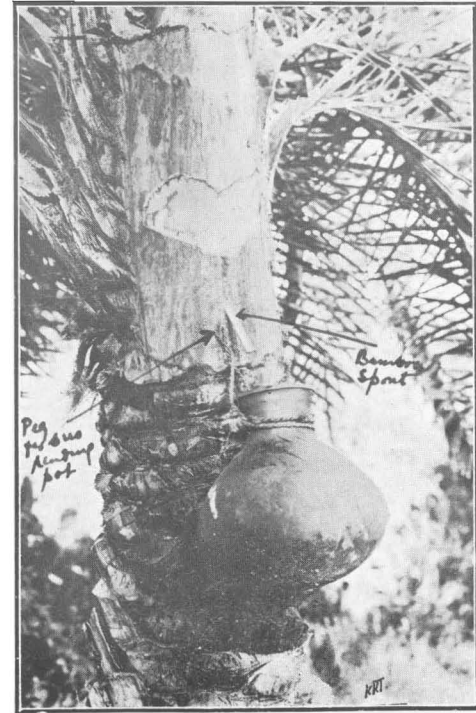
APPEARANCE OF THE STEM AT THE END OF THE
SEASON IN THE THANA METHOD.



BENGAL METHOD SHOWING THE APPEAR-
ANCE AFTER THE SECOND STEP IS CUT OUT.



TYING OF THE POT, THANA METHOD.



BENGAL METHOD FIRST NOTCH READY.
(also showing the simple and speedy
method of suspending the pot).

*Quantity of Juice obtained from Date Palms per tree during night
(12 hours).*

Lot A.		Lot B.					Lot C.			
Mark on the trees.	Quantity in lbs.	Mark on the trees.	1st night.	2nd night.	3rd night.	4th night.	Mark on the trees.	1st night.	2nd night.	3rd night.
1	2	3	4	5	6	7	8	9	10	11
			lbs.	lbs.	lbs.	lbs.		lbs.	lbs.	lbs.
1	3	1	5	2.5	3.3	0.8	1	5	5	4.2
2	1.5	2	3.75	2.1	5		2	4.2	5	3.3
3	1.5	3	4.2	2.5	4.2	3	3	4.5	3.3	4.2
4	3	4	3.75	5.5	3	3.3	4	5	5	5.8
5	2	5	4.5	0.8	1.25	0.8	5	7.5	5	5.8
6	2	6	3	3	5.5	6.7	6	5	3.3	5
7	2	7	3.5	4.5	7.5	8.5	7	6.5	5.8	5
8	1.5	8	5	5	0.4	4.2	8	7.5	6.5	6.5
9	3	9	5	3.3	3	3				
10	1	10	3.3	4	2.5	3.75				
11	2									
12	1									
13	0.5									
14	2									
15	2									
	28 lbs.		40.80 lbs.	33.2 lbs.	35.65 lbs.	34.05 lbs.		45.20 lbs.	38.9 lbs.	39.80 lbs.

It can be said therefore that $15+40+24=79$ Date palms yielded 295.60 lbs. of juice. The average per tree during one night (*i.e.*, for morning collection) comes to 4.3 lbs., or 38.7 gallons per season of 90 days.

Comparative Quantities of Date Juice obtained during day time (i.e., for evening collection) and night time (i.e., for morning collection).

Sanjan (Thana).

90 per cent. during night time. } For details see the
10 per cent. during day time. } table below:—

Mark on the trees.	Morning collection.	Evening collection.
	lbs.	lbs.
1	5	1.25
2	3.75	0.25
3	4.2	0.50
4	3.75	0.8
5	4.5	1.7
6	3	0
7	3.3	0.25
8	5	0.8
9	5	0.4
10	3.3	0.8
	48.80	6.75

B.

Chemical Composition of the Date palm juice.

Analysis of the Date palm juice for crystalline and non-crystalline sugars, acidity, &c., and its rate of deterioration in keeping:—

	Acidity in terms of KOH grms. per 100 c.c.	Brix reading corrected for temperature.	Refractometer corrected for temperature.	Sugars.	
				Crystal-lizable. per cent.	Non-crystal-lizable. per cent.
Average sample juice taken at 8 a.m.	0.0663	12.86	13.70	9.00	1.80
Average sample taken at 6 a.m.	0.030	12.90	13.80	9.80	1.30
Do. do. ...	0.050	11.58	13.20	9.13	1.27
Do. do. ...	0.051	10.22	10.64	8.10	1.80
Day collections average sample taken at 6-30 p.m.	0.3009	13.30	13.80	4.91	5.00

Rate of deterioration as shown by the same sample of juice kept for four days :—

Date.	Time.	Brix reading corrected to 170 c.	Acidity in KOH grms. per 100 lbs. juice.
30-1-1915	9 a.m.	10.58	0.0357
"	1 p.m.	10.47	0.0561
"	5 p.m.	10.20	0.1122
"	9 p.m.	10.15	0.2703
31-1-1915	9 a.m.	9.65	0.3825
"	1 p.m.	9.00	0.4335
"	5 p.m.	8.35	0.4590
"	9 p.m.	8.00	0.4845
1-2-1915	9 a.m.	7.20	0.6375
"	1 p.m.	6.80	0.7140
"	5 p.m.	5.70	0.8160
"	9 p.m.	5.00	0.8415
2-2-1915	9 a.m.	4.00	0.8926
"	1 p.m.	3.50	0.9384
"	5 p.m.	3.00	0.9843
"	9 p.m.	2.90	1.012

Date Juice.

	Acidity in terms of KOH grms. per 100 c. c.	Brix reading corrected for temperature.	Refractometer corrected for temperature.	Sugars.	
				Crystallizable per cent.	Non-crystallizable per cent.
Night collections taken in new baked pots and tested in the morning at 7 a.m.	0.0357	10.58	10.30	7.50	1.38
Average sample taken at 7 a.m. in pots that were limed.	Neutral.	9.45	10.70	6.28	1.21

D.

COMPOSITION OF THE SAMPLES OF GUL FROM DATE AND BRAB PALM JUICE.

Date Palm.

	(1) p.c.	(2) p.c.
Moisture	8.44	8.40
Ash	2.80	3.27
Chlorine	0.65	1.12
Non-crystallizable sugar	8.00	8.16
Crystallizable sugar	75.01	73.73
Acidity (Grms. KOH per 100 grms. of gul)	0.26	0.26

Brab Palm.

	(1) p.c.	(2) p.c.
Moisture	5.2	8.1
Ash	1.2	2.3
Chlorine	1.0	1.4
Non-crystallizable sugar	4.0	9.7
Crystallizable sugar	83.8	76.1
Acidity (Grms. KOH per 100 grms. of gul)	0.25	.61

APPENDIX III.

DAILY OUT-PUT OF JUICE AND GUL OBTAINED FROM DATE PALM AT TADGAON
(PETA UMBERGAON, DISTRICT THANA) DURING THE TAPPING
SEASONS OF 1917-18 AND 1918-19.

Experiments of 1917-18 by Mr. Sorabji's modified Thana Method of tapping with 400 date trees :—

Date.	Quantity of juice obtained in gallons.		Brix reading.	Quantity of gul obtained in lbs.	Quality of gul.
	Morning.	Evening.			
5-12-1917	10		17	17	Soft, brownish.
6-12-1917	16		16	22	Sticky.
7-12-1917	19		Not available.	25½	"
8-12-1917	22		15	28½	"
9-12-1917	24		15	32	"
10-12-1917	24		Not available.	32	"
11-12-1917	23		"	28	Solid to some extent.
12-12-1917	26		"	31½	Sticky.
13-12-1917	28		15½	32	"
14-12-1917	25		16	35	Solidified.
15-12-1917	33		15	43	Sticky.
16-12-1917	36		14½	50	Not available.
17-12-1917	45		Not available.	55	"
18-12-1917	34		"	43	"
19-12-1917	47		"	57	"
20-12-1917	38		"	45	"
21-12-1917	44		"	53	"
22-12-1917	47		"	56½	"
23-12-1917	55		"	65	"
24-12-1917	44		"	55	"
25-12-1917	49		"	56	"
26-12-1917	43		"	60	"

No collections were taken.

APPENDIX III—contd.

Date.	Quantity of juice obtained in gallons.		Brix reading.	Quantity of gul obtained in lbs.	Quality of gul.
	Morning.	Evening.			
27-12-1917	48		Not available.	58	Not available.
28-12-1917	68		14	80	Soft.
29-12-1917	71		14	82	"
30-12-1917	64		16	80	"
31-12-1917	65		13½	77	"
1-1-1918	81		15	97	Sticky.
2-1-1918	77		15	77	Soft.
3-1-1918	79		16	97	"
4-1-1918	86		13	102	"
5-1-1918	84		Not available.	99	Sticky, soft.
6-1-1918	81		14	92	Hard.
7-1-1918	82		Not available.	95	Soft.
8-1-1918	87		"	100	"
9-1-1918	91		"	108	Hard.
10-1-1918	93		12½	116	Soft.
11-1-1918	87		14	114	"
12-1-1918	90		13	106	Sticky, soft.
13-1-1918	96		13	120	Sticky.
14-1-1918	92		Not available.	106	Soft.
15-1-1918	94		"	120	"
16-1-1918	96		12	112	"
17-1-1918	85		13½	106	"
18-1-1918	99		13½	115	"
19-1-1918	95		14½	114	"
20-1-1918	100		13½	125	"
21-1-1918	108		Not available.	125	"
22-1-1918	103		"	115	"
23-1-1918	101		"	115	"
24-1-1918	109		"	114	Good gul, hard.

No collections were taken.

APPENDIX III—*contd.*

Date.	Quantity of juice obtained in gallons.		Brix reading.	Quantity of gnl obtained in lbs.	Quality of gul.	
	Morning.	Evening				
25-1-1918	93		12	112	Good gul hard.	
26-1-1918	109		Not available.	119	Not available.	
27-1-1918	95		"	125	"	
28-1-1918	120		"	134	"	
29-1-1918	112		12½	130	"	
30-1-1918	116		Not available.	125	"	
31-1-1918	106		"	119	"	
1-2-1918	112		"	120	Hard.	
2-2-1918	113		"	129	"	
3-2-1918	106		"	115	"	
4-2-1918	110		12½	135	"	
5-2-1918	113		Not available.	127	"	
6-2-1918	82	No collections taken.	"	110	"	
7-2-1918	97		"	102	"	
8-2-1918	107		"	121	"	
9-2-1918	113		"	122	"	
10-2-1918	107		"	12½	132	"
11-2-1918	108		"	12	118	"
12-2-1918	92		"	12½	121	"
13-2-1918	99		"	11½	118	"
14-2-1918	104		"	11	120	"
15-2-1918	114		"	11	125	"
16-2-1918	99	"	13	124	"	
17-2-1918	95	"	11	100	"	
18-2-1918	82	"	12½	100	"	
19-2-1918	98	"	11	108	Soft.	
20-2-1918	93	"	12½	116	Good.	
21-2-1918	101	"	11½	111	"	
22-2-1918	97	"	13½	125	"	

APPENDIX III—contd.

Date.	Quantity of juice obtained in gallons.		Brix reading.	Quantity of gal obtained in lbs.	Quality of gal.
	Morning.	Evening.			
23-2-1918	108		13½	118	Good.
24-2-1918	88		11½	107	"
25-2-1918	106		11	115	Soft.
26-2-1918	97		11	130	"
27-2-1918	98		11½	115	"
28-2-1918	103		11	130	"
1-3-1918	110		10½	115	Not available.
2-3-1918	88		11½	112	"
3-3-1918	83		10	95	"
4-3-1918	88		11½	104	"
5-3-1918	100		Not available.	120	"
6-3-1918	102		"	118	"
7-3-1918	90		11	109	"
8-3-1918	110		Not available.	129	"
9-3-1918	93		"	110	"
10-3-1918	82		"	97	"
11-3-1918	95		"	110	"
12-3-1918	90		"	101	"
13-3-1918	99		"	120	"
14-3-1918	97		"	117½	"
15-3-1918	92		11½	110	"
16-3-1918	102		11½	122½	"
17-3-1918	103		11½	120	"
18-3-1918	96		10	115	"
19-3-1918	105		11½	112	"
20-3-1918	105		11½	113	"
21-3-1918	95		11½	106	"
22-3-1918	97		11½	109	"
23-3-1918	95		11½	111	"

No collections taken.

APPENDIX III—contd.

Date.	Quantity of juice obtained in gallons.		Brix reading.	Quantity of gul obtained in lbs.	Quality of gul.
	Morning.	Evening.			
24-3-1918	68		Not available.	99	Not available.
25-3-1918	104		"	120	"
26-3-1918	108		"	123	"
27-3-1918	100		"	112	"
28-3-1918	96		"	106	"
29-3-1918			"	Not available.	"
30-3-1918			"	"	"
31-3-1918			"	"	"
1-4-1918			"	"	"
2-4-1918	66		"	78	"
3-4-1918	98		"	110	"
4-4-1918	78		"	90	"
5-4-1918	88		"	102	"
6-4-1918	104		"	113	"
7-4-1918	82		"	91	"
8-4-1918	100		"	109	"
9-4-1918	101		"	107	"
10-4-1918	96		"	104	"
11-4-1918	110		"	116	"
12-4-1918	103		"	106	"
13-4-1918	86		"	95	"
14-4-1918	94		"	98	"
15-4-1918	92		"	100	"
16-4-1918	80		"	85	"
17-4-1918	98		"	103	"
18-4-1918	92		"	97	"
19-4-1918	87		"	91	"
20-4-1918	89		"	95	"
21-4-1918	96		"	100	"

Work closed for
Shinga
Holidays.

No collections taken.

APPENDIX III—contd.

Date.	Quantity of juice obtained in gallons.		Erix reading.	Quantity of gul obtained in lbs.	Quality of gul.
	Morning.	Evening.			
22-4-1918	59		Not available	55	Not available.
23-4-1918	90		"	94	"
24-4-1918	67	No collections taken.	"	71	"
25-4-1918	70		"	74	"
26-4-1918	64		"	68	"
27-4-1918	67		"	70	"
28-4-1918	48		"	52	"
29-4-1918	76		"	80	"
30-4-1918	48		"	54	"

QUANTITY OF JUICE AND GUL DAILY OBTAINED FROM 100 TREES OF DATE PALM BY MR. SORABJI PATEL OF TADGAON, PETA UMBERGAON, DISTRICT THANA, IN THE SEASON 1918-19.

13-12-1918	28	No collections taken.	Not available.	45	Not available.
14-12-1918	39		"	61	"
15-12-1918	37		"	59	"
16-12-1918	47		"	71	"
17-12-1918	36		"	63	"
18-12-1918	37		"	58	"
19-12-1918	45		"	75	"
20-12-1918	52		"	78	"
21-12-1918	52		"	82	"
22-12-1918	51		"	78	"
23-12-1918	52		"	82	"
24-12-1918	59		"	87	"
25-12-1918	54		"	84	"
26-12-1918	53		"	90 $\frac{1}{2}$	"
27-12-1918	60	"	82	"	

APPENDIX III—contd.

Date.	Quantity of juice obtained in gallons.		Brix reading.	Quantity of gul obtained in lbs.	Quality of gul.
	Morning.	Evening.			
28-12-1918	70		Not available.	96	Not available.
29-12-1918	59		"	85	"
30-12-1918	64		"	89	"
31-12-1918	59		"	84	"
1-1-1919	65		"	93	"
2-1-1919	66		"	94	"
3-1-1919	64		"	86	"
4-1-1919	59		"	78	"
5-1-1919	75		"	98	"
6-1-1919	77		"	100	"
7-1-1919	59	No collections taken.	"	94	"
8-1-1919	83		"	110	"
9-1-1919	75		"	103	"
10-1-1919	73		"	100	"
11-1-1919	81		"	106	"
12-1-1919	87		"	109	"
13-1-1919	85		"	116	"
14-1-1919	96		"	124	"
15-1-1919	86		"	140	"
16-1-1919	85		"	105	"
17-1-1919	101		"	136	"
18-1-1919	84		"	104	"
19-1-1919	89		"	110	"
20-1-1919	92		"	113	"
21-1-1919	97		"	119	"
22-1-1919	92		"	112	"
23-1-1919	93		"	112	"
24-1-1919	95		"	114	"
25-1-1919	93		"	112	"

APPENDIX III—contd.

Date.	Quantity of juice obtained in gallons.		Brix reading.	Quantity of gal obtained in lbs.	Quality of gal.
	Morning.	Evening.			
26-1-1919	91		Not available.	110	Not available.
27-1-1919	95		"	119	"
28-1-1919	88		"	110	"
29-1-1919	Not available.		"	Not available.	"
30-1-1919	102		"	125	"
31-1-1919	93		"	116	"
1-2-1919	82		"	104	"
2-2-1919	102		"	129	"
3-2-1919	102		"	130	"
4-2-1919	93		"	117	"
5-2-1919	92		"	116	"
6-2-1919	102		"	126	"
7-2-1919	85		"	105	"
8-2-1919	88		"	112	"
9-2-1919	101		"	125	"
10-2-1919	91		"	108	"
11-2-1919	92		"	116	"
12-2-1919	97		"	119	"
13-2-1919	87		"	102	"
14-2-1919	93		"	117	"
15-2-1919	95		"	112	"
16-2-1919	75		"	94	"
17-2-1919	91		"	113	"
18-2-1919	99		"	120	"
19-2-1919	75		"	95	"
20-2-1919	94		"	114	"
21-2-1919	88		"	109	"
22-2-1919	79		"	92	"
23-2-1919	97		"	120	"

No collections taken.

APPENDIX III—*contd.*

Date.	Quantity of juice obtained in gallons.		Brix reading.	Quantity of gul obtained in lbs.	Quality of gul.
	Morning.	Evening.			
24-2-1919	89		Not available.	103	Not available.
25-2-1919	70		"	83	"
26-2-1919	93		"	118	"
27-2-1919	92		"	122	"
28-2-1919	74		"	87	"
1-3-1919	89		"	119	"
2-3-1919	88		"	119	"
3-3-1919	61		"	85	"
4-3-1919	88		"	113	"
5-3-1919	84		"	110	"
6-3-1919	65		"	80	"
7-3-1919	92		"	118	"
8-3-1919	89		"	111	"
9-3-1919	60		"	76	"
10-3-1919	79		"	101	"
11-3-1919	85		"	106	"
12-3-1919	57		"	74	"
13-3-1919	72		"	94	"
14-3-1919	66		"	83	"
15-3-1919	58		"	75	"
16-3-1919	65		"	82	"
17-3-1919			"	Nil.	"
18-3-1919			"	"	"
19-3-1919			"	"	"
20-3-1919			"	"	"
21-3-1919			"	"	"
22-3-1919			"	"	"
23-3-1919	64		"	81	"
24-3-1919	53		"	53	"

No collections taken.

Work closed for
Shinga Holidays.

APPENDIX III—*contd.*

Date.	Quantity of juice obtained in gallons.		Brix reading.	Quantity of gul obtained in lbs.	Quality of gul.
	Morning.	Evening.			
25-3-1919	63		Not available.	69	Not available.
26-3-1919	47		"	53	"
27-3-1919	75		"	81	"
28-3-1919	67		"	74	"
29-3-1919	51		"	66	"
30-3-1919	76		"	83	"
31-3-1919	70		"	76	"
1-4-1919	52		"	57	"
2-4-1919	72		"	80	"
3-4-1919	68		"	79	"
4-4-1919	49		"	52	"
5-4-1919	78	No collections taken.	"	96	"
6-4-1919	68		"	76	"
7-4-1919	50		"	57	"
8-4-1919	78		"	86	"
9-4-1919	60		"	68	"
10-4-1919	50		"	57	"
11-4-1919	80		"	88	"
12-4-1919	54		"	61	"
13-4-1919	44		"	52	"
14-4-1919	67		"	75	"
15-4-1919	59		"	66	"
16-4-1919	48		"	56	"
17-4-1919	71		"	80	"
18-4-1919	53		"	61	"
19-4-1919	41		"	49	"
20-4-1919	65		"	73	"
21-4-1919	53		"	61	"
22-4-1919	45		"	53	"

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APPENDIX III—*contd.*

Date.	Quantity of juice obtained in gallons.		Brix reading.	Quantity of gul obtained in lbs.	Quality of gul.
	Morning.	Evening.			
23-4-1919	59	No collections taken.	Not available.	67	Not available.
24-4-1919	43		"	52	"
25-4-1919	33		"	44	"
26-4-1919	57		"	73	"
27-4-1919	43		"	44	"
28-4-1919	36		"	38	"
29-4-1919	44		"	47	"
30-4-1919	33		"	35	"

Department of Agriculture, Bombay.

BULLETIN No. 93 OF 1919.

PALM GUL MANUFACTURE
IN THE
BOMBAY PRESIDENCY
(Principally Date Palm).

BY

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Deputy Director of Agriculture, Konkan.



POONA :

PRINTED AT THE YERAVDA PRISON PRESS.

1920.

45752

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