

## STUDIES IN THE COST OF PRODUCTION OF CROPS— SUGARCANE

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Below is given an abstract statement giving the cost of production of jaggery, arrived at from figures elicited by enquiry in typical cane-growing areas in North Arcot, South Arcot and Chittoor Districts, as also from figures taken from the Palur Agricultural Research Station.

Abstract statement showing cost of production of jaggery of the above four areas :—

	Production cost per acre											
	I			II			III			IV		
	N. Arcot			Palur Farm			S. Arcot			Chittoor		
	RS	A	P	RS	A	P	RS	A	P	RS	A	P
<b>A. CANES—</b>												
1. Preparatory cultivation ...	24	0	0	20	10	6	15	0	0	34	10	0
2. Manures and manuring ...	50	0	0	91	6	0	174	0	0	55	10	0
3. Seeds and sowing ...	87	0	0	62	2	0	77	8	0	51	4	0
4. After cultivation ...	20	4	0	58	10	0	12	3	0	90	6	0
5. Irrigation ...	54	0	0	75	13	0	157	8	0	219	0	0
6. Harvesting ...	24	12	0	22	12	0	15	0	0	45	0	0
Total ...	260	0	0	331	5	6	451	3	0	495	14	0
7. Weight of crop in tons ...	22.32			35			33.5			35.7		
8. Cost per ton ...	Rs. 11.6			9.5			13.4			13.6		
<b>B. CONVERSION—</b>												
1. Weight ...	22.32			35			33.5			35.7		
2. Cost of making ...	59 0 0			87½			...			67½		
3. " per ton ...	2.6			2.5			...			1.9		
Weight of raw sugar ...	6,000 lbs. or 2.7 tons			4.1			4.6			4.5		
Cost per ton ...	Rs. 118.			102			...			125		

The disparity in figures under the items have been explained in the following note with reference to—

- (1) Soil.
- (2) Previous crop.
- (3) Residual effects of manure.
- (4) Availability of cattle pairs.
- (5) Rate per pair.
- (6) Net receipts from Messrs. Nellikuppam factory.
- (7) Average market rates.
- (8) Kind and quality of output.

The figures for Palur (II) were taken from the average of three years of 247 B canes grown on bulk. The figures for South Arcot (III) were got from enquiry from ryots in the villages in the vicinity of the Palur Agricultural Station (viz.) Kuchipalayam and Arungunam. It is a fact that the ryots in the vicinity of Palur manure their canes with very high doses of manure (viz.) at 8 candies per cawnie or 6 candies per acre and they say that only if they manure at this high rate they get good yields from canes without depleting the soil fertility. Moreover it is the practice in these parts to grow canes in alternate years and hence they say that they use very large quantities of manure. The figure of Rupees 174 was obtained from ryots who use such quantities and the figure is correct. The figure represents the cost, when groundnut cake was selling high at Rs. 26 per candy.

In the Palur Agricultural Station, manure at 150 lbs. Nitrogen per acre only is applied as cake and Ammonium sulphate in the proportion of 3:1 and this comes to about 1,400 lbs. of cake or very nearly 3 candies and 182 lbs. of Ammonium sulphate. Hence the cost is less here (viz.) Rs. 91.

The figures given by the ryots (III) are for canes cultivated by the ryots themselves on their own lands (not on lease or varam) keeping their own cattle and sometimes hiring cattle at Rs. 2 per pair per day of 10 hours for mhoting.

*Irrigation.*—As regards irrigation charges, the charges for the farm are for water lifted by engine. If overhead charges are included another Rs. 15 is to be added to the farm irrigation charges at Rs. 0-8-0 per irrigation. The charges of lifting water by the engine in the East India Distilleries also comes to about Rs. 20 including finding man.

The ryots' figures (South Arcot) are for mhoting with bullocks and the charges were calculated as though the pairs were hired at Rs. 2 per pair per day with man. If the owner maintains his own cattle and feeds them, and has extra work for his animals (which he has in most cases here for the cultivation of other crops) the charge per pair may be put down at Re. 1-4-0 including man. When pairs are maintained for ploughing, mhoting, carting etc. by ryots, and the feeding charges and the number of days worked are taken into consideration, the charges per pair alone per day comes to Rs. 0-14-0 and with man to Rs. 1-4-0 and if this figure is taken the figure will work at Rs. 104 per acre, which is the figure of another ryot of Arungunam. The hired figure was taken as the ryot who gave information was hiring the cattle.

As regards the other points in the analysis the following notes will be of interest:—

1. The soils of both Palur and South Arcot (vicinity of Palur) are sandy loams and are under garden conditions.
2. The previous crop in the case of farm, was garden paddy. One ryot had garden paddy previous to canes and another had pure groundnuts harvested in July-August and then canes.
3. The previous paddy crop in the ryots' lands is manured with green leaves at 5,000 lbs. per acre, and groundnut is manured with 15 cart loads

of village rubbish. These may have some residual effect. In the farm the previous paddy crops were manured with groundnut cake at 3 cwts. and bonemeal at 2 cwts. per acre.

4. Cattle are available but the charges are high.

5. The rate per pair is Rs. 2 per day with man.

6. The net receipts from the factory will be from Rs. 600 to Rs. 650 per acre (i.e.) value of jaggery.

7. The factory was paying till now at Rs. 31 per candy of 500 lbs. jaggery obtained from the juice extracted by the power mill at the factory. The canes are to be simply carted to the factory and they pay for the jaggery obtained after making a test boiling of 15 gallons of the juice.

1. Ryots do not mill and boil but they give as whole canes to the factory.

Below are given details for the four areas cited above.

### DETAILED STATEMENTS

#### I .

#### *Sugar-cane—Cost of Production—North Arcot District*

Particulars	Per acre			Amount
	Men at 6 as	Women at 3 as.	Pairs at 12 as	
<i>Preparatory Cultivation.—</i>				RS . A . P.
Ploughing and digging corners ...	...	...	...	15 0 0
Trenching—contract ...	...	...	...	9 0 0
<i>Manures and Manuring—(applied before planting)</i>				
8 cart loads of cattle manure at Re. 1 per cart load including cartage.	...	...	...	8 0 0
Spreading manure in trenches ...	...	4 to 8	...	1 0 0
10 cart loads of cattlemancure including cartage.	...	...	...	10 0 0
1,000 lbs. <i>pungam</i> poonac ...	...	...	...	27 0 0
Carting the above poonac ...	...	...	...	1 0 0
Spreading the manure ...	3	10	...	3 0 0
<i>Seeds and sowing.—</i>				
15,000 cane setts at Rs. 5 per 1,000.	...	...	...	75 0 0
Cartage at 8 as. per 1,000 setts ...	...	...	...	7 8 0
Irrigating for planting ...	...	...	3	2 4 0
Distributing the setts ...	...	6	...	1 2 0
Planting the setts ...	3	...	...	1 2 0

Particulars	Per acre			Amount
	Men at 6 as.	Women at 3 as.	Pairs at 12 as.	
<i>After-Cultivation.—</i>				RS. A. P.
3 weedings ... ..	...	60	...	11 4 0
Earthing up canes—contract ... ..	...	...	...	4 0 0
Fencing—contract ... ..	...	...	...	5 0 0
<i>Irrigation.—</i>				
Irrigating for 9 months at an average of 4 irrigations per month (deducting 2 months for rains received during rainy months) at 2 pairs for irrigation.	...	...	72	54 0 0
<i>Harvesting etc.—</i>				
Cutting, tapping and cleaning the canes, including charges for bringing the staff to the milling area.	24	72	...	22 8 0
Miscellaneous — ... ..	...	...	...	2 4 0
Total cost of production of stripped canes at the milling floor per acre.	...	...	...	260 0 0
<i>Milling and jaggery-making.—</i>				
Hire of mill pan etc. for 12 days at Re. 1-4-0 per day.	...	...	...	15 0 0
Construction of the furnace, bricks, labour etc.	...	...	...	4 0 0
Iron grating—cost per acre—assuming it lasts for 60 acres-work-(cost Rs. 3-12-0).	...	...	...	0 1 0
Crushing charges-7 boilings per day at 6 as. per milling of the canes for boiling-contract.	...	...	...	31 8 0
Feeding charges ... ..	...	12	...	2 4 0
Jaggery man ... ..	12 at 8 as.	...	...	6 0 0
				58 13 0

Yield, 50,000 lbs. of stripped canes.

Therefore cost of producing 82  $\frac{3}{4}$  lbs. of canes ... 0-6-10 or nearly 7 annas.

Yield of jaggery equivalent to 50,000 lbs. canes ... 6,000 lbs.

Cost of conversion of canes into jaggery .. ... 0-12-11 or nearly 0-13-0

Percentage of jaggery to cane ... .. 12 approximately.

## II

Cost of production of sugarcane per acre (Farm figures for bulk crops  
of 247 B. (J-247) average of three years

Description of work	Pair	Men	Women	Amount
<i>Preparatory cultivation.—</i>				RS. A. P.
2 ploughings with improved ploughs ...	4	4	...	5 0 0
Working Guntakka twice ...	2	2	...	2 8 0
Trenching with victory ploughs ...	2	3	...	2 13 6
Setting right trenches and digging bottoms to loosen the soil and forming channel for irrigation.	...	30	...	10 5 0
				20 10 6
<i>Manures and manuring.—</i>				
Cost of 1,400 lbs. groundnut cake at Rs. 27 per candy of 530 lbs.	...	...	...	72 0 0
And 182 lbs. Ammonium sulphate (manuring done with 150 lbs. nitrogen per acre, 75 per cent Nitrogen as groundnut cake and 25 per cent nitrogen as ammonium sulphate).	...	...	...	15 0 0
Weighing and distributing manure (3 times during the growth).	...	4	16	4 6 0
				91 6 0
<i>Seeds and sowing.—</i>				
Guiding water and planting setts ...	...	4	4	2 2 0
Cost of 12,000 setts at Rs. 5 per 1,000 ...	...	...	...	60 0 0
				62 2 0
<i>Irrigation.—</i>				
Cost of 36 engine irrigations ...	...	...	...	57 4 0
Charges of man guiding water throughout the period.	...	54	...	18 9 0
				75 13 0
<i>After-cultivation.—</i>				
Weeding 4 times ...	...	...	80	15 0 0
Intercultivating with Junior hoe along the ridges—4 times.	2	4	...	3 3 0
Earthing up after second manuring ...	...	8	...	2 12 0
Tying and untying leaves before and after manuring for second earthing up.	...	...	16	3 0 0
Second earthing up ...	...	20	...	6 14 0
Trashing and removing trash twice in September and November.	...	2	42	9 5 0
Fencing posts and propping with wires twice (high cost due to lifting and propping fallen canes a second time).	...	52	...	17 14 0
Removing propping wires ...	...	2	...	0 11 0
				58 10 0
<i>Harvesting.—</i>				
Yield of canes per acre—35 tons (average).	...	...	...	20 0 0
Harvesting canes 35 tons on contract at 0-4-6 for 50 bundles of 10 canes each or 70 cartloads	...	...	...	2 12 0
Carrying the produce to the milling floor.	...	8	...	2 12 0
				22 12 0
<b>Total cost of production per acre ...</b>	...	...	...	<b>331 5 6</b>

I. Average cost of production per railway maund stripped cane stalks at the milling floor—variety 247 B.

Average yield of crop ... 35 tons.

Cost of production ... Rs. 331-5-6.

(i.e.) to produce 35 tons of cane the cost is Rs. 331-5-6.

Therefore for 82  $\frac{3}{4}$  lbs. of canes  $\frac{576}{7} \times \frac{2651}{8} \times \frac{16 \times 12}{35 \times 2240} = 5 \text{ as. } 6 \frac{3}{4} \text{ ps.}$

II. *The cost of conversion into jaggery.* (By power mill capable of milling 1,000 lbs. canes per hour).

Weight of canes (247 B) used for milling to give enough quantity of juice for 6 charges per day ... 3,875 lbs.

Average percentage of extraction 62 per cent.

Amount of juice obtained  $\frac{3871 \times 62}{100} = 2,403 \text{ lbs. juice.}$

(The average percentage of juice 19 per cent).

No. of boilings taken per day with 400 lbs. of juice in each parr—6.

*The cost of producing jaggery for 6 charges as above.*

	RS.	A.	P.
1 expert cooly for boiling the juice ... ..	...	1	0 0
1 man to attend to the milling at 6 as. ... ..	...	0	6 0
1 man to remove juice and for pouring in pan at 6 as. ... ..	...	0	6 0
1 man to feed the furnace at 6 annas ... ..	...	0	6 0
1 woman to remove megass etc ... ..	...	0	3 0
Running charges of engine for 4 hours at 5 annas per hour ... ..	...	1	4 0
Charges for mill and pan ... ..	...	0	12 0
Total ... ..	4	5	0

No charges are included for fuel as megass and trash are used.

For converting 3,875 lbs. of cane the charges come to Rs. 4-5-0.

For 82  $\frac{3}{4}$  lbs. ...  $\frac{576}{7} \times \frac{69 \times 12}{3875}$  ... 17  $\frac{1}{2}$  pies or 1 anna 5  $\frac{1}{2}$  pies.

Percentage of brix ... 19 per cent.

Total jaggery obtained for 3,875 lbs. ...  $\frac{2403 \times 19}{100}$  ... 456  $\frac{1}{2}$  lbs.

Percentage of jaggery to cane ... 11.8 per cent.

The figures are average ones for the bulk crops of 247 B grown in the Farm and Fiji B grown by ryots in the vicinity. As ryots do not mill canes here and as they invariably send them to the factory no cost of conversion of canes into jaggery can be given for ryots' crop. The figures for jaggery conversion given are for Farm canes (247 B) crushed by a power mill which crushes about 1,000 lbs. per hour. The ryots' canes are always Fiji B which gives from 13.5 per cent to 14 per cent jaggery to cane by weight.

## III

Ryots' figures in garden land and wet land per acre in the vicinity of the Palur Farm—Variety Fiji B.

Description of the work	Pairs	Men	Women	Amount
				RS. A. P.
Trenching with mamutty in fallow land 3ft. apart—1 foot broad and 1 foot deep.	...	40	...	15 0 0
10 cartloads of village rubbish or compost at Rs. 0-12-0 per cart.	...	...	...	7 8 0
Spreading ... ..	...	4	...	1 8 0
Irrigating by mhote and planting ...	2	4	4	5 8 0
Cost of 12,000 setts at Rs. 6 per 1,000 on the average.	...	...	...	72 0 0
Cost of 6 candies of groundnut cake at Rs. 26 per candy.	...	...	...	156 0 0
Powdering cake—6 candies ... ..	...	...	...	6 12 0
Applying cake—3 times ... ..	...	...	12	2 4 0
Earthing up twice after manuring ...	...	25	...	9 6 0
Tying leaves to facilitate earthing up and untying.	...	...	15	2 13 0
<i>Irrigation charges.—</i>				
Irrigating once in 8 days (or 6 days if severe drought prevails) 36 irrigations throughout the life of 11 months excluding rainy months of October, November and December at Rs. 4-6-0 per irrigation per acre. 2 pairs at Re. 1-10-0 each and 3 men at 0-6-0 each (per acre).	...	...	...	157 8 0
Harvesting charges for 50 carts at 0-4-0 per cart of 1,000 lbs. or 33½ tons on the average.	...	...	...	15 0 0
Total Rs. ...	...	...	...	451 3 0

According to ryots' figures the total cost of production of one acre of sugarcane (Fiji B) comes to Rs. 451-3-0.

The average yield of canes in tons per acre ... .. 33½

Therefore cost of producing 82 ¾ lbs.  $\frac{7219 \times 576 \times 2}{7 \times 77 \times 2240} = 6$  annas 10½ pies.

Percentage of jaggery to cane in Fiji B is from 13.5 to 14 per cent.

## IV

## Sugarcane—cost of production—Chittoor

Particulars	Men at 6 as.	Women at 4 as.	Pairs at 12 as.	Amount
				RS. A. P.
<i>Preparatory cultivation.—</i>				
Irrigating to moisten the field ...	3	...	3 at 1-8-0	5 10 0
1st ploughing with country plough ...	...	...	3 at 1-0-0	3 0 0
Subsequent 9 ploughings ...	...	...	18	18 0 0
Trimming bunds ...	4	...	...	1 8 0
Levelling and ridging the land ...	12	...	2	6 8 0
<i>Manures and manuring.—</i>				
Sheep-penning at 2,500 sheep per acre at Rs. 10.	...	...	...	10 0 0
Cost of 25 cartloads cattle manure at 8 as. each.	...	...	...	12 8 0
Carting 15 cartloads cattle manure and spreading (before ridging).	4	...	2 at 1-8-0	4 8 0
Carrying 10 cartloads cattle manure at the time of planting and spreading it in the trenches (at planting time).	3	2	...	1 10 0
Cost of 2 candies pungam cake at Rs. 12 a candy.	...	...	...	24 0 0
Powdering cake, carrying and manuring the crop in trenches before earthing up.	8	...	...	3 0 0
<i>Seeds and sowing.—</i>				
Cost of 20,000 setts at Rs. 2 per 1,000 ...	...	...	...	40 0 0
Preparing the setts for planting and distributing the same.	2	6	...	2 4 0
Planting the setts ...	9	...	...	3 6 0
Irrigating for planting ...	3	...	3 at 1-8-0	5 10 0
Irrigations on 5th day after planting ...	...	...	2 at 1-8-0	3 0 0
72 irrigations before the crop is cut ...	...	...	144 at 1-8-0	216 0 0
<i>After-cultivation.—</i>				
1st hoeing in young crop ...	...	10	...	2 8 0
2nd weeding and hoeing in the second month.	...	30	...	7 8 0
Earthing up canes after applying cake ...	12	...	...	4 8 0
Weeding the crop before wrapping in the trenches.	...	6	...	1 8 0
1st wrapping to the canes ...	30	...	...	11 4 0
Proportionate cost of 600 standards and 300 bamboo horizontals which keep for three years.	...	...	...	35 0 0
Carrying and fixing the standards, tying the horizontals and wrapping second time.	40	...	...	15 0 0
Third wrapping ...	20	...	...	7 8 0
Fourth wrapping ...	15	...	...	5 10 0



Particulars	Men at 6 as.	Women at 4 as.	Pairs at 12 as.	Amount
				RS. A. P.
<i>Harvesting.—</i>				
Harvesting, trashing, bundling and transporting the canes to the mill.	120	...	...	45 0 0
Total cost of producing (one acre) of stripped canes at the milling floor.	...	...	...	495 14 0
Milling and preparing jaggery at the usual charges per day, 15 days.	60	...	Pair at 3 as. per charge	67 8 0
				67 8 0

Approximate no. of canes per acre ... 40,000.

„ weight of canes per acre... 80,000 lbs and cost of production—  
Rs. 495-14-0.

1. Cost of production of one railway maund or 82½ lbs. of canes 0-8-2.

2. Approximate percentage of jaggery to cane—12½, i.e., 10,000 lbs.

3. Cost of conversion of all canes per acre into jaggery Rs. 67-8-0.

Therefore cost of conversion of canes into 82 ½ lbs. jaggery Rs. 0-8-11 or  
Rs. 0-9-0.

## Agriculture at the Indian Science Congress, Nagpur.

The section of Agriculture of the Indian Science Congress held at Nagpur, in the first week of January this year, had a very interesting and successful session under the presidency of Sir T. Vijayaraghavacharyar, vice-Chairman, Imperial Council of Agricultural Research. Fifty-six papers on the science and practice of agriculture and dealing with such varied subjects as soil science, plant and animal nutrition, plant breeding, genetics and cytology, plant physiology, agricultural economics and statistics, horticulture, plant pathology and on the use of electricity in agriculture, were submitted from the various centres of research in India. The papers are of interest both to the practical agriculturist and to the scientific investigator. Short notes on some of the papers which are of a practical interest to the agriculturist are given below for the benefit of our readers. In a later issue we hope to mention other papers which are of interest to the purely scientific investigator.

*Notes on papers of interest to the practical agriculturist.*—Mr. M. N. Ghosh of Sabour described the effect of flooding and other soil conditions on the growth and maturity of sugarcane in the cane-growing tract of Saran in North Behar, situated between two big Himalayan rivers. When the rivers