

Cost of Small-Scale Production of Canned Mangoes

By

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At the Government Fruit Products Research Laboratory, Kodur, a series of investigations were taken up since 1943 to standardise methods for the preservation of the important fruits of South India. Preliminary details regarding the economics of fruit preservation as a cottage industry have been published by Siddappa, (1949). The most important from the preservation point are the mangoes and the citrus fruits. Intensive research has been taken up to standardise different methods of preservation of these two fruits. Full details regarding these will be published elsewhere. In the course of these studies it was thought useful to work out the cost of production of canned mangoes on a small scale using laboratory or home-scale equipment. The method has been described by the author elsewhere. (Siddappa; 1950). The details of the working of the cost of production during June—July 1950, are given in this paper as they may be of interest in these days, when great emphasis is placed on the development of small-scale and cottage industries.

Material and Methods: *Material:* The fruit used for canning was got from the Government Fruit Research Station, Kodur and the surrounding orchards at current market rates. Although several varieties of mangoes were available at the Research Station, only four of the commercially important varieties were selected. These were Baneshan, Alampur Baneshan, Neelum and Bangalora. Of these, the former two are high class dessert varieties with thick and smooth flesh, free from fibre and give a very good canned product. Neelum is available in very large quantities during the season. It is fairly good for canning. Peeling of the ripe fruit, however, renders it soft and pulpy. There is much fibre also in the pulp. The fruit has a tendency to ripen at the tip first. The fruit should be firm ripe for canning. Bangalora mango, although large in size and has a rich pulp of good texture, is poor in flavour. The canned product is of fair quality only. Since these four varieties of mangoes are the ones likely to be available for canning during the season, all of them were used, inspite of there being some difference in the quality of the canned product. The fruits were ripened in the laboratory and canning-ripe ones taken out for canning in lots.

Methods of Canning: Fully ripe, but firm, fruit was taken, washed well in water and peeled by means of a stainless steel knife by working it round the fruit. The two sides were then sliced off, and each slice cut

into two halves. The pulp on the thin side of the stone was removed in two sections. Thus from each fruit, six longitudinal slices of approximately equal size were obtained. These were filled into A 2½ size plain cans and covered with sugar syrup of 40 degree Brix at 175-180°F, leaving a headspace of about ¼ of an inch. The cans were then exhausted in hot water at 185-190°F for 10 minutes and sealed hermetically by means of a small Dixie automatic double seamer. The sealed cans were processed in boiling water for 30 minutes and then cooled quickly in cold water to prevent 'over-cooking' during storage.

Cost of Production: The cost of production of an A 2½ can of mangoes was worked out making use of the data collected in a set of twelve small-scale experiments. Details regarding the variety and quantity of fruit, weight of sugar used and the number of cans packed on each day are given in Table I. The total quantity of each variety of fruit used and the price paid are shown in Table II.

Charcoal and kerosene oil were used for preparing syrup and exhausting and processing. A charcoal oven was used mostly for heating the sterilizing water in an open aluminium vessel. One mazdoor was employed at Re. 1/- per day to help in the day's work. The other two workers, who were members of the staff, consisted of one canning assistant and one laboratory attender.

Complete details for the working of the cost of production of an A 2½ can of mangoes are given in Table III.

Discussion: The yield of slices suitable for canning is about 50-55 per cent of the total weight of fruit depending upon the variety and ripeness of the fruit purchased. An A 2½ size of can holds about 18 oz. of prepared slices. On the basis of a yield of 50 per cent of slices, the weight of fruit required per can is 36 oz. In Table I, 392 cans were packed from 56 lb. 3 oz. of fruit purchased and ripened to proper extent before canning. On an average, 2 lb. 3 oz. of fruit as purchased and ripened were actually required to prepare one A 2½ can. Even if wastage should be large, 2½ lb. of fruit would do for packing an A 2½ can. On account of this extra quantity of about 4 oz. of fruit the cost of fruit per can will be increased by about half an anna only.

As already mentioned, about 50 per cent only of the weight of fruit is recovered in the form of slices, the rest being made up of peel (20-22%), stone (16-18%) and trimmings and scrapings of pulp from the stone (12-14%). The scraped pulp and trimmings can be utilized for making mango jam. This, however, need not be taken into consideration while working out the cost of production of canned mangoes, since the major cost in jam making will be that of sugar. The approximate yield of 50 percent of slices allows for any wastage during the ripening of fruit purchased, slightly under-ripe, and ripened subsequently. In the

experimental data reported, the fruits were actually ripened in the laboratory before canning and such contingencies have, therefore, been allowed for already in the data in Table I.

Investment: The cost of production is based on a small-scale basis only, where the equipment used is very small. The provision of four annas per unit for meeting the depreciation and interest charges on building, equipment, and working capital and overhead charges leaves a wide margin.

The only costly equipment required for canning about 100 cans per day is a good can sealer costing about Rs. 200/-. The other items like aluminium vessels for preparing syrup, exhausting and cooking, knives, balance, working bench, trays, kerosene oil stove, charcoal ovens, thermometer, Brix hydrometer etc., will cost about Rs. 500/-. By adding additional equipment at a cost of about Rs. 1,300/- other products like jam jelly, fruit juices and squashes, candied fruit etc., can be prepared and the staff can be kept engaged for about 6 months in a year and thus depreciation and overhead charges per unit of production reduced. The building will be the costliest item and this cannot be avoided. This preparation room should be fly-proofed with wire gauze doors and windows. The walls and floor should be smooth and washable and there should be a good drain. A room 10' x 12' will be sufficient for the preparation room. Raw materials, containers, finished products, etc., can be conveniently stored in a separate room which need not necessarily be of any special type. The preparation hall may cost about Rs. 1,500/-. The addition of a small shed at a cost of about Rs. 1,500/- will be highly useful. The total cost on buildings will thus be about Rs. 3,000/-.

Establishment: One trained person should look after the day-to-day work. One or two skilled mazdoors under him will be highly useful. Together they can attend to the daily production of about one hundred units of canned fruit.

Working Capital: The capital required for the purchase of raw materials, containers, etc., can be taken on an average of about one rupee per standard can of fruit or bottle of squash.

Depreciation, interest and overhead charges: The details under this head are as follows:

1. Depreciation on buildings costing Rs. 3,000/- at 5 percent	...	Rs.	150/-
2. Depreciation on equipment costing Rs. 2,000/- at 10%	...	..	200/-
3. Interest on capital investment Rs. 5,000/- at 6%	...	..	300/-
4. Interest on working capital of Rs. 10,000/- (i. e. 2rd of the total Rs. 15,000/-)	...	..	500/-
			1,150/-
Total of depreciation and interest charges	...	..	1,150/-

Overhead Charges:

One trained assistant @ Rs. 150/- p. m.	...	Rs. 1,800/-
One skilled worker @ Rs. 50/- p. m.	...	6,000/-
Total	...	<u>Rs. 2,400/-</u>

Total of Depreciation, interest and overhead charges

$$(Rs. 1,150/- + Rs. 2,400/-) = \dots Rs. 3,550/-$$

Assuming a production of 100 units per day for a working of 25 days in a month for six months in a year the total number of units of production will be $100 \times 25 \times 6 = 15,000$.

Depreciation, interest and overhead charges per unit will thus come to 3.79 annas. This is rather on the high side. It will be ample if four annas per unit are added to the cost of production to meet these charges.

Retail price of an A 2½ can of mangoes: In working out the retail sale price, allowance has to be made for various incidental charges such as labelling, packing, railway freight, losses, wholesale and retail dealer's commission, profit, etc. The following are the details under these heads.

Cost of production of one A 2½ can of mangoes inclusive of depreciation, interest and overhead charges at 4 annas per unit	...	Rs. 0-15-0
Probable losses during storage etc., @ 6.7%	...	.. 0-1-0
Packing charges, etc., at Rs. 3/- per case of 24 cans	...	.. 0-2-0
Railway freight to destination	...	.. 0-2-0
Hence, cost per can F. O. R. destination	...	Rs. 1-4-0
Add 1. Wholesale and retail commission at 20%	...	.. 0-4-0
2. Profit at 20 percent of marked price for wholesale trade	...	.. 0-4-0
Hence retail price should be	...	<u>Rs. 1-12-0</u>

This is a reasonable and competitive price at present.

The price paid for the different varieties of fruit during 1950 is a normal one. It is, however, likely to be slightly more in places away from the growing centre, to include packing, transport and losses in transit. The cost of charcoal at Rs. 4-4-0 per bag of 80 lbs is also normal. Four persons working together can easily pack 100 cans of mangoes in a day. The cost of an A 2½ can of mangoes comes to Rs. 0-14-11 or Rs. 0-15-0, which is reasonable. While the cost of the contents of the

can including processing and labour charges was only Re. 0—7—1, the cost of the container alone was Re. 0—3—10 that is, nearly half of it. The retail sale price of an A 2½ can of mangoes can be fixed at Rs. 1—12—0, which will allow for various incidental marketing charges such as labelling, packing, transport, commission, probable losses, etc., and also leave sufficient margin for profit to the small-scale producer.

Conclusion : In mango growing centres, where suitable varieties of mangoes are available, their small-scale canning can be taken up with advantage. It is, however, necessary for the person taking it up to have a thorough training in the technique. Suitable marketing facilities also are essential to make the scheme a success.

Summary : Details have been worked out for the small-scale production of canned mangoes,

The cost of production of an A 2½ can of mangoes including depreciation and overhead charges, is Re. 0—15—0, which is reasonable. The retail sale price may be fixed at Rs. 1—12—0 per can to allow for incidental marketing charges and a safe margin of profit.

REFERENCES :

1. Siddappa, G. S. 1949. Economics of fruit preservation as a cottage industry. Madras Agric. J. 36, Feb. pp. 63—81.
2. Siddappa, G. S. 1950. Canning of mangoes, Leaflet No. 6 pp. 1—2. Madras Agricultural Department.

TABLE I
Small-scale canning of Mangoes

Expt. No.	Date	Variety of Mango	Weight of fruit taken	Weight of sugar used	No. of A 2½ size cans packed	Remarks
			lb. oz.	lb. oz.		
1.	14—6—1950	Alampur Baneshan	39— 0	8— 6	21	
2.	16—6—1950	do	26— 8	5— 7	15	
3.	15—6—1950	Baneshan	145— 6	27— 0	73	
4.	16—6—1950	do	115— 6	22— 13	63	
5.	17—6—1950	do	46— 12	9— 13	20	
6.	10—7—1950	Neelum	26— 12	5— 10	13	
7.	11—7—1950	do	30— 8	5— 10	14	
8.	12—7—1950	do	137— 0	23— 0	61	
9.	13—7—1950	do	47— 9	9— 9	24	
10.	18—7—1950	Bangalora	160— 0	19— 11	51*	* Nearly 40 percent of the slices, being soft, were used for jam.
11.	19—7—1950	do	60— 8	9— 13	26	
12.	20—7—1950	do	21— 8	4— 4	11	
Total			856— 3	151— 0	392	

TABLE II
Quantity and cost of different varieties of mangoes canned

Item No.	Variety of mango	Quantity		Rate per pound	Amount	Remarks
		lb.	oz.	Rs. A. P.	Rs. A. P.	
1.	Alampur Baneshan	65	8	0-2-6	10-3-0	
2.	Baneshan	307	8	0-1-6	28-13-3	
3.	Neelum	461	11	0-1-0	28-13-9	
4.	Bangalora	21	8	0-0-9	1-0-2	
Total		856	3		68-14-11	

TABLE III
Cost of production of an A 2½ size can of mango slices

Item No.	Particulars	Quantity	Rate	Amount
			Rs. A. P.	Rs. A. P.
1.	Fruit (Mixed varieties)	856 lb. 3 oz.	Different rates	68-15-0*
2.	Sugar	151 lb.	0-7-4	69-3-0
3.	Kerosene oil : bottles	30	0-4-0 (per bot.)	7-8-0
4.	Charcoal	2 bags	4-4-0 (per bag)	8-8-0
5.	Labour, man days	20	1-0-0	20-0-0
6.	Cost of contents of 392 A 2½ cans of mango slices			174-2-0
7.	Cost of contents of 1 A 2½ can of mango slices			0-7-1
8.	Add, (i) cost of can (ii) overhead charges and depreciation			0-3-10 0-1-0
9.	Cost of one A 2½ can of mango slices			0-14-11 or 0-15-0

* Details are given in Table I.