Post-harvest practices and perception of losses among tomato retailers at five marketing centres in Accra

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ABSTRACT

One hundred small-scale tomato retailers at five marketing centres in Accra were interviewed between the months of January-March and May-October in 1991 and repeated in 1997, on what they perceive as problems with the handling and storage of fresh tomato. Their perceptions were compared with an analysis of the percentage of non-marketable tomato from these markets. The analyses were based on the physical defects on tomato bought at two-week intervals over a period of six months from the same retailers at each marketing centre, during the time of the survey. Retailers' perceptions on sorting, cleaning, poor packaging, lack of storage facilities for tomato correlated well with the physical defects results of physiological and mechanical losses. Most retailers did not appreciate that unsanitary environment decreases the keeping qualities of the vegetable. The degree of use of post-harvest practices was found to be market-dependent. Though 95% of respondents wanted improved facilities at the marketing centres for keeping tomato, analysis of the relationship between their net profit/losses and the amount they would have to spend on such improvements revealed that there would be problems if the retailers are to pay for the cost of such interventions.

1. Introduction

Tomatoes are widely used in several food preparations in Ghana because of its rich source of vitamins A and C. Though annual production of the fruit is reasonably high, there are perennial shortfalls in the supply of the vegetable, which has been attributed to poor handling, storage and distribution of tomato by farmers and retailers (Eyeson *et al.*, 1980). A tomato glut during and immediately after the two harvest periods (August to October and January to March) is a common occurrence. Attempts to solve the problem of seasonal glut by commercial processing have, unfortunately, not been successful. Three tomato processing factories, Pwalugu, Wenchi and Nsawam Canneries, set up in the country in the past have failed to effectively utilise the excess tomato available at the end of the season. A number of reasons account for this. Prominent among them is, surprisingly, the market for products from these processed tomato products. The inefficient and old processing machinery being used by these factories meant production levels were not only low, but also that their products were not competitive enough when compared with the imported brands.

Since most Ghanaians use un-processed tomato on a large scale, improving the post-harvest handling and storage practices during marketing of fresh tomatoes is still important. That way, the economic viability of the tomato industry will be sustained. However, any improvement schemes must be such that the tomato farmer and retailer would embrace it. This means the scheme to improve the post-harvest handling and storage of tomatoes must be technologically and socio-economically acceptable to the tomato farmer and retailer. A preliminary study is, therefore, needed to establish what is acceptable as loss to the farmer and retailer before implementing any improvement schemes. Harris and

What one may consider as a loss may not be a loss to another person. Thus, it is likely that a tomato farmer and/or retailer's perception as regards losses in tomatoes will influence the extent she/he is prepared to welcome any improvements in the post-harvest handling and storage for tomatoes. The objective of this study was, therefore, to investigate the post-harvest practices used, identify the main causes and extent of losses incurred as well as assess the perceptions of loss among tomato retailers in Accra.

2. Methodology

Three methods were used in this study. In the first one, hundred tomato retailers from the five main marketing centres in Accra, 31st-December, Makola, Kaneshie, Agbogbloshie and Malam Ata were interviewed, using a structured questionnaire, on the handling and storage practices. The interviews, first in 1991 and repeated in 1997, were conducted between the months of January to March and then from May to October. Respondents were randomly chosen and they must have been in the tomato trade for at least two years.

The second method involved the estimation of percentage of non-marketable tomatoes based on the analysis of the physical defects (Musa and Thompson, 1976). 30 kg of fresh tomato (equivalent to one medium-sized basket) was bought every two weeks from the same retailer in each of the five marketing centres for six months (May–October). Approximately, 20 kg of the tomato was randomly selected and sorted immediately into five groups comprising: Undamaged (representing the control), physiologically damaged, pathologically damaged, mechanically damaged and non-marketable portion. These various categories were expressed as a percentage of the initial weight. The results of the estimation of percentage of non-marketable tomatoes were compared with the results obtained from the interviews.

The third method involved estimating the economic loss during sale of tomato (Kendall, 1971).

3. Results and discussion

In Table 1, most respondents identified poor sorting at farm level, cuts due to crate design and lack of storage facilities for increasing the keeping quality as the main causes of loss in tomato during marketing. Fig. 1 shows that sorting and cleaning as a combined practice was best carried out at the 31st December and Makola markets, whilst at places like the Kaneshie markets, only sorting was done. At the 31st December and Makola

Table 1. Percentages of respondents agreeing to the cause of losses during the sale of tomato

	Cause	Frequency	%	Estimated Loss
i.	Type of cultivar (e.g., soft skin)	15		10
ii.	Bad nature of roads	20		7
iii.	Poor sorting at farm-gate	80		24
iv.	Cuts due to design of crates	75		6
v.	Lack of good storage facilities	55		17
vi.	Rough handling of crates during off-loading	40		11
vii.	Poor sorting and cleaning at the market	15		2
viii.	General sanitation in and around the market.	10		2
Ix.	Position of stall in the market	10		4
x.	Theft	25		3
xi.	Separate diseased and over-ripened fruits from half-ripped fruits before storage	20		5
x.	Failure to store in the cool place	45		12

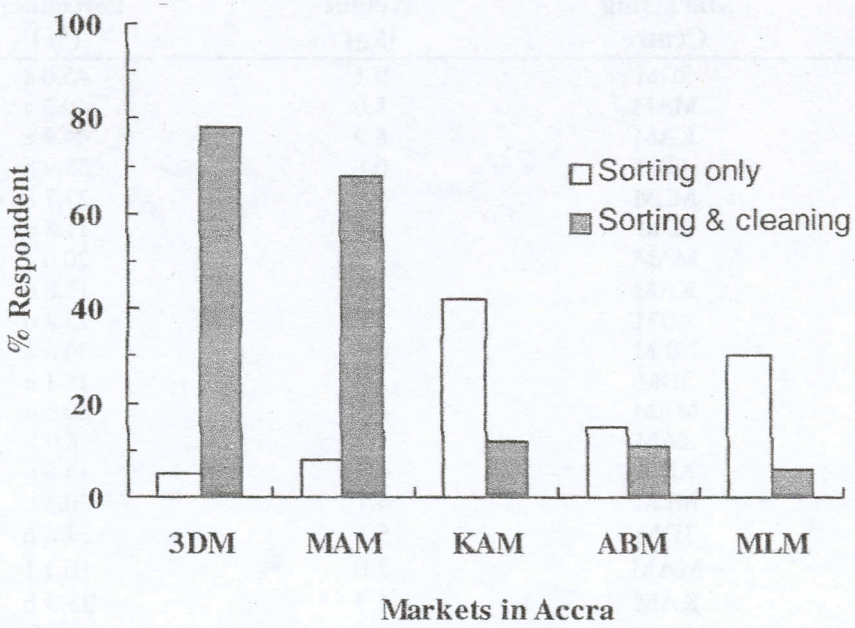

Fig. 1. Percentages of respondents who sort and clean tomato before selling.

markets, retailers said on receipt of the crates of tomatoes they undertook first to sort good quality tomatoes from the poor ones. Next, the fully ripe and relatively softer ones were separated from the half-ripe and harder ones. Each lot of good tomatoes was well cleaned by a dry and clean cloth. The fully ripe ones were then arranged on a flat circular displaying board for sale. The poor quality tomato was usually divided into either two or three parts depending on the state of deterioration. For example, those with few cuts and bruises were also cleaned and arranged at different parts of the displaying board. Those which happened to have lots of cuts (mechanical) and with the juice oozing out (pathological) were usually washed and sold cheaply. At the Kaneshie market, good quality tomatoes were sorted out from the poor ones. Retailers appeared not to be motivated to present the fruits in very excellent conditions. When questioned on this nearly 90% said most buyers did not place too much premium on well-sorted and cleaned fruits but rather what they can afford to buy.

On storage techniques for tomatoes at the end of the day, Table 1 again indicates that only 20% undertook any form of precautions crates of tomato with jute sacks or any other appropriate cover to prevent the accidental droppings of any rodents who might come by during the night.

In the survey, the most popular container for tomato was a rectangular wooden crate measuring 600 mm long, 400 mm wide and 400 mm deep, with wall of about 20 to 25 mm thick and usually with two small lateral openings of about 50 mm. The crate, which, on the average could hold about 50 kg of medium-sized tomatoes, had the advantage of being able to be stacked on top of each other. The container usually lacked padding at the base or in between to help reduce the compressive force experienced during transportation. This helps to explain the relatively high percentages found for mechanical damage, from all the five markets in Table 2. New *et al.* (1978), Proctor *et al.* (1981), Tindall and Procter (1983) have all explained that any container used for handling such perishable fruits and vegetables such as tomatoes must be able to keep a number of them together and protect them as much as possible against hazards during transportation, like adverse weather and bruising on impact during transportation from the farm-gate to the marketing

Table 2. Percent distribution of various types of damaged tomatoes at the five markets in Accra

Nature of Damage	Marketing Centre	Weight (kg)	Percentage (%)
Undamaged (Control)	3DM	9.1	45.6 a
	MAM	8.0	40.2 a
	KAM	8.9	44.4 a
	ABM	6.8	33.9 b
	MLM	5.5	27.7 b
Mechanical	3DM	2.6	11.8 d
	MAM	4.1	20.6 c
	KAM	2.2	13.8 d
	ABM	5.0	25.2 b
	MLM	4.1	20.5 c
Pathological	3DM	3.0	15.1 e
	MAM	4.1	20.5 c
	KAM	1.8	8.9 f
	ABM	4.5	14.6 e
	MLM	4.1	20.3 c
Unmarketable	3DM	5.5	27.6 b
	MAM	2.0	10.1 f
	KAM	4.7	23.3 h
	ABM	2.1	10.6 d
	MLM	2.6	12.8 d
	3DM	-	0
	MAM	1.6	8.0 f
	KAM	2.5	12.6 d
	ABM	1.6	8.1 f
	MLM	3.8	18.9 c

Markets: 3DM = 31st-December ; MAM= Makola; KAM = Kaneshie;
ABM = Agbogbloshie and MLM = Malam Ata.

* Values shown as the means of 3 replicates.

+ Means within each column with different letters are different significantly ($P < 0.05$).

fruits within the container to prevent transit injury problems. The present crates being used by traders are too big, some without holes or slits openings at the base to allow any fluid collecting in the crate to run out. When questioned only 58% of the retailers agreed that the present crate was contributing to loss they were incurring. Moreover, nearly 45% of the respondents explained that they did not entirely lose because fruits with minor cuts were still marketable, though at a reduced price.

Table 1 also shows that only a few respondents considered the poor unsanitary environment as a cause of loss. The survey revealed that from the points of assembly of the crates of tomatoes immediately after offloading to the actual selling points within the market complexes, sanitary conditions were found to be in very poor state. It was common to find used, unwashed crates lying very close to crates of fresh tomatoes in some places, especially in the Agbogbloshie market.

The mean loss, in monetary terms, of tomatoes handled per week was estimated at 30.5% with a standard deviation of 11.96. The high variability of 11.96 may be due to methods used by the individual retailers in the handling and storage of the tomatoes. The study showed that in most cases bruised tomatoes, which would normally have been counted as losses are actually sold at, reduced

Table 3. Showing the profitability of tomato sold by selected respondents in a week

Retailer	No. of Crates Sold	Selling Price/crate ($)	Cost Price/crate ($)	Total Cost ($)	Expected Revenue ($)	Expected Profit ($)	Actual Profit/ Loss ($)
1	2.0	20.1	17.39	34.78	40.22	5.4	-0.60
2	2.0	23.9	20.65	41.84	47.83	6.5	0.54
3	5.0	21.7	19.02	95.10	108.69	13.6	-2.51
4	7.0	36.4	32.61	228.27	254.89	26.6	4.84
5	2.5	38.0	32.61	81.52	95.11	13.6	-1.15
6	2.0	35.3	32.61	65.22	70.65	5.4	3.40
7	3.0	36.9	33.70	101.09	110.87	9.8	-8.70
8	1.0	26.1	24.46	24.46	26.09	1.6	-4.89
9	5.5	15.8	14.13	77.72	86.41	9.0	-6.79
10	2.0	14.9	13.04	26.10	29.89	3.8	-3.67
11	2.0	16.3	15.22	30.44	32.61	2.2	-1.90
12	6.0	36.4	32.61	195.65	218.47	22.8	-1.36
13	5.0	38.0	32.61	163.04	190.22	27.2	-1.35
14	3.0	48.9	45.12	135.36	146.74	11.4	5.30
15	3.0	33.4	31.52	94.56	100.00	5.7	-10.17
16	3.0	39.4	33.97	101.90	118.21	16.3	-3.40
17	4.5	29.8	27.17	122.27	134.51	12.2	1.63
18	2.0	24.4	21.74	43.48	48.91	5.4	-1.90
19	1.0	32.6	29.89	29.89	32.61	2.7	1.87
20	3.5	44.0	40.76	142.66	154.10	11.3	-3.92
21	4.0	24.2	20.10	80.41	96.74	16.3	4.21

prices. These are sold at about 50% reduction of the actual selling price of the tomatoes without cuts. The percentage loss per week would have gone higher if they had discarded the bruised tomatoes. The range for the losses was between as low as 8.2% and as high as 57.0%. This disparity can be attributed to the type of tomatoes handled and the handling practices used by the retailers.

Analysis of the effect of losses on the returns of the respondents revealed that percentage losses had a great effect on the profitability of the tomato trade, only 33% of respondents made profit. The rest made losses which ranged from between $ 0.60 to as high as $ 4.48, depending on the volume of sales (Table 3). All the retailers interviewed were of the view that the losses had effect on the profit margins and about 95.24% of the retailers were interested in any means that would tomatoes they sell at the marketing centres. When asked to suggest charges that they could offer for storing each crate of tomato over-night in a purpose-built room with reduced temperature facility, the range was as low as $ 0.25 to $ 2.50, the average charge was calculated as $ 1.50. It was found out that there was no relationship between the net profit/loss and the amount offered per crate of tomatoes to be stored (Fig. 2). The implication of this is that the level of losses does not influence the handling and storage practices used in their business. This is contrary to the expectation that the higher the losses, the higher the amount many of the retailers would be willing to pay per crate for storage. This deviation from normalcy can be attributed to the fact that the retailers do not keep records of their business transactions to let them know the level of profits and the losses

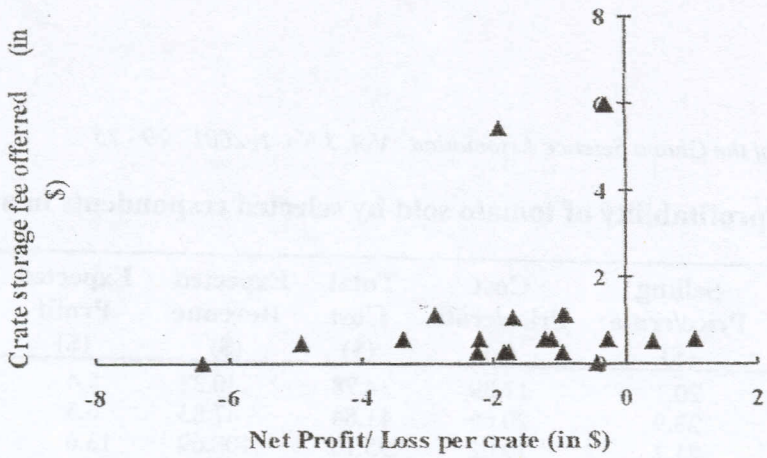

Fig. 2. Relationship between amount retailers were willing to pay and the net profit/loss per crate of tomato.

4. Conclusion

This study revealed that most tomato retailers in Accra knew about the main factors that reduce the shelf life of the vegetable during marketing. The main causes were pathological and mechanical. Overall monetary loss, though variable, was considered not to be too significantly high. Though most tomato retailers used simple techniques for improving the keeping qualities of fresh tomatoes, the effects of unsanitary conditions aggravating the losses due to pathological effects were not well appreciated by majority of them. This calls for intensification of the educational programmes of the women in Agriculture Division of the Ministry of Food and Agriculture for the market women. Most of the retailers need to be sensitised on how adverse environmental conditions could affect their profit margins. There is also the need for the development of new forms of tomato crates that could help minimise the cuts on vegetables during transportation. Finally, the design and construction of markets must incorporate storage places with facilities for reducing temperature conditions for such perishable crops as tomatoes.

5. Acknowledgement

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