

## Postharvest problems of tomato production in Ghana - field studies of some selected major growing areas in Ghana

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### ABSTRACT

*Lycopersicon esculentum*, Mill, commonly referred to as tomato is a highly perishable crop. However, the rate and extent of spoilage depends on several factors. To overcome this problem there is the need to develop simple, cost-effective and easily adaptable preservation techniques and to do this requires a better understanding of the farm management system of farmers. A study was carried out to determine the current farm practices, postharvest problems, preservation methods and marketing practices of farmers. Surveys using questionnaires were carried out in selected major tomato growing areas in Ashanti and Brong-Ahafo regions. The results of the study show that tomato is cultivated mainly by male youth with basic educational background. Cultivation is on the average three times a year and it is mainly on rented plots. The 'Power' variety is the predominant variety for cultivation in Ghana. There is also the rampant abuse of agrochemicals by most of the farmers. The farmers carry out neither on-farm nor off-farm storage of the fresh tomato fruits. The major postharvest problems of the farmers are the need for permanent purchasing outlets and the stabilization of the unit price per box of tomato. This calls for a significant look at the distribution system for tomatoes.

### 1. Introduction

*Lycopersicon esculentum*, Mill, commonly referred to as tomato is a vegetable from an annual herbaceous plant. It is widely distributed throughout the tropics and in the temperate regions. In Ghana, tomato is grown on a large scale in the Northern (Tono and Veve areas), Ashanti (Akumadan), Kumawu, Agogo areas), Brong-Ahafo (Techiman, Derma and Techimantia areas) and the Greater Accra regions. Tomato is one of the major vegetables grown in Ghana and in 1994, it was estimated that about 181,640 metric tonnes of tomatoes was produced. Studies have shown that various varieties of tomatoes are grown in Ghana. These include Roma VF, Margloves, Anecho, Owusu-Bio, Fixball, Wosowoso, Ace VF, Floradel, Power, Caterpillar, Heinz 1250, Harvester supermarket, Indian river, Luarano 70, Zuarungu, Marilocal, Early Dwarf and Pearl Harbour (CRI,

1994). The contribution of tomato to world food production although relatively small is quite significant as shown in the FAO food production table for 1979. Tomato is used as a basic ingredient in stews, sauces, soups, vegetable salads, etc. The versatility of tomato fruit as a food source is exhibited by the range of products produced from it such as tomato juice, tomato paste, tomato puree, tomato ketchup, canned whole tomato and dehydrated tomatoes (Goose and Binsted, 1964). However, tomato as a vegetable is highly perishable, spoiling within 4 to 6 days after harvest depending on the variety leading to huge economic losses for farmers. It is estimated that losses in Ghana range between 30 - 70%. Willis *et al.* (1981) also reported that pre-harvest practices significantly affect postharvest losses of perishable crops. Irrespective of the high perishability of the tomato, its rate and extent of spoilage depends on several factors including poor handling practices, storage

conditions, microbial infection and high temperature

To overcome the extensive postharvest losses, there is the need to develop simple, cost effective and easily adaptable preservation techniques for shelf-life extension of fresh tomatoes. However, this requires an understanding of the current farming and preservation methods in use on the field, the expectations of the end-users, i.e. whether they desire to preserve or that they are only interested in cultivating for the general market. The objective of this study was to obtain baseline information on the current farming methods and postharvest problems associated with tomato production in Ghana with Ashanti and Brong Ahafo regions as the focal points.

## 2. Methodology

### 2.1 Survey

To effectively obtain baseline information on the current methods and postharvest problems associated with tomato production, a survey was conducted in some major tomato growing areas within the Ashanti and Brong-Ahafo regions. In all ninety-six farmers were interviewed.

### 2.2 Questionnaire Design

A questionnaire was designed for the farmers. Some of the parameters considered in the design included the sex, age, educational background, size of farm, method of farming, time of harvesting, varieties cultivated, postharvest problems and mode of marketing (Casley and Lury, 1981).

### 2.3 Sampling Area

The study was carried out using selected tomato growing centres in Ashanti and Brong-Ahafo regions. In the Ashanti region, the selected centres were Kumawu, Agogo, Abodom and Abenkyim. In the Brong-Ahafo region, the selected centres were Techimantia and Derma.

### 2.4 Questionnaire Administration

The designed questionnaire was first pre-tested in the East Amansie District at Abodom and Abenkyim. Data obtained were analyzed and based on the results modifications were made to the questionnaire. The modified questionnaire was then administered to farmers in the selected centres.

### 2.5 Statistical Analysis

Statistical analysis (Chi-square test of independence) was carried out on the data obtained from the survey using the StatPac Gold Statistical Analysis Package.

## 3. Results and Discussion

The results of the study is shown in Table 1. Tomato is predominantly cultivated by males (86.5%) with females forming a small percentage (13.5%). This trend may be attributed to the labour-intensive nature of tomato cultivation. The high male percentage is also due to the fact that in most of these communities the most economically viable venture opened to the male youth is farming, specifically tomato farming.

Those actively involved in tomato production are within the age bracket of 21-40 years, specifically the youth. This is reflected in the educational status of most of the respondents. More than 50% of the farmers had either completed Middle School (Standard four) or Junior Secondary School (J.S.S.) with 30% making it to the primary school level.

The land tenure system being operated in most of the tomato producing areas is that of rented plots. Most of the farming activities are carried out on rented plots (about 77%). Only 22% of the farmers cultivate on their own plots. Some of the reasons for the high farming activity on rented plots may be due to land ownership being in the hands of few indigenous inhabitants and families. Many of the farmers were also migrant farmers and there was also the habit of not farming at the same area for quite a long time.

The cropping pattern is that of crop rotation (77%) followed by bush fallowing with a few practising continuous cropping. The trend in

cropping pattern is due to some of the following reasons, source of finance for continuous culti-

vation, the land tenure system and the maintenance of soil fertility.

**Table 1. Results of survey**

| Parameter                   | No. of Respondents | Percent Respondent |
|-----------------------------|--------------------|--------------------|
| <b>Sex</b>                  |                    |                    |
| Male                        | 83                 | 86.5               |
| Female                      | 13                 | 13.5               |
| <b>Age</b>                  |                    |                    |
| 11-20                       | 3                  | 3                  |
| 21-30                       | 35                 | 36.5               |
| 31-40                       | 22                 | 23                 |
| 41-50                       | 12                 | 12.5               |
| 51-60                       | 2                  | 2                  |
| No Response                 | 22                 | 23                 |
| <b>Educational Status</b>   |                    |                    |
| Illiterate                  | 5                  | 5                  |
| Primary                     | 29                 | 30                 |
| MSLC/JSS                    | 49                 | 51                 |
| Secondary                   | 13                 | 13.5               |
| Post-Sec.                   | 0                  | 0                  |
| <b>Cropping Pattern</b>     |                    |                    |
| Crop Rotation               | 75                 | 77                 |
| Bush Fallow                 | 20                 | 21                 |
| Continuous                  | 8                  | 8                  |
| Other                       | 0                  | 0                  |
| <b>Cropping Times/Year</b>  |                    |                    |
| Once                        | 8                  | 8                  |
| Twice                       | 20                 | 21                 |
| Thrice                      | 59                 | 61.5               |
| Four                        | 9                  | 9                  |
| > Four                      | 0                  | 0                  |
| <b>Varieties Cultivated</b> |                    |                    |
| Power                       | 75                 | 63                 |
| Rano                        | 18                 | 15                 |
| Italy                       | 17                 | 14                 |
| Rasta                       | 4                  | 3                  |
| Caterpillar                 | 2                  | 1.7                |
| Others                      | 3                  | 2.4                |

Table 1. (Cont'd.)

| Parameter                       | No. of Respondents | Percent Rsepondents |
|---------------------------------|--------------------|---------------------|
| <b>Farm Size (Acres)</b>        |                    |                     |
| 0 - 2                           | 61                 | 63.5                |
| 2 - 4                           | 22                 | 23                  |
| 4 - 6                           | 9                  | 9.4                 |
| > 6                             | 4                  | 4.1                 |
| <b>Land Tenure System</b>       |                    |                     |
| Rented plots                    | 74                 | 77                  |
| Own plots                       | 21                 | 22                  |
| Family plots                    | 1                  | 1                   |
| <b>Agrochemical Application</b> |                    |                     |
| Increase in Yield               | 30                 | 31                  |
| Control of Weeds                | 0                  | 0                   |
| Disease Control                 | 17                 | 18                  |
| Others                          | 49                 | 51                  |
| <b>Time of Harvesting</b>       |                    |                     |
| Morning                         | 66                 | 69                  |
| Afternoon                       | 6                  | 6                   |
| Evening                         | 0                  | 0                   |
| Other                           | 24                 | 25                  |
| <b>On-Farm Storage</b>          |                    |                     |
| Yes                             | 3                  | 3                   |
| No                              | 90                 | 94                  |
| No Response                     | 3                  | 3                   |
| <b>Mode of Packaging</b>        |                    |                     |
| Basket                          | 0                  | 0                   |
| Boxes                           | 95                 | 99                  |
| Metal Containers                | 0                  | 0                   |
| No Response                     | 1                  | 1                   |

Most farmers cultivate tomatoes three times in a year (61.5%). However, about 21% of farmers surveyed cultivate it twice in a year with only 8% cultivating it once in the cropping season. The period or times of cultivation is greatly influenced by the availability of water and price fluctuations. Several varieties of tomatoes are cultivated by the farmers but the predominant variety is the 'Power' which forms about 63% of

the total varieties cultivated per season. This is followed by Rano (18%) and then Italy (17%). The Power variety is most preferred due to its firm texture thus, its ability to have a longer shelf life and also stand the stress of handling. Some farmers alternate the varieties such as Caterpillar with Power or Rano and Italy with Power.

The results of the study also showed that, different kinds of agrochemicals are used in the

cultivation of tomatoes. These ranged from the conventional fertilizers comprising mainly NPK 15:15:15, NPK 20:20:20, Sulphate of Ammonia and Urea to other chemicals such as Samppi, Uden, Karate, Dithane, Topsin, Champion, etc. The conventional fertilizers are used during the early stages of transplanting in the form of granules and in solution whilst the pesticides are used throughout cultivation. Frequency of fertilizer application is on the average twice but this varies from farmer to farmer. There are several reasons for agrochemical application. These inputs are used to help increase yield and to control diseases and insects but in most cases not with the intent to control weeds. On the whole, there is the blatant abuse of agrochemicals by most of these farmers.

Most of the farmers (69%) harvest their tomatoes in the mornings. This is due to the arrival of the buyers in the night or at dawn for purchasing. Postharvest storage activities by the farmers is very minimal. Virtually none of the farmers carry out on-farm storage of tomatoes after harvesting. Quite apart from this, no form of storage type is also practised prior to sales. The type of storage carried out by the farmers can best be described as packaging which occurs during the harvesting period. Packaging is predominantly carried out in wooden crates (boxes) (about 99%) and this is usually preceded by sorting to remove damaged fruits. About 98% of the farmers carry out this practice during packaging. As to problems of postharvest linked to tomato production, less than 50% of the farmers felt that they have postharvest problems and these were mainly linked to fruit handling. Even though, postharvest storage was sometimes a concern, their main problem was having avenues or permanent markets to sell off their produce and the stabilization of market prices especially during the period of glut. This ascertainment is reflected by the proportion of farmers (about 50%) who responded that they have no postharvest problems. These responses may be due to the handling practices carried out by the farmers whereby they only harvest when the buyers arrive. However, the call for permanent purchasing outlets for tomatoes and the stabilization of the unit price for a box (or crate) of tomatoes is an issue of great importance to the farmers.

Statistical analysis of the data obtained from the survey shows that the cropping pattern and educational status of the farmers are significantly ( $P < 0.01$ ) affected by age of the farmer. There is also a highly significant ( $P < 0.01$ ) link between the mode of sales and experience in farming. Farm size is significantly ( $P < 0.05$ ) affected by sex and this (i.e. farm size) also significantly ( $P < 0.05$ ) affects the cropping times and chemical inputs. The results also showed that the extent of harvesting problems is significantly ( $P < 0.05$ ) dependent on the farm size.

#### 4. Conclusion

The results obtained from this study showed that the main concern of the farmers is the ability to dispose off their harvest. The interest is not mainly on processing or storage even though an appropriate and simple methodology would be appreciated especially in situations where there are no buyers for the produce. Thus, there is the need to take a significant look at the distribution system for tomatoes since it would have a major impact on the postharvest problems of the tomato industry. Any postharvest technique directed at fresh tomato storage must be targeted at the variety or varieties that are commonly cultivated.

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#### References

- Casley, D. J. and Lury, D. A. (1981). *Data collection in Developing Countries*. Oxford Univ. Press, N. Y.
- Crops Research Institute (CRI). (1994). *Training and Communication Unit (Fax-Sheet)*.
- Goose, P. G. D. and Binsted, R. (1964). *Tomato paste, puree, juice and powder*. Food Trade Press Ltd. London.
- Willis, R. H. H., Lee, T. H., Graham, W. B., McGlasson, W. B. and Hall, E. G. (1981). *Post-harvest: An introduction to physiology and handling of fruit and vegetables*. Granada. London.