Tomato production in four major tomato-growing districts in Ghana: Farming practices and production constraints

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ABSTRACT

The cultivation of tomatoes is a major farming activity in the savanna and forest-savanna transitional zones in Ghana. This paper investigates the current production practices and constraints in four major production areas in Ghana. Average yields are very low, ranging from 6 to18 t/ha. The average area of production per farmer is less than 2.0 ha per year. A wide range of varieties, mainly of foreign origin, are grown and producers seldom acquire seed from approved seed sources. Factors contributing to the low yields are poor adaptation of most of the introduced varieties, poor seed delivery system, sub-optimal application of irrigation water when necessary, sub-optimal and/or untimely application of inputs such as fertilizers, and inadequate control of pests and diseases. High cost of production, coupled with difficulty in obtaining credit, are some of the factors that limit the scale and efficiency of production. Overall level of production could be increased through the following measures: removal of genetic limitations through provision of good quality seed, rationalizing the seed delivery system, a rewarding fresh produce pricing structure, and improving access to credit.

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RÉSUMÉ

ADU-DAPAAH, H. K. & OPPONG-KONADU, E. Y.: *La production de tomate en quatre zones majeures de tomate au Ghana: Les pratiques de la culture et les contraintes de production.* La culture des tomates est une activité dans les zones de savane et de la transition forêt-savane au Ghana. Cet article fait une enquête sur les pratiques de production courantes et les contraintes en quatre zones majeures de production au Ghana. Les rendements moyens sont très bas, variant de 6-18 t/ha. Le champ moyen de production par cultivateur est moins que 2.0 hectare par an. Un grand choix de variétés surtout d'origine étrangère, sont cultivées et les producteurs achètent rarement les graines des sources de graine approuvées. Les facteurs contribuant aux rendements bas sont la pauvre adaptation de la plupart de variétés introduites, la pauvre système de livraison de graine, l'application sous-optimale d'eau d'irrigation quand il est nécessaire, l'application sous-optimale et/ou inopportune de facteurs d'intrants tels que les engrais chimiques et le contrôle insuffisant d'insectes ravageurs et les maladies. Le coût élevé de la production, ajouté à la difficulté d'obtenir les lignes de crédit sont les quelques facteurs limitant l'échelle et l'efficacité de la production. L'ensemble de niveau de production pourrait être augmenté par les mesures suivantes: enlévement de limitations génétiques par la fourniture de bonne graine de qualité, la rationalisation du système de livraison de graine, une structure des prix rémunératrices de produit frais et l'amélioration d'accès aux lignes de crédit.

Introduction

Tomato (*Lycopersicon esculentum* Mill.) is an important vegetable crop in most parts of the world. In Ghana, it is almost an indispensable ingredient in the daily diets of people across all regions. It is used in preparing a wide variety of cuisines such as soups, sauces, and other dishes. Compared to other vegetables used in Ghana, tomato is normally used in large quantities (Ellis *et al.*, 1998). The crop is grown for fresh market and for processing. However, in most West African countries, it is produced mainly for domestic consumption (Norman, 1992). Tomato provides good nutritional balance to farm families as well as boosts their income and hence standard of living.

Tomato production is a flourishing farming activity in the savanna and forest-savanna transitional belt of Ghana. In spite of the role it plays in the financial and nutritional well being of most farm families, production of the crop has not been encouraging over the years. The present total land area under cultivation is unknown, but about 16,000 ha of Ghana's arable land was under tomato cultivation in 1995 (PPMED, 1996). The over 25,000 ha of land which was cultivated in 1972 was the highest ever recorded and the lowest was in the mid 1980s (Fig.1). Data for the Policy Planning, Monitoring and Evaluation Division (PPMED, 1997) of the Ministry of Food and Agriculture (MOFA) indicate that the highest ever annual production was recorded in 1995 (213,000 mt), and the lowest was recorded in 1997 (35,800 mt). The overall annual production seldom reaches 90,000 mt). The current production level is inadequate for the nation.

Production is confined to only a few months of the year (mainly done under rain-fed conditions), resulting in a glut and low producer prices. This is followed by shortage and rise in price of the fresh produce, especially during the dry/minor season. Scarcity and high cost of fresh tomatoes were major constraints, accounting among other things, for the unprofitable running of the factories (Apte *et al.*, 1969). As a consequence, processed tomato products continue to be imported into the country annually. For instance, in 1994, 1995 and 1996, Ghana imported 2,873.4, 3,283.2 and 6,177.8 metric tonnes, respectively, of tomato paste (Ministry of Trade, 1996).

It is important that the actual causes of low (decline) and/or inconsistency in production are uncovered for different agro-ecological zones. This information will provide the basis for the planning of research programmes, and thus help researchers and policy makers to address relevant farmer needs in different production zones.

The purpose of the study was to investigate

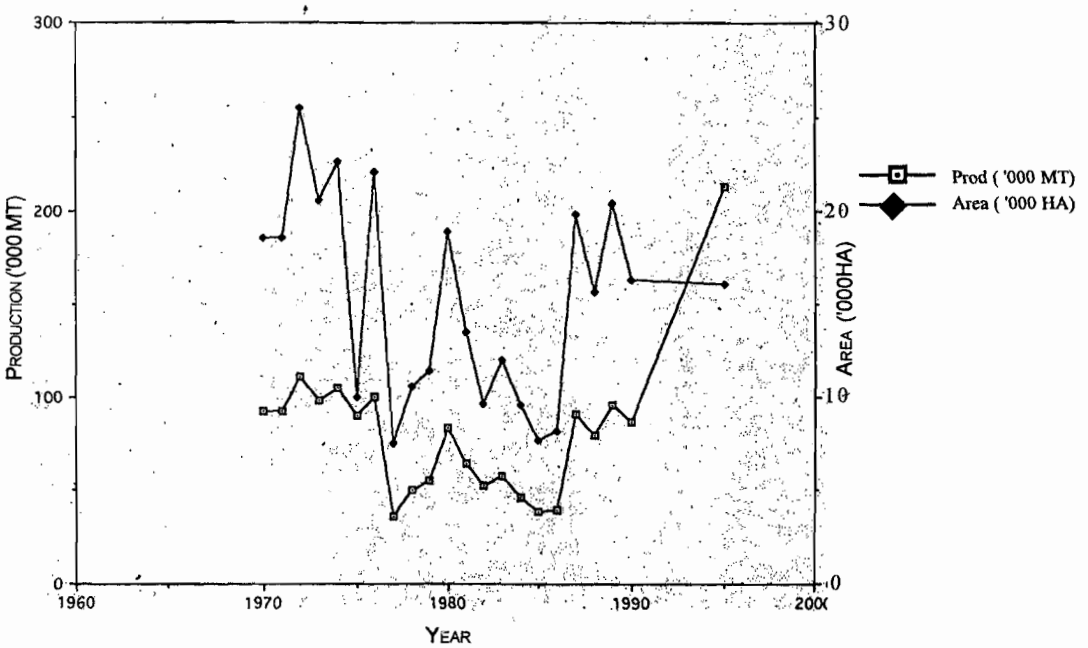

Fig. 1. Tomato production and area estimates in Ghana from 1970-1996.
Source: PPMED (Statistics Division), Ministry of Food and Agriculture (MOFA).

the current farming practices in the Ashanti and Brong Ahafo Regions of Ghana, and in particular, to identify the limitations to increased production from the crop, and the factors that influence farm decision making.

Materials and methods

The tomato-growing locations chosen for the study are in the northern part of the Offinso District in the Ashanti Region, and the Techiman, Nkoranza, and Wenchi Districts in the Brong Ahafo Region (Fig. 2). The specific locations within these districts are Akumadan and Afrancho in the Offinso District; Tanoso and Tuobodom in the Techiman District; Kranka, Baafi, Fiema, Senya, Asempaneye, Akumsa Dumase, and Nkoranza in the Nkoranza District; and Subingya Awisa, Ofuman, Nwoase, Ayeasu, and Atrensu in the Wenchi District. Of these locations, Akumadan, Tanoso and Subingya have irrigation facilities installed by the Irrigation Development Authority of the Government of Ghana. All the sites lie within latitudes 7° and 8° N and longitudes 1° 30' and 2° 30' W (Fig. 3). These regions/locations were chosen because they are important production regions in Ghana (Norman, 1992). PPMED (1997) record indicates that the two regions together contribute 43 per cent of the total tomato produced in the country.

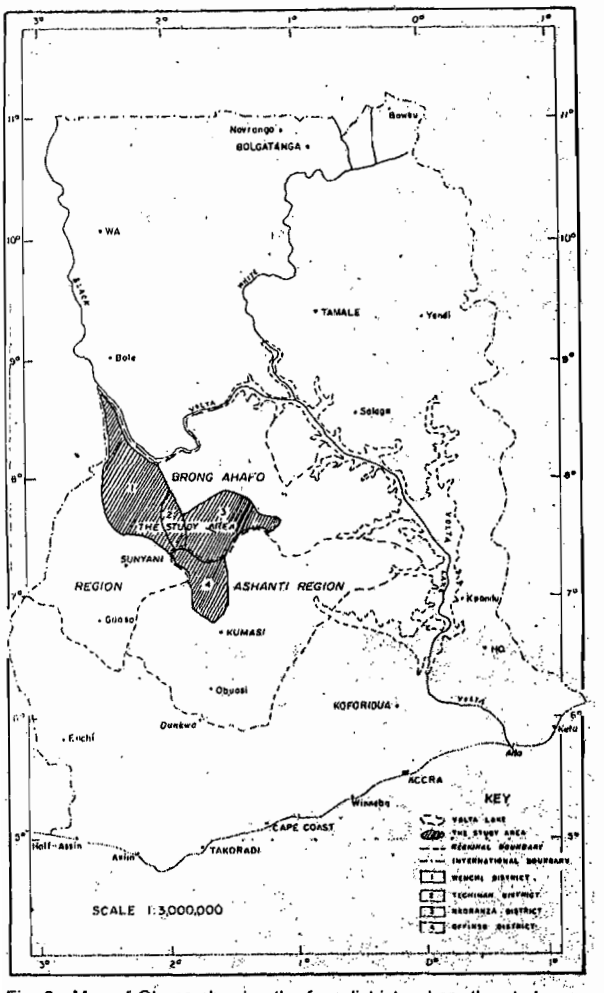

Fig. 2. Map of Ghana showing the four districts where the study was conducted in the Ashanti and Brong Ahafo Regions.

Each of the locations in the study was visited on two occasions in May and June, 1997. The first visit was a reconnaissance one to identify tomato growers in the locations, and to locate a reliable contact person who could organize all the known tomato growers in the area for a formal discussion. On the second visit to each site, all the tomato growers were met and interviewed. Groups of 50 farmers per group were formed and semi-structured questionnaires were administered to gather information on farming practices, cost of production, factors that influence their decision making, and to identify constraints to production. Individuals in a group in each site were allowed to give their opinions or answers to the questions raised, and the groups' general consensus on each issue was noted.

Soil and water samples were collected from farmers' fields and irrigation/dam sites (where available). Laboratory analyses were carried out in collaboration with the Soil Research Institute (SRI) of Ghana. The physical and chemical properties of the samples were determined. In addition, information on climatic conditions in each of the locations

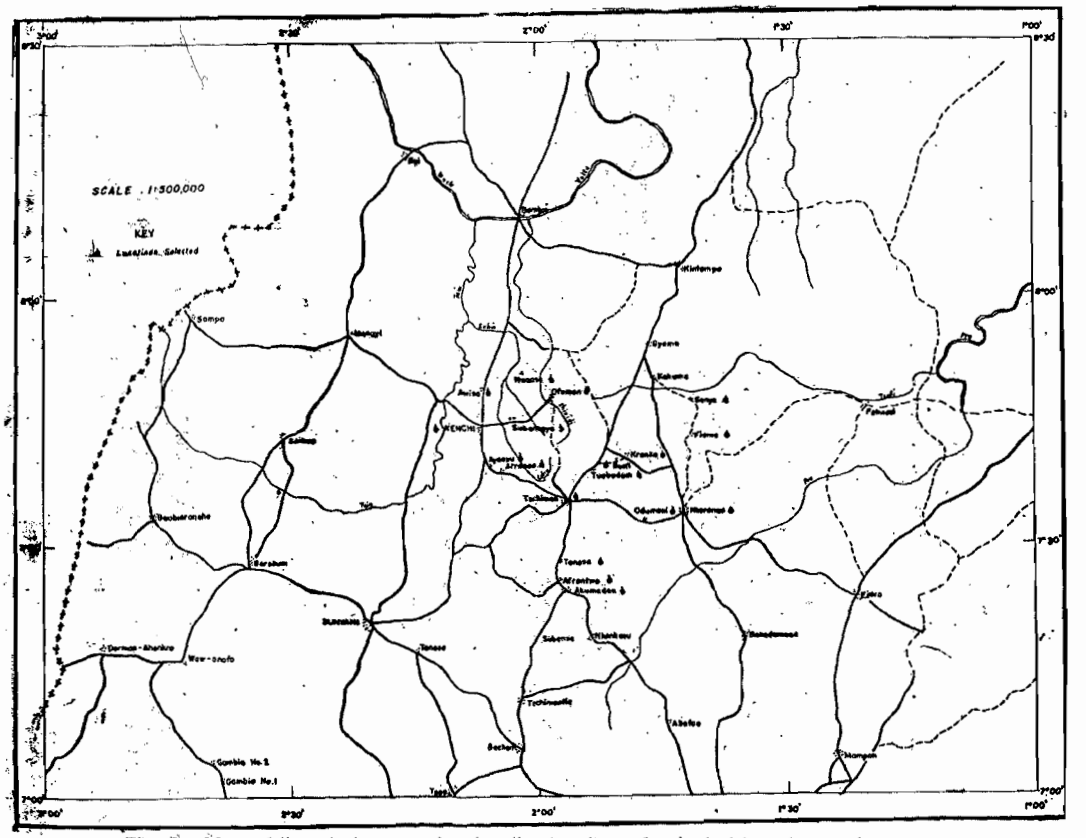

Fig. 3. Map of the study area showing the location of selected tomato-growing areas.

(temperature, rainfall, relative humidity, hours of sunshine per day), where available, were collected. Results of these analyses are presented elsewhere (Oppong-Konadu, Adu-Dapaah & Tetteh, in press).

Results and discussion

Interaction with farmers in each of the locations in the study showed that they adhered to some farming practices most of which were common across all locations. However, a few local differences in farm management were also noticed. The observations made are detailed in the following sections of this study.

Present farm practices of farmers

All farmers (100 per cent) in all the locations had a fairly good knowledge of the appropriate agronomic practices such as planting in rows, staking, fertilizer application, spraying of chemicals (fungicides and insecticides), and timely weed control, specific to tomato production. Farmers adhered to these agronomic practices most of which were acquired from colleagues and/or from several years of experience in tomato growing or from agricultural extension officers in the locality. However, there were variations in the way this knowledge was translated into actual farm practice. Growers indicated that the ability to adhere to good farm management practices was very much influenced by a variety of factors, the most prominent of them being financial constraints. It was shown that the application of wrong or inappropriate farm management practice, such as non-adherence to fertilizer recommendations, was not due to the ignorance of farmers but to financial

constraints. This severely limits the sale and efficiency of their activities.

Constraints to production

The constraints to increased tomato production were similar across all the locations under study. These constraints are discussed below:

1. *Farm finance.* Across all locations, about 97 per cent of the farmers indicated that financing farm operations was a major constraint to production. Most of the farmers were resource-poor and found it difficult to finance their farming operations from their own personal resources alone. Farmers were unable to obtain credit from financial institutions mainly because of lack of the requisite collateral security to buttress credit application.
2. *Seeds for planting.* About 85 per cent of farmers interviewed indicated that there were no locally developed improved seed for planting. They, therefore, had to rely on so-called imported seed that were obtained from the markets and small corner shops, from their own selections from previous crops, and from exchanges between farmers. Most of these seeds were of low viability and germinability, since they were not selected by testing.
3. *Irrigation facilities for dry season tomato cultivation.* Dry season tomato production is a problem for most farmers across all locations. Only 20 per cent of farmers who answered the questionnaire indicated that they had their own irrigation facility. All the locations studied have bi-modal rainfall pattern; the major rains occur from Mar/Apr to Jun/Jul, and the minor starts in September and ends in Oct/Nov. The pattern of rainfall gives rise to two main cropping seasons: the major cropping season which begins in mid-March to April and the minor season which is July to September. The period ranging from November to February is classified as the dry season, and rainfall during this period is generally low. Cropping in the dry season, therefore, implies that water must be supplied through irrigation. Occasional dry spell, even during the rainy season, also does occur, creating the need for irrigation. Most farmers (80 per cent) do not have their own irrigation facilities, and if they have, the cost of irrigation is considerably high. This problem, therefore, prevents most farmers from farming and/or compels others either to rent irrigation facilities at a higher cost, or to move to rent pieces of land close to rivers, thereby increasing cost of production.
4. *Marketing of produce.* Farmers were of the view that poor prices were often offered for their produce. Across all locations, about 80 per cent of farmers indicated that the non-existence of guaranteed market and pricing system for the fresh tomato produce was a major disincentive to production.
5. *Cost of production.* Sixty-seven per cent of farmers indicated that the cost of production was too high. This resulted from high cost of inputs such as fertilizer, agro-chemicals (fungicides and insectides), labour, and cost of irrigation, if available.
6. *Land preparation.* Fifty-five per cent of farmers named unavailability of tractors to plough fields at the right time as a constraint to production. The unavailability of tractors to mechanize land preparation creates increased need and competition for human labour for land clearing/preparation and, consequently, increases labour cost.
7. *Diseases, pests and problems with weed control.* About 45 percent of farmers opined that these were the major field problems. They indicated that these would not have been major concerns if there were no problems with production finance.
8. *Land tenure or land acquisition problems.* Fifty-seven per cent of farmers thought that acquisition of land suitable for tomato cultivation was a major concern. Farmers who do not own pieces of land, especially migrant farmers, pay various sums of money for land rental. The acquisition of land presents a problem also for farmers who crop during the

dry season. Most of these farmers usually prefer land close to a perennial source of water such as a stream, to permit the use of their irrigation pumps, if they have, or to embark on manual watering by using watering cans and buckets.

These constraints not only significantly reduced the average yield per unit area, but also the total area of land that could potentially be cropped to tomatoes. These constraints to production may account for the generally low and inconsistent level of production observed in the country since 1970 (Fig. 1).

Average area of cultivation/number of successive plantings in a year

Table 1 indicates the average area of cultivation per farmer. The low average area of cultivation observed in the study was mainly because more than 80 per cent of the farmers were resource-poor and were unable to afford to finance large acres of land. With the exception of Tuobodom, where the average area of production per farmer was 4.0 ha per year, the average area of cultivation for each farmer was less than 2.0 ha per year. The average area of cultivation ranged from as low as 0.8 ha for Tanoso to a maximum of 1.7 ha for Nkoranza and Awisa (Table 1).

Tomato was successively planted from as low as once a year to six times a year across all locations. This was made possible with supplemental irrigation for dry season cropping. A typical successive planting was Jan/Feb, Feb/Mar, May/Jun, Aug/Sep, and Nov/Dec. This successive planting reflects typical times of planting, and since most of the cultivars grown mature about 90 days from transplanting, harvested tomatoes are usually available from

TABLE 1

Average Area of Cultivation, Yield and Number of Successive Plantings/Year and Cost of Production in Seventeen Locations

Location	*No. of farmers*	*Area of cultivation/year*	*Yield (t/ha)*	*No. of successive plantings/year*	*Cost of production/ha (cedis)*
Akumadan (AK)	760(15)	1.0	16	5	2,156,200
Tanoso (TA)	180(4)*	0.8	14	6	1,967,200
Wenchi (WE)	61(1)	1.4	7.8	3	1,912,700
Atrensu (AT)	20(1)	1.4	7.8	3	1,912,700
Ayeasu (AY)	30(1)	1.5	7.5	3	1,912,700
Nwoase (NW)	61(1)	1.7	7.0	3	1,912,700
Awisa (AW)	613(12)	2.0	8.0	1	1,912,700
Ofuman (OF)	156(3)	1.0	12	3	1,878,000
Afrancho (AF)	181(4)	4.0	6.0	5	2,156,200
Tuobodom (TU)	100(2)	1.0	16	4	2,157,200
Kranka (KR)	200(4)	1.0	18	4	2,011,200
Baafi (BA)	86(2)	1.7	14	4	2,011,200
Nkoranza (NK)	236(5)	1.6	11.1	4	2,017,400
Akumsa Dumase (AD)	23(1)	1.5	11.0	4	2,017,400
Asempaneye (AS)	32(1)	1.0	11.0	4	2,017,400
Senya (SE)	117(3)	1.0	16.4	3	2,011,200
Fiema (FI)	116(3)		15.0	3	2,011,200

Source: Survey data

Cedis = Ghanaian unit of currency

* Figures in parenthesis indicate number of groups of about 50 farmers formed in each location.

these areas around Apr/May, May/Jun, Aug/Sep, Nov/Dec, and Feb/Mar, respectively. Although it appears fresh tomatoes are available all year round, the quantities on the market vary considerably with the area of land that is actually cultivated, particularly during the dry period, i.e. November to February, and this is a major determinant of whether there is glut or scarcity.

Average yields/ha

Yields in the areas studied averaged less than 20 t/ha across all locations. The highest average yield of about 18 t/ha was recorded for Kranka, and the lowest (6 t/ha) at Afrancho (Table 1). The yields are consistent with the findings that tomato yields in Ghana are very low and among the lowest in Africa (FAO, 1995). The average yields in 1974 ranged from 7.5 to 15 t/ha (Norman, 1992). PPMED (1997) recorded 13.2 t/ha in 1995. The yield data recorded in the areas under study were subjected to analysis of variance to determine whether there were significant differences between locations. The 17 different locations were used as replications, and the yield of five groups selected at random from each location was used as treatments. In locations where there were less than five groups, the yield of five farmers selected at random was used.

Results of the analysis indicated that location differences were highly significant ($P<0.01$) (Table 2), while farmer and/or group was significant only at $P<0.05$ level. Whilst the latter could be attributed to Type 1 Errors, high differences between locations seem real, as shown by mean comparisons by the Tukey's ω procedure (Steel & Torrie, 1980). The yield of a crop plant is the result of the interaction between the plant genotype and the environment in which it is grown. The yield of tomato in particular depends on several factors, including the variety planted,

TABLE 2

Analysis of Variance of Yield Across Locations

Source of variation	*Df*	*MS*	*F*
Location	16	64.95	13.55**
Treatment	4	10.65	2.12*
Error	64	4.79	
Total	84		

CV (%) = 18.88

Tukey's ω procedure for comparison between location sample mean yields across locations

Loc.	AF	AY	AT	WE	NW	AW	AS	AD	NK	OF	BA	TA	FI	KR	SE	AK	TU
Yield	6.1	7.4	7.5	7.9	8.0	8.4	10.2	10.6	10.7	12.8	14.0	14.3	15.3	15.4	16.0	16.1	16.0

Location sample means underscored by the same line are not significantly different. Location names are represented by the first two letters as indicated in Table 1.

Where means are compared at ω (1) (0.01) using the formula:

$(\omega) = q\alpha(p,f_e)\, S_{\bar{y}}$

where

$q\alpha$ = tabular value of q with p number of treatments (obtained from tables)

p = the number of treatments within each location

f_e = error degrees of freedom (df), and

$S_{\bar{y}}$ = standard error of a treatment mean

spacing, cultural practices, i.e. pruning, staking, date of planting, soil fertility status, especially amount of organic matter, soil moisture, general weather conditions, and the vegetation zone. For high tomato yields, strict attention to agronomic details and elimination of most of the constraints to production are essential. The very low yields in the areas under study may be due to a variety of factors, the most important of them being the use of poor quality seed, unimproved varieties, poor cultural practices in the nursery and on the field, and low soil fertility status.

The very low yields recorded on farmers' fields do not imply that the tomato crop is unsuitable for cultivation in Ghana. Norman (1974) showed that yields could be over 32.5 to 46 t/ha in the forest zone of the country. With the use of improved cultivars, good horticultural and soil management practices, and easy access to funds, substantially higher yields could be recorded.

Varieties grown

The farmer grew a wide range of varieties of tomato that were mainly open-pollinated and were of foreign origin. The most popular varieties grown by all farmers in all the locations were "Laurano 70", "Racci", "Zaussi", "Power-Laurano", and "Power rasta". It was also a common feature to find a mixture of two or more varieties in one growing field. However, the most preferred varieties were "Laurano" for the dry/ minor season planting, and a mixture of "Power" and "Power-Laurano" for the major season crop. They indicated that "Laurano" was preferred in the minor season because it was relatively higher yielding under the harsh conditions of the dry spell, and may be somewhat more drought tolerant than the other types. Table 3 shows the varieties grown and preference for varieties in the two main growing seasons.

The variety grown is a major contributory factor for a lot of losses on most tomato farms. Since most of the varieties are of foreign or unknown origin, they need to be evaluated for adaptation to the local environment before farmers adopt them. The use of such untested tomato introductions often places genetic and/or environmental limitations on yield, due to poor adaptation to the local environment or stresses such as high temperatures, drought, diseases, and pests.

Source of seed supply

It was observed that farmers seldom bought seed from an approved seed source. Over 95 per cent of farmers used seeds mainly from their own selections from their previous crop and also exchanges between themselves. As a result of this practice, and because of the lack of quality controls in this seed trade, tomato fruits harvested from their fields were a mixture of different types in fruit shapes, sizes, and other fruit characteristics. Although seed for planting was readily available in all the locations, these seeds were of no reliable quality. Seeds purchased from unapproved seed traders and/or from other sources had no indication of percent viability, and farmers did not perform germination tests before nursing. Consequently, a lot of seed is wasted at the nursery stage. Many seeds have to be nursed to ensure that enough seedlings are raised for transplanting. This results in overcrowding on seedbeds with concomitant adverse effects on seedling vigour (Tigchelaar, 1986).

TABLE 3

Varieties Grown and Farmers Preferences

Variety grown	*Number of farmers in the seasons*	
	Major	*Minor*
Laurano "70"	24	35
Racci	7	5
Zaussi	3	2
Power reno	33	15
Power rasta	18	20
Mixture of varieties	9	11
Variety grown unknown	6	2

Selection of seed by farmers themselves and exchange of seed among farmers represent another cause of low yields. The few farmers who indicated that they sometimes bought seed from accredited seed merchants were unaware that some of the seeds were hybrids that could segregate after the first cycle of cropping. Re-use of the progeny of the seed material therefore caused low yields. The seed supply system is haphazard because the vegetable seed delivery system in general, and tomato in particular, is not well developed in Ghana. For a very long time, virtually no tomato variety has been developed in Ghana. Tomatoes grown in the country are, therefore, predominantly introductions, mostly from Europe, by approved and unapproved private seed merchants. There are only few of such approved seed merchants in the country, and their seed shops are located in the cities, regional, and district capitals. Farmers in the areas of study, therefore, did not have easy access to these approved sources of seed, even if they were prepared to buy.

Market considerations versus variety planted

There is a considerable interplay between market forces and tomato production. The choice of varieties for planting is a market-driven decision. Farmers plant any variety so far as there is a market for the fresh produce. Planning production in terms of choice of variety is, thus, done with the consent of the merchants who buy the farm produce. Market preference is for varieties that produce tough, non-cracking fruits, and with a higher flesh to seed ratio. For these reasons, producers no longer or rarely plant local varieties/ landraces like "Wosowoso" and "improved Zuarungu", which used to be popular varieties, because the market selected against them. Local varieties/landraces have rough fruit shapes, highly variable sizes, watery consistency, and are very prone to mechanical damage during transit and to post-harvest infestation with diseases.

Apte *et al.* (1969) indicated that locally grown tomatoes had corrugated surface, hard core, many seeds, low total soluble solids, and pale orange-red coloured pulp, making them unsuitable for processing. The Ghanaian domestic and the West African markets also preferred fruits that had more flesh than seeds, had firm, less watery consistency, and were very high in sugar with the colour being reasonably red for all culinary purposes. For these reasons, and for ease of marketing the final produce, farmers preferred to grow imported cultivars to the local, unimproved types. This has implications for germplasm conservation and breeding.

The diversity of genetic material, especially wild species and landraces, has been used extensively to develop improved tomato cultivars for commercial planting (Kalloo, 1993). For instance, wild spices such as *L. pimpinellifolium, L. hirsutum, L. chilense,* and *L. pennellii* provide abundant genetic resources for disease, pest and drought resistance breeding (Rana & Kalloo, 1950; Majero, Ng & Barksdale, 1990; Farrar & Kennedy, 1991; Lukyanenko, 1991). Field trials involving local and exotic varieties have indicated that local tomato landraces are more resistant or tolerant to virus disease, and are more adapted to the local environment than introduced varieties (Oppong-Konadu, Adu-Dapaah & Tetteh, unpublished). Selection against local landraces, therefore, means that several valuable sources of genes for genetic improvement could be lost.

Disease and pest problems and their control

Disease and pest attacks are some of the major constraints to increased productivity in all the locations. Foliar diseases and soil-borne pathogens are the most economically important. The most prevalent diseases are damping off (*Pythium* spp.) at the nursery stage, blight (*Xanthomonas compestris pv. vesicatoria*), fusarium wilt (*Fusarium oxysporum f. sp. Lycopersici*), mosaic (tomato mosaic virus), leaf curl (tomato yellow leaf curl virus (TYLCV), bunchy top virus disease, nematode attacks, and fruit blossom end rot (*Alternaria alternata*). They are controlled by periodic spraying with fungicides such as Dithane M45, Topsin, Kocide, and

insecticides/nematicides. The most popular insecticide used is Karate. These chemicals are very expensive and the prices keep rising, making the cost of chemical control expensive.

Spraying is done several times in the growing season, depending on severity of infection. In the major season, when the atmospheric humidity is normally high, diseases become more prevalent and are controlled more frequently at shorter intervals than in the minor season. Also, when a contact chemical was used for spraying, it lost most of its potency when it rained shortly after application. In the major season, therefore, as many as 12 sprays/season was possible.

Farmers in the different locations preferred different sprayers for use in disease and pest control. On the average, about 80 per cent of farmers preferred the mist blower machine for spraying, because they claimed it was more efficient than the knapsack spraying machine. They further indicated that the mist blower was better if a large area of land was to be sprayed within a short period of time. On the other hand, they indicated that the knapsack sprayer was slow and could be a health hazard if used over a long period of time. All of the farmers also indicated that they did not use protective clothing during spraying or while performing other general farm operations because they did not have them. These protective clothing were either not readily available on the local markets, or were expensive and beyond their financial reach, and would add to the cost of production. They indicated that they were ready to use them once they were provided at no cost.

Cost of production

Production cost was fairy variable among locations considered in the study (Table 1). This was primarily because labour cost differed from area to area. The locations had different weed problems, hence initial land clearing costs were different; the cost of land clearing/preparation in areas where elephant grass was prevalent was higher. Other factors that caused variation in cost of production across locations were nearness to a market center where agro-chemicals could be purchased and irrigation costs. A lot of the farm costs were absorbed by the farmers themselves through their own efforts (and often in combination with assistance from their families, friends, and relatives) in performing some of the farm operations. Thus, another way of financing their farming operations was through the use of their own labour whenever this was possible.

The operations involved in tomato production are many and varied, and require complete dedication and strict adherence to good farm management practices. Most of these practices are labour intensive, thereby making cost of production high. Farmers' inability to meet this high cost of production invariably leads to situations where either they do not adhere to approved agronomic practices, or they apply inadequate quantities of farm inputs such as fertilizers and/or other agro-chemicals. There are instances where the appropriate management practice is not carried out or is applied at an inappropriate time, thereby reducing the efficacy of the treatment. This is, therefore, one of the main reasons for the low productivity observed.

Financing production

Tomato growers in the locations studied indicated that production finance was one of the most important limitations to increased production and/or efficiency in production. Farmers found it difficult to obtain credit for their farming activities. Most of the farmers were resource-poor and often found it difficult to obtain credit from the nation's financial institutions, because of lack of appropriate collateral and documentation usually demanded by these institutions. Furthermore, even when credit was available, interest rates for lending were usually too high. The rates for lending were 34 and 35 per cent for the Agricultural Development Bank and the Social Security Bank, respectively (Bank of Ghana, 1998). Due to the high interest rates, most farmers defaulted in repayment of the loans they were able to secure.

Farmers also hesitated to go for credit because

there was no guaranteed producer price for fresh tomatoes. They could not make a reliable prediction of what the market prices for their produce would be at the time of harvest. Farmers, therefore, relied on their own very limited financial resources and small loans from friends and/or relatives which were sometimes 'soft', but in other cases with very harsh terms. This led to the inadequate, and more often, untimely acquisition of farm inputs which resulted in low productivity.

Conclusion

Tomato production could be a very profitable venture for the areas under study, and for Ghana as a whole, if problems hindering production could be overcome. Production efficiency (yield per unit area) depends on two main factors: the availability of improved varieties that are well adapted to the agro-ecological zones of production, and improved (and timely) access to adequate funding at reasonable interest rates. The elimination of agronomic constraints to production will make local production and processing competitive with imported processed products. Overall level of production may also rise if there is a proper pricing structure for the fresh produce. This may be possible if there are canneries that could buy some of the fresh produce for processing. Currently, there is no functional tomato cannery in the country.

The rejuvenation of canneries and the addition of new ones will be required to process tomato into several products. This will also create more outlets for marketing and help stabilize prices of the fresh produce. Canneries could also provide a guaranteed minimum price for fresh tomato product to serve as an incentive to production. Locally adapted, unimproved varieties stand the risk of being lost from tomato genetic stocks in the country because of market selection against them. Concerted efforts need to be made to protect and conserve these useful genetic resources for future genetic improvement.

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