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ANALYSING THE CONSTRAINTS FACED BY THE SMALL HOLDER TOMATO GROWERS IN GHANA

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ABSTRACT

Tomato yield in Ghana is lower than potential of 15t/ha about 7.5t/ha which is also lower as compared to neighbouring countries like Burkina Faso, 12.5t/ha. This has resulted in importation of fresh tomatoes from neighboring countries, particularly Burkina Faso, a situation which is attributed to a number of constraints in the production and marketing chain. This study was conducted to identify the problems and suggest solutions to ameliorate same. Two hundred and forty (240) farmers in 24 communities in 12 districts, covering 5 agro-zones of Ghana were interviewed. Findings revealed that most farmers (52%) were still relying on their own stored seed for planting and 28% obtained seeds from the local market, accounting for over 80% reliance on informal seed sources. Majority of the farmers (80%) indicated high cost of quality seed and unavailability of good seed of improved varieties, poor access and unreliable market for harvested tomato fruits, pest and disease build up as factors militating tomato production. The study revealed that 45% of farmers had received secondary education and only 17% were illiterates. It also revealed the gender roles in the production and marketing chain. Majority of the farmers (77%) were males and 23% females; aged between 30-39 and 40 years and above (84%). Making available to farmers high quality seeds of improved varieties and subsidizing the cost of basic inputs like fertilizers and agro-chemicals will help minimize these constraints and enhance tomato production.

Keywords: Tomato, production constraints, farmer-saved seeds, smallholder farmers.

INTRODUCTION

Tomato (*Lycopersicon esculentum* Mill.) is a fruity vegetable, which belongs to a large family of plants known as Solanaceae, with the common name, the nightshades (Norman, 1992). Its versatility in fresh or processed form has played a major role in its rapid and widespread adoption as an important food commodity in Ghana (Norman, 1992; Horna *et al.*, 2006). It is a major source of vitamins A and C (Bull, 1989). Moreover, tomato production is a major source of employment and income to both rural and urban dwellers (Asare-Bediako *et al.*, 2007). Ghana Living Standard Survey (1991/1992) indicated that more 830,000 households were engaged in tomato harvesting, especially women. In the national economy, tomato exports in the past has contributed significantly to the foreign exchange portfolio as exemplified by the \$ 437,000 accrued from exports of 4,

368 metric tonnes in 2003 (FAO, 2005). However, the trend over the past decade has been stagnant and in to an extent declining. In value tomato export has been declining from GH. 1.2 million in 2008 to GH. 0.15 million in 2012, while its imports in the same period increased from GH. 50 million to GH. 280 million (ISSODEC, 2004; Asuming-Brempong & Asuming, 2008; Robinson *et al.*, 2010; Elizabeth *et al.*, 2010, SRID-MoFA, 2013). In spite of its extensive cultivation, covering an area of 44,000 ha in 2012, tomato yields are still low, about 7.5t/ha compared to achievable yields of 15t/ha, giving a yield gap of 50%, while neighbouring Burkina Faso is reporting 12.5t/ha (Danquah & Fulton. 2007, Elizabeth *et al.*, 2010, SRID-MoFA, 2013, FAOSTAT, 2013). This has resulted in importation of fresh tomatoes from neighboring countries like Burkina Faso for about half of the year (Horna *et al.*, 2006), a situation attributed to a number of constraints in the production and marketing chain. Consequently, both income levels of smallholder farmers as well as overall foreign exchange earnings have declined. Several studies

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exist with regards to tomato production and their challenges (Ellis *et al.*, 1998; Danquah & Fulton, 2007); Clottey *et al.* (2009). According to Benjamin *et al.* (2013), small scale tomato producers in the Wenchi district face a myriad of production constraints such as lack of capital, high cost of inputs and low price of produce, which limit their ability to increase production. In a similar study, Aidoo *et al.*, (2014); Farida & Fariya (2014) reported lack of storage facilities, high cost of production and limited access to credit as critical constraints faced by tomato farmers. These studies however, were limited in scope and focus; either covering few districts or communities and or relating to post-harvest losses assessment.

The objective of this study was to evaluate the production and marketing challenges that smallholder tomato farmers face, which could have continuously resulted in lower yields. Specifically, the study sought to identify the factors that affect yields of small scale tomato farmers in a wider scope across the various agro-ecological zones of Ghana, with focus on production and marketing.

MATERIALS AND METHODS

A field survey was conducted in tomato-growing areas namely Offinso and Agogo districts in the Forest zone, Ga-West and Dangbe-East in the Coastal savanna zone; Techiman and Akumadan in the Forest-Transition zone; West-Mamprusi and Yendi in the Guinea savanna zone and finally Bolgatanga and Navrongo in the Sudan savanna zone. A standardized structured questionnaire was used to collect data from 240 farmers covering the five agro-ecological zones of Ghana. In each of the selected districts above, a list of communities noted for tomato cultivation were prepared with the assistance of the Agricultural Extension Agents (AEAs). Two communities per district were randomly selected and 10 tomato farmers were selected through a simple random sampling technique for the interview. Thus a total of 24 communities from 12 districts were used for the study. Data were collected using interview schedule and questionnaire. Both tools were pre-tested on 30 farmers in a nearby tomato growing area, after which the necessary corrections and omissions were made. English and local languages based on the educational background of the respondents were

employed in questionnaire administration. Descriptive statistics were used to summarize characteristics of respondents and data presented in frequency distribution tables and charts using Statistical Package for Social Sciences, SPSS version 16.

RESULTS AND DISCUSSION

Distribution of respondents according to their

Educational level: Among the interviewed farmers, 77% were male while only 23% were females. 45% of the tomato farmers had received secondary education, 37% had at least received basic education (primary/junior high school) and only 17% had no formal education (Table 1). Existing literature shows that improved crop production strategies require high levels of expertise from farmers in order to be implemented effectively, and farmer practices have been shown to constrain performance resulting in low productivity (Crosby *et al.*, 2000). Farmers who are better educated are generally more open to innovative ideas and new technologies that promote technical change (Lapar & Ehui, 2003). Thus, tomato farmers in Ghana are more likely to appreciate innovative ideas and technologies for improved productivity when they have access to these innovative technologies.

Distribution of respondents according to their Age:

The study revealed that majority (84%) of farmers were between the ages of 30-39 and 40 and above years. whilst 16% were between the ages of 20-29 years old. Majority of the farmers although youthful, however are ageing. This calls for an urgent campaign to encourage the youth in this sector. That notwithstanding, the youth will be willing only if the needed assistance are made available to them timely. This assistance could be in a form of input supply such as improved seeds, fertilizers, agrochemicals, marketing opportunities (both domestic and export) as well as technical assistance in field management practices. There currently exist a number of youth who are unemployed but educated and would best inclined to adopting new ideas, concepts and technologies which are all critical to changing the way agriculture is perceived and practiced in Ghana.

Table 1. Demographic attributes of the respondents.

Age	Percentage	Gender	Percentage	Educational Background	Percentage
20 - 29	16	Male	77	Primary/Junior High Sch.	37
30 - 39	42	Female	23	Secondary	45
40 and above	42	-	-	Tertiary	1
-	-	-	-	No formal education	17

Distribution of respondents according to their Gender:

The high percentage (77%) of farmers being males with only 23% being females as revealed from the survey (Table 1) may be because, according to Clotey *et al.* (2009), tomato production is known to attract more men than women in Ghana. Another reason could be that, tomato production is more capital intensive and it is known that men have more access to financial capital than women. This corroborates with an observation by Mamudu *et al.* (2009) that about 56% of the credit portfolios of Rural Banks in Ghana go to men while the remaining 44% go to women. Moreover, tomato production is regarded as a risky venture and women appeared not to be ready to take so much risk for fear of incurring debts. This observation lends support to the findings of Clotey *et al.* (2009).

Cropping System and adopted production Practices:

Majority of the farmers (45%) practiced continuous cropping, 29% practiced sole cropping, 14% mixed cropping and 12% crop rotation (Table 2).

The practice of continuous cropping monoculture increases the possibility and severity of pests and diseases epidemics, which affects yields of tomatoes (Asare-Bediako *et al.*, 2007). This could be partially

linked to the lower fruit yields been recorded by these farmers across the country. Most of the farmers (97%) used chemical pesticides practices and only 3% used botanicals to manage pests and diseases and apply these frequently (once to twice a week) (Table 2). However, it is reported that excessive and frequent application of chemical pesticides can lead to the situation where pests develop resistance (Staurt, 2003). The increased pesticide resistance in pest population results in the need for several additional applications of the commonly used pesticides; which often are banned to maintain some reasonable crop yields. These chemicals also eliminate beneficial natural enemies as well as cause damage to the crop (Pimentel *et al.*, 1993a). With the dangers associated with the extensive use of agro-chemicals in vegetable production, it is important that more environmentally-friendly technologies such as Integrated Crop-Pest Management Practices (ICPM) and use of Botanicals be promoted among smallholder tomato farmers. Adoption and use of such technologies for pest and disease control are more likely to increase productivity of tomato farmers, with the associated benefits to environment and farmers/consumers.

Table 2. Cropping systems and types of pesticides commonly used among smallholder tomato farmers.

Cropping system	Percentage (%)	Types of pesticides	Percentage (%)
Crop rotation	12	Chemical pesticides	97
Continuous cropping	45	Poison/Karate*	38
		Diathane	42
		Cymethoate	3
		Actellic	10
		Furadan	4
Mixed cropping	14	Botanicals	3
Mono cropping	29		-

*Trade name

Table 3. Seed sources, cost of seed and Quantity of seeds used by tomato farmers in Ghana.

Source of seed	Percentage (%)	Cost of 68g seed* per Agro-ecological zone	GH. ¢	Quantity of seed used (g)/acre	Percentage
Farmer own saved seed	52	Forest	5.00 -15.00	68	25
Local market	28	Transition	10.00-15.00	136	31
Friends/Neighbour	1	Coastal savanna	5.00 -10.00	170	19
Agro-store/Dealers	15	Guinea savanna	2.00 – 5.00	204 and more	25
MoFA/NGOs	1	Sudan savanna	2.00 – 5.00	-	-

Exchange rate: 1.00 GH. = 3.5 USD *weight of full Tin of Milk- container used is measuring tomato seeds for sale.

Access to quality seeds of improved varieties: A major constraint:

Resource constraints of tomato production with regards to sources of seeds, quantity used and cost are presented in Table 3. Majority of the farmers (52%) sourced their seeds from their previously saved harvests while 28% obtained seeds from the local market and 15% purchased seeds from the agro-stores. It must however, be noted that almost all seeds sold in the local market and sometimes in the agro-stores are surplus seeds saved by other farmers, who sell to get extra income. Thus, cumulatively, about 80% or more farmers rely on informal source for seeds. The reason for the over-reliance of saved seeds could be for agronomic and economic reasons: the saved variety is the best suited to the local soil and climate and it saves money. Further, for small seeds like sorghum and millet, farmers usually employ self-storage practices because it present fewer challenges compared to seeds like cowpea and soybean during storage (Sperling & McGuire, 2010). The small land holdings been cultivated by farmers as revealed in this study (0.2 to 1.2 ha) and lack of inputs are reasons that could force farmers to use their own saved seeds as also reported by Kumar & Ratan (2004). Most importantly is the unavailability of seeds of good quality. Farmers usually will have to travel long distances (30-50 km or more) to urban centers to purchase few grams of seeds, which compared to the transportation cost is economically not prudent. Moreover, in Ghana currently, there exists no improved tomato varieties developed locally for cultivation. This is a huge gap that exists in the current plant breeding program in the country. It must however, be noted that seeds obtained from the local market or farmers' own farms are most likely mixed (Danquah, 2004). As revealed from the survey results, majority of farmers (52%) do not know the names of the varieties they cultivate (Fig. 1) and thus bulk every material available to them at the time of planting as same

seed lot. Hence, it was evident in a field trial that was conducted by Bortey *et al.* (2011) that a seed lot from the same farmer was genetically impure (observed visually lots of off-types). Moreover, these seeds could also be heavily infected with disease pathogens and this may contribute to poor crop establishment and subsequently lower yields, since the productivity of a crop is directly linked to quality of the seed used (Shetty, 2000). Additionally, most farmers do not patronize seeds of improved varieties, which are of good quality in terms of viability with good yield potential because they find the cost to be quite exorbitant; the reason most smallholder farmers prefer to use their own saved seeds, which is relatively cheap. The cost of seeds purchased from the local market ranged from ₵2.00 – ₵15.00 per of 68g milk tin (Table 3). However, the cost varied across the agro-ecological zone. Understandably, the cost of the same quantity of seeds is relatively lower in the Sudan and Guinea Savanna zones (the northern regions of Ghana) compared to the middle to southern parts of Ghana. This could be due to the fact that, majority of smallholder farmers in the northern parts of Ghana are often considered to be poor, living below the poverty line of \$ 1 a day. The quantity of seeds used by farmers to plant an acre of land ranges from 68g to 204g (Table 3), which is very high. This practice was found to be common among the farmers. The reason could be that only 19% of farmers interviewed (Figure. 2) test their seeds to assess their germination potential prior to sowing, hence they increase the sowing rate just to compensate for seeds that may fail to germinate or survive after transplanting. Conversely, using this technique may imply that farmers are likely to spend more on seeds (own or purchased from local market) and increase their cost of production. However, if simple and basic techniques like seed germination test is conducted on own-saved seeds prior to sowing, the seed rate used could be reduced and save cost.

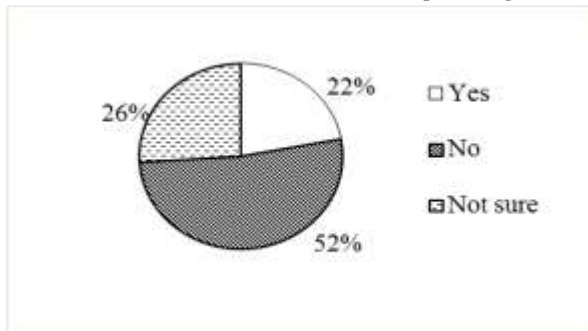


Figure 1. Respondents' knowledge of variety grown.

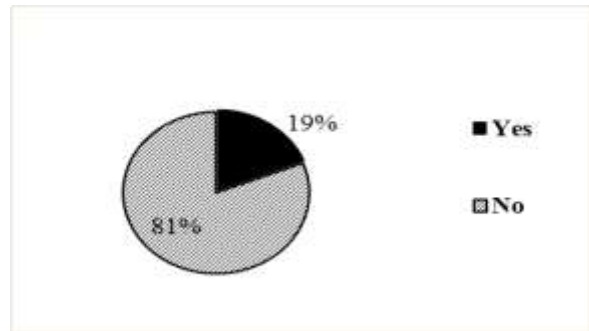


Figure 2. Percentage of Farmers who conduct germination test of saved seeds pre-sowing

Biotic and Marketing constraints: Table 4 reveals biotic constraints militating tomato production in Ghana. Damping off and Tomato Wilt disease are the major diseases (45% and 17%) respectively accounting for the poor performance of tomatoes, followed by Blight (15%) and Leaf Curl (14%). Caterpillars and Nematodes (42% and 23%) respectively were the major pests. These diseases and pests are known to be devastating and contribute significantly to yield loss. The reason for recording most of these diseases in the Table 4. Biotic constraints of smallholder tomato farmers in Ghana.

Disease	Percentage (%)	Insect/Pest	Percentage (%)
Damping off	45	Nematode	23
Wilt	17	Caterpillar	42
Leaf curl	14	Whitefly	15
Blight	15	Aphids	13
Fruit rot	9	Other insects	7

CONCLUSION AND RECOMMENDATIONS

Tomato production in Ghana is constrained with many challenges. Farmer-Stored seed was the major source of seeds for tomato farmers in Ghana. This according to the authors could have contributed hugely to the lower yields been recorded by the farmers. There was high dependence on the use of chemical pesticides and most of them practiced continuous and mono cropping system. Other resource constraints militating tomato production in Ghana include; high cost of quality seeds and poor access to good seeds of improved varieties. The major marketing constraint smallholder farmers in Ghana faced is market access and poor pricing especially during the glut season. Some biotic challenges include Damping off, Wilt, Blight and Fruit rot diseases and Nematodes, Aphids, Whitefly and Fruit borer (*Helicoverpa armigera*). However, these constraints can be reduced by making available to farmers good quality seeds of improved varieties and subsidizing the cost of basic inputs like fertilizers and agro-chemicals to enhance tomato production. There is the need to strengthen tomato R & D to develop improved locally adaptable varieties. Further, seeds of the existing promising local varieties should be cleaned and made available to small holder farmers. Additionally, the Ministry of Food and Agriculture extension service department should intensify education on use of quality seed, chemical pesticides application among other good agronomic practices. Add here some brief and concrete recommendation.

field could be due to the source of seeds and storage practices employed by these farmers (Bortey et al., 2011) as well as the farming practices as revealed in this study. Some of the diseases often witnessed in farmers' fields could be avoided if healthy seeds of improved varieties are cultivated while observing good agronomic practices. According to this study, the major marketing constraint smallholder farmers in Ghana face is access to reliable market and poor pricing especially during the glut season.

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