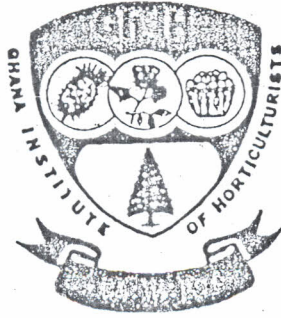


Ghana Institute of Horticulturists



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14 February 2011

Mr. Moomin Abu
Department Of Horticulture
UDS
Tamale

Dear Mr. Abu


ACCEPTANCE OF PAPER FOR PUBLICATION

I write to inform you that your paper titled 'The mango industry in Ghana', which was submitted to the Ghana Journal of Horticulture, has been accepted for publication.

We look forward to receiving more manuscripts from you

With best wishes.

Yours sincerely,


Prof. J. C. Norman
Editor-in-Chief

THE MANGO INDUSTRY IN GHANA

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ABSTRACT

Baseline information was collected nation wide to assess the current state of mango industry in Ghana. Factors considered included size and nature of the industry, production practices, types of products, quality management practices, handling practices and challenges of the sector. Others are mango quality standards and export performance. The findings of the study showed that Ghana's mango industry is still in an infant stage. It has not developed extensively with the times. Its productivity and exports are low. It contributed about 0.3% of total agricultural exports in 2009. The export performance of fresh mango fruits from Ghana in 2009 indicated a value of US\$ 234950. Between January and December 2007 Europe's import of mango from Ghana was 1,071Mt, representing only 1% as Ghana's share on the EU market. All the same, Ghana recorded the highest annual growth (73%) as well as the highest total growth (799%) amongst the exporters tabulated within the period suggesting that mango has the potential as a foreign exchange earner in Ghana. The major varieties exported are Haden, Kent, Palmer and Keitt. There is the need for improvement in production practices, enterprise development and marketing techniques. The industry needs technical and financial support considering the changing trends of the sector and the opportunities for employment and income generation in the country.

INTRODUCTION

The mango industry in Ghana has the potential to be a major foreign exchange earner. The importance of mango to many Ghanaians is epitomized in the description for the crop as 'Golden tree', 'next cash crop', 'gold mine', 'Ghana's future', amongst others (Ava *et al.*, 2008). These put mango ahead of most tree crops if not all, in the nation's quest to alleviate poverty through the improvement in incomes of farmers and also make mango Ghana's next big entry to the European market.

Many countries in Africa, South America and Asia have become aware of the possibility to penetrate the market for mangoes in Europe (EUSMG, 2001). Favourable climatic conditions and low labour cost leading to low production cost give the South American and African countries a strong position on the European markets. However, there is also strong competition among the low wage countries. Ghana is comparatively closer to Europe and has the advantage of lower transportation cost and shorter delivery times. Irrespective of these opportunities, Ghana is unable to take advantage due to the uncompetitive state of the mango industry. To make the industry more competitive, therefore, calls for a better understanding and re-focusing of the sector. The objective of this study was to determine the major constraints and opportunities to growth and development of the mango industry in Ghana and make recommendations for its improvement.

METHODOLOGY

The mango industry was initially mapped out looking at the main stakeholders (producers, exporters, processors, wholesalers and retailers) and their functions, and also the support services and input suppliers. An opportunity analysis was conducted and that formed the basis for the development of the check list for the study. Contributions to the understanding of the relationship amongst stakeholders and the opportunities that exist for improvement were sourced from the main stakeholders identified in the industry.

Earlier research reports as well as papers presented at various workshops and fora were reviewed. The internet was also consulted for information on the industry, especially regarding the global picture of mango production. Ghana Export Promotion Council (GEPC) was also consulted to ascertain the extent to which the export environment was made conducive for the trade in mangoes. There was a review of secondary information on the mango industry, followed by interactions and collection of primary data to fill information

gaps. Sources of secondary information were various national University Libraries at University of Ghana, Legon, Accra; Kwame Nkrumah University of Science and Technology, Kumasi; and University for Development Studies, Tamale. Other sources were Crops Research Institute (CRI) at Fumesua and Savanna Agricultural Research Institute (SARI) at Nyankpala, all of the Council for Scientific and Industrial Research (CSIR), Ghana.

The author interacted with the stakeholders of the mango industry, professionals in the field of horticulture in the universities, research institutions, Ministry of Food and Agriculture (MoFA) and NGO^s such as Trade and Investment Programme for a Competitive Export Economy (TIPCEE-USAID), Market Oriented Agriculture Programme (MOAP/MoFA-GTZ), Adventist Development Relief Agency (ADRA), PLAN Ghana, West Africa Fair Fruit Company (WAFFC) and TechnoServe, all of which are engaged in promoting mango production. Umbrella associations such as Federation of Association of Ghanaian Exporters (FAGE) and Papaya and Mango Producers and Exporters Association of Ghana (PAMPEAG) were also interacted with using the check list. Agencies and institutions involved in the provision of services to the horticultural industry such as Ghana Ports and Harbours Authority (GPHA), Ghana Civil Aviation Authority (GCAA), Plant Protection and Regulatory Services Division (PPRSD) of MoFA, Ghana Standards Board (GSB) and Food and Drugs Board (Anon, 2006), provided valuable information. Primary data were collected from producers, exporters, processors, wholesalers and retailers, input suppliers, co-operative societies and associations.

There was a review of quality standards for mangoes and an attachment study on mango in an export oriented mango plantation to obtain practical experience and knowledge on production, harvest and postharvest handling of mangoes for export and also for the local market.

RESULTS AND DISCUSSION

The Industry Framework

Stakeholders and the associate companies/ agencies/ institutions interacted with/ consulted/ interviewed during the baseline survey are presented in Table 1.

Table 1: Stakeholders and the associate companies/ agencies/ institutions interacted with/ consulted/ interviewed.

Stakeholders	Companies/Agencies/Institutions
Exporters	Prudent Export and Import Company Ltd, Bomarts Farms Ltd, Volta River Estates Ltd (VREL), Integrated Tamale Fruits Company (ITFC) Ltd, John Lawrence Farms Ltd, Dhillon Farms Ltd, Indgha Agro Enterprise Ltd, Evelyn Farms, Mission Farms Ltd, GLAACO Farms Ltd, VIAD Farms Ltd. and BASAM Company Ltd.
Processors	Blue Skies, Akramang Processing Industries Ltd, Tongu Fruits, First Catering Services, Ebenut Limited, Afrique Link.
Wholesalers/Retailers	Eco Enterprise, Elizabeth Adjei, Osu RE (Oxford Road), Agbogbloshie, Nima, 37 Hospital, Achimota, Ayikuma station, Agomeda station, Dodowa station, Akorley junction.
Producers	Dangbe West Mango Farmers and Association executives, Yilo Krobo Mango Farmers and Association executives, Manya Krobo Farmers and Association executives and other individual farmers.
Input Suppliers	Agrimat, Dodowa Seedling Producers, Manya Krobo Seedling Producers, Tease Seedling Producers (Akorley).
Support Services	Shai Rural Bank, Dodowa; Manya Krobo Rural Bank, Somanya
Other Stakeholders	MOFA, CEPS, TIPCEE, ADRA, MOAP, FAGE, PAMPEAG, GPHA, GCAA, PPRSD, GSB, FDB, AMEX INTERNATIONAL, TECHNOSERVE, PFID, HAG, SIFCF, GhIH, GEPC, MCA

Stakeholders involve producers, processors, traders, input suppliers and those that seek to support and promote the industry in various ways. Producers comprise small (0.81ha to 4.05ha), medium (4.05ha to 21ha) and large scale farmers (21ha to 167ha) (TechnoServe, 2007). Both small and medium scale farmers form cooperatives and farmer associations to facilitate input supply and training on good agricultural practices. They also receive farm inputs and some financial assistance from the large scale farmers and other nucleus farmers

under a contractual arrangement. They may also be provided technical assistance to secure their commitment (Obeng, 2009).

Earlier report by FAGE/USAID/TIPCEE (2007) indicated that processing capacity in the country is small. In recent times Blue Skies in Nsawam, Tongu Fruits in Sogakope and First Catering Services in Accra produce fresh chilled pre-cut mango fruits for the export market. Integrated Tamale Fruit Company (ITFC) processes dry mango fruit for export. Others who process dried mango fruit are Ebenut Limited in Weija and Afrique Link which as well processes mango puree and mango concentrates under its brand name 'Wenchi Fresh'. The Methodist University Campus in Wenchi also produces mango fruit juice for sale locally.

The bulk (64%) of mango produced in Ghana is handled by local retailers which represent the non-exportable class (low quality), 10% by processors, 11% postharvest losses and only 15% by exporters. According to Obeng (2009), research and extension is involved in the provision of technical services to farmers. Input suppliers include nursery operators and suppliers of agro-chemicals and other agricultural equipment. The other companies, agencies and institutions are active in advocacy for improved policy and promotion of the mango industry.

Historical Perspective

The study revealed that Ghana (then Gold Coast) has been cultivating mangoes since the 1920's. It is believed that natural hybridization has taken place between the species over time and by 1973 it was found that only three of these species ('Julie', 'Jaffna' and 'Ruppee') could be recognized with certainty. More than a dozen other cultivars were brought in much later from Florida and India (Addaquaye, 2004). An effort was begun in 1967 to classify the seedlings in the Ejura district (in the Ejura Agricultural Station) in order to eliminate confusion and have identifiable cultivars marked for future research (Addaquaye, 2004). In 1973, descriptions and photographs of 21 newly named cultivars were published. Of these, 12 are fibrous and nine fibreless. One of the fibrous cultivars, named 'Tee-Vee-Dee', is so well flavoured and aromatic that it is locally very popular. The nine fibreless cultivars constitute the species of "exotic" varieties cultivated presently on commercial scale (Anon, 2004).

It may appear that the initial motive for cultivating mangoes in Ghana was for backyard food source because of its versatility and gregarious nature as well as its function as shade trees.

ADRA, since the 1970's has implemented programs in the Brong Ahafo, Northern and Upper West Regions and Krobo areas in the Eastern region to promote mango production as part of its food security program. This did not go down well with the Northern and Upper regions who rather emphasized on the promotion of arable crops, which according to the farmers was a faster way to food security move.

A number of interventions have been made to develop the supply base of mango production in the country since the late 1980's. For example, with the support of the United Nations Development Programme (UNDP), the Crop Research Institute and Kethab Seed Company, 9244 mango seedlings were produced, which were distributed to farmers in Dangme West and the Afram Plains. This covered a total land area of about 95.83ha (Twum, 2008). In 2002, the Ghana Export Promotion Council with the support of the UNDP developed another project known as "Specialised Support to Supply Base Expansion of Mangoes" in which 13,000 mango seedlings were produced and distributed to 90 farmers in the Dangme West District. Before this project, the Ministry of Food and Agriculture had established three mango nurseries in Dodowa, Kintampo and Ejura, while the University Farms at Kade also developed mango seedlings for the industry (Addaquaye, 2004).

Zonal and Regional Mango Production Areas in Ghana

The mango producing areas in Ghana are categorized into the southern zone comprising parts of Central, Eastern, Greater Accra and Volta Regions, and the northern zone comprising Ashanti, Brong Ahafo, Northern, Upper East and Upper West Regions. There is therefore only one (Western) out of the ten regions where mango is not commercially grown, even though in the Upper East and West Regions, mango is only cultivated on subsistence basis. The Southern zone is characterized by a major season which is from mid-April to mid-August and a minor season which is from mid-December to mid-March probably because of its bimodal rainfall pattern. There is one mango season (mid-April to mid-August) in the northern zone probably as a result of its unimodal rainfall pattern since it is in the savannah region. Also flowering is influenced by lower temperature environments and this is absent in the north after this first (major) season where the temperature range remains 33°C for the day and 23°C for the night (ITFCWR, 2010).

A recent study conducted by United States Agency for International Development/Trade and Investment Program for a Competitive Export Economy (USAID/TIPCEE) indicated that about 2775 ha are planted to mango in Ghana (2255 and 520 ha planted to various varieties in the southern and northern zones, respectively). Eighty percent of the estimated area has been fruiting since then (Twum, 2008). The proportionally higher coverage of cultivated mango land area for the southern zone (81.3%) than the northern zone (18.7%) is a clear manifestation of the belief of the northern zone farmers who emphasized on the promotion of arable crops as a faster way to food security move.

The study also indicated that varieties of mangoes currently grown in Ghana include Keitt, Kent, Haden, Palmer, Tommy Atkins, Eldon, Zill, Amelie, Erwin, Julie, Jaffna, Njala 5, Springfield and Sunset. Haden, Kent, Palmer, Keitt and Tommy Atkins meet the EU benchmark for export (Eurostat Comext, 2008). Yilo Krobo district accounts for 32% (largest) of the cultivated area in the southern zone while Savelugu-Nanton district dominates (38%) the northern zone. In terms of area under cultivation, the small scale producers constitute 10%, medium scale, 55% and large scale, 35% (Takyi, 2009).

The main production areas in the Southern Zone include Yilo Krobo district, Dangme West and East districts, Asuogyaman district, Hohoe district, Manya Krobo district, Jasikan district, Kpandu district, Akwapim North and South districts, Awutu Effutu Senya district and South Tongu District. Yilo Krobo, Hohoe and Dangme West districts produce more mango in the southern zone while the least producing districts are Akwapim South and Asuogyaman districts. Manya Krobo and South Tongu districts are average producers. Production in the southern zone covers almost all mango varieties discovered in Ghana (Table 2). This is made possible, probably because all the institutions, agencies, regulatory bodies, development programs and projects that seek to support the industry contributed in one way or the other to the growth of the industry in the southern zone. This is confirmed under the historical perspective of the industry.

Table 2: Some Varieties and their Production sizes (hectares) for Some Districts in the Southern Zone

DISTRICT	VARIETY	AREA(ha)	%AREA
Akwapim S.	Keitt	6.36	100
Asuogyaman	Keitt	69.68	80.8
	Haden	8.52	9.9
	Kent	3.44	4.0
	Tommy Atkins	1.96	2.3
	Erwin	1.44	1.7
	Jaffna	0.84	1.0
	Palmer	0.32	0.3
	Sum:	86.20	100
Dangme W.	Keitt	403.88	78.5
	Kent	65.2	12.7
	Njala 5	16.24	3.2
	Haden	13.08	2.5
	Palmer	10.84	2.1
	Tommy Atkins	3.08	0.6
	Erwin	1.24	0.2
	Springfield	1.0	0.2
	Julie	0.12	0.0
	Jaffna	0.04	0.0
	Sum:	514.76	100
Hohoe	Keitt	606.96	90.1
	Kent	49.4	7.3
	Palmer	11.92	1.8
	Haden	3.64	0.5
	Erwin	1.0	0.2
	Springfield	0.64	0.1
Manya Krobo	Keitt	100.28	86.1
	Kent	15.0	12.9
	Palmer	1.12	1.0
	Sum:	116.40	100
South Tongu	Keitt	112.8	50.0
	Kent	70.96	31.5
	Palmer	8.32	3.7
	Zill	8.32	3.7
	Tommy Atkins	8.32	3.7
	Haden	8.32	3.7
	Julie	8.32	3.7
	Sum:	225.44	100
Yilo Krobo	Keitt	608.56	83.2
	Kent	70.32	9.6
	Palmer	15.88	2.2
	Haden	12.72	1.7
	Erwin	11.04	1.5
	Julie	9.36	1.3

	Tommy Atkins	1.88	0.3
	Zill	0.72	0.1
	Jaffna	0.6	0.1
	Sunset	0.36	0.1
	Sum:	731.44	100

Source: TecnoServe (2007)

Production, Harvest and Postharvest Practices

Total production of mango in Ghana was estimated at 4,500t of which 40% is produced in the Northern sector. Local varieties occupy 2900t while export varieties occupy 1600t, with the dominant varieties being 'local' and 'Jaffna' types. An estimated figure of 4124t is consumed locally, mainly of the local and Jaffna varieties (FAO, 2006). The level of production of the export varieties is comparatively low most probably because the horticulture industry in Ghana recently realized the potential of mango as a foreign exchange earner (Anon, 2007).

All producers interviewed attested to the fact that they have difficulty in determining when to harvest fruit for the export and local markets. This confirms reports received from importers overseas warning exporters from Ghana for variation in maturity in a single consignment (Twum, 2008). Most workers who did harvesting had no adequate knowledge on appropriate harvesting, export quality fruits and packing and packaging techniques (personal, observation). Mitra (1997) and Litz (2003) had earlier reported that one of the major problems currently restricting international trade in mangoes was the variation in maturity in a single consignment. Joyce and Patterson (1994) and Kouno *et al.* (1994) indicated that future research should consider easy-to-apply harvest indices and non-destructive methods for checking fruit maturity which could be incorporated in an automated grading system. These indices however need to be adjusted for cultivar and season. Thus relevant methods/procedures used for assessing export mango fruit quality characteristics become a necessity.

Seventy five percent of the farmers interviewed were aware that insecticides, herbicides and disease control chemicals they ought to apply should be those that are generally recommended as safe (GRAS). A report by the EU Strategic Marketing Guide (EUSMG, 2001) indicated that it is important for exporters to note that chemicals used after harvest should comply with EU Maximum Residue Level (MRL) regulation.

The study showed that mango fruits due for local marketing are not normally given any post harvest treatment such as appropriate sorting, grading or packaging, or any treatment to extend the shelf life, except for being left in open containers usually at ambient temperatures. This buttresses the point that the industry is still in its juvenile stages, where local sellers and consumers do not even see the need for sorted, graded or packaged fruits for sale as a necessity.

Marketing

According to the study, Ghana's mangoes are marketed through export, local processing and local fresh market (super markets, food services industries and retailers). Fruits harvested for these outlets are usually unripe (mature green) i.e. before the onset of the climacteric but physiologically mature. The bulk (64%) of mango produced in Ghana is handled by local retailers which represent the non-exportable class (low quality), 10% by local processors, 11% postharvest losses and only 15% by exporters (TechnoServe, 2007).

Export Market

Mango exported from Ghana are whole fresh fruits or processed. Processed fruits in the form of fresh cuts and salads are exported by Blue Skies. The mangoes are exported mainly to Europe (the traditional market for West African mango producing countries) comprising United Kingdom, Netherlands, France, Italy, Belgium, Switzerland, Germany and Spain. Other destinations include South Africa, Lebanon, Morocco, Libya, Burkina Faso, Middle-East (Kuwait/Saudi-Arabia/United Arab Emirates) and South-East Asia (Malaysia/Singapore, China/Hongkong).

The main mango exporting companies identified in Ghana were Prudent Export and Import Company Ltd., Bomarts Farms Ltd, Volta River Estates Ltd, Integrated Tamale Fruits Company (ITFC) Ltd, John Lawrence Farms Ltd, Dhillon Farms Ltd, Indgha Agro Enterprise Ltd., Evelyn Farms, Mission Farms Ltd, GLAACO Farms Ltd, VIAD Farms Ltd. and BASAM Company Ltd. Currently, there is no company exporting mangoes from the northern sector of Ghana with the exception of ITFC which has just started but through veteran exporters. The export performance of Ghana's mangoes from 2001 to 2009 is shown in Table 3.

Table 3: Export Performance of Mango from Ghana

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009
Quantity (ton)	231,707	126	234,382	376	407,231	182,464	823,726	857,571	434,873
Value (US\$)	78,476	69,609	108,085	163,850	134,560	83,207	998,155	821,826	234,950

Source: GEPC, 2009

Mango exports dwindled from the year 2001 to 2003 beyond which exports increased yearly, except for 2006 (Table 3). Even though young the industry is gradually improving particularly where the industry is supported by other institutions including the Horticultural Exports and Imports Initiative (HEII). This is confirmed by a statement issued by FAGE/USAID/TIPCEE (2007) that the EU's imports from all sources have increased in the current decade more than 100 % for papayas, 85 % for melons, 90 % for guavas/mangoes and 60 % for aubergines. Analyses of the export performance indicate an average growth rate of 34% in quantity of mangoes exported between 2001 and 2009.

Table 4: Evolution of Europe Imports of Mango in metric tonnes

ORIGIN	YEAR					ANNUAL GROWTH	TOTAL GROWTH
	2003	2004	2005	2006	2007		
Brazil	90,244	69,518	82,475	85,362	81,257	-3%	-10%
Peru	15,415	19,905	26,460	41,079	36,798	24%	139%
Cote d'Ivoire	7,362	11,651	9,965	14,584	14,879	19%	102%
Israel	8,693	8,089	12,690	11,330	15,054	15%	73%
Pakistan	8,911	11,184	12,547	10,289	13,479	11%	51%
USA	7,399	7,640	6,971	5,985	7,456	0%	1%
Costa Rica	2,636	4,012	6,293	7,587	4,728	16%	79%
Others	36,827	32,552	30,871	37,454	36,429	0%	-1%
Ghana	119	228	343	366	1,071	73%	799%
Total	177,606	164,780	188,615	214,033	211,152	4%	19%

SOURCE: EU: Eurostat Comext (2008).

The evolution of Europe imports between 2003 and 2007 in metric tonnes is shown in Table 4. Ghana's export volumes are rather comparatively too low to be considered as a significant player in world mango export industry (MTSS, 2004; EU: Eurostat Comext, 2008). For

instance, Ghana's largest share of 1,071t which occurred in 2007 represented only 1%. This analysis confirms the coincidental findings of the present study and an earlier finding by Mitra (1997) that Ghana's mango trade in the international front is restricted by the variation in physiological maturity in a single consignment. Under such conditions, lack of uniformity in ripening occurs and this results in fruit being offered for sale at undesirably different stages of ripeness at any particular time.

The export of local mangoes (mature green) has witnessed an increase in trade in recent years. The local mangoes are exported in the unripe form to Asian communities in the United Kingdom. The Asian communities eat the unripe mangoes as vegetables (Obeng, 2009).

Ghana's mangoes are now largely exported by both air and sea freights. Until 2007, Ghana's mangoes were exported mainly by air and the freight charges ranged between \$0.70/kg and \$1.15/kg (Takyi, 2009). Though air-freight is more expensive, it gets fruits to their destination markets faster and therefore in much more acceptable condition. However, for Ghana to be competitive on the international market considering the high air freight charges, it is obligatory for Ghana to consider using sea freight for mango export and benefit from cheaper freight rates and the opportunities to move bigger volumes to the market. Fortunately for the industry the Tema sea port collective cold room facility has just been installed and accordingly commissioned.

Local Processing

Very few large scale processing plants for fruits were identified during the study. However, there are several micro-processing plants at the farm gate. Blue Skies and Akramang Processing Industries Ltd are examples of large scale processors. Some processors possess their own farmlands where they grow exotic mango varieties as determined by the export market, while some other processing companies initiate an out-grower scheme for the same purpose.

The main processor company of mango in Ghana is Blue Skies, a company that is doing minimal processing (fresh pre-cut) for export mainly to United Kingdom. Blue Skies currently source most of its fresh mango fruit requirement from the southern sector since there is no significant production from the northern sector yet. When Ghanaian mangoes are out of season the company sources fresh fruit from countries such as Brazil, Senegal and Burkina Faso. However, there are a lot of private sector initiatives to establish fresh mango

fruit processing centres. Other firms such as Tongu Fruits, First Catering and Pinella have successfully penetrated the fresh-cut fruit sector. Initial exports of fresh-cut Cayenne pineapple have diversified and today include Sugarloaf and MD2 pineapple, papaya and mango, some of which have been certified under the Fairtrade label. Vegetable exporters have also adopted the pre-pack format and supply European supermarkets with vegetables such as chillies, okra, turia, dudhi and raviya. With such delicious and diverse offerings, European consumers are sure to see Ghana as a major source of quality fresh produce.

Local Fresh Market

The main local market channels identified for mangoes were middlemen who take mango from the farm-gates to sell to other market retailers, street retailers, supermarkets and the food services industry. It was also noted that most of the produce is transported to the markets via non-ventilated trucks, pick-ups, passenger buses and even in booths of taxis. The unit of sale in the formal markets (supermarkets, markets with processors, exporters and food services industries, etc.) is in weight, while informal markets e.g. the retail market use fruit counts or volume.

For the local fresh market mangoes are packaged in both plastic and wooden crates, sacks and baskets during harvesting and transportation. Consumer packages present in the Ghanaian market for fresh mango fruits include small woven baskets, low density polyethylene film bags, paper bags, empty emulsion paint containers, aluminum pans, flat oval wooden boards and small plastic buckets. Others are stuffed old-kitchen bowls and tin containers.

Restaurants, hotels and supermarkets source fruits from middlemen (29%), the wholesale market (57%) and selected farmers (14%). Premium is put on the fruit colour, size, freshness and firmness. Food services industry (hotels and restaurants) sources fruit from middlemen, wholesalers and farmers. Fruit variety does not influence procurement decision for this sector of users. However, during procurement, premium price is paid on fruit colour, size, freshness and firmness (TechnoServe, 2007).

Due to poor storage practices by retailers, the shelf life of fruits usually ranges between 3 and 6 days. They store what is left unsold only in the open but protected and at ambient

conditions. Supermarkets put a premium on fruit colour and size and are stored under refrigeration, thus extending the shelf life to about 14 days.

Local Price Structure

At the farm gate, price of mango fruit is influenced by prevailing market price but a few farmers consider their production costs before pricing. Other variables that influence price at the farm gate include fruit colour, freshness, firmness, size and variety while payment is generally by cash on delivery, payment at two weeks after procurement or one week after procurement. In the informal market (retail market) where pricing is according to count, price is influenced by fruit colour, freshness, firmness, size and variety while payment is by both cash on hand and by credit (period from 1-2 weeks). For the formal market where pricing is according to weight, supermarkets and food services industry quote the highest prices for mangoes because they sell the highest quality fruit in terms of freshness, consistency, etc. Usually the wholesalers get the lowest prices for the produce since they buy at the farm-gate level. Prices are always in a range and as much as possible strictly depends on the season, location and whether produce is in abundance or is scarce. The price range is from 50 Gp to GHc 1.00 per kg of mango at each segment (wholesalers, retailers, supermarkets and the food services industry) of the market.

Ghana Mango Standards, Competitiveness Analysis and End Market Analysis

Ghana's quality standards for mango currently used is based on the general minimum quality criteria for imported fruits and vegetables into the EU which stipulate definition of produce, provisions concerning quality, sizing, tolerances, presentation, marking or labelling, contaminants and hygiene but is poorly applied in contrast to other exporting countries. The bulk (64%) of mango produced in Ghana is handled by local retailers which represent the non-exportable class (low quality), 10% by processors, 11% postharvest losses and only 15% by exporters (TechnoServe, 2007).

One special feature of Ghana is two harvests each year in the southern zone. This may offer an opportunity for Ghana to supply the European market during times when competition is weaker, for instance during summer. Compared to Burkina Faso, the northern zone of Ghana has a competitive advantage for the European market as harvesting starts two weeks earlier, which allows for gaining a certain market share. Regarding exports of mangoes to the European and the Middle East markets, Ghana has a geographical advantage over Latin

American countries, as distances are shorter. Ghana also has an opportunity to sea freight over Burkina Faso or Mali as it is not landlocked, and it can draw on an existing and functioning infrastructure for mango exports such as transportation, logistics and networks, ports, suppliers of cartons and pallets and set freight rates.

On the domestic market, local mango varieties seem to play an important role. In recent years, exotic varieties, especially Keitt, Kent, Haden, Palmer and Tommy Atkins have gained significance as well. Although exotic varieties are suitable for export, a lot of the produce is sold on the expanding domestic markets because they do not meet export quality standards. These analyses imply that, Ghana can take advantage of the market potential to increase its share from the current 1% to an appreciable share if all protocols in the export market are observed.

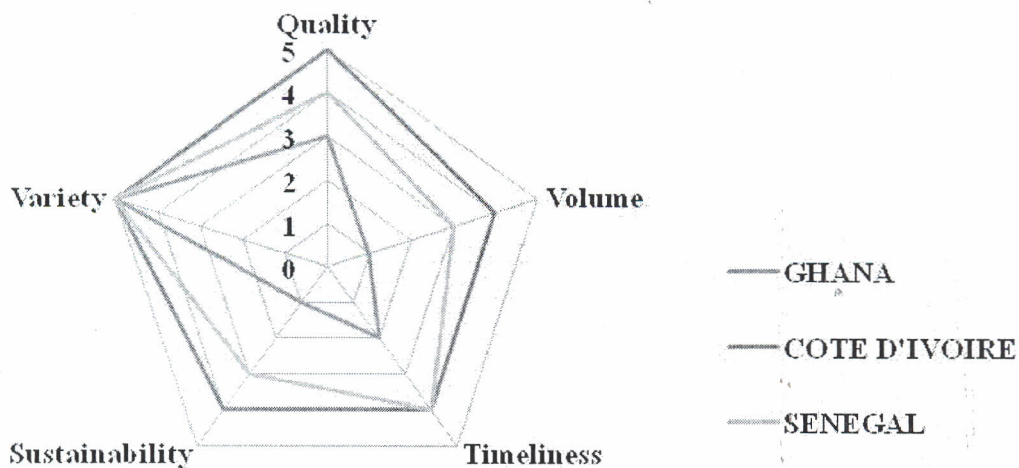


Figure 1: Buyer Benchmarking for Ghana, Cote d'Ivoire and Senegal.

Ranking: 0 - 5 = favourable and 5 - 0 = unfavourable.

A buyer benchmarking for Ghana, Cote d'Ivoire and Senegal (Avah *et al.*, 2008) indicate that Ghana has varietal competitiveness. However, the country must improve on the quality and also put in place measures to produce more to meet required volumes. Then the delivery system also has to be timely so that the export industry is ignited and sustained (Figure 1).

Driving Forces of the Industry

It was noted that the positive driving forces of the mango industry include good soil and climatic conditions (Yeboah and Kunze, 2004), increasing demand for mango in the European market and other destinations and profitability of the industry (MIR, 2008). Then liberal land tenure system and availability of labour (Avah *et al.*, 2008). The major negative driving force or challenge/constraint is the difficulty mango farmers have in determining when to harvest fruits for the export and local markets which result in poor fruit quality and variation in maturity in a single consignment (Mitra, 1997; Litz, 2003 and Twum, 2008). Other challenges include inadequate finance, less informed agronomic practices and low production volumes, inadequate research, unreliable seedling supply sources, poor harvest and post harvest handling and management, fewer and inadequate processing facilities and technologies, very low per capita consumption of mango fruits in Ghana, inadequate standards and certification, inadequate knowledge about the export market and inadequate production data.

CONCLUSION AND RECOMMENDATIONS

The Ghanaian mango sector has a lot of potential for improved foreign exchange earning and its growth in the agricultural economy is not in doubt. The many development organizations, other NGOs, private businesses, etc. investing time and effort in supporting the industry lend credence to this fact.

The study indicated no clear market leaders although some like ITFC, VIAD and WAFF are emerging. There are, however, a lot of stakeholders in the sector, many of them providing very similar services in various segments. A lot of subsector studies have also been done on mangoes leading to similar conclusions and recommendations. The challenge is to make strategic interventions through concerted stakeholder efforts so that there is more compliments to the efforts made.

The institutional framework for the development of the sector is also in a nascent stage and to sustain the interest of government the advocacy platform has to be strengthened. Efficiency in service delivery infrastructure to the sector is paramount in this regard as well as appropriate policy framework for its promotion and support. However, mango production is not without challenges ranging from pre-harvest to post-harvest as outlined above. There have also been

some strides made in production even though still within limits of negligibility that makes Ghana's exports insignificant in world market.

To address the major concerns and challenges inhibiting the development of the mango industry, the following are recommended:

- (i) Stakeholders should collaborate with financial institutions to create innovative financial schemes that make credit at a reasonable interest rate available and also addresses the issue of collateral.
- ii) Training of mango producers in improved production and harvesting techniques including introduction to GLOBALGAP to improve the knowledge base of these farmers. Hence increasing farm productivity, quality of produce and reduction of cost of production.
- (iii) Assisting research institutions such as Crop Research Institute, Savannah Agricultural Research Institute, Food Research Institute, etc., all of the Council for Scientific and Industrial Research (CSIR) and the Universities to focus research efforts on areas such as appropriate irrigation methods, fertilization regimes, appropriate pruning methods, control of various pests (eg. mango stone weevil) and diseases (eg. Anthracnose), etc.
- (iv) Establishing an inspectorate division to oversee the activities of nursery operators since their operations is very important to the mango industry. This requires standardization of the practices and operations of nursery attendants.
- (v) Easy-to-apply harvest indices and non-destructive methods for determining harvest maturity for mangoes which could be incorporated in an automated grading system should be clearly outlined for Ghanaian farmers.
- (vi) Promoting investments in harvest and postharvest infrastructure such as pack houses with cold storage and transport facilities at strategic locations to deliver top quality produce to domestic and export markets.
- (vii) Introducing processing technologies for the production of juice, concentrates, fresh precuts or ready-to-eat products from non-exportable fruits to increase job creation and incomes, especially in the comparatively poor northern sector.
- (viii) Education of fruit vendors on post-harvest handling and vigorous media campaign on the nutritional value of fruits.
- (ix) As a matter of urgency, Ghana must institute a mandatory requirement for all produce leaving the ports to have a quality certification seal if exports from this country are to attract the reputation of high quality for the international market.
- (x) MoFA in collaboration with GEPC should educate mango producers on export marketing and also intensify their efforts toward taking adequate production data.

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