



THE NURSERY INDUSTRY IN GHANA: PROSPECTS AND CHALLENGES

J. B. K. Asiedu¹, J. D. Owusu-Sekyere², K. J. Taah¹, G. C. van der Puije¹ and E. Ocloo¹

¹Department of Crop Science, University of Cape Coast, Cape Coast, Ghana

²Department of Agricultural Engineering, University of Cape Coast, Cape Coast, Ghana

E-Mail: klartlands@yahoo.com

ABSTRACT

The research was carried out between December 2008 and December 2010 and covered six administrative districts in the Greater Accra and Eastern regions of Ghana. A total of 132 nurseries were identified in the districts out of which 20 were selected using a table of random digits. A content validated questionnaire together with a surveyors tape and a digital camera were used to collect the data. The questionnaire was administered to respondents in each of the 20 nurseries using English and two local dialects, Twi and Ewe. The survey showed that the nursery industry is serving as an important source of employment for people both on full-time and part-time basis. The industry is dominated by males who make up 80% of the respondents. Young and agile people of between 20-49 years make up 75% of the respondents. The industry is important in the distribution of ornamental and fruit trees using seedlings and vegetative propagated materials. Nurseries surveyed were mostly large in size ranging between 2023.5m² and 7689m², however, further expansion of small nurseries located in built up areas could be limited by inadequate space. Nurseries relied more on surface water sources like streams to irrigate their plants and the main method of irrigation was overhead with the use of watering cans being the most popular. A total of 110 species of plants belonging to 79 genera and 49 families were cultivated by all the nurseries surveyed. None of the nurseries was either affiliated to any organization or had received any support.

Keywords: nursery, ornamental plants, labour type, forms of employment, vegetative propagation, survey, Ghana.

INTRODUCTION

The establishment of nurseries has become a major feature of the urban landscape in Ghana, springing up mainly along major roads and highways, along streets, foot paths and even in private homes. They are an economic activity creating viable employment for a number of families (Bota, 2008) in the country and providing invaluable service to the fast growing landscape and floricultural industries. Poincelot, (2004) described nurseries as a means to create opportunities for start-ups or beginners for either full-time or part-time employment.

Nurseries are used for the artificial regeneration of plants through the use of planting materials like seeds, leaf cuttings, stem cuttings (Anka-Ampong, 2009) budding, grafting and layering.

Nurseries are areas where planting materials are raised for sowing or planting in gardens or on the field (Hazra *et al.*, 2006). Singh (2002) defined a nursery as a place where plants are raised until they are ready for final transplanting in the field or as expressed by Opeke (1987) a place where young plants are raised under intensive management for later transplanting to the field.

Nurseries can be established anywhere but Poincelot (2004) suggests that areas undergoing major construction activities are the best places for their establishment. Such areas have rapid population growth with developing real estate or individual housing as well. Already built-up areas offer less opportunity due mainly to inadequate space.

There are different types and classifications of nurseries. Singh (2002); Gerald (undated); Opeke (1987); Anonymous (2007b) identified peasant, temporary and standard or permanent nurseries. Mason (2004); Anonymous (2007b); Bota (2008); Diver and Greer

(2008); also identified production nursery or wholesale nursery, retail nursery, landscape nursery, general purpose nursery, mail-order nursery and farmer markets as types of nurseries from which home owners, florists, gardeners, retailers and landscape contractors can obtain their planting materials (Anonymous, 2007a).

Although the nursery industry is very important in the nurturing and distribution of plants and in the landscape industry, it has received less attention over the years by way of monitoring and evaluation of their activities and how it is impacting the development of various sectors of the economy in Ghana. A survey was thus necessary to obtain information for market analysis to determine opportunities (Diver and Greer, 2008) as well as challenges in the industry. It was against this background that the survey was conducted to obtain baseline information on nurseries in six administrative districts in two regions of Ghana. The two regions are the Greater Accra region, an urban community where the capital city is located and the Eastern region, a predominantly farming area. Greater Accra has a thriving nursery business servicing the construction industry while in the Eastern region nurseries are fast growing to meet the needs of tree fruit crop farmers and to a lesser extent, the construction industry.

MATERIALS AND METHODS

Study area

The survey covered a total of six administrative districts in the Greater Accra and Eastern regions of Ghana as indicated in Table-1 and was carried out between December 2008 and December 2010.

**Table-1.** Distribution of study area in the two regions.

Regions	Administrative districts
Greater Accra	Ga North, Ga East, Accra metropolitan assembly, Tema metropolitan assembly
Eastern region	Kwahu South, Kwahu North

Materials

The materials used to collect the data included measuring tape, a digital camera and a content validated questionnaire. The questionnaire was designed to cover educational background, marital status and age of respondents. The location of the nursery, size, services offered and types of plants raised (appendix 1) were also covered. At each nursery visited operators and attendants were interviewed. Plants were identified through photographic images taken at the nurseries and with the aid of reference books such as *Exotica* by A.B. Graf published in 1978; *The House plant expert* by D. G. Hessayon published in 1996, as well as internet resources like the United States Dept. of Agriculture Natural Resource Conservation Service web site. <http://plants.usda.gov/java/profile?symbol=CAFI3> (Assessed 06/02/2011).

Sampling sites and method used

A preliminary survey was carried out in 132 nurseries in the 6 administrative districts. Using a table of random digits, 20 were selected for the research. The 20 nurseries covered all the 6 administrative districts. At each nursery open-ended questionnaires were administered to respondents who were operators or nursery attendants. The operators and attendants were interviewed using the content validated questionnaire in English or local dialects like Twi and Ewe.

Data collection and analysis

Data obtained was coded and analyzed using the SPSS statistical program, cross tabulated and presented in the form of frequencies, percentages and figures.

RESULTS

Socio-Economic profile of nurseries

There were more males (80%) than females (20%) engaged in the nursery business. Majority of the respondents (75%) were young and within the 20-49 age range (Figure-1). The ages of the rest (25%) was between 50 and 79. Most respondents surveyed were married (75%) with the rest being single (Figure-2). The business was used as a supplementary source of income for 55% of respondents who worked on part time basis while the rest (45%), used it as their primary source of income and worked full-time. There was greater reliance on a combination of hired and family labour (55%) in the management of the business with only 15% using hired

labour alone (Figure-3). Labour size ranged between 1 and 8.

Production resources profile

Nurseries were put into four groups according to their sizes (Figure-4). The smallest group were less than 2023.5 m² (<0.5 acres) and formed the majority (75%). The group with the largest size ranged between 6070.4 m² and 7689.2 m² (1.5 acres-1.9 acres). Most nurseries (90%) used imported topsoil to raise seedlings with only a small percentage (5%) using top soil *insitu* (Figure-5). Nurseries used both organic and inorganic fertilizers to enhance plant growth. Among those who used inorganic fertilizers, N P K was the most popular (50%), followed by foliar fertilizers (10%). The least used inorganic fertilizer was Ammonia (5%). Twenty five percent (25%) of respondents did not use any inorganic fertilizer. All nurseries used some form of organic fertilizer with the most popular being a combination of cow dung and poultry manure (40%), followed by cow dung only (35%). The least used organic manure was compost and cow dung (5%) (Figures 6a and 6b), however, none of the nurseries composted their manure using recommended standards. Most nurseries (90%) used insecticides to control pests while the rest used both insecticides and fungicides. Fifty percent (50%) used burning to dispose off used pesticide containers while 35% either disposed them off in a refuse dump or in a nearby bush. Only 5% used burying to dispose off used pesticide containers (Figure-7). Left-over pesticides and expired pesticides were however disposed off indiscriminately.

Nurseries had no reliable source of planting materials with 85% of respondents admitting they had difficulty in obtaining planting materials and that they had to rely on their colleagues and philanthropists to improve their stock of plants. Majority of respondents (95%) said they will prefer a certified source from where they can obtain certified planting materials. Vegetative propagation method was the most popular means of propagation used by 75% of respondents compared with 25% who used seeds. Seedlings of various plant types and habits are produced by the nurseries. These included foliage and flowering tree plants, palms, shrubs, herbaceous perennials, cacti and succulents, vines/lianes and lawn grasses. These belonged to 49 families, 79 genera and 110 species. All nurseries surveyed produced at least 15 different genera of plants belonging to various families and none specialized in any particular plant species, genus or family. More herbaceous perennials were cultivated by the nurseries than trees, palms or shrubs. Almost all



nurseries in the Greater Accra region did not show any interest in fruit tree seedlings, except a few which sold either budded citrus or grafted mango. In some districts where the production of fruit tree crops like citrus, mango and oil palm is endemic, nurseries produced and sold only mango, sweet orange or oil palm seedlings in large quantities to farmers. The Araceae family was the most popular and had the most number of genera under cultivation. Table-2 lists sixteen (16) most popular families cultivated by nurseries.

Table-2. Plants produced from 16 most popular families.

Family	Number of genus	Frequency
Araceae	8	13
Liliaceae	7	9
Euphorbiaceae	3	8
Araliaceae	2	6
Marantaceae	2	6
Moraceae	1	5
Palmae	4	4
Commelinaceae	4	4
Fabaceae	3	4
Arecaceae	3	4
Rubiaceae	2	4
Ruscaceae	1	4
Verbenaceae	3	3
Poaceae	3	3
Dracaenaceae	1	3
Begoniaceae	1	3

Location, type of production and category of services offered

Most nurseries surveyed (60%) were located in built up areas. Only 5% were located in developing estates (Figure-8). All nurseries raised and sold their seedlings in pots, polyethylene pots being the most popular. The survey identified such services as landscape design and installation, sale of potted plants, pots, manure, lawn grasses, and ornamental plants as the leading services offered by the nurseries (Figure-9). Among these services, sale of pots, potted plants and lawn grasses were the most patronized and took up 65% of the service. Sale of potted plants only was the least patronized and took up only 10% of the service.

Quantity, source of water and method of irrigation

More nurseries relied more on streams (45%) to supply water to their plants (Figure-10) than pipe borne water (25%) or wells (20%) or waste water (10%) and 65% agreed that the sources of water were not reliable

resulting in heavy loss of plants during the dry season. The main method of irrigation was overhead although 60% of respondents preferred watering-cans to water hose. The quantity of water used by nurseries ranged between 1000-29, 900 l per day but majority of the respondents (70%) used 1000 l of water per day (Figure-11).

Membership of professional bodies and challenges nurseries face

Ninety five percent (95%) of the nurseries did not belong to any association, professional or social, neither were they affiliated with or received any form of help from governmental or non-governmental organizations. The challenges facing nurseries were identified by respondents and ranked in order of importance as follows;

- Lack of financial support
- Lack of avenues for training and development
- Lack of certified planting materials
- Seasonal nature of produce patronage
- Unreliability and unavailability of a cheaper source of water for irrigation.
- Variability in the pricing of produce
- Theft cases
- Pest infestation
- Inadequate space in built up areas

Lack of financial support together with avenues for training and unavailability of certified planting materials were identified as the three most important challenges affecting the industry.

Cross tabulations between size of nursery and age, labour, form of employment, quantity of water used

No clear trend emerged between the ages of respondents and the sizes of nurseries; however, a great proportion of respondents (83.4-100%) of all age groups appeared to favour nursery sizes of 3642.3 m² (0.9 acres) or less. Also the majority (81.8 -100%) of all the three labour types preferred to work in nurseries of 3642.3m² (0.9 acre) size or less, however, where both hired and family labour were used preference was for larger sized nurseries. The form of employment did not seem to influence the size of nurseries they managed as over 88% of both full time and part-time managers preferred 3642.3m² (0.9 acres) or less of nursery size. The results showed a clear trend between size of nursery and the quantity of water used. Over 93% of nurseries of less than 2023.5m² (0.5 acres) used 1000 l of water per day. The highest consumption was recorded in 6070.4m²-7689m² (1.5-1.9 acre) nurseries which used up to 29, 900 L per day (Appendices 2-5).

DISCUSSIONS

Socio-economic profile of nurseries

The high percentage of youth and males engaged in the business conforms to similar findings by Fakayode *et al.*, (2008) who reported an age range of 21-50 and an



85.5% male dominated nursery business in a particular area in Nigeria.

Although a greater proportion of respondents used the business to provide supplementary income to the family budget as observed by Mason (2004), it also served as an important source of employment and provided support for both skilled and unskilled labour, married and single urban dwellers (Fakayode *et al.*, 2008). The higher percentage of respondents engaged on part-time basis also collaborates with Poincelot (2004) who observed that most people in the nursery business work on part-time until the business was profitable.

Production resources profile

The nurseries were quite large as compared with observations by Sellmer and Dana (undated) and also by Fakayode *et al.*, (2008) in Nigeria, who surveyed retail nurseries considered to be small; size ranging between 2.47m² and 123.6m². A small nursery is defined by Diver and Greer (2008) as a nursery with fewer than 500m² of container production or fewer than 1500m² of field production. Such nurseries usually have a small labour force of less than 5. Diver and Greer (2008); Wilkinson and Landis (2009) however consider small size nurseries to be of advantage in the development of the business as it is a good way to gain experience in all phases of production and delivery. Ball (1979); Evans and Turnbull (2004); Diver and Greer (2008); consider container growing the most popular form of nursery production and that it is used to raise about 80% of plants produced in a nursery. The importation of topsoil for potting combined with more frequent watering to maintain potted plants makes the container system of production very labour intensive (Mason, 2004; Bota, 2008). The system also leads to waste of water but requires less space, allowing nurseries to be located in any available place (Mason, 2004; Yeboah, 2008). Although the use of agricultural inputs to improve plant growth were popular among nurseries, Bekoe (2005); Asante *et al.*, (2008) cautioned that inefficient use of pesticides and fertilizers and improper disposal of their containers could compound the already high levels of fresh water pollution.

Quantity, source of water and method of irrigation

The quantity of water used by nurseries per month is quite high compared with estimates provided by Diver and Greer (2008). This may be due to waste associated with the overhead method of irrigation; a method popular with small nurseries (Evans and Turnbull, 2004). The method though cheap leads to uneven distribution of water. This slows down plant growth, encourages spread of diseases, requiring 60-70% more water than the drip method (Diver and Greer, 2008; Obeng, 2008). All the same, Landis and Wilkinson (2009) observed that effective and efficient irrigation is not a matter of deciding on one particular system but rather choosing a type of system which best serves the needs of plants.

The results contradict findings by Mason (2004); Obeng (2008) that nurseries located in urban areas rely more on pipe borne water. It however collaborate findings that the presence of water bodies like streams, lakes, ponds, wells as well as pipe borne water supply close to a nursery site was important consideration in the location of nurseries (Obeng, 2008; Sellmer and Dana, undated). It also confirms observations by Evans and Turnbull (2004) that small nurseries rely on manual means to irrigate their plants.

Sourcing water from water bodies like streams is cheap but may be limited by storage capacity, contamination, and reliability to fulfill needs during the dry season (Sellmer and Dana, undated). This explains why most of the nurseries lose plants during the dry season as their sources of water run out. Adequate water is very important for the success of any nursery business; more so with container plants whose roots are restricted and therefore depend entirely on receiving enough water through irrigation (Landis and Wilkinson, 2009).

Although the study recorded less reliance on pipe borne water (Municipal water) as source for nurseries, Mason (2004) has observed that reliance on pipe borne water to irrigate plants in a nursery is one of the most important limiting factors against expansion of nurseries. Pipe borne water and wells are also expensive and usually have high pH levels (Sellmer and Dana, undated).

Location, category of services offered and membership with professional bodies

Poincelot (2004) advised that the best location for nurseries is in areas experiencing major construction activities and that already built up areas offer less promise. Most nurseries were being run as general purpose businesses, growing a wide range of plants (Mason, 2004) in pots. Mason (2004) advises that nurseries should establish contacts with professional organizations and experts in the field who will guide them in the choice of plants especially those with promise for promotional purposes. Such contacts will also help them obtain training and development to improve production and marketing skills.

Types of plants propagated

Although different ornamental plants were produced by nurseries, similar to findings by Bua *et al.*, (2005) in Uganda, production was centered on only a few popular genera and families. Wilkinson and Landis (2009) observed that the wider the variety of species produced by a nursery, the greater the diversity. This diversity was clearly lacking giving the impression that the nursery business is not well developed. As observed by Diver and Greer (2008), the nursery industry is dependent on the construction industry, and thus the more professional the construction industry, the wider the scope of plants demanded for landscape work. Therefore the wider the variation in plants, the greater will be the diversity nurseries will have to produce, to meet demand. These not-with-standing, nurseries in the urban setting provides a



wide range of ecological as well as socio-cultural benefits such as micro-climate control, increased biodiversity as well as improving the visual quality of urban free space (Lovell, 2010).

Challenges nurseries face

Fakayode *et al.*, (2008) similarly identified inadequate funding as a major constraint to ornamental plant production. Another challenge is the need for a form of certification of plant materials to ensure that nurseries are supplied with high quality planting materials which are also free from pest and diseases to prevent the possible spread of plant pests and diseases in the country.

Cross tabulation between size of nursery and quantity of water used

Water consumption per day by the larger sized nurseries was quite high compared with estimates provided by Diver and Greer (2008) who gave between 569.6 l - 1,515.6 l per day per 4046.9m² (acre). This may be attributed to the poor soil mix used by nurseries in potting (Yeboah, 2008) and the manual overhead method of irrigation adopted by the nurseries (Evans and Turnbull, 2004; Yeboah, 2008).

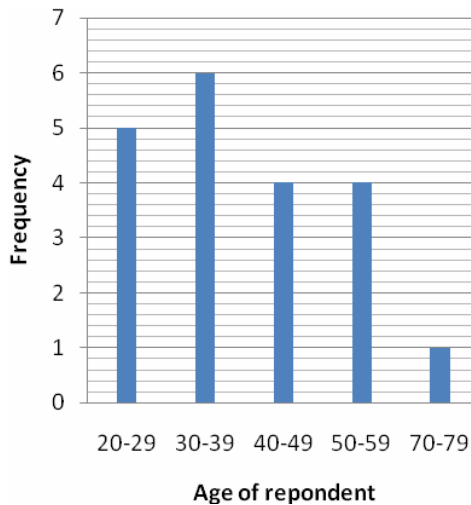


Figure-1. Age distribution of respondents.



Figure-2. Marital status of respondents.

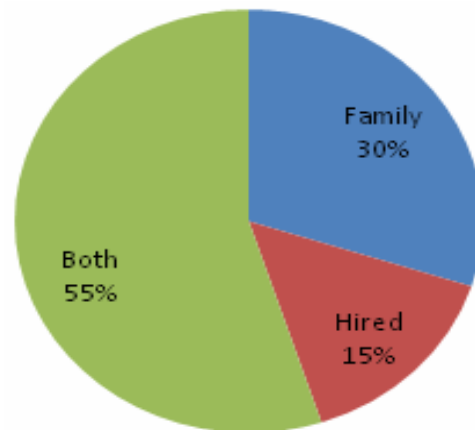


Figure-3. Type of labour favoured by nurseries.

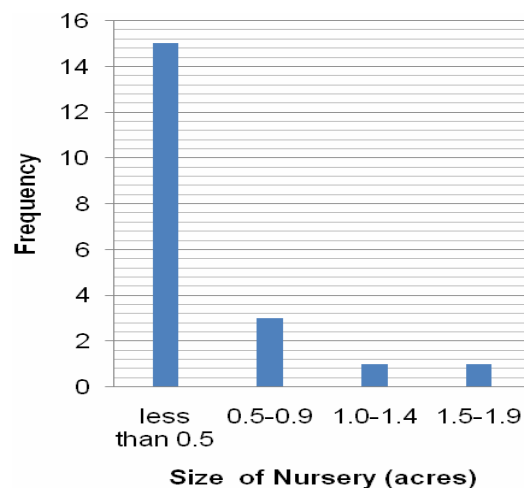


Figure-4. Size of nurseries in acres.

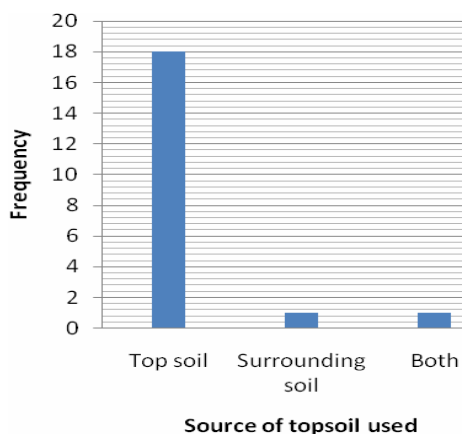


Figure-5. Source of planting media (topsoil).

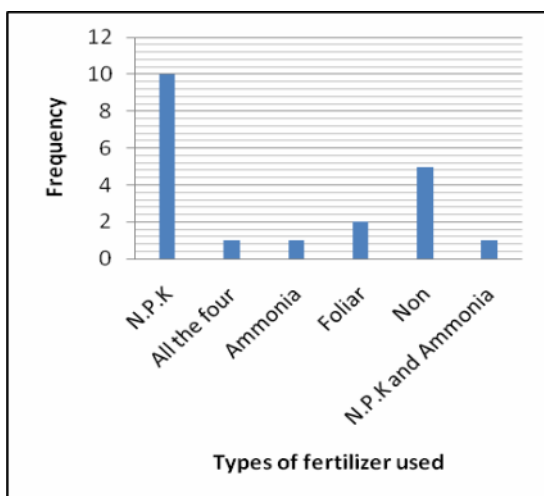


Figure-6(a). Inorganic fertilizers used by nurseries.

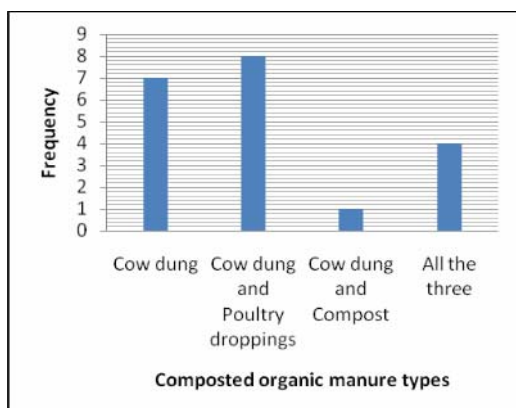


Figure-6(b). Organic fertilizers used by nurseries.

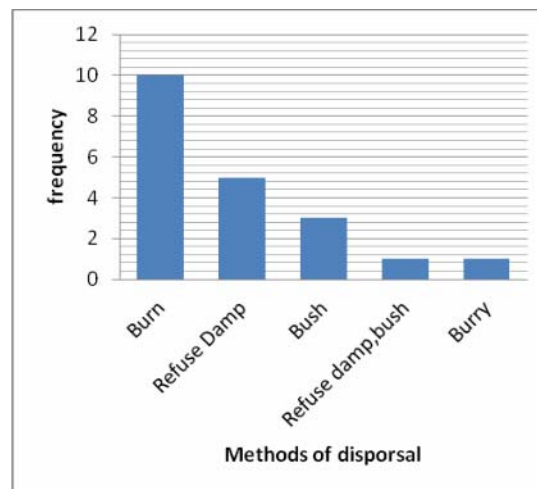


Figure-7. Place and method of pesticide disposal among nurseries.

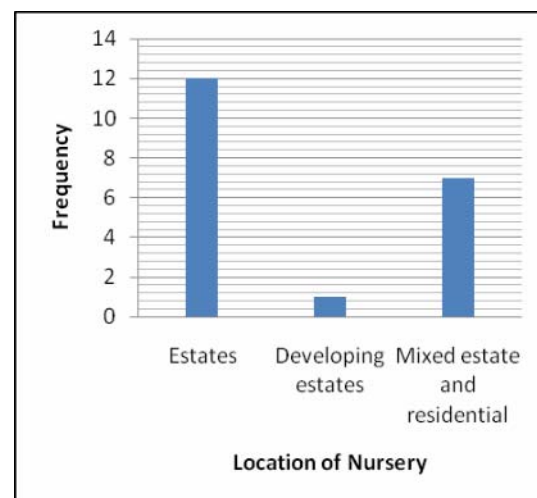


Figure-8. Location of nurseries in the communities.

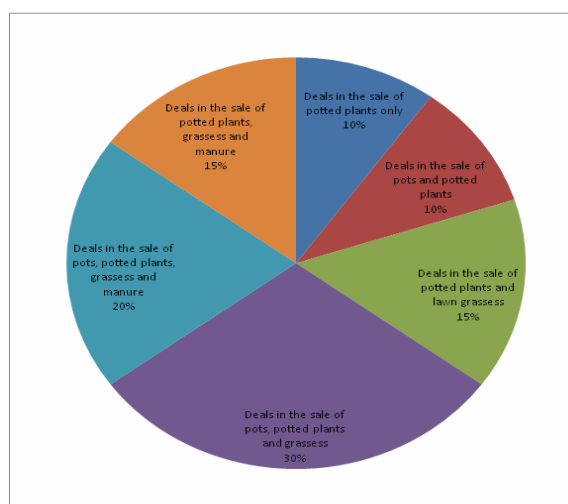


Figure-9. Services offered by nurseries.

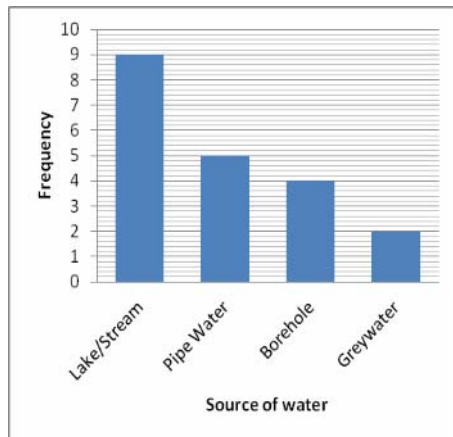


Figure-10. Source of irrigation water.

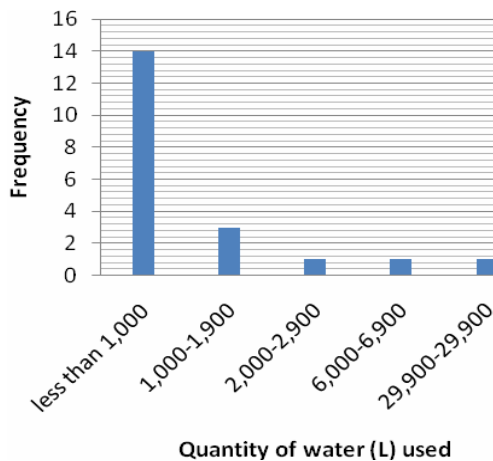


Figure-11. Quantity of water (l) used per day.

CONCLUSIONS

Horticultural nurseries in Ghana serve as the most important avenue for the distribution of ornamental and non-ornamental genetic material to the landscape industry, garden enthusiasts, farmers and also help to improve biodiversity in the urban setting. They serve as a source of employment and investment for the intrepid entrepreneur, creating a vibrant start-up business either for full-time or part-time employment. Young and agile people dominate the business, assuring the industry of a bright future.

The relatively large size of nurseries located in already built-up areas may limit expansion due to inadequate space in such areas. The operation of the nurseries is inefficient in terms of water use and extent of cultivation of plants. Thus, there is little variation in the types of plants grown by the nurseries as production is centered on only 110 species, 79 popular genera and 49 plant families.

The lack of affiliation with government, professional bodies, and non-governmental agencies has not allowed for proper monitoring to streamline their

activities. It has also not provided opportunity for training to improve their skill or the necessary inputs from research to increase variation in the types of plants cultivated. This is against the background that there are genetic materials in the forests of Ghana which are of ornamental value but are yet to receive attention from research and the industry. Moreover unmonitored distribution of plant materials from unknown and uncertified sources could create a health hazard to the developing agricultural industry.

REFERENCES

Anonymous. 2007a. Plant nursery types. Plant Nurseries.us. <http://www.plantnurseries.us/nursery-types.htm>

Anonymous. 2007b. Tree nursery reforestation course. Rural Costa Rica. Rural Tourism in Costa Rica with the Santa Fe Women's Group. <http://www.ruralcostarica.com/tree-nursery.html>

Anka-Ampong J. 2009. Propagation of some tropical trees by the method of hardwood cuttings. B.Sc. Thesis. University of Cape Coast, Ghana. p. 35.

Asante K. A., Quarcoopone T. and Amevenku F.Y. K. 2008. Water quality of the Weijsa Reservoir after 28 years of impoundment. West African Journal of Applied Ecology. Vol. 13

Ball J. B. 1979. Plastic containers and coiling roofs. FAO Corporate Document Repository. Forestry Dept. Unasylva. International Journal of Forestry and Forest Industries. Issue Number 111. <http://www.fao.org/docrep/h2575e/h2575e06.htm>

Bekoe E. O. 2005. Application of a hydrological model in a data-poor tropical West African Catchment: a case study of the Densu Basin of Ghana. PhD Thesis. Cranfield University. pp. 31-32.

Bua B., Akao G., Kakaire S. and Bazaale J. 2005. Constraints to nursery operations and management in Uganda: A rapid rural appraisal (RRA). African Crop Science Conference Proceedings, 7: 721-724. ISSN 1023-070x <http://www.acss.ws/Upload/XML/Research/598.pdf>

Bota M. G. 2008. Potential of horticultural nurseries in Ghana: A case study in the Ga North district of the Greater Accra region. B.Sc. Thesis. University of Cape Coast, Ghana. pp. 6-8, 24.

Diver S. and Greer L. 2008. Sustainable small scale nursery production. ATTRA National Sustainable Agriculture Information Service. 1-800-346-9140. <http://attra.ncat.org/attra-pub/nursery.html>

Evans J. and Turnbull J. W. 2004. Plantation Forestry in the Tropics. 3rd Edn. Oxford University Press, New York, USA. pp. 153-188.



- Fakayode B.S., Adewumi M. O., Rahji M. A. Y. and Jolaiya J. A. 2008. Viability and resource use in ornamental plants nursery business in Nigeria. *Eur. J. Soc. Sci.* 6: 19-28
http://www.eurojournals.com/ejss_6_4_02.pdf
- Geralde V.V. 2009. Nursery Establishment. <http://www.scribd.com/doc/13294265/Nursery-Establishment>
- Hazra P., Ghosh S. K., Maity T. K., Pandit M. K. and Som M. G. 2006. Glossary of Horticulture. Kalyani Publishers, New Delhi, India. pp. 126-136.
- Landis T.D. and Wilkinson K. M. 2009. Water Quality and Irrigation. In: *Nursery Manual for Native Plants: A Guide for Tribal Nurseries*. Dumroese, R.K, T. Luna and T.D. Landis (Eds.). Vol. 1. Nursery Management. Agricultural Handbook 730. Washington, D.C., New York. pp. 1-13.
- Lovell S.T. 2010. Multifunctional urban agriculture for sustainable land-use planning in the United States. *Sustainability*. 2: 2499-2522.
<http://www.mdpi.com/journal/sustainability>
- Mason J. 2004. Nursery Management. 2nd Ed. Land Links Press, Australia. pp. 234, 235.
- Obeng M.F. 2008. Assessment of the activities of fruit crop nurseries: A case study in the Kwahu South and West districts of the Eastern region of Ghana. B.Sc. Thesis. University of Cape Coast, Ghana. pp. 4-5.
- Opeke L. K. 1987. Tropical Tree Crops. Woye and Sons Ltd., Ilorin. pp. 9-20.
- Poincelot R. P. 2004. Sustainable Horticulture-Today and Tomorrow. Prentice Hall, New Jersey, USA. pp. 605-610.
- Sellmer J. C and Dana M. N. 1994. Starting in the Nursery Business. Commercial Horticulture. Dept of Horticulture, Purdue University Cooperative Extension Services. Commercial HO- 212. Rev 3/94.
<http://www.ces.purdue.edu/extmedia/HO/HO-212.pdf>
- Singh J. 2002. Basic Horticulture. Kalyani Publishers, New Delhi, India. p. 65.
- Wilkinson K. M. and Landis T. D. 2009. Planning a Native Plant Nursery. In: *Nursery Manual for Native Plants: A Guide for Tribal Nurseries*. Dumroese, R.K., T. Luna and T.D. Landis, (Eds.). Vol. 1. Nursery Management, Agricultural Handbook 730, Washington, D.C., New York. pp. 1-13.
- Yeboah R. 2008. Effect of different media on the sprouting capacity and growth performance of Anthurium andreanum (Pink Anthurium) stem cuttings. B.Sc. Thesis. University of Cape Coast, Ghana. p. 12.



APPENDIX

Appendix-I: Content validated questionnaire

A survey of horticultural/ornamental nurseries in the Greater Accra and Eastern regions of Ghana. This survey is aimed at providing necessary baseline information on the performance, and the constraints of horticultural nurseries in the study area.

- (1) Name of respondent
- (2) Age of respondentyrs.
- (3) Sex of respondent Male ☐, Female ☐
- (4) Marital status Single ☐, Married ☐, Divorced ☐, Widowed ☐
- (5) Dist./Municipal/Metro. District ☐, Municipal ☐, or Metropolitan ☐
- (6) Name of town/village/city
- (7) Size of nursery (acres)
- (8) Type of labour Family ☐, Hired ☐, or Both ☐
- (9) Occupation of respondent Full-time operator
- Others
- (10) Number of full-time worker(s)
- (11) Number of part time worker(s)
- (12) Salary of full-time worker(s)
- (13) Salary of part time worker(s)
- (14) Source of water for irrigation Lake/Stream ☐, Pipe borne water ☐,
Bore-hole ☐, or Waste water ☐
- (15) Is it reliable Yes ☐, No ☐
- (16) Method of irrigation Sprinkler system ☐, Drip system ☐,
Watering can ☐, or Water hose ☐
- (17) Quantity of water used per day (Liters)
- (18) Location of nursery Within Estates ☐, Developing Estates ☐
- (19) Types of input (excluding labour)
 - (i) Chemical fertilizer N.P.K ☐, Urea ☐, Ammonia ☐, others.....
 - (ii) Organic fertilizer Cow dung ☐, Poultry droppings ☐, Compost ☐
 - (iii) Pesticides Insecticides ☐, Fungicides ☐, Nematicide ☐,
others.....
- (20) How do you dispose off chemical containers
-
- (21) Do you receive help from NGOs ☐, Government (MoFA) ☐,
Universities ☐, Non of the above ☐
- (22) What kind of help do you receive from the above listed agencies in (21) above
.....
.....
.....
- (23) Duration of stay at nursery/Nursery-life of plants (days)
 - (a) Shrubs (Example).
 - (b) Trees and Palms (Example).
 - (c) Herbs (Example).
- (24) Method of propagation
 - (a) By seed ☐ Percentage (%).....
 - (b) By vegetative means ☐ Percentage (%).....
 - (c) Both ☐ Percentage (%).....
- (25) How do you obtain planting materials
 - (a) Sourcing from cloned plants ☐
 - (b) By purchase ☐
- (26) If by purchase, where do you obtain them?.....
- (27) Do you find any difficulty in obtaining planting materials? Yes ☐, No ☐



- (28) Do you need a supplier of planting materials? Yes [], No []
- (29) What kind of soil do you use in as a planting medium? Top soil [],
Soil from site []
- (30) Categorize your enterprise under the following:
- (i) Deals in the sale of concrete and ceramic pots []
 - (ii) Deals in the sale of pot plants []
 - (iii) Deals in the sale of lawn grasses for landscaping []
 - (iv) Deals in the sale of manure []
 - (v) Deals in the sale of other gardening tools/materials []
- (31) If you deal in lawn grasses, give the names of grasses under cultivation for sale?
.....
.....
.....
- (32) Quantity produced (jute bags)
- (33) Do you need any form of training? Yes [], No []
- (34) Training in what form?
.....
.....
- (35) Do you need financing? Yes [], No []
- (36) Do you need any equipment that will assist you in the enterprise? Yes [], No []
- (37) Specify the kind of equipment/implement that you need?
.....
.....
- (38) What are your constraints/problems in the enterprise?
.....
.....
- (39) How do you rate this enterprise? Lucrative [], Not lucrative []
- (40) Daily expenditure (GH¢)
- (41) Daily sale (GH¢)
- (42) Are you in any association? Yes [], No []
- (43) If yes, what is the name of the association(s)?
.....
.....
- (44) If no, why?
.....
.....
- (45) Containers in use

Type of container	Diameter of container	Percentage (%)
(a) Sachet water polyethylene		
(b) Transparent polyethylene		
(c) Black polyethylene		
(d) Metal cans		
(e) Plastic cans		
(f) Concrete and Ceramic pots		

- (46) Kind of plants under cultivation:

	Classification (annuals, biennials, or perennials)	Common name	Botanical name
Shrubs			
Trees and palms			
Herbs			

**Appendix-II. Age of respondents and size of nurseries.**

Age of respondents		Size of nursery in acres				
		< 0.5	0.5-0.9	1.0-1.4	1.5-1.9	Total
20-29	Count % within age of resp.	480%	00.0%	120.0%	00.0%	5100.0%
30-39	Count % within age of resp.	466.7%	116.7%	00.0%	116.7%	6100.0%
40-49	Count % within age of resp.	4100.0%	00.0%	00.0%	00.0%	4100.0%
50-59	Count % within age of resp.	250.0%	250.0%	00.0%	00.0%	4100.0%
70-79	Count % within age of resp.	1100.0%	00.0%	00.0%	00.0%	1100.0%
Total	Count % within age of resp.	1575.0%	315.0%	15.0%	15.0%	20100.0%

Appendix-III. Labour type and size of nursery.

Type of labour adopted		Size of nursery in acres				
		< 0.5	0.5-0.9	1.0-1.4	1.5-1.9	Total
Family	Count % within type of labour	466.7%	233.3%	00.0%	00.0%	6100.0%
Hired	Count % within type of labour	266.7%	133.3%	00.0%	00.0%	3100.0%
Both	Count % within type of labour	981.8%	00.0%	19.1%	19.1%	11100.0%
Total	Count % within type of labour	1575.0%	315.0%	15.0%	15.0%	20100.0%

Appendix-IV. Form of employment and size of nursery in acres.

Occupation of respondents		Size of nursery in acres				
		< 0.5	0.5-0.9	1.0-1.4	1.5-1.9	Total
Full-time	Count % within type of labour	777.8%	111.1%	111.1%	00.0%	9100.0%
Others	Count % within type of labour	872.8%	218.2%	00.0%	19.1%	11100.0%
Total	Count % within type of labour	1575.0%	315.0%	15.0%	15.0%	20100.0%

Appendix-V. Size of nursery and quantity of water used in liters.

Quantity of water in liters						
Size of nursery in m ² < 1000 1000-1900 2000-2900 6000-6900 29000-29900 Total						
<50m ²	Count	14	1	0	0	15
	% within size	93.3%	6.7%	0.0%	0.0%	100.0%
50-90	Count	0	2	1	0	3
	% within size	0.0%	66.7%	33.3%	0.0%	100.0%
100-140	Count	0	0	0	1	1
	% within size	0.0%	0.0%	0.0%	100%	100.0%
150-190	Count	0	0	0	1	1
	% within size	0.0%	0.0%	0.0%	100.0%	100.0%
Total	Count	14	3	1	1	20
	% within size	70.0%	15.0%	5.0%	5.0%	100.0%