International Journal of Advanced Engineering and Management Research

Vol. 4, No. 05; 2019

ISSN: 2456-3676

PRODUCTION AND SUPPLY OF TRADITIONAL VEGETABLE LEAVES IN THE CITY OF COTONOU

NASSI Karl Martial[1], MAGNON Zountchégbé Yves[2], EFIO Sylvain[2]
[1]School of Horticulture and Spatial Planning (EHAEV), National University of Agriculture (UNA), BP 43 Kétou, Benin
[2]Ecole of Economics, Socio-Anthropology and Communication for Rural Development / Faculty of Agricultural Sciences / University of Abomey-Calavi (Benin)

ABSTRACT
The production and supply of traditional leafy vegetables has been studied in the city of Cotonou to contribute to a better knowledge of traditional leafy vegetables and their mode of production. Data were collected from socio-economic surveys based on structured interviews with three categories of actors, namely gardeners, traders and consumers. A total of 209 people were interviewed, including 130 traders, 39 consumers and 40 gardeners. Data were analyzed using descriptive statistical tools such as frequencies, response rates and averages. From the results obtained, it emerges that 06 main traditional leafy vegetables are grown in the city of Cotonou. Each gardener produces an average of 2016 m2 of Amaranthus cruentus, 5424 m2 of Solanum aethiopicum, 1362 m2 of Vernonia amygdalina, 1548 m2 of Ocimum gratissimum, 1020 m2 of Celosia argentea and 360 m2 of Hibiscus sabdariffa. Finally, the various supply routes for traditional leafy vegetables are the market garden sites, the small markets of the sub-municipalities of Cotonou, the markets of the municipalities bordering Cotonou such as Ouidah, Abomey-Calavi and Sèmè-Kpodji and the international market Dantokpa which feeds all local markets in the supply of traditional leafy vegetables.

Keywords: urban agriculture, market gardening, supply circuit, leafy vegetables, Cotonou.

1. INTRODUCTION
The African continent has a great diversity of food plants (Okigbo, 1977, Okigbo et al., 2000). These plant genetic resources are the basis of global food security. They are the raw material that farmers use to improve the quality and productivity of crops (FAO, 2000). Among these phylogenetic resources are traditional leafy vegetables (FAO, 2002). Traditional leafy vegetables are among the species of great diversity and multiple use (Attèrè, 1999). Thus, they play an important role in the diets of all populations in the world, particularly in Africa, Asia and Oceania, where they provide the bulk of nutritional and medicinal requirements (Batawila et al., 2005). In fact, traditional or indigenous leafy vegetables, as opposed to exotic vegetables from temperate countries, are generally richer in mineral elements, vitamins and nutritional factors, without presenting any crippling antinutritional factors (Bailey, 2003). In addition to being easily accessible to poor individuals and households, they generate income in a relatively short time compared to cereals (Margiotta, 1997). The uses of these species are also food and medicinal. It is undoubtedly for these various reasons that the International Institute for the Management of Phylogenetic Resources (IPGRI) has been concerned by the issue by organizing several international workshops on the subject and by setting up international research networks (Attèrè,

Vol. 4, No. 05; 2019

ISSN: 2456-3676

1999). In Benin, a significant number of plants are consumed as vegetables. According to Dansi (2008), 187 species are consumed of which 47 are cultivated and 140 are still in the wild. Eighteen (18) of these vegetables are of national and regional interest (Dansi, 2008). And among these 18 traditional leafy vegetables *Amaranthus cruentus, Celosia argentea, Solanum aethiopicum, Vernonia amygdalina, Ocimum gratissimum, Corchorus olitorius, Hibiscus sabdariffa, Talinum triangulare, Vigna unguiculata, Manihotesculenta, Vitex doniana, Moringa oleifera, Ipomoea batatas, Launaea taraxacifolia* are regularly found. Of national importance, they are sold on local markets and come mainly from market gardening sites and different localities of the country. Among these localities, the city of Cotonou, the economic capital of the country, is a major pole, both in terms of production and supply. But despite its obvious utility, very little research is concerned with this sector, which is still seen as embryonic and minor (Kpéki, 2008). The present study aims to overcome this shortcoming by analyzing the system of production and supply of leafy vegetables in the city of Cotonou.

The city of Cotonou extends on both sides of a channel that connects Lake Nokoué and the Atlantic Ocean. It is limited to the North by the municipality of Sô Ava (Lake Nokoué), to the South by the Atlantic Ocean, to the East by the municipality of Sèmè Podji, and to the West by the municipality of Abomey-Calavi. The choice of Cotonou as a study area is therefore linked to the fact that it is the first city in the country from a demographic point of view at the same time as it includes a large number of market gardening sites. It is in many ways a pole of consumption, attraction and transit par excellence.

Figure 1: Geographical location of the study area

2. METHODOLOGICAL APPROACH

The data collection was done on the different market gardening sites as regards the market gardeners, in the markets and their homes respectively for traders and consumers. Socio-

Vol. 4, No. 05; 2019

ISSN: 2456-3676

economic surveys were conducted using questionnaires and interview guides, which gathered the representations and practices of these three categories of actors. The interviews were all conducted individually. A total of 209 people were interviewed, including 130 shopkeepers, 39 consumers and 40 market gardeners. The information collected concerns the entire production and supply system, namely mainly cultivated and consumed products, cultural practices, production and supply routes and routes, the various categories of actors and the relations between them. existing between them.

The counting was done manually using the Excel spreadsheet. The results obtained were presented in the form of tables and graphs. Specifically for producers, response rates for indicators such as crop species, distribution of producers by age, sex, level of education and number of years of experience, calculated using the formula of Seastrom (2001):

$$\mathbf{T = \frac{S}{N} \times 100}$$

With T: respondents' response rate (%), S: number of people who responded to a given activity and N: number of people interviewed

The data collected, cross-checked and analyzed, made it possible to highlight the phenomenon under study

3. RESULTS

3.1. Production of traditional leafy vegetables

3.1.1. Types of traditional leafy vegetables produced

In the city of Cotonou, 6 main traditional leafy vegetables are grown by market gardeners. It is:

Amaranthus cruentus (Photo 1): It is one of the most cultivated vegetables on the market gardening sites of Cotonou. It exists in two forms, a red and a green; the last being the most frequent and the most cultivated. After two weeks of nursery, it is transplanted on boards already erected at 20 x 20 cm spacings. Its production time is 3 weeks. These boards are watered twice a day. Amaranth is harvested from one harvest per production cycle and is produced 8 times a year. Its harvest is done by tearing or by successive cutting of the plants. It should be noted here that unlike other traditional leafy vegetables, Amaranth is insensitive to gall-nematodes found in all soils of southern Benin (Photo 1).

Celosia argentea (Photo 2): It is one of the vegetables grown on the market gardening sites of Cotonou. It exists in two forms that are essentially distinguished by the type of leaves. After two weeks of nursery, it is transplanted on already erected planks at intervals of 10 times 10 cm to 20 times 20 cm. Its production time is 3 weeks. These boards are watered twice a day. Celosia argentea is subject to 02 harvests per production cycle and is produced 5 times a year. Its harvest is done by successive cutting of the plants.

Solanum aethiopicum (Photo 3): This vegetable is one of the most cultivated vegetables on the market gardening sites of Cotonou. After three weeks of nursery, it is transplanted on the boards already erected at larger spacings up to 50 times 50 cm. Its production time is two and a half months. These boards are watered twice a day and after two months, once a day. Solanum

Vol. 4, No. 05; 2019

ISSN: 2456-3676

aethiopicum is harvested 5 times per production cycle and is produced once a year. Its harvest is done by successive cutting of the plants.

Vernonia amygdalina (Photo 4): This vegetable is one of the most cultivated vegetables on the market gardening sites of the city of Cotonou. It is propagated by cutting (part of a plant that is planted with roots) on planks already erected at larger spacings up to 50 times 50 cm. Its production time is two and a half months. These boards are watered twice a day and after two months, once a day. It is harvested 5 times per production cycle and is produced once a year. Its harvest is done by successive cutting of the plants.

Occimum gratissimum (Photo 5): It is one of the most cultivated vegetables on the market gardening sites of Cotonou. After three weeks of nursery, it is transplanted on planks already erected at intervals of 40 times 40 cm. Its production time is two and a half months. These boards are watered twice a day and after two months, once a day. Ocimum gratissimum is also harvested 5 times per production cycle and is produced once a year. Its harvest is done by successive cutting of the plants.

Hibiscus sabdariffa (Photo 6): This is a vegetable grown on the market gardening sites of Cotonou. After 02 weeks of nursery, it is transplanted on the boards already erected at spacings of 20 times 20 cm. Its production time is two months. These boards are watered twice a day. Hibiscus sabdariffa is also harvested 3 times per production cycle and is produced twice a year. Its harvest is done by successive cutting of the plants.

Photo 1: *Amaranthus cruentus*

Photo 2: Celosia argentea

Photo 3: *Solanum aethiopicum*

Photo 4: *Vernonia amygdalina*

Photo 5: *basil welcome*

Photo 6: *Hibiscus sabdariffa*

3.1.2. Proportion by crop types

Figure 2 shows the proportion by crop type. From the observation of Figure 2, it appears that the most common leafy vegetables grown on market gardening sites by producers are: Solanum aethiopicum (19%), Vernonia amygdalina (19%), Ocimum gratissimum (19%), Amaranthus

Vol. 4, No. 05; 2019

ISSN: 2456-3676

cruentus (18%). Then come Celosia argentea (15%) and Hibiscus sabdariffa (12%). This state of affairs is explained by the fact that these vegetables are the most demanded by consumers.

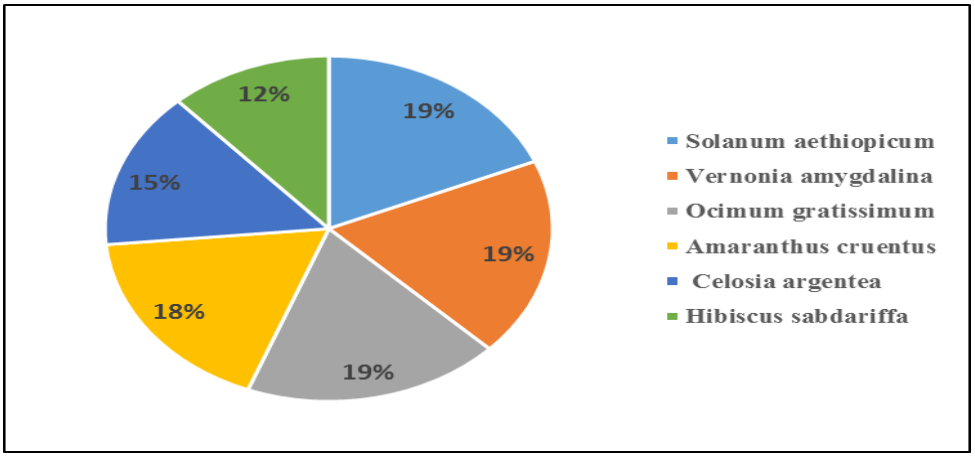

Figure 2: Proportion of producers by crop type
Source: Field Survey, December 2018

4.1.3. Period of production and availability of traditional leafy vegetables

The production of leafy vegetables is possible throughout the year (Table I). The analysis of the table shows that during the small rainy season that runs from mid-September to mid-November, market gardeners produce a large amount of traditional leafy vegetables. This is related to the fact that in the rainy season, we witness the flood of the Ouémé river.

Table I: Agricultural calendar of traditional leafy vegetables

Month		J	F	M	A	M	J	Ju	A	S	O	N	D
Climate Calendar													
Legend			Dry season						Rainy season				
Agricultural calendar	*Amaranthuscruentus*												
	Celosia argentea												
	Solanumaethiopicum												
	Vernonia tonsillitis												
	Ocimumgratissimum												
	Hibiscus sabdariffa												
Legend			Period of plenty				Period moderately abundant			Poorly abundant period	Poorly abundant period		

Source: *Field Survey, December 2018*

Vol. 4, No. 05; 2019

ISSN: 2456-3676

4.1.4. Sociodemographic profile of production actors

On the market gardening sites, men are the most represented. This situation is linked to the unique land pressure linked to access to land suitable for market gardening activities in the city of Cotonou and in southern Benin in general (Figure 3). With regard to educational attainment, 30% of producers are uneducated, 40% have primary education, 20% have secondary education and 10% have tertiary level (Figure 4). As for age, 20% of producers are under 30, 47.5% are under 40, 22.5% are under 50, and 10% are under 60 years of age. This situation is linked to the fact that market gardening is mainly practiced by young people under the age of 40 (Figure 5). In terms of experience, 25% of traditional leafy vegetable growers have less than 10 years of experience, 40% have less than 20 years of experience, 20% have less than 30 years of experience and 15% have less than 40 years of experience. The predominance of young people in market gardening is explained by the fact that over 40 years of physical effort is no longer bearable by market gardeners (Figure 6).

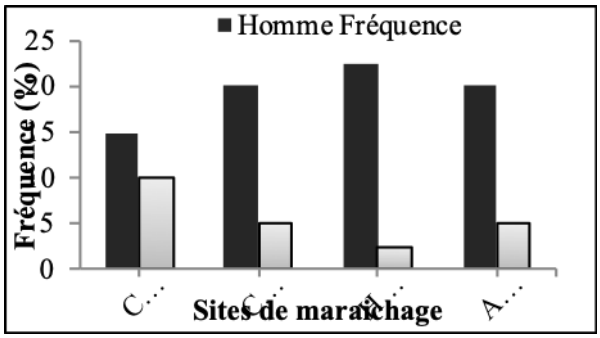

Figure 3: *Distribution of producers by sex*

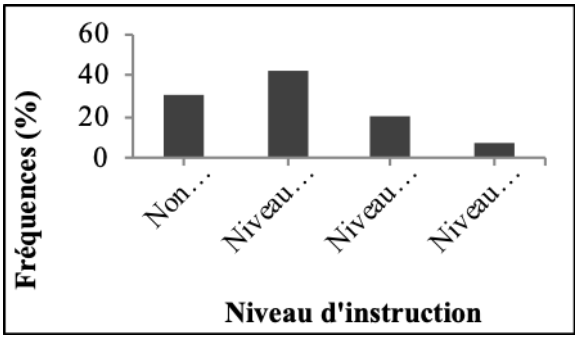

Figure 4 : *Distribution of producers by level of education*

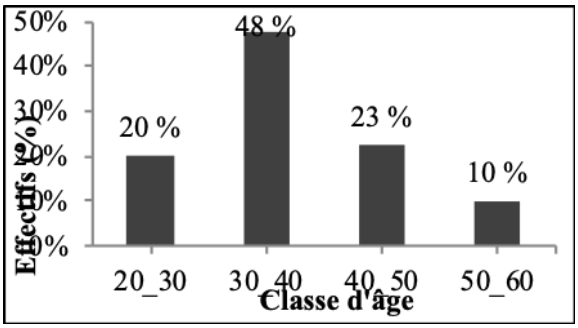

Figure 5: *Distribution of producers by age group*

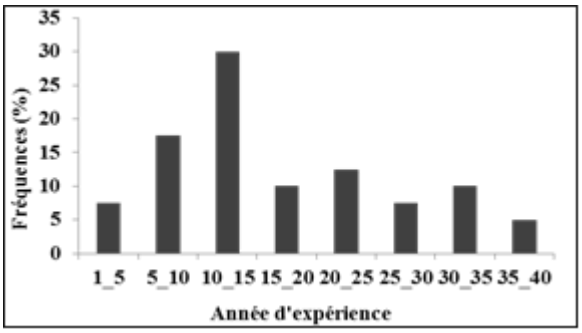

Figure 6: *Producers' year of experience*

***Source**: field survey, December 2018*

3.2. Socio-economic aspects of production

4.2.1. Average cost of producing a traditional leaf vegetable board according to the seasons

The cost of producing a traditional leaf vegetable board, with an average surface area of 6 m2, varies from one producer to another and from one site to another. This takes into account the

Vol. 4, No. 05; 2019

ISSN: 2456-3676

expenditures made, from seed supply to sale, ie the cost of seeds, labor and inputs. Table III shows the cost of producing a board. The analysis in Table II shows that the production cost of a plank of Vernonia amygdalina of Solanum aethiopicum of Hibiscus sabdariffa and Ocimum gratissimum varies from 500 to 1000 FCFA in the rainy season and is above 1000 FCFA in the dry season. Similarly, the production cost of a plate of Celosia argentea and Amaranthus cruentus is less than 500 FCFA in the rainy season and is between 500 and 1000 FCFA in the dry season.

Table II: Cost (FCFA) of production of a traditional leaf vegetable board

	Coût en saison pluvieuse (FCFA)			Cost in rainy season (FCFA) Cost in dry season (FCFA)		
especes	< 500	500_1000	> 1000	< 500	500_1000	>1000
Vernonia amygdalina	0,00	36,39	19,44	0,00	18,10	32,75
amaranth red	66,53	5,56	0,00	18,10	54,39	0,00
Solanum aethiopicum	0,00	36,39	25,69	0,00	18,10	47,72
Hibiscus sabdariffa	6,25	57,50	0,00	5,88	12,22	47,72
Celosia argentea	60,28	13,89	0,00	18,10	54,39	6,67
basil welcome	20,14	51,94	0,00	18,10	5,88	41,84

Source: *Field Survey, December 2018*

3.2.2. Evaluation of the production of traditional leafy vegetables

Amaranthus cruentus, Ocimum gratissimum, Vernonia amygdalina, and Solanum aethiopicum are the four most common traditional leafy vegetables grown in Cotonou. Solanum aethiopicum is a favored and highly valued vegetable for growers, as it is not only harvested multiple times per production cycle, but also has a higher selling price than other traditional leafy vegetable varieties. The traditional leafy vegetables are transplanted on planks of 6m long and 1m wide so on an area of 6m2. The selling price of a traditional leafy vegetable board varies seasonally. The traditional leafy vegetable board is expensive during the short rainy season. This brings the market gardeners of the city of Cotonou to grow a large amount of traditional leafy vegetables at this time. Table IV shows the number of planks produced, the production cycle and the selling prices of a traditional leafy vegetable board.

The analysis in Table III shows that traditional leafy vegetables such as Solanum aethiopicum, Amaranthus cruentus, Ocimum gratissimum and Vernonia amygdalina are the most widely grown vegetables in Cotonou respectively. Hibiscus sabdariffa and Celosia argentea are the least cultivated. In addition, the board of traditional leafy vegetables are expensive in the rainy season than in the dry season.

Vol. 4, No. 05; 2019

ISSN: 2456-3676

Table III: Number of boards produced and selling price of a traditional leaf vegetable board according to the seasons in FCFA

LFT	NDPCP	NPA	SP (m^2)	STAP (m^2)	PVPSP	PVPSS
Amaranthus cruentus	42	336	6	2016	987,75	754
Celosia argentea	34	170	6	1020	945,5	851,75
Hibiscus sabdariffa	30	60	6	360	1124,75	891,25
Ocimum gratissimum	258	258	6	1548	1204	1024,75
Solanum aethiopicum	452	904	6	5424	2437,25	1999,75
Vernonia amygdalina	227	227	6	1362	1274,75	1099,75

Legend: NDPCP = Number of boards per production cycle; NPA = Number of boards per year; PVPSS = Sale price of a vegetable board X in dry season in FCFA; PVPSP = Sale price of a vegetable board X in rainy season in FCFA; SP = Area of a board; STAP = Total annual area of planks

Source: *Field Survey, December 2018*

3.3. Supply circuit of traditional leafy vegetables

Traditional leafy vegetables follow a journey of exploitation in the hands of consumers through different circuits. These traditional leafy vegetables come from the various market gardening sites in the city of Cotonou for the local markets of the city. The tradesmen come to stock up in the gardens. Market gardening sites are generally located close to markets, resulting in low transport costs and easier access. Traditional leafy vegetables that are not cultivated in Cotonou like Talinum triangulare, Vigna unguiculata, Manihot esculenta, Vitex doniana, Moringa oleifera, Ipomoea batatas, Launaea taraxacifolia come from the following localities, more or less distant: Cococodji, Hevié, Abomey, Ouidah, Pahou and Dogbo. These vegetables are also sourced from the large international Dantopka market, which supplies all local markets in Cotonou with traditional leafy vegetables. Merchants are forced to move to these different places. These supply areas are more than 25 km distant for Pahou, 41 km for Ouidah, 139 km for Abomey, 124 km for Dogbo, 15 km for Hevié. Figure 7 shows the different supply routes for traditional leafy vegetables in the local markets of the city of Cotonou.

The analysis in Figure 7 shows that the traditional leafy vegetables that are marketed in the local markets of the city of Cotonou come from the various market gardening sites of the city and the following surrounding localities like Cococodji, Hevié, AbomeyCalavi, Ouidah , Pahou and Dogbo.

Vol. 4, No. 05; 2019

ISSN: 2456-3676

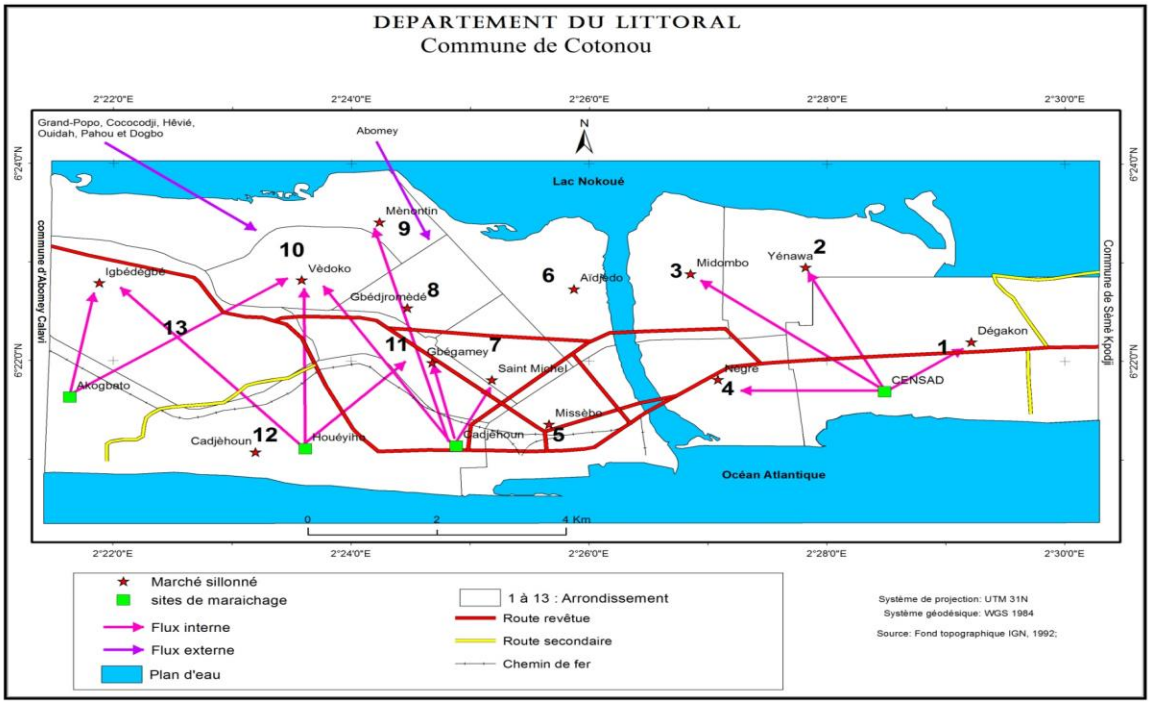

Figure 7: Carte du circuit d'approvisionnement en légumes feuilles traditionnels

Figure 7: Map of the traditional leafy vegetable supply circuit

4. DISCUSSION

Although seasonal, the production of traditional leafy vegetables occupies a significant number of the active population of Cotonou. Market gardening is a generator of jobs and income and solves enormous problems of unemployment and food insecurity faced by the population. This trend confirms the socio-economic surveys conducted in 2000 by the Market Gardening Support Project in southern Benin, which show that around 85,000 direct and indirect jobs were created in the market gardening sector in this region of the country (PDAF, 2000). Traditional leafy vegetables contribute to the development of households by the income they earn from them. Similarly, they allow households to feed themselves throughout the year. These results confirm the studies carried out by Margiotta (1997) who also show that market gardening activities can feed families all year long, since the supply period for leafy vegetables is longer for urban agriculture. that is 9 months out of 12. In Cotonou, women are poorly represented in traditional leafy vegetable producers. This is linked to the strong pressure on the land that leads to their virtual exclusion from access to land in this area. In addition, 40% of producers have primary level. This is explained by the fact that in Cotonou, market gardening absorbs some of the school dropouts. Thus, 47.5% of producers are under 40 years of age. In terms of experience, 40% have less than 20 years of experience. This is explained by the fact that beyond 40 years the physical effort is no longer bearable by market gardeners. These results confirm those of Adegbola, (2007) who reveal that market gardening is an activity practiced by young people. A total of 06 traditional leafy vegetables are grown on the Cotonou market gardening sites. These are:

Vol. 4, No. 05; 2019

ISSN: 2456-3676

Amaranthus cruentus grown by 18.78% of producers, Solanum aethiopicum 18.78%, Vernonia amygdalina 18.78%, Ocimum gratissimum 18.78%, Celosia argentea 15.02% and Hibiscus sabdariffa 9.86 %. This variation is probably related to the preference diversity of consumers, prices and seasonality of traditional leafy vegetables. Before the cultivation of traditional leafy vegetables, the market gardeners of the city of Cotonou proceed first to the realization of a nursery that they cover with branches. This confirms the research work of Mitchozounou (2008) who claims that market gardeners make a nursery that he covers with branches, and a few weeks after sowing, the young seedlings are transplanted onto planks. Vernonia amygdalina, Ocimum gratissimum and Solanum aetyopicum are produced once a year and have 5 crops per production cycle. Amaranthus cruentus is a single crop and is produced 8 times a year. Hibiscus sabdarifa is produced twice a year and has 3 crops per production cycle. Celosia argentea is produced 5 times a year and has 2 crops per production cycle. This is due to the fact that the production cycle of traditional leafy vegetables varies from one vegetable to another. Generalized soil infestation by root-knot nematodes makes susceptible except Amaranthus cruentus. These nematodes significantly weaken the plants and reduce their production. This trend confirms the results of Amoussougbo's (1993) research, which shows that all species are susceptible to root-knot nematodes except Amaranthus cruentus. Soil fertilization is done with NPK fertilizer and urea with and / or compost and poultry droppings. These results are consistent with that found by Lanmafanpkotin (2007) which shows that soil fertilization is done with NPK fertilizer and urea. The inputs used by producers come from the input market. Similarly, the seeds used by traditional leafy vegetable growers come from their own plantation and those of their friends or neighbors. These results are consistent with those of Seck (1997) who showed that in many African countries, self-production remains the main means for producers to use in terms of seed supply. In addition Cotonou market gardeners use pesticides to fight against certain pests and diseases of crops. These results are in line with that of (Assogba, 2001) which states that in the Atlantic and Littoral Departments, more specifically in the city of Cotonou, cypercal is one of the insecticides used to protect vegetable crops. In Cotonou, the doses of pesticides applied by treatment are generally higher than those recommended (Attèrè, 1999). The watering of crops is done by the watering can by 82% of producers and 18% of producers

CONCLUSION

This study, conducted in the city of Cotonou looked at three categories of actors namely market gardeners, shopkeepers and consumers. Men are at the center of activities related to the production of traditional leafy vegetables. The rate of intervention of women in the production of traditional leafy vegetables is low. Among the traditional leafy vegetables that are marketed in the local markets of the city of Cotonou, 6 traditional leafy vegetables are grown by the market gardeners in Cotonou. These are: Amaranthus cruentus, Celosia argentea, Solanum aethiopicum, Vernonia amygdalina, Ocimum gratissimum and Hibiscus sabdariffa. The different circuits of origin of the traditional leafy vegetables in the local markets of the city of Cotonou are Cococodji, Hevié, Abomey, Ouidah, Pahou, Dogbo, as well as international market Dantokpa which also supplies all the local markets with traditional leafy vegetables. The surrounding

Vol. 4, No. 05; 2019

ISSN: 2456-3676

municipalities are not neglected in terms of supply of the city of Cotonou and must be taken into account in all programs to promote this activity in the country's economic capital.

BIBLIOGRAPHIC REFERENCES

Adegbola P., 2007. Production and marketing of local vegetables in urban and peri-urban areas in Benin: 21-29 p.

Adjatin A., 2006. Contribution to the study of the diversity of traditional leafy vegetables consumed in the department of Atacora in Togo: 19-31 p.

Amoussougbo Y., 1993. Survey on the use of pesticides in vegetable crops in southern Benin and experimentation of three nematicides in the control of root-knot nematodes. Thesis of Agricultural Engineer, Faculty of Agricultural Sciences, UNB-Benin: 50 p.

Assogba F., 2001. Preliminary results on the valorization of some agroindustrial waste in market gardening, Case of the city of Cotonou. In: Proceedings of the Scientific Workshop 2, South-Central Regional Program of Benin, 2001: 16-26 p.

Attere F., 1999. Introductory Note to the Workshop on Traditional Leafy Vegetables: 71 p.

Batawila, K., S. Akpavi, K. Wala, M. Kanda, R. Vodouhe, K. Akpagana, 2005: Diversity and management of picking vegetables in Togo. In african journal of food agriculture nutrition and development. 21 p.

Bailey., 2003: Medicinal use of traditional leafy vegetables: 87 p.

Chidikofan., 2007: Soil management study: Case of the city of Cotonou: 28 p.

ChweyaJ.A., AndEyzaaguire P., 1999. International plant genetic resources institute via delle settechiese: 122 p.

Dansi S., 2008. Biodiversity of traditional leafy vegetables consumed in Benin: 92 p.

Diouf O., 2007. Biodiversity of traditional leafy vegetable in Senegal: 170 p.

Eyzaaguire P., 1999. The biodiversity of traditional leafy vegetables, IGRI Rome (Italy): 68 p.

FAO, 2000. The State of Food and Agriculture: 59-74 p.

FAO, 2002. Urban and peri-urban agriculture. Virtual conference: 102 p.

FAO., 1996. Expanding the food resource base through native plants: 68 percent.

Hessou., 1995. Support for the intensification and production of vegetable and fruit crops. Study of strategies to develop nutritionally. FAO / TCP / BEN / 4553 (A), MDR, Benin.

Kpèki A., 2008. The cultivation of amaranth: tropical leaf vegetable: 27 p.

Vol. 4, No. 05; 2019

ISSN: 2456-3676

Lanmafanpkotin G., 2007. Fight against poverty in Benin: the market gardening program and its impact on the urban environment: 35-52 p.

Margiotta M., 1997. Development of production in the urban and peri-urban perimeters of Mauritania: 61 p.

Mbaye., 2000. Plan for promoting vegetable and fruit crops in Benin. FAO / TCP / BEN / 4553.

Mitchozounou M., 2008. The cultivation of amaranth in Cotonou 19-31 p.

Okigbo. 1977. Vegetables intropical Africa. A paper presented at a consultation meeting, Arusha, Tanzani 133 p.

Okigbo et al., 2000. Contribution to the study of the diversity of traditional leafy vegetables consumed in the Atacora department of Togo: 111 p.

PDAF., 2000. Feasibility study: market gardening project in southern Benin 230 p.

Sanny S., 2002. Contribution to the improvement of yields and the quality of vegetable crops (detection of biocontaminants and toxic agents): Case of the market gardening perimeter of Houéyiho in Cotonou. Memory for obtaining the Engineer's Diploma of Works. CPU / UAC, Benin.

Seastron., 2001: Response rate as a data quality management tool. Proceedings of the 2001 Statistics Canada Symposium 324 p.

Seck., 1999. Traditional Leaf Vegetables: An Irreplaceable Food Supplement 53 p.

Stevels H., 1990. Leaf vegetable from Cameroon: An agrobotanical study: 52-97 p.

Tim H., 2005. Using Traditional Leafy Vegetables to Improve Soil Quality: 96%

Tyrilly D., 1999. Technology of traditional leafy vegetables: 24-57 p.