Int.J.Curr.Microbiol.App.Sci (2017) *6*(6): 3328-3340

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 6 Number 6 (2017) pp. 3328-3340**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2017.606.391

Cassava (*Manihot esculenta* Crantz) Production Constraints, Farmers' Preference Criteria and Diversity Management in Togo

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Keywords

Cassava, constraints, preference criteria, diversity management, Togo

Article Info

Accepted:
03 April 2017
Available Online:
10 June 2017

A B S T R A C T

Cassava (*Manihot esculenta* Crantz) is among the main food crops of Togo. In the country's traditional agriculture, a great diversity a varieties exist and need to be preserved. Moreover, the production constraints that can be solved through breeding of novel varieties and the farmers' varietal preference criteria are not yet well documented. To fill these gaps of knowledge a survey was conducted in 40 villages distributed throughout the country using participatory approach (individual survey and group discussion with questionnaire). The first 5 most important constraints at national level were: the attacks of insects, low marketable value of cassava roots, leaves and stem diseases (mainly viruses and bacterial diseases), and root rots. The most important varieties preference criteria were high productivity, early maturity, the good poundability, resistance to diseases, good quality of gari and good in ground post maturity conservation. The number of varieties maintained per household varies from 1 to 8 with 2 in average. No seed is used as planting material. The crop is propagated only by stem cuttings and the farmers' knowledge on the floral biology, diseases and their propagation, the use of botanical seeds to generate plantlet, the contribution of the reproductive biology to the enhancement of the existing diversity and to the development of new cultivars is very low. No strategy is put in place for the preservation of the diversity and its sustainable use. The study recommends intensive education and sensitization of the farmers as well as their organization for cassava biodiversity conservation in Togo.

Introduction

Originated from Amazonia where it was domesticated (Santos *et al.*, 2013), Cassava (*Manihot esculenta* Crantz) is the main staple food for more than 800 million of people worldwide (Bull *et al.*, 2011; De Oliveira *et al.*, 2014). Cassava is valued as food-bank

stored in the ground (Lebot *et al.*, 2015). It is the third largest source of carbohydrates for human food in the world especially in Africa (Jarvis *et al.*, 2012; Lekha *et al.*, 2011), it's largest center of production. It is cultivated mainly by resource-limited small farmers for its starchy roots, which are used as human food either fresh or in many processed forms and products and for animal feed (Carpenter, 2011; Zawedde *et al.*, 2014).

In traditional agroecosystems in Africa and elsewhere, farmers generally grow a large diversity of landraces per crop species that need to be conserved as its sustainable utilization may help to lower the risk of crop failure owing to vagaries of climate, diseases, pests and soil limitations (Willemen *et al.*, 2007; Yong-Bi *et al.*, 2014).

Sustainable management of genetic resources is a crucial issue in the global context of food security and on-farm conservation is now widely acknowledged as a relevant strategy to reach this goal (Thomas *et al.*, 2011). Seed. Locally adapted landraces usually produce lower yields during optimal conditions than ''improved'' cultivars, but the relative stability of their yields provides food security to households (Dossou-Aminon *et al.*, 2016; Kombo *et al.*, 2012; Yong'an *et al.*, 2010). In Togo a relatively important diversity of cassava local varieties exists (Kombate *et al.*, 2017) but its local management and the farmers' varietal preference criteria are still not yet properly documented for use by the breeders and conservationists. The productions constraints and their variation across production zones are also not well known for priority setting.

The development of cassava production in Togo will require the use of modern cultivars resistant to pests and diseases that are better adapted to climate change and have producers and consumers' qualities. In this context, the development of a breeding program that will lead to adoptable cultivars cannot be done without the knowledge of the production constraints and farmers' preference criteria. We report in this paper the results of an ethnobotanical survey conducted on cassava in Togo in order to:

- Document the productions constraints and their variation across production zones
- Identify and prioritize farmers' preference criteria
- Understand the traditional management of cassava diversity at community level for development of conservation strategies

Materials and methods

Study area and sites selection

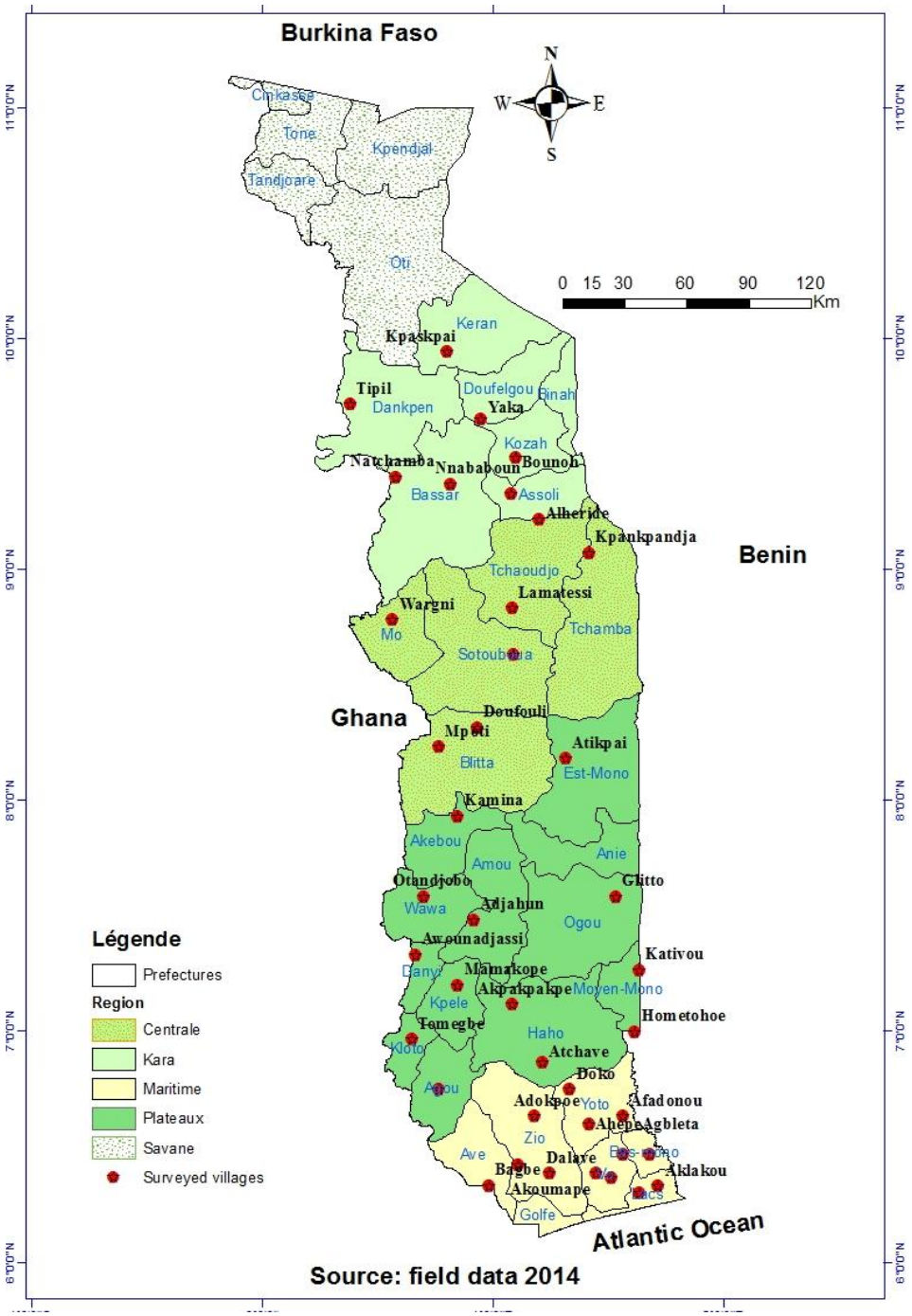
With 56,600 km² of land area, Togo is located in West Africa between Burkina Faso (in the North), Ghana (in the West), Benin (in the East) and the Atlantic Ocean (in the South). The country has slightly more than 6 191 155 habitants organized around 41 ethnic groups and unequally distributed throughout five administrative regions (DGSCN, 2011). Apart from the Savanna administrative region, cassava is grown almost everywhere in Togo (Country STAT, 2014).

To document the production constraints and farmers' preference criteria, 40 villages located in four administrative regions and diverse ethnic zones were selected (Table 1, Figure 1) as follows: Kara region (7 villages), Central region (7 villages), Plateau region (13 villages) and Maritime region (13 villages). To study the local management of cassava diversity, 10 villages (in bold in Table 1) have been selected among the 40 previously investigated, based on the varietal diversity per ethnic group.

Table.1 List of different villages surveyed in Togo

No	Village	Canton	Prefecture	Ethnic group	Region	Latitude	Longitude
1	**Adjahun**	Amlamé	Amou	Akposso	Plateaux	7,48330	0,91660
2	Adokpoe	Agbelouvé	Zio	ewe	Maritime	6,63330	1,18330
3	Afadonou	Tokpli	Yoto	ewe	Maritime	6,63330	1,56660
4	Agbavé	Azanfiogbé	Agou	ewe	Plateaux	6,75000	0,76660
5	Ahépé-Agbléta	Ahépé	Yoto	watchi	Maritime	6,60000	1,41660
6	Aklakou	Aklakou	Lacs	mina	Maritime	6,33330	1,71660
7	Akoumapé	Akoumapé	Vo	ewe	Maritime	6,38720	1,44970
8	Akpakpakpé	Kpedomé	Haho	ewe	Plateaux	7,11660	1,08330
9	Alhéridè	Alhéridè	Tchaoudjo	Tem	Centrale	9,21660	1,20000
10	Atchavé	Atchavé	Haho	ewe	Plateaux	6,86660	1,21660
11	**Atikpaï**	Kpessi	Est-mono	Ifè	Plateaux	8,18330	1,31660
12	**Ativeme**	Bolou	Zio	ewe	Maritime	6,42270	1,11050
13	Attikplè	Afagnan	Bas-Mono	watchi	Maritime	6,46660	1,68330
14	Awounadjassi	Ahlon	Danyi	Ahlon	Plateaux	7,33330	0,66660
15	Bagbé	Badja	Avé	ewe	Maritime	6,33330	0,98330
16	Bounoh	Atchangbadè	Kozah	Kabyè	Kara	9,48330	1,10000
17	Dalavé	Dalavé	Zio	ewe	Maritime	6,38610	1,24860
18	Dôko	Zafi	Yoto	ewe	Maritime	6,75000	1,33330
19	**Doufouli**	Doufouli	Blitta	Agnanga	Centrale	8,31660	0,93330
20	**Ganavé**	Ganavé	Lacs	mina	Maritime	6,30000	1,63330
21	Glitto	Glitto	Anié	Agouna	Plateaux	7,58330	1,53330
22	Hometohoe	Tohoun	Moyen-mono	Adja	Plateaux	7,00000	1,61660
23	**Kamina**	Kamina	Akébou	Akébou	Plateaux	7,93330	0,85000
24	Kativou	Kpekpelemé	Moyen-mono	Adja	Plateaux	7,26660	1,63330
25	Kpankpandja	Larini	Tchamba	Peulh	Centrale	9,07278	1,41722
26	Kpaskpaï	Helota	Kéran	Lamba	Kara	9,94320	0,80160
27	Lama-tessi	Lama-tessi	Tchaoudjo	Kabye	Centrale	8,83330	1,08330
28	Mamakope	Kpélé-Nord	Kpélé	Kabyè	Plateaux	7,20000	0,85000
29	**Mome-Hounkpati**	Mome	Vo	watchi	Maritime	6,46660	1,56660
30	**M'poti**	M'poti	Blitta	Adélé	Centrale	8,23330	0,76660
31	Natchamba	Bangeli	Bassar	bassar	Kara	9,40000	0,58330
32	Niamgoulam	Titigbé	Sotouboua	Naouda	Centrale	8,63500	1,09222
33	N'nababoun	Kabou	Bassar	lamba	Kara	9,37000	0,81660
34	Otandjobo	Efoukpa	Wawa	Akposso	Plateaux	7,58330	0,70000
35	Tipil	Kidjaboun	Dankpen	Konkomba	Kara	9,71660	0,38330
36	Tomégbé	Kpimé	Kloto	ewe	Plateaux	6,96660	0,65000
37	Vo-Afowuime	Vogan	Vo	watchi	Maritime	6,36660	1,51660
38	Wargni	Djarkpanga	Plaine de Mô	Tem	Centrale	8,78330	0,56660
39	**Yaka**	Léon	Doufelgou	lamba	Kara	9,65000	0,95000
40	**Yarayara**	Daoudè	Assoli	Tem	Kara	9,32900	1,07980

Fig.1 Geographical location of the villages surveyed



Data collection and analysis

The first part of the survey was related to the production constraints and famers varieties preference criteria. In each of the surveyed sites, a group discussion was carried out with 20 - 30 farmers (both men and women) of different ages with the help of translators from each village. Local farmers' association, and extension workers were involved in the study to facilitate the organization of the meetings and the collection of data.

The producers were asked to list by category and in their vernacular language all the constraints (abiotic and biotic) which hinder the production of cassava in their environment. The identified constraints were ranked in a group by the method of identification and progressive elimination of the most important constraint following Dansi *et al.,* (2013). In a first step, producers were asked to identify, among the constraints they have listed, the most critical one and for which an urgent solution must be found.

The constraint thus identified is ranked first and is eliminated from the list. The same procedure was repeated until the last constraint was ranked and the results were given immediately to producers for approval. Later on, the producers always in group were brought to list the characteristics that a variety of cassava must have to be widely adopted in the context of their village. By using the same approach as that of the identification of the constraints, "progressive elimination of the most important criterion" was done.

The second part of the survey was the diversity management study. Here 10 households were selected using the method of transect described by Kombo *et al.,* (2012). The households were chosen along transect (main alley crossing the village) and on both sides according to a fixed interval of five houses.

In every household, the interview took place with the head of the household or his wife or one of his wives in case of polygamy following (Loko *et al.,* 2013a). The data were collected using semi-structured questionnaire including among others the germplasm exchange system, the storage practices and the preservation system, the knowledge of the producers on the sexual reproduction of the cassava and the way seeds and seedlings are handled, the choice of the potential conservation actors and the definition of their roles, the necessity or not to create village committees of conservation, the composition, functioning and activities of this committee when possible.

Data obtained were analyzed using descriptive statistics (average, percentage, etc.) and the results were presented in the form of tables. Per administrative region and at national levels, the national levels, the constraints were prioritized based on the methods of Loko *et al.,* (2013) that used the average of the following three parameters:

- the total number of villages (TNV) in which the constraint was cited
- the number of villages in which the constraint was classified among the principal constraints (PCO) i.e. among the first five
- the number of villages where the constraint is the major one or ranked first (MAC)

For these three parameters, the higher the number, the more important the constraint. The importance of a constraint (IMC) was therefore determined by the formula:

$$IMC = \frac{TNV + PCO + MAC}{3}.$$

The same approach was used to rank farmers' preference criteria.

Results and Discussion

Importance of cassava in surveyed household

In the 100 investigated households, 22 crops (Table 2) were quoted as cultivated. Cassava was quoted first main crop among all other crops.

Table.2 Main crops in the study zone

Crop	Rank (%)							
	1st	2nd	3rd	4th	5th	6th	7th	Total
Cassava	45	21	10	10	3	2	1	92
Maize	25	43	9	3	2	1	0	83
bean	4	9	24	12	7	1	0	57
Yam	2	3	12	12	3	2	0	34
Pepper	5	2	6	2	2	0	0	17
Tomato	4	4	5	3	0	1	0	17
Sorghum	8	1	6	0	0	0	0	15
Rice	2	4	3	2	3	1	0	15
Soya beans	3	2	5	1	0	1	0	12
Groundnut	1	2	1	4	1	0	0	9
Cotton	3	1	3	1	0	0	0	8
Chorchorus	2	2	0	2	1	1	0	8
Egusi*	2	1	0	1	0	1	0	5
Okra	2	2	0	0	0	0	0	4
Eggplant	0	0	0	2	0	0	1	3
Millet	0	1	0	1	0	0	0	2
Fonio	0	0	0	0	1	1	0	2
Taro	0	0	0	1	0	1	0	2
Banana	0	0	1	0	0	0	0	1
Cashew tree	0	0	0	0	0	0	1	1
Coffee	0	0	0	1	0	0	0	1
Sweet potato	0	0	0	1	0	0	0	1

N.B. Egusi is seeds of cultivars coming from *Citrullus lanatus* subsp. Mucosospermus, C*ucumeropsis mannii* and *Lagenaria siceraria* species.

In the villages of Yarayara, Doufouli, M'poti, Ganavé and Momé-hounkpati, cassava is the main source of income crop (Table 3). Observations showed that in these villages, there are small home-made cassavas processing units installed here and there. In the village of Yaka, it is the sorghum which is the main cash income crop. In this village, cassava roots are transformed into dry chips mainly for the family consumption. Cassava dry chips are ground mixed with flour of maize, millet or sorghum to make the paste. In the remaining villages, every household has his main source of income crops. The storage of these harvested roots lasts mostly only three days. In some households, cassava and other crops are equal as main source of income. It is the example of 4 households in the village of Ganavé who besides the cassava as main culture also have maize and tomato at the same level.

Constraints related to cassava cultivation in Togo

The major constraints (the first 5 constraints) at the national level (Table 4) are: the attacks of insects, the lack of market, leaves and stem diseases, roots rot and lack of processing facilities. Only two major constraints (attacks of insects, leaves and stem diseases) are common to all the regions. In Kara region, roots rot is not a major constraint but rather the damages of animals in transhumance. In Central region, susceptibility of cassava chips to storage insects comes before the lack of processing facilities. In the Maritime region, soil poverty and climate variability were the major constraints. Among major constraints, attacks of insect is the first at national level and in the Maritime and Central region.

Table.3 Main crops sources of income in the zone

Crops	Villages										Total
	Yaka	Yarayara	Doufouli	M'poti	Attikpaï	Adjahun	Kamina	Moméhounkpati	Ganavé	Ativémé	
Cassava		10	10	10		5	2	8	10	1	**56**
Maize	1			2			4	4	1	4	**16**
Sorghum	9				1						**10**
Soya beans					3	1	3				**7**
Rice								2		3	**5**
Tomato						1			3	1	**5**
Cotton					2		3				**5**
Pepper					2					2	**4**
Egousi					3						**3**
Beans						3					**3**
Yams					2						**2**
Coffee						1					**1**
Groundnut							1				**1**

Table.4 Cassava production constraints in Togo

Constraints	Number of villages					Rank per region			
	TNV	PC	CMA	Av	Rn	Mar	Pla	Cen	Ka
Attacks of insects	35	2	32	23	1	1	3	1	2
Lack of markets for selling	28	13	24	21.7	2	6	1	1	1
Leaves and stem diseases	32	3	25	20	3	2	4	1	5
Roots rot	29	3	18	16.7	4	4	4	4	6
Lack of processing facilities	22	4	19	15	5	11	2	6	2
Damages of animals in transhumance	17	5	15	12.33	6	12	4	6	4
Soil poverty	17	1	12	10	7	2	11		7
Climate variability	18	2	10	10	7	5	10	8	7
Susceptibility to weeds	15	2	9	8.7	9	9	7	8	8
Lack of cutting	11	2	8	7	10	8	9	12	11
Lack of early maturing varieties	13	1	7	7	10	6	7	-	-
Susceptibility to high soil	6	1	3	3.3	12	14	11	10	-
Susceptibility of chips to storage insects	5	0	4	3	13	-	-	5	11
Bad in ground post maturity storage ability	6	0	2	2.7	14	16	13	12	11
Other attacks on root	5	0	2	2.3	15	12	15	-	8
Inadaptability to all types of soil	5	0	2	2.3	15	16	13	12	-
Fast post-harvest drying of stems	5	0	2	2.3	15	10	15	-	-
Damage of bush fire on cassava fields	4	0	1	1.7	18	-	17	10	11

NB: *TNV: Total Number of villages where this constraint has been listed; PC: Principal Constraint; MAC: Major Constraints, Av: Average; Rn: Rank at national level*

The impact of this climate variability (Table 4) is less felt in Plateau region and is ranked 5th in the Maritime region and 7th at national level and in Kara region. The absence of market comes in the second position at the national level while it is ranked sixth in Maritime Region and first in the three remaining regions. The damages of animals in transhumance and the lack of processing facilities are less marked in the maritime region which is more provided in processing equipment than the others. In Central and Kara regions, apart from fufu, cassava roots are transformed into dry chips. In this region, susceptibility of dry chips to weevils was quoted as constraints.

This study on production constraints, famers' preference criteria and diversity management of local cassava varieties is the first one carried out in Togo. Among major constraints, the attacks of insects occupy the first rank at national level and in the Maritime and Central regions which are less watered and where cassava last during dry season. The absence of cochineal in West-Plateau where the impacts of climate variability are less felt confirms that the attacks of these insects are closely linked to the climate variability. The absence of market is not a major constraint in Maritime region where the international market of Lomé is located. According to Akinnagbe, (2010) there is a high demand for cassava raw materials for agro-industries. About diseases, Banito et al. (2007) reported that cassava bacterial blight and cassava mosaic disease have relatively high importance in all the ecological zones of Togo. Research has to release cassava varieties that are resistant or tolerant to diseases in all the country.

Famers' preference criteria

Twenty (20) preference criteria were identified throughout the surveyed villages (Table 5). Among them, six (6) were of culinary and technological (good quality of crazy, good quality of the gari, high yielding in gari, good taste, good quality of tapioca, high starch content) nature while 14 were of agronomic type. In the entire study area, the top five preference are high productivity, precocity, good quality of fufu, resistance to diseases, and good quality of gari. High productivity is not a main concern in the Maritime and Plateau regions while it is important in Central and Kara Regions. In the Maritime region, resistance to drought is among the major criteria. Drought tolerant varieties are needed to face the periods of irregularity of rains.

All the regions have specificities with regard to the 5th preference criterion. The producers of Maritime region were looking for varieties adapted to less fertile soils. Those of Plateau wish to obtain resistant varieties to root rot while those of Central region prefer varieties adapted to all types of soil. All these preferences seem to be solutions to the enumerated constraints. In the Kara region resistance of chips to storage insects and good quality of the tapioca surprisingly appeared. Most probably, population of this zone wishes to transform cassava into chips and tapioca but they lack processing equipment (2nd constraint within this region).

Farmers' preference criteria and their ranking indicate that high productive and early growing cassava varieties are those needed for near future. Our respondents showed huge interest in increasing cassava yields by using high productive and early maturing cassava varieties. Late maturing and low productive local varieties may be abandoned if no culture or no food habit support their cultivation. It is urgent to undertake preservation strategies. These findings do not match those of Peña-Venegas et al. (2014) who reported no preference in increasing cassava yields in five ethnic groups of the Colombian Amazon. High yielding, early maturity, good quality of

fufu, resistance to diseases and good quality of *gari* were the top most important. Similar to the studies on the diversity of yams (Dansi et al. 2013), high productivity as major criterion is not surprising since it is for any producer and any crop the most desired criterion. It is not also surprising to see precocity occupying the second rank because high productivity associated to earliness increases the production of the cultures in short time. These results also partially confirm those obtain by Kombo et al. (2012) at Bouenza (Republic of Congo) where, among the twenty (20) preference criteria considered by the farmers when making a choice, high yield, early maturity and taste were the top most important. In the preferences criteria, producers put in 3rd position the resistance of the varieties to diseases. It is to say that these diseases reduce highly the productivity. Producers understood that increase of productivity depends on the performance of the varieties but also on their resistance to diseases.

Table.5 Farmers' preference criteria of cassava varieties and their importance across regions

Preference criteria	Number of villages					Rank per region			
	TNV	PCr	MAC	Av	Rn	Mar	Plat	Cen	Kar
High productivity	38	11	33	27.3	1	2	2	1	1
Precocity	31	14	30	25	2	1	1	3	3
Good quality of fufu	28	2	26	18.7	3	3	3	4	9
Resistance to diseases	21	2	16	13	4	3	6	9	3
Good quality of *gari*	21	1	14	12	5	7	4	7	10
Non toxicity	16	5	12	11	6	13	7	2	2
Adaptability to all type of soils	10	0	9	6.3	7	16	13	5	7
Resistance to drought	11	0	7	6	8	5	14	14	10
High productivity in gari	11	1	6	6	8	8	7	14	14
Tolerance to high soil moisture	9	1	7	5.7	10	8	9	9	-
Resistance to weeds	10	1	6	5.7	10	13	17	6	7
Resistance to root rot	9	1	7	5.7	10	-	5	8	10
Adaptability to poor soils	8	1	7	5.3	13	5	-	12	-
Good taste	7	0	5	4	14	10	14	14	14
Good quality of tapioca	10	0	2	4	14	10	11	9	5
Good quality of dry chips	5	0	4	3	16	10	11	14	-
Resistance of chips to storage insects	4	2	3	3	16	-	-	12	5
High content in starch	6	0	2	2.7	18	13	14	-	13
Good storage of the cuttings	4	0	2	2	19	17	9	-	-
Good in ground post maturity conservation	2	0	0	0.7	20	17	-	14	-

NB: TNVC: total number of villages where criteria have been identified; PCr: Principal criteria; MAC: major Criteria; Av: Average; Rn: Rank at national level

Farmers' knowledge, use and management of cassava sexual propagation

Among the 100 investigated households, 87 have seen flowers and seeds of some cassava varieties but they don't use the seeds. Only 22% of the interviewees have seen seedlings and reported that they produce only a single root. However, they do not attach any importance to those seedlings and even destroy them some time during weeding. According to farmers, only cassava plants that produce branch have flowers. One farmer from Dalavé village reported during group discussion that he used cutting from seedling that emerged from seeds in his farm and named the landrace with his own name for traceability (i.e. Aladevi).

Cassava has a huge importance for Togolese's farmers as their main food and cash income crop. Changes are occurring in the decision-making processes that determine crop diversity by the replacement of traditional crops. Cassava seedlings are also source of diversity variability (Kawuki et al. 2013) from which new landraces can arise, apart from mutation which this study did not examine. Contrary to the report of Fraser et al. (2012), Peña-Venegas et al. (2014), although cassava seeds and seedlings appeared to be well-known to some Togolese farmers, few farmer use them. But all the farmers who have seen seedlings recognized that seedlings are plants that do not grow from stem cuttings, produce only a single bulking root, and are morphologically different from the planted landraces, as they tend to grow taller and only have a single tuberous root growing straight downwards (Fraser et al, 2012, Peña-Venegas et al. 2014). In this traditional agriculture, cassava is usually propagated by means of stem cuttings (Kombo et al. 2012; Turyagyenda et al. 2012). Same as the studies of Manu-Aduening et al. (2005), none of all the interviewed farmers understood the role of pollination in seeds setting and providing variation amongst seedlings, none purposely planted seeds and most farmers ignored or weeded out cassava seedlings. Since the input supply is scarce, the only way to raise the level of production is undoubtedly improved genetic potential of cassava (Adjata et al. 2013). Communication and capacity building is therefore required for farmers as mentioned by Kombo et al. (2012).

Diversity management

In each of the investigated households, several modes of obtaining cuttings and new varieties were reported (Table 6 and 7). According to the producers, acquisition of new varieties (Table 6) within household is made by gift (53.6 %) of some cuttings. These cuttings are then planted in fields, tested and multiplied if they present interesting characters. The acquisition of new varieties (Table 6) by purchase and exchanges between farmers represent respectively 25.2 % and 12.3 %. Inheritance of variety is rarely observed (6.5 %).

Table.6 New varieties access mode

Mode	Relative frequency per region (%)				Study zone
	Kara	Centrale	Plateaux	Maritime	
Gift	5.7	7.3	22.0	18.7	53.6
Purchase	2.4	4.8	4.0	13.8	25.2
Exchange	4.8	6.6	0.9	0.0	12.3
Inheritance	4.9	0.0	1.6	0.0	6.5
Introduction by agricultural extension	2.4	0.0	0.0	0.0	2.4

The introduction by agricultural institutions (2.4%) was quoted only in the region of Kara. The introduction from the nearby country, was mentioned in none of the households as mode of obtaining cutting. In each of the investigated households, several modes of obtaining of cuttings were indicated (Table 7). The majority (48.1%) of cuttings used in their fields come from previous cassava crops of the previous field. Obtaining of cuttings is also made by gift (35.3 % of answer) and by purchase (16.6 %). Farmer added that, gifts, exchange and inheritance occurs between relatives, neighbors or friends, usually within the same ethnic group.

Table.7 Cutting obtainment modes

Mode	Relative frequency per region (%)				Study zone
	Kara	Centrale	Plateaux	Maritime	
Retention from previous field	10.1	10.1	12.3	15.5	48.1
Gift	3.8	4.8	14.4	12.3	35.3
Purchase	1.6	3.2	2.6	9.1	16.6

The introduction from the nearby countries has been mentioned in none of the households as the mode of obtaining cutting.

In the investigated villages, there was neither an association of seed production nor varieties diversity preservation community fields. About 85% of the investigated households agreed that it was adequate to have diversity preservation community fields on public lands. The maintenance of such fields should be made by rotation of the group's members and cuttings (planting materials) produced will be sold.

Most Togolese farmers obtained their cassava planting material either from their own fields or from within their community. This is similar to the results reported by Samberg *et al.,* (2013) in the southern highlands of Ethiopia and Manu-Aduening *et al.,* (2005) in Ghana. Contrary to the study of Peña-Venegas *et al.*, (2014) in Colombian Amazon, there is no use of different manioc landraces by Togolese farmers to create differences between ethnic groups. Farmers seem to take any opportunity they can to exchange seeds with their friends and relatives when they observe a good variety (Carpenter, 2005). Access to cutting through inheritance is low (6.5%), farmers are not waiting for their parents to die before cultivating their own farms. So, they get varieties through donation and until their relatives die, they have the same varieties in their own farm. According to Emperaire and Peroni, (2007) and Peña-Venegas *et al.,* (2014) role of women is essential in the circulation of cassava diversity.

The whole study reveals that farmers have so far utilized and maintained a great diversity of cassava varieties, but constraints, and farmers preferences are challenging with cultural aspects, eating habit for this diversity maintenance or its erosion. It also reveals that the best way to increase cassava production is not only that research must release a lot of varieties according to the desire of famers, but this research has also to increase the diversity preservation issues and to work closely with policy makers for market availability of cassava. If the many socioeconomic constraints on cassava production, utilization, and marketing could be alleviated, farmers' yields could be easily doubled by using improved technologies (El-Sharkawy, 2004).

Conflict of interest statement

Authors declare that they have no conflict of interest.

Acknowledgment

This study was sponsored by the Togo component of the West African Agricultural Productivity Program (WAAPP) on request of the National Agricultural Research Institute (ITRA) and UEMOA through PAES program. We express our gratitude to the national institute of agricultural extension for technical support and to the farmers we met for fruitful discussion.

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How to cite this article:

Kombate, K., I. Dossou-Aminon, A. Dansi, R.A. Adjatin, G.A. Dassou, K. Kpemoua, M. Dansi, K. Akpagana and Sanni, A. 2017. Cassava (*Manihot esculenta* Crantz) Production Constraints, Farmers' Preference Criteria and Diversity Management in Togo. *Int.J.Curr.Microbiol.App.Sci.* 6(6): 3328-3340. doi: https://doi.org/10.20546/ijcmas.2017.606.391