A Research Article in AJRTC (2013) Vol. 10 No. 1: Pages 67-74

Farmer perceptions of cassava bacterial blight disease in Oyo State, south-west, Nigeria

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Abstract
The study was specifically undertaken to appraise farmers' perception to cassava bacterial blight disease that ravages cassava in most cassava growing regions of sub-Saharan Africa and Asia. The study revealed that majority of the cassava farmers in the sampled area were averagely young, experienced in farming cassava with a fairly good level of education. The study revealed that majority of farmers are not aware that the disease exists in their farms, in most cases it is considered same as senescence of leaves. Most of them have not participated in training addressing cassava diseases. This underscores the need to enlighten farmers on cassava diseases that lead to yield losses, and the need to fully adopt improved genotypes. Adoption of other disease management strategies such as farm sanitation, use of high quality planting materials from known sources need to be regularly communicated to farmers by organizing training programs, workshops, and field days as this would aid reduce severity of disease in farmers' field and thus improve food security.

Keywords: Cassava, Bacterial blight, *Xanthomonas axonopodis* pv. *Manihotis*, farmers fields assessment.

Introduction

Cassava is a perennial shrub. Basically every part of the plant can be utilized, but the starchy roots are by far the most commonly used product. The starchy roots are valuable sources of energy and can be boiled or processed in different ways for human consumption. Roots can also be used for obtaining native or fermented starches and as dried chips, meal or pellets for animal feed. Cassava supplies about 70% of the total calories intake of about 60 million people in Nigeria (Ezulike *et al*., 2006), and contributes about 15% of the daily dietary energy intake of most Nigerians. The roots are quite rich in carbohydrates (85-90%), with very small amount of protein (1.3%) (Nwaugo *et al.,* 2008). Claude and Dennis (1990) classified cassava as the major source of carbohydrate and precisely the third largest in the world with Africa as the leading producing region, with an annual output of 115 million tons in 2005 (FAO, 2006). This high carbohydrate content makes cassava a major food item especially for low income earners in most tropical countries especially Africa and Asia.

Cassava is susceptible to various diseases of fungal, bacterial, viral origin, and to nematodes (Hillocks and Wydra, 2002; Wydra and Verdia, 2002). Among all these diseases, cassava mosaic virus disease, cassava bacterial blight, cassava root-rot and cassava anthracnose disease are of most economic importance (CIAT, 1996; Fokunang et al., 2000; Hoque *et al*., 2005). Cassava bacterial blight (CBB) caused by *Xanthomonas axonopodis pv. Manihotis* (Vauterin *et al*., 1995) is the most important bacterial disease of cassava with a worldwide distribution (Lozano and Booth, 1974). CBB was observed in different countries of West Africa in all eco-zones, with higher site incidence of more than 60% (Wydra and Msikita, 1998). Recently, CBB field and plant incidences of more than 90% and 70% respectively, were reported in Togo (Banito *et al.,* 2008). Typical symptoms of CBB include water-soaked angular leaf spot, blighting, wilting, defoliation, vascular necrosis of the stem, production of exudates on leaves, petioles or stems, and stem dieback (Lozano and Sequeira, 1974).

Root yield losses of more than 50% due to CBB were reported (Wydra, 2002). Since chemical control of the disease does not exist, integrated control measures were suggested (Wydra and Rudolph, 1999) including the use of resistant genotypes, crop rotation,

weeding and mixed cropping associating cassava with maize (Fanou, 1999; Fanou *et al*., 2001). The importance of CBB across eco-zones and the relationship between the disease and ecological and agronomic characteristics have been established in Nigeria (Onyeka *et al*., 2005). With the level of yield loss recorded caused by this disease and present push by the Government of Nigeria to increase yield of cassava to meet both food and industrial needs, this study selected Oyo state (one of the major cassava producing States in south west Nigeria) to examine the perception of farmers to this disease and need to reduce the disease severity towards achieving higher yields of the crop.

Materials and Methods

Study Area

The study was conducted in Oyo State, Nigeria (from July 2011-May, 2012). Oyo State with a total of thirty three Local Government Areas (LGAs) has a population of 5,591,589 and a total land area of approximately 28,454 square kilometers (NBS, 2006). The state enjoys a tropical humid climate with two major climatic seasons, the rainy season that prevails from April to October and dry season that lasts from November to March. The Southern Part of the state is dominated by the tropical rainforest while the Guinea Savannah belt dominates the remaining part. The annual rainfall ranges between 1300mm and 1,500mm (Afolabi *et al*., 2011). The average daily temperature ranges between 25°C and 35°C almost throughout the year (Mohammad *et al*., 2012). The mainstay of the State's economy is Agriculture. The climate in the state favors the cultivation of staple crops like maize, yam, millet, rice, plantains, cocoa, palm produce, cashew and cassava etc. Oyo state is divided into four Agricultural zones by the Oyo State Agricultural Development program (OYSADEP) based on the agro- ecological and cultural characteristics of the state. The four major zones are: (1) Ibadan/Ibarapa, (2) Ogbomoso zone, (3) Saki zone and (4) Oyo zone. Cassava is commonly produced across all the OYSADEP zones in the state. Based on the foregoing, study sample was spread across Ibadan, Ogbomoso and Oyo zones.

Sampling technique

A three stage random sampling technique was employed for this study. The first stage involved a random selection of four Local Government Areas (LGAs) of the thirty-three local Government Areas in Oyo State. The second stage was the random selection of four villages each from the selected LGAs. The third stage was the random selection of ten (10) OYSADEP registered contact farmers (based on their prominence in cassava production) each from the selected villages to make up a sample size of 40. Ten (10) farmers were interviewed in Ogbomoso South, 5 farmers in Akinyele, 10 farmers in Oyo South, 5 farmers in Lagelu, and 10 farmers in Ido Local Government Area of Oyo State respectively. A total of 40 questionnaires were returned and analyzed for the study.

The survey interview variables employed the method described by Ebukiba (2010); Tokula and Ekwe, (2006). For the primary data, the assistance of the OYSADEP enumerators was used to access registered farmers in the study areas. The research employed a well structured questionnaire and interview guide. The appointments for visits were made via OYSADEP zonal offices in Oyo State. The questionnaire survey elicited information on the socio-economic characteristics, farming experience, number of cassava varieties cultivated, size of cassava farm cultivated, personal criteria for choosing any planting materials (cassava varieties), knowledge of CBB, perception of the disease, its impact on yield /their farm. A checklist of photograph showing various cassava diseases was used to guide the farmers in identification.

Site description and field sampling

Subsequent upon the group discussion with the farmers, epidemiological surveys were conducted on their farms. The exercise spanned between 18th November 2011 to 16th May 2012. A total of fifty farmer's fields were surveyed. The survey followed the method used by Onyeka *et al*., (2005; 2008). Location of LGAs surveyed are presented on a map (Figure 1); 10 sites were surveyed in Ogbomoso South, 10 fields in Oyo south,10 sites in Ido, 10 fields in Akinyele and 10 fields in Lagelu Local Government area respectively.

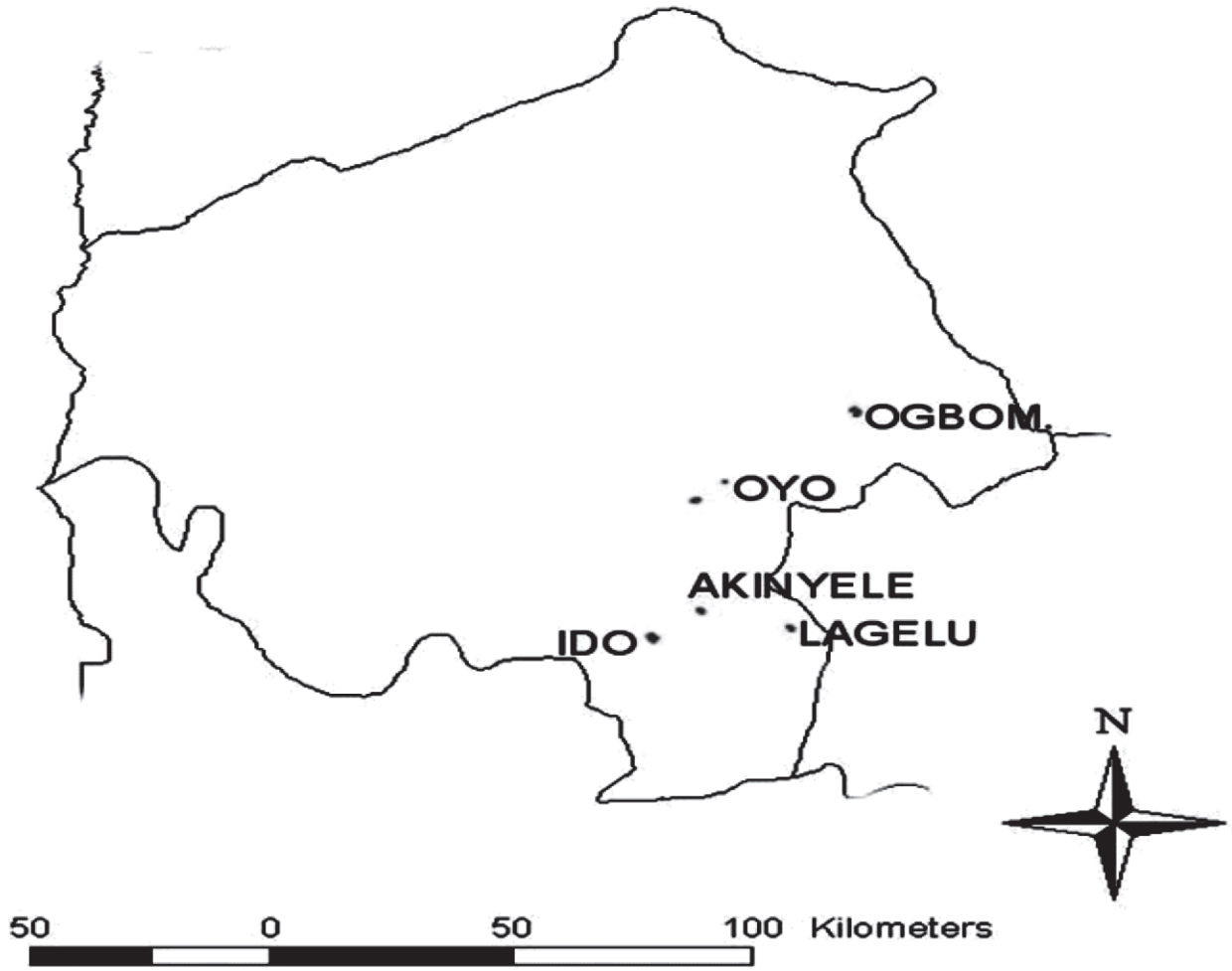

Figure 1. Map of Oyo State showing the locations of the sampled local government areas.

Assessment of CBB in farmers' field

In each field surveyed, 30 cassava plants selected along two longitudinal transepts were assessed for CBB incidence. Disease incidence was calculated by the percentage of plants with typical CBB symptoms in each farm. Characteristics of the fields were also documented; these included type of farming practice (Commercial/subsistence), location of the field, and cropping system. Geographical coordinate of each farm assessed was recorded with the aid of a Global position system (GPS; *etrex Summit Garmin*) and the limit was subsequently represented on a map using ArcGIS (ESRI, 2012).

Results and Discussion

Survey of farmers' perception to CBB

Socio-economic profiles of the respondents (farmers)

The socio-economic profile of the respondents shown in Table 1 revealed that a good number of the respondents (67.5%) fall between 41-60 years with a mean average age of 48.8. Majority of the respondents (95%) are married while 45% and 35.0% claimed to maintain >5 and 5-9 household sizes respectively. Most of the respondents were males (75%). On the average, the level of education of the farmers was found to be high as 77.5% had completed one form of formal education or the other while the remaining 22.5% had no formal education at all. Most of them (50%) inherited their land while 42.5% of the farmers rented their farm land.

Majority of the cassava farmers (60%) cultivated less than 5 ha of land for cassava alone while 22.5% cultivate 6–10 ha of land. A good number of them (65%) belong to one farmer organization or the other (Table 2). This indicates a high level of social participation among the respondents. All the respondents (100%) do farming as their primary occupation. 65% of the farmers usually have access to extension agents on a monthly basis (40%). Most of them (60%) had not visited agricultural office in their vicinity in the last five years. Majority of the farmers (80%) have not participated in programs addressing cassava diseases in past five years

(Table3). This could be attributed to the fact that none has been organized focusing on diseases in recent times (85%) or maybe the farmers have other means of obtaining information on farming. While most of the respondents (37.5%) have been farming for 6–10 years, 12.5% have less than 5 years experience in cassava production (Figure 2).

Table 1: Socio-economic profile of the sampled cassava farmers in Oyo State.

Socio-economic Characteristics(n=40)		**Freq.**	**%**
Age (years)	21 –30	4	10.0
	31 –40	9	22.5
	41 –50	11	27.5
	51 –60	6	15.0
	> 60	10	25.0
Marital status	Married	38	95.0
	Single	1	2.5
Gender	Male	30	75.0
	Female	10	25.0
Household Size	< 5	14	35.0
Household	< 5	14	35.0
Size	5 – 9	18	45.0
	10 – 12	5	12.5
	> 13	3	7.5
Level	Primary	11	27.5
of Education	Secondary	11	27.5
	College	4	10.0
	Tertiary	5	12.5
	None	9	22.5

Table 2. Farming activities of the respondents

Characteristics		**Frequency**	**Percent**
Size of Cassava Farm	< 5	24	60.0
	6 – 10	9	22.5
	11 – 15	1	2.5
	16 – 20	2	5.0
	> 20	4	10.0
Membership of Farmer's Organization	Yes	26	65.0
	No	14	35.0
Primary Occupation	Farming	40	100.0
Secondary Occupation	Clergy	1	2.5
	Contract or Sprayer	1	2.5
	Farming	37	92.5
	Trader	1	2.5
Access to Extension Agents	Yes	26	65.0
	No	13	32.5
Frequency of access to extension agents	Weekly	8	20.0
	Monthly	16	40.0
	Yearly	3	7.5

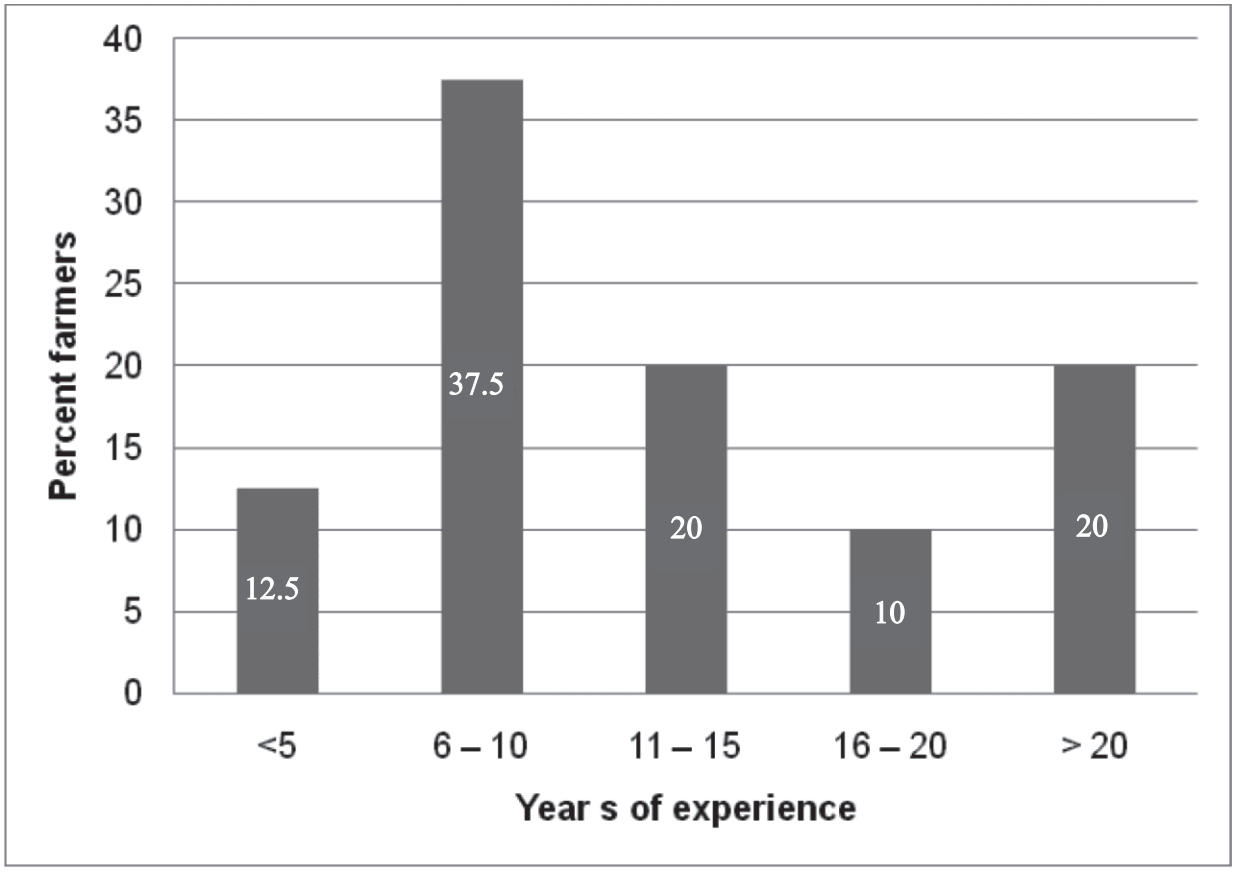

Figure 2. Years of experience in cassava production

As regards the cassava varieties grown by the respondents, Table 4 shows that majority of them (60%) grow local varieties. Farmers in general have special criteria for selecting a variety before cultivating it; in light of this, respondents were asked to indicate their personal criteria for choosing any cassava variety to grow. Results revealed that all the characteristics of cassava were of interest to farmers. In terms of ranking, fresh root yield (27.6%) and early maturity (26.2%) were most important for the sampled farmers. Disease resistance was important only to 6.2 percent of the respondents (Table 5).

Table 3: Frequency of Access to Extension information

Visitation to any Agric Office in the past 5 years	Yes	15	38.0
	No	24	62.0
Other means of Obtaining Farming Information	Yes	34	85.0
	No	5	12.5
Participation in any program addressing cassava diseases	Yes	8	20.0
	No	32	80.0

Table 4: Cassava varieties grown by respondents

Cassava varieties*	Frequency	Percent
E GEDUDU	13	32.5
IITA	10	25
ODONGBO	8	20
OKO IYAWO	34	85
OLEKANGA	13	32.5
TME 419	5	12.5
AGRIC	1	2.5
DOGO	1	2.5
AWOLOWO	1	2.5

*Names are retained as given by farmers

Table 5. Farmers criteria for the choice of the cassava varieties grown

Criteria	Frequency	Percent
Fufu	67	24.4
Fresh root yield	76	27.6
Garri	5	1.8
Resistant to rodents	11	4.0
Disease resistant	17	6.2
Early maturity	72	26.2
Long duration in the Field	27	9.8

Majority of the respondents (72.5%) obtain their planting material from friends and family. This may not be unconnected with the reason why most (70.0%) source their information from friends and family. A good number of the respondents (45%) moderately prefer improved varieties over local lines (Figure 3).

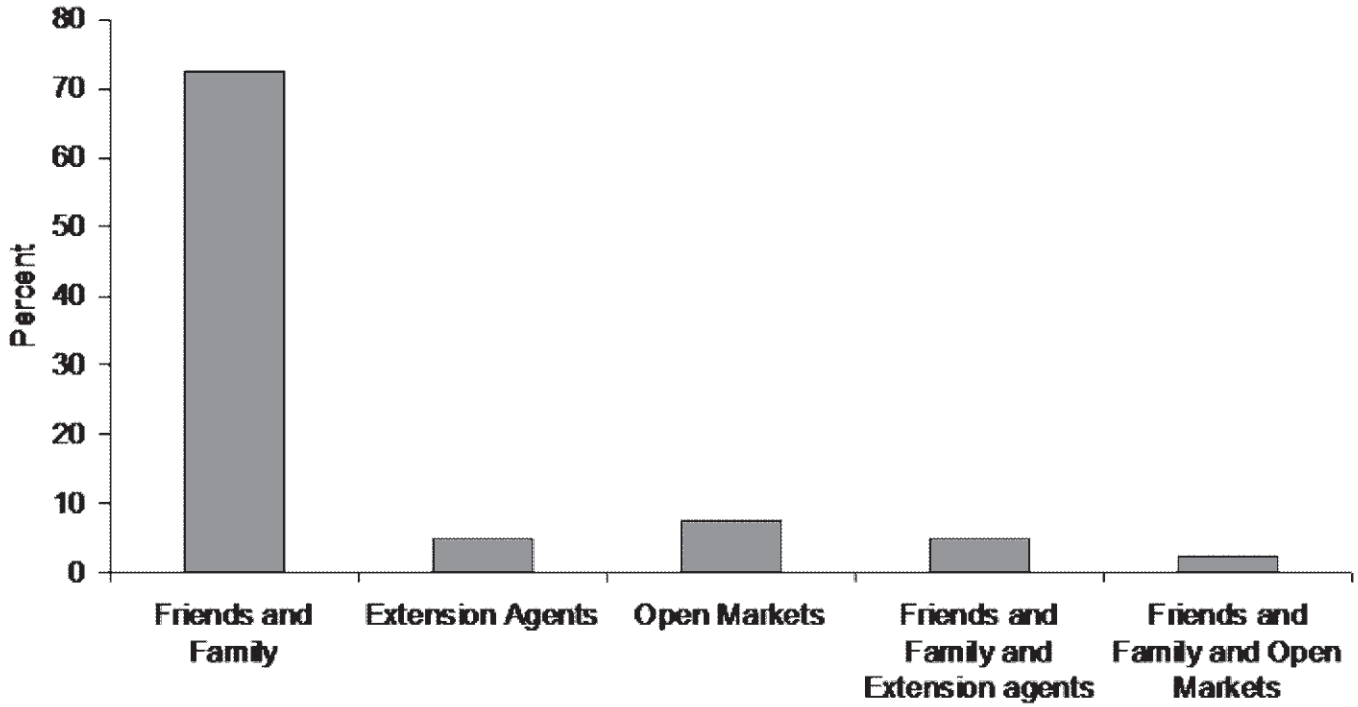

Figure 3. Showing respondents source of planting materials.

Farmers perception to CBB

Figure 4 shows that a number of the farmers (47%) perceive CBB as a constraint to cassava production in their farms. This is followed by other diseases CMD (34%), and Root rot (18%) in descending order. Their major reasons for considering the disease as a threat also varied, (35%) claimed that the disease attack local varieties mostly during the rainy season, 30% of the respondents were of the opinion that the disease reduces yield in their farms, 2.5% merely observe it in their farms with no reason, 22.5% are not even aware of the disease in their farms even though it is present, 2.5% know about the disease but does not consider it a problem while 2.5% of them claimed that it attacks cassava in general at an early stage.

While reduction of yield due to CBB (54%) ranked highest as their reason for considering the CBB a threat to cassava production, 38% still require proof that it is a disease threatening their yields, eight percent of the respondents see the disease as no problems at all, even though they observed it their farms (Table 6). At the end of interaction with the farmers during this study 88% of the respondents were able to identify CBB as a threat to their farms as against 12% who agreed that CBB could affect their yield at the beginning of the focus group.

Table 6. Reasons to justify farmers' claims of knowledge of disease

Response	Frequency	Percent
Not a problem	2	8
Not sure	10	38
A threat, reduces yields	14	54
Total	26	100

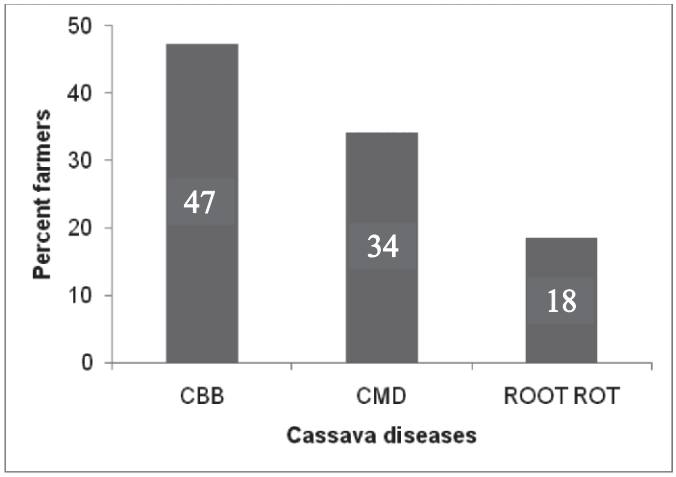

Figure 4. Percent distribution of respondents according their perception of cassava diseases

Incidence of CBB in farmers fields within the sampled areas in Oyo State

Percentage CBB incidence in farmers field also varied with location and type of cassava varieties cultivated by the farmers. The highest CBB incidence (38.7%) was recorded in Lagelu followed by Oyo (34.3%). Akinyele LGA recorded the lowest CBB incidence in farmers' field (Figure 5)

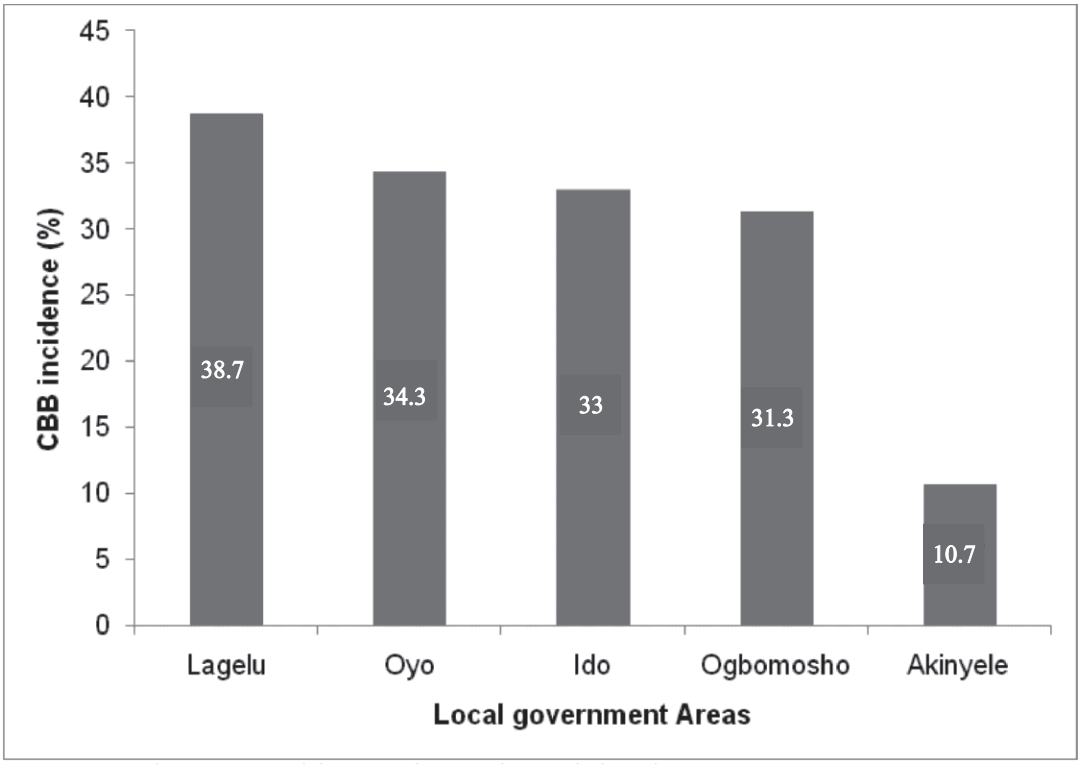

Figure 5. Incidence of CBB in each local government area

Conclusion

Many cassava farmers in Oyo state have not considered CBB a threat to their production mostly due to ignorance and lack of information of cassava diseases disseminated to the farmers at the grassroot. Farmers socio-economic profile revealed ageing farmers, in light of this, the Government should launch programs/campaigns that will attract youths to cassava production and provide them with adequate information on crop management. Majority of the sampled farmers still cultivate the local lines; for increased productivity, farmers should be encouraged to fully adopt improved cassava cultivation as this remains the only means of checking cassava diseases. From the study, farmers had less improved cassava stems to the local lines, implying that there is need for wider distribution of the improved varieties in Oyo State for increased food production. Since the OYSADEP is one of the major channels through which farmers obtain information on farming, Government should improve on the working condition of the extension agents to enable them work effectively.

Acknowledgement

The authors wish to acknowledge the kind assistance of the Senate of the University of Ibadan and International Institute of Tropical Agriculture for providing the research grants and materials used in this study respectively.

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