

## Evaluation of Handling, Transportation and Storage Methods of Desma (*Novella Pentadesma*) Seed in Sixteen Communities Of Edo State, Nigeria

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### -----ABSTRACT-----

The handling, transportation and storage methods of Desma seeds in sixteen communities of Ovia North-East and South-West local government areas of Edo state was evaluated in this study. Questionnaires to be filled were given to respondents who could read and write. The information obtained from the administered questionnaires was analyzed using descriptive statistics of quantitative variables. The results showed that a very excellent collection points were observed in Igoshodi and Iguoshode communities of Ovia North-East and South-West in each case. The road linking Iguoshode community and the study site was also in good condition, thus Desma seed growers see this as opportunity to transport their harvested seeds. The storage facility at Okabegbe community is excellent with moderately good access road and collection points. Improvements are urgently needed in Arah, Uhoague, Ofunwengbe, Iguesagban and Neikpemaba communities with either poor or very poor collection points, road access and storage facilities. The quantity of Desma seed loss due to the rodent (56% and 61%) attack was more than those associate with insect attack (23% and 20%) or deterioration (21% and 19%) in Ovia North-East and South East, respectively.

**Keywords-** processing, storage, transportation, communities, Desma seed

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### I. INTRODUCTION

Desma (*Novella pentadesma*) seeds are obtained from Penta tree. The local names are *Eri* or *Ize eni* and *Ezoheane* by Isan, Ora, Esako and Ooga local communities where they are grown in the tropical forest of Ovia North East and Ovia South West Local Government Areas of Edo State, Nigeria, respectively. The real origin of *Novella pentadesma* (Desma seed) is still unknown. It was discovered accidentally during the picking of *Novella allanblankia* seeds for Unilever Margarine Oil Project in the year 2005 [3]. The desma seed is in a pod which botanically is a berry. It varies in size, colour and shape. It is made up of many united carpels and contains on an average of fifty seeds in a big matured pod. The seeds are embedded in a mass of brownish or pinkish colour, acid to sweet, aromatic pulp developed from the outer layers of the testa. The seeds are rounded, in pinkish gelatinous pulp which is either sweet or bitter depending on the maturity. The pod husk may be thick and woody or thin and easy to cut through, depending on the size. Immature pods are small with a light brown or red colour, mature pods have a deep or red colour [1]. Ecologically, desma plants appear to be trees of low land tropical forests. Their natural habitat includes very wet sports in dense rain forest. The limits of cultivation are about 20° North and 20° South, with the bulk of the crop within 10° of the Equator, and within these limits, most of main producing areas are at low or sloppy elevations [8]. Due to inappropriate post harvest storage, drying and transportation system, it is estimated that about 20-30% of total seeds are lost after harvesting. The underutilization of the seed is a cause for grave concern in Nigeria. Large quantity of harvested *Novella pentadesma* seeds are either lost due to inadequate processing, transportation and storage facilities or are left to decay in the plantation because of lack of awareness of their potential uses. However, where storage facilities are provided improper drying, insects and pests attack have often caused deterioration with a consequent reduction in nutritional values of the seed and oil [3]. Therefore, this study aimed at evaluating the methods of handling, transportation and storage of *Novella pentadesma* seeds in Ovia North-East and South-West Local Government Areas of Edo State, South-South Nigeria.

## II. METHODOLOGY

### 2.1 Study Area

In this study, Ovia South-West and North-East local government area of Edo state with head quarters located at Iguobazuwa and Okada in South-South Nigeria were considered, respectively.

According to the census report [6] the populations of these areas were 135, 356 and 153, 849 inhabitants, with average land masses of 2803 and 2301 square kilometers, respectively. Figures 1 and 2 show the map of Edo State and the two Local Government Areas in the state and the sketch map of the communities in the two Local Government Areas where desma seeds were predominantly known for handling, processing, storage and transportation of desma seeds in Nigeria.

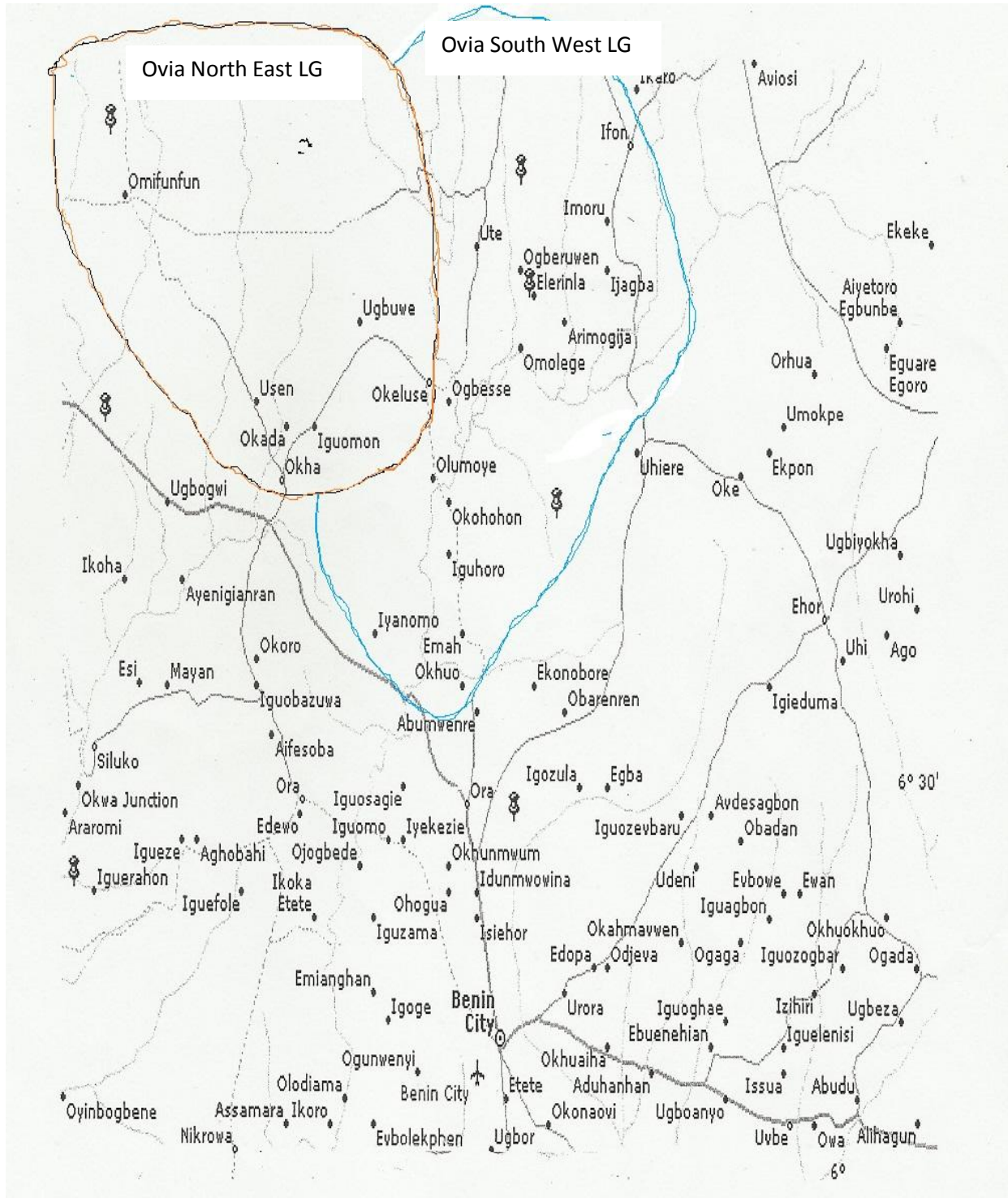
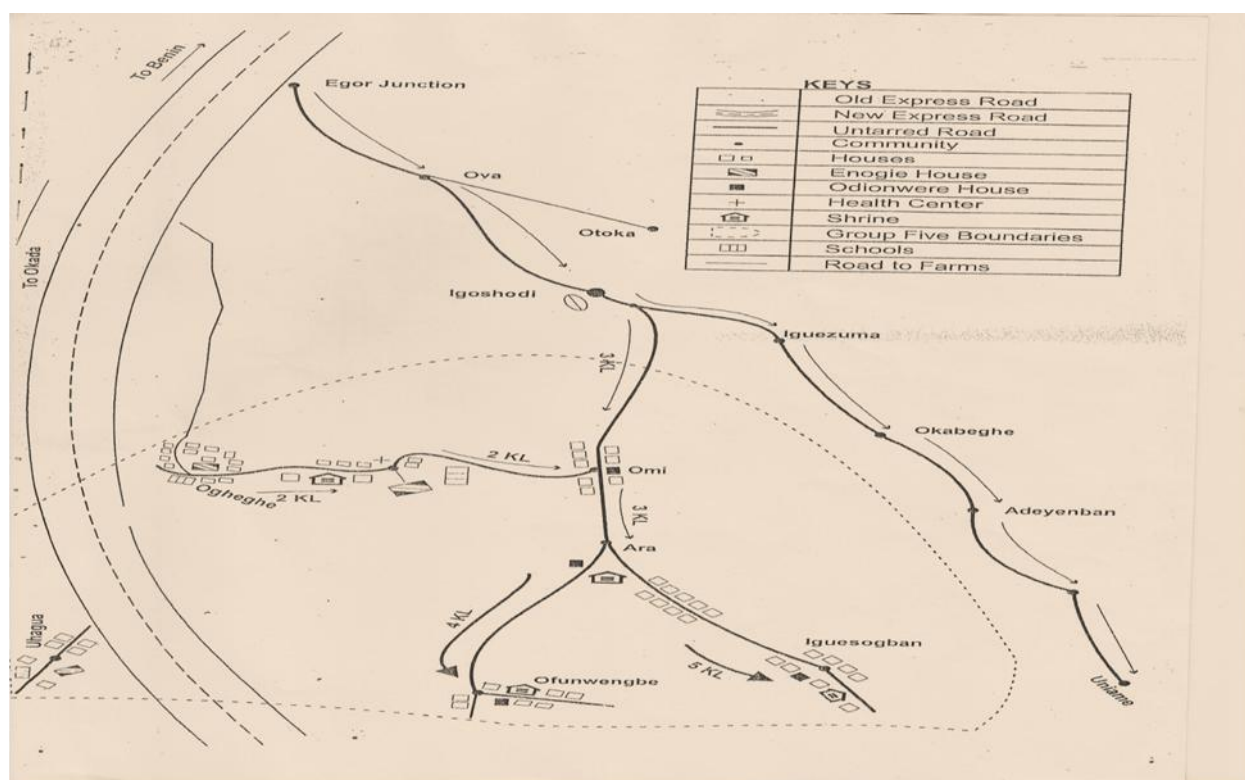


Figure 1: Map of Edo State Showing the Study Area



**Figure 2: Some Communities where Desma Seeds are mostly Concentrated (Demographic Department Ministry of Lands and Survey, Edo State)**

### 2.2 Method of Data Collection and Analysis

The random selection techniques described by Douglas and Montgomery [7] was used to select the farmers and villagers from the sixteen communities involved in this survey. A total of one thousand two hundred and thirty one (1231) and eight hundred and eighty eight (888) respondents from Ovia North-East and Ovia South-West Local Government Areas were respectively involved (Table 1).

**Table 1: Number of Farmers/Collectors interviewed /LGA**

LGA	Name of the Community	Number of Farmers/collector
Ovia North-East	Igoshodi	246
	Omi	168
	Arah	107
	Obagie	206
	Ogheghe	215
	Uhoague	107
	Ofunwengbe	88
	Iguesagban	94
<b>Total</b>	<b>8</b>	<b>1231</b>
Ovia South-West	Okabegbe	96
	Iguoshode	231
	Iguecama	82
	Adeyanoba	57
	Utokha	68
	Agbomoba	46
	Uniamen	216
	Neikpemaba	93
<b>Total</b>	<b>8</b>	<b>888</b>

Questionnaires to be filled were given to respondents who could read and write, while other unanswered questions were put to them by an interviewer, which was recorded on a prepared questionnaire. The prepared questionnaire sought the following information: Estimated number of trees per hectare, number of years to first fruit harvest, collection period of the year, number seeds per fruits, average weight of seeds per fruit, packaging

materials of fruits, transportation methods, storage methods, processing techniques, average number of collectors, estimated and causes of seeds loss and any other relevant information.

The information obtained from the administered questionnaires was analyzed using descriptive statistics of quantitative variables. This involved the use of central tendencies including mean, frequency distributions and percentages.

### III. RESULTS AND DISCUSSIONS

#### 3.1 Farming Communities involved in the Collection of *Desma* seeds

Table 2 shows the number of farmers in the communities engaged in *Desma* seeds collection from the plantations. More farmers (246) were engaged in *Desma* seeds collection in Igoshodi community in Ovia North-East local government area probably because of the growing interest in *Desma* trees farming by the youths of the community. This was reflected by the number of *Desma* trees cultivated at different locations in the community. However, only 88 farmers were engaged in this study in Ofunwengbe community suggesting that *Desma* tree cultivation was not taken seriously by the youths in that community. In Ovia South-West local government area 231 youth farmers were engaged in *Desma* seeds collection in Iguoshode community. Also only 68 farmers were engaged in *Desma* seeds collection in Utokha community. In all more farmers were engaged in *Desma* seed collection in Ovia North-East than in Ovia South-west.

**Table 2: Average Number of Farmers/collectors in each Local Government Area**

Local Government Area	Name of Community	Average Number of Farmers
Ovia North-East	Igoshodi	246
	Omi	168
	Arah	107
	Obagie	206
	Ogheghe	215
	Uhoague	107
	Ofunwengbe	88
	Iguesagban	94
Ovia South-west	Okabegbe	96
	Iguoshode	231
	Iguecama	82
	Adeyanoba	57
	Utokha	68
	Agbomoba	46
	Uniamen	216
	Neikpemaba	93

#### 3.2 Evaluation of Quantity of *Desma* seeds Collected in the Study Areas

Tables 3 and 4 show the average quantity of *Desma* seeds collected and the estimated number of seeds per fruit in Ovia North-East and Ovia South-West local government areas Edo state. A total of 1231 farmers engaged in Ovia North-East local government area collected 6278100 *Desma* seeds representing 5100 *Desma* seeds per farmer. In Ovia South-West local government however, 4049280 *Desma* seeds were collected from the 888 farmers engaged. More farmers were engaged in Ogheghe and guoshode communities of Ovia North-East and Ovia South-West local government areas Edo state, respectively.

**Table 3: Average Quantity of Seeds Collected per Local Government Area**

LGA	AC per Farmer (kg)	Number of F. /LGA	AC per kg/LGA
Ovia North-East	5100	1231	6278100
Ovia South-West	4560	888	4049280

AC = Average Collected, F = Farmers, LGA = Local Government Area



**Table 4: Estimated Number of Seeds per Fruit in Ovia North East and Ovia South West Local Government Areas of Edo State**

Name of Communities	No of Farmers	Estimated No of trees per Hectare	No of mature fruits per tree	Average No of seeds per fruit	Average weight of seed per fruit (gms)
<b>Ovia North East Local Government Area of Edo Sate</b>					
Igoshodi	246	22	15	45	104
Omi	168	21	13	45	104
Arah	107	21	14	45	104
Obagie	206	23	15	45	104
Ogheghe	215	22	12	45	104
Whoague	107	20	12	45	104
Ofun wengbe	88	21	13	45	104
Igue sagbon	94	21	14	45	104
<b>Ovia South West Local Government Area of Edo Sate</b>					
Okabegbe	96	24	13	45	104
Iguoshode	231	22	15	45	104
Iguecama	82	22	15	45	104
Adeyannoba	57	23	15	45	104
Utokha	68	21	13	45	104
Agbomoba	46	21	12	45	104
Uniamen	216	21	12	45	104

### 3.3 Evaluation of Transportation and Storage Facilities of *Novella pentadesma* Seed

Table 5 shows that the transportation of *Novella pentadesma* in the two local government areas is affected by collection points, road access and inadequate storage facility in some communities. A very excellent collection points were observed in Igoshodi and Iguoshode communities of Ovia North-East and South-West in each case. The road linking Iguoshode and the study site was also in good condition, thus *Novella pentadesma* seed growers see this as opportunity to transport their harvested seeds. The storage facility at Okabegbe community is excellent with moderately good access road and collection points. Improvement is therefore urgently needed in Arah, Uhoague, Ofunwengbe, Iguesagban and Neikpemaba with either poor or very poor collection points, road access and storage facilities.

**Table 5: Collection Point, Road Access and Storage Facilities of *Desma* Seeds in the Study Areas**

LGA	Community	Collection Point	Road Access	Storage Facility
Ovia North-East	Igoshodi	5	4	4
	Omi	3	3	2
	Arah	2	3	0
	Obagie	2	4	3
	Ogheghe	2	4	3
	Uhoague	1	3	1
	Ofunwengbe	0	3	0
	Iguesagban	0	2	0
Ovia South-West	Okabegbe	4	4	5
	Iguoshode	5	5	4
	Iguecama	4	4	3
	Adeyanoba	3	4	2
	Utokha	4	3	4
	Agbomoba	3	3	4
	Uniamen	2	2	4
	Neikpemaba	1	2	1

5 = Excellent, 4 = Very good, 3 = Good, 2 = Fair good, 1 = Poor, 0 = Very poor

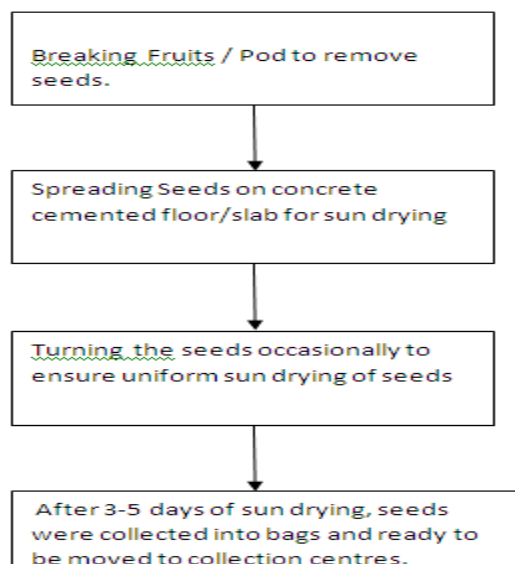
Table 6 shows the method of handling, transportation and storage methods of *desma* seed in the two local government areas. Motorcycles are the major means of transporting *desma* seeds in the communities of Ovia North East and South West local government areas. This was followed by the use of bicycles and wheelbarrows in Ovia North East and South West, respectively. Polyethylene bags are usually used for packaging and storage

of the seeds from the point of harvest to the market where they are eventually sold. The farmers are sighted in some communities using paper cartons, plastic or metal buckets and jutes bags for packaging and storage of the seeds in the two local government areas of Edo State.

**Table 6: Handling, Transportation and Storage Method of Desma Seeds**

Local Government Area	Methods	Quantity (kg)	Accessed (%)
Ovia North East	Transportation :		
	Bicycles	941715	30
	Motorcycles	2197335	50
	Wheelbarrows	1883430	10
	Labour (Legs)	1255620	10
	Storage/Packaging :		
	Jute bags	1883430	15
	Polyethylene bags	3139050	35
	Paper cartons	627810	30
Ovia South West	Transportation :		
	Bicycles	809,856.00	20
	Motorcycles	1,700,697.60	42
	Wheelbarrows	1,052,812.80	26
	Labour (Legs)	485,913.60	12
	Storage/Packaging :		
	Jute bags	971,827.20	24
	Polyethylene bags	2,429,568.00	60
	Paper cartons	161,971.20	4
Buckets (plastic/metal)	485,913.60	12	

Figure 3 shows a flow diagram of the local processing and handling technique for desma seeds in Ovia North East and South West local government areas of Edo State. The removal of the seeds from the seed pods is usually the first stage in the process line; after which they are spread out in thin layer under the sun to dry for between 3 to 5 days. In Igoshodi and Okabegbe communities of Ovia North East and South West local government areas, the farmers are seen using dried sticks to occasionally turn the heaped seeds for uniform drying. This collaborates the work by Altisent [1] where desma seeds were dried under the sun to reduce their moisture content for their effective storage.



**Figure 3 : Local Processing and Handling Techniques of Desma Seeds**

### 3.4 Evaluation of Quantity of *Desma* Seed Stored and Loss

Most agricultural seeds and grains deteriorate when left on the floor in the plantation [5]. Poor handling is one of the major factors that encourage the on set of deterioration. However, indices of seed spoilage can be attributed to harsh environmental conditions. High air temperature and humidity have been reported to cause significant reduction in the oil yield of most seeds [2]. The average quantity of *Novella pentadesma* seed stored and the losses incurred by the seed growers from operating tools during harvesting and in packaging are expressed as shown in Table 7. Loss in terms of quantity of *desma* seed due to the rodent (56% and 61%) attack was more than those associate with insect attack (23% and 20%) or deterioration (21% and 19%) in Ovia North-East and South East, respectively. This is largely because the thick vegetation zone of the study areas provided a good habit for the survivals of the rodents, which eventually grows in number and rapidly attacks the *desma* seeds for food. Sivy *et al.* [4] reported a significant decrease in viability of seeds attacked by Kangaroo mice and pocket mice in their study on effects of rodent species, seed species, and predator cues on seed fate. Ultimately, many *desma* seed farmers in the South-South, Nigeria have grown cold in the cultivation of *desma* trees because of the activities of the rodents.

**Table 7: Average Quantity of *Desma* seed stored and loss**

Parameter	Local Government Area	
	Ovia North-East	Ovia South-East
Seed stored (kg)	620,516	896,713
Seed Loss (kg)	76,036	97,517
	<i>Causes of Loss:</i>	
Insect (%)	23	20
Rodent (%)	56	61
Deterioration (%)	21	19

## IV. CONCLUSIONS

In order to solve the problems associated with the storage, handling and transportation of *Desma* seeds in Edo State, sixteen communities in Ovia North-East and South-West Local Government Areas of the State were selected for this investigation. The study revealed that a total of 6,278,100 *Desma* seeds were collected by 1231 farmers mostly from Igoshodi community in Ovia North-East local government area. However, 4,0492,80 *Desma* seeds were collected from the 888 farmers mostly from Iguoshode community in Ovia South-West local government area. A very excellent collection points were observed in Igoshodi and Iguoshode communities of Ovia North-East and South-West in each case. The road linking Iguoshode and the study site was also in good condition, thus *Desma* seed growers see this as opportunity to transport their harvested seeds. The storage facility at Okabegbe community is excellent with moderately good access road and collection points. Improvement is therefore urgently needed in Arah, Uhoague, Ofunwengbe, Iguesagban and Neikpemaba with either poor or very poor collection points, road access and storage facilities. The quantity of *Desma* seed loss due to the rodent (56% and 61%) attack was more than those associate with insect attack (23% and 20%) or deterioration (21% and 19%) in Ovia North-East and South East, respectively. This was largely because the thick vegetation zone of the study areas provided a good habit for the survivals of the rodents, which eventually grows in number and rapidly attacks the *Desma* seeds for food.

## REFERENCES

- [1] Altisent, C.K (2006): Women and the Food cycle. London, U.K: Intermediary Technology Publications. 5:22-25.
- [2] Bhat, K.A, S.A. Masoud, N.A. Bhat, M.A. Bhat and S.M. Razavi, (2010). Current Status of Postharvest Soft Rot in Vegetables: A review. *Asian J. Plant Sci.*, 200-208.
- [3] Baraski, A.C., Wiemer, H.J. and Altes, F.W.K. (2006). Small scale processing of oilfruits and oilseeds. Eschborn, Germany: GATE/GTZ.
- [4] Sivy, K.J., Ostoja, S.M., Schupp, E. W., and Durham, S. (2011). Effects of rodent species, seed species, and predator cues on seed fate. *Acta Oecologica Elsevir*, Pp 1-8
- [5] Fadeyibi A and Osunde Z D (2012). Thermo-physical properties of rubber seed useful in the design of storage structure. *Int J Agric & Biol Eng*, 2012; 5(2): 62–66.
- [6] Census (2006). Edo state population census. Edo state government, Wikipedia document.
- [7] Douglas, C., and Montgomery, A. (1991). Design and analysis of experiments (Third Edition). Pages 197-201, 203-208, 230-235,270-309,498-513. Jonh wiley and sons New York.
- [8] Urquhart, K.C.(2007): <http://www.iucn.org/en>