

# **An Assessment of the Factors Inhibiting the use of Plastic Materials among Selected Agro-Enterprises and Farmers in Calabar Agricultural Zone of Cross River State, Nigeria**

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D.O.I: 10.56201/ijaes.v8.no5.2022.pg1.16

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## **ABSTRACT**

*This study assessed the factors inhibiting the use of plastic materials among selected agro-enterprises and farmers in Calabar Agricultural Zone of Cross River State, Nigeria. The objectives of the study were to indicate the number of registered agro-enterprises that uses plastic materials in the study area, ascertain the ways in which the Government can discourage the use of plastic among farmers and their agro-enterprises in the study area, ascertain the level of participation of respondents in sustainable plastic use in the study area and identify inhibiting factors or constraints to utilization of plastic products by agro-firms in the study area. Both primary and secondary data were used for the study. Primary data was through a structured questionnaire while secondary data was gotten from the Cross River State Ministry of Agricultural. A total of 153 respondents were surveyed. The population of the study included farmers who operates selected agro-enterprises in the study area. Findings revealed that there are about 1230 registered agro-firms in the Calabar Agricultural Zone of Cross River State which make use of plastic input. Ways in which the government can discourage the use of plastic materials were; Government policies that restrict the import/export of plastic materials ( $\bar{x} = 1.7$ ), Government taxes on plastic production ( $\bar{x} = 1.9$ ), among others which were all significant. The highest level of participation in sustainable plastic use in the study area occurred among agro-packaging enterprises ( $\bar{x} = 2.6$ ). Farmers indicated that the constraints of plastic use as identified in this study are insignificant except that it causes death due to ingestion and entanglement. This study therefore recommend the support of the government at all level to support the use of plastic in agriculture due to it many benefits, while seeking better ways to manage plastic menace.*

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**Keywords:** *Plastic Materials, Agro-enterprises, Plastic Constraints, Plastic Use,*

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## INTRODUCTION

Plastics in agriculture is the use of plastic materials by a farm establishment in its production, processing, storage and marketing. It also provides assets, input or capital to create output, enhance profit, subsidize cost of production and develop the farm business. Agricultural plastic technology on the other hand, entails ideas, practices, methods or principles which employ the use of plastic materials to ease agricultural production challenges. Plastic pollution on the other hand is the excessive presence of plastic material in the environment in an amount that is capable of destroying the system that supports life (Etim, 2018; Hammer, Kraak, and Parsons, 2012). According to Etim (2018), it is having the occurrence of plastic materials in an environment at a level that is dangerous to life.

Plastics have contributed to the accumulation of plastic materials on the surface soil, which forms different degrees of interference, nuisance, dirt, blockage and prevents direct infiltration of nutrients, plant roots, reducing porosity, increasing compaction, disrupting tillage operation, causing death of plants and animal, while also contributing immensely to agricultural production such as packaging, storage, mulching, erosion control, safe handling, hygiene, farm structures and so on. Plastic materials dumped into the earth prevent the production of nutrients in the soil. As a result of this, the fertility of the soil is reduced and affects the agricultural sector. Its persistence in the environment can do great harm, cause immune and enzyme disorders, hormonal disruption or endocrinal disorders, infertility and cancer, it becomes harmful and hazardous not only to human health, it can dangerously affects other animal life and alter the environmental (air, water and soil) sustainability causing hazardous pollution (Giuliano, Rosa, Ileana, Giacomo, and Mugnozza, (2015). When plastics are used, recycled, or disposed of, or left in the environment as litter, they break down and release harmful chemicals. These pollutants include heavy metals such as cadmium and lead, and chemicals such as benzene, dioxins, and other pollutants, which all release harmful toxins into the air, water and ground. Burning plastic in incinerators releases toxic heavy metals and chemicals. Incinerators produce a variety of toxic discharges to the air, water, and ground that are significant sources of powerful pollutants, including dioxin and other chlorinated organic compounds that are well known for their toxic effects on human health and the environment, (Giuliano, Rosa, Ileana, Giacomo, and Evelia, (2015)).

Plastics unveil opportunity for economic and rural development which deals with the improvement of the social and economic life of the people in the environment through industrialization, creation of employment, job opportunity (Plastic vendors), and government interventions that will better the rural life and environment by good policy framework, schemes and programmes that support clean environment, remove plastic liters on the road, streets, drainages or water ways, creation of awareness and inauguration of an Agricultural and Environmental Safety Awareness and Sanitation Agency (Etim 2018).

In Africa, Nigeria is the largest importer of plastics in primary forms (Fairtrade, 2019). With about 70% of raw materials imported (mainly from the Middle East, Europe and Asia) and only 30% produced locally, the Nigerian market has great potential for exporters of plastics in primary forms. In the years 2008 to 2015, for example, imports of plastic raw materials increased annually by 7.2% from 464 kt to 754 kt, a +62.5% increase (Fairtrade, 2019). This makes Nigeria, together with Algeria, Africa's largest importer of plastics in primary forms. Plastic packaging has become very popular in Nigeria's agriculture and is increasingly being preferred to glass, even in the pharmaceutical and cosmetics industries (World Wide Fund for nature, 2018). Most Economic Community of West African States (ECOWAS) countries depend on Nigeria for their plastic needs, given the country's competitive advantage in the area of

sourcing raw materials. Plastic products are mostly exported to these neighboring countries by resellers as opposed to the actual manufacturers. The demand for plastic products continues to outpace supply and consumption is expected to grow significantly. Also, the World Wide Fund for nature (WWF, 2018) says South Africa uses between 30kg and 59kg of plastic per person per year. While *Plastic South Africa* in a National Plastic Recycling Survey, 2017 says that the industry recycled 334, 727tons or 43.7% of all plastics. According to World Wide Fund for Nature (2018) report, this recycling industry in South Africa supports 5, 837 formal jobs.

Nigeria's plastic and packaging sector has grown rapidly in recent decades, from around 50 companies at its inception in the 1960s to more than 3,000 manufacturers, as reported by the National Agency for Food and Drug Administration and Control (NAFDAC) in 2017(Fairtrade, 2019). Unsurprisingly growth in the sector closely mirrors that of the FMCG (Fast Moving Consumer Goods) industry which has seen a 40% expansion in demand for packaged goods over the last five years. This has contributed to a compound annual growth rate of roughly 12% over that same period for packaging producers, in spite of the slowdown in consumer spending following the recession, (Fairtrade, 2019).

According to Giuliano, Rosa, Ileana, Giacomo, and Evelia, (2015a), the current intensification of the use of plastic materials in agriculture, has increased significantly thereby generating growing adverse effects on the environment of the agro-ecosystems. Besides the pollution generated during manufacturing, at the end of their lifetime plastic materials used for crop covering, soil mulching, packaging, containers, pots, irrigation and drainage pipes, may become a pollution source when improperly disposed, left on the ground or burned. Instead the Agricultural Plastic Waste, if correctly collected, can be used as a new secondary raw material or as an energy source. An adequate Agricultural Plastic Waste (APW) management can prevent economic losses and environmental damages.

Also, Bernard (2015), posited that for over five decades now, the effects of plastics in agriculture have allowed farmers to obtain a better quality and better efficiency in crop production. By using agri-plastics, professionals (farmers and growers, distributors and plastics producers) are involved from the start in the protection of the environment. The knowledge and practice of plastic agriculture increases production in quality and quantity, while reducing the consumption of valuable resources (water, pesticides, fertilizers, energy). Plastics retain CO<sub>2</sub> and warm the soil, preserving humidity and reducing the leaching of pesticides and fertilizers. Plastic protect plants, roots, soil structure. This is the contribution of agri-plastics to an Intensive Ecological Agriculture necessary to feed the growing human population. Without plastics, 60% of fruit, vegetable and dairy production would be endangered (Bernard, 2015).Plastics pollution poses a serious global challenge. Farmers however, so much appreciate and routinely use plastic to improve their value. The "Beat Plastic Pollution" of the World Environment body, in 2018 raised a global outcry to eliminate plastic usage and pollution by all means and sought for international collaboration with all the countries of the world. The movement to; "refuse, reuse and recycle" are mechanisms which target plastic reduction by the public or consumers; while tax imposition targets manufacturers and retail supermarkets; and also light ban to total ban which targets reduction of plastic usage and pollution at a national scale in each collaborating countries of the world (Taylor, 2018). Health and safety concerns have increased the agitation by health and environmental bodies to ban plastics due to the use of toxic and hazardous chemicals in it production which are mostly carcinogenic (Etim, 2018). Also, the vast polluted area in Oceans, massive accumulation on land and beaches, and the danger of plastics to wildlife and sea creatures has prompted oceanographers to play a leading role in the prohibition of plastics.

Environmental and Urban Development Agencies saw plastics as a material that has defiled the aesthetic and natural credence of the environment with its non-biodegradable feature causing pollution and waste accumulation.

## **STATEMENT OF THE PROBLEM**

Plastic materials have shown an unprecedentedly high level of disruptions in agriculture, the environment and the society. But its level of utilization has surprisingly continued to increase more than the utilization of alternative materials for the same purpose. Atuanya, Aborisade and Nwogu, (2012) indicated that it constitutes tremendous harm to the growth of agricultural produce, as well, Giuliano, Rosa, Ileana, Giacomo, and Evelia, (2015), reiterated its harmfulness based on health, safety and environmental concerns. Meanwhile, Nyarko and Adu (2016), William (2015), Trucost (2016) and Bernard (2015) have extravagantly demonstrated the useful impact of plastic on agricultural development.

The high environmental costs of clearing the environment of plastic, have prompted some researchers to argue that plastics should be banned and replaced with alternative materials, which may present fewer environmental challenges (UNEP, 2014). However, recent studies by Franklin Associates (2013) and Trucost (2016) which modeled the substitution of plastic with alternative materials (such as paper, steel, Aluminum and glass), suggested that a move away from plastics may come at an even higher net environmental cost. Bernard (2015) has opposed the move to ban plastic, and strongly asserted that plastic has provided the bulk of farm implements used in agricultural businesses and its usefulness cannot be replaced easily.

Any policy framework by the government of Nigeria and Cross River State to ban plastic use will cause a shake up in the farming and agri-business environment and halt production, processing, marketing or storage/packaging activities. There is a gap between high plastic problem awareness and fast increasing plastic demand and utilization in agriculture. Through assessing the factors inhibiting the use of plastic materials among farmers in the study area. This study seeks to fill this research gap by providing data or information on constraints to plastic utilization among agro-farmers in the study area.

## **OBJECTIVES**

The general objective of this study was to assess the constraint to the use of plastic materials among agro-farmers in Calabar Agricultural Zone of Cross River State.

The specific objective of the study was to;

- i. indicate the number of registered agro-enterprises that use plastic materials in the study area.
- ii. ascertain the ways in which the Government can discourage the use of plastic
- iii. ascertain the level of participation of respondents in sustainable plastic use in the study area.
- iv. identify inhibiting factors or constraints to utilization of plastic products by agro-firms in the study area.

## LITERATURE REVIEW

The cost effective and risk bearing nature of agriculture has induced a higher level of adoption of plastic materials in a bid to reduce input cost, farm risk and increase profit with the use of plastics. The knowledge and practice of plastic in Agriculture also contribute some relieve and reduction of cost or risk of production to the farmer despite environmental concern. Nigeria, a most populous African country has the largest adoption rate of plastic use in her daily life, businesses, consumption and production, hence any ban on plastic usage like other countries, will affect the cost of living, productivity of the farming business, profitability of farmers, increased risk due to high cost of alternative materials to plastic, reduced motivation to produce due to high cost of alternative materials to plastic, increase cost of agri-business and marketing due to high cost of product inputs which will replace plastic containers and bags.

Any policy framework by the government of Nigeria and Cross River State that bans plastic use to an extent will cause a shake up in the farming and agri-business aspect of social life and halt production and business of already producing plastic companies, farms and its assets. This also may pose another challenge is bio-plastic is enforced to an extent because thou it is desirable but it is not sustainable at a level for small holder farmers due to it high cost. Different units and components of the agricultural sector has benefited from the good qualities of plastic in various forms, shape and size which made plastic more desirable. There are;

- The Agricultural Audio Visual units : Plastic TV, Chair, Table, Scanner, Radio, Screen or projector
- Agricultural Machines and tractors with plastic surfaces or handles
- Agricultural tools; shovels, cutlasses, cutter, hand trowels etc. has some plastic surfaces for easy and soft handling.
- Agricultural wiring and farm electrification uses plastic as a good insulator for it cables, wires, fuse, sockets and switches.
- Agricultural storage has placed a hugged demand for plastic use in packaging, storage of farm produce and liquid produce, such as bottles, plates, buckets, drums, cans etc, all made of plastic.
- Agricultural construction of farm houses, demonstration rooms, green houses and storage rooms has plastic components as attachments as nets, window blind, electrical wires, plastic standing fans, PVC roof, chairs and so on.
- Display of Agricultural produce in transparent plastic containers, display of agricultural laboratory specimen in a visible form, display of agricultural produce in transparent containers to attract buyers.

All these application has increased the adoption of plastic in agriculture and made it indispensable. Any ban on plastic will have an inverse relationship with agricultural production in these aspects. Current development has seen plastic roofing, canopies, pond, watering tanks, irrigation tubes and piping, and so on, continually displacing it alternatives such as glass, steel, iron and aluminum. Other benefits of plastic use include;

The indiscriminate littering of the sachet and empty bottle waste in various sites such as along the streets, gutters, lorry stations, school compounds, market places, homes, and venues of social functions etc. poses a lot of threat to the environment and agricultural land. The sachets and empty bottles are usually made from non-biodegradable synthetic polyethylene (polythene), which does not decay, they can stay in the soil for more than 100 years. When they are burnt too, they produce oxides of carbon, nitrogen and Sulphur which are poisonous to human health and the soil (Tiway, 2015). A study by the European Union revealed that plastic waste

contributes to the death of about one million sea birds and 100,000 marine mammals and large number of birds (EU Plastic Waste Ecological and Human Health Impact, 2015). Excessive plastic accumulation in the soil causes problems such as blocking water penetration into the soil, contamination of ground water, poor soil aeration etc. The higher consumption of sachet and bottled water in the area is causing a lot of harm to the environment especially agricultural land, due to the nuisance of littering behaviour of the people.

On the negative effects of plastic bags on animals, plastic bags are consumed by animals, just like in the ocean. Animals eat food wrappers, waste, and plastic bags leading to digestive problems that can cause death. Furthermore, animals can get trapped with bags around their heads causing them to suffocate or cause limping joint around the limbs. There is even one recorded case of two deer getting their antlers tangled together by plastic waste. These animals suffer huge consequences because our plastic waste is not correctly disposed of. The constraints of plastic in Agriculture as reviewed in the literature include;

- entanglement and ingestion by wildlife or livestock leading to death.
- Litters on the environment.
- Reduced soil fertility
- cause immune and enzyme disorders, hormonal disruption leading to endocrinal disorders and even infertility and is also considered as carcinogenic (cancer).
- Not only human health, it dangerously effects other animal life and alters the environment (air, water and soil) sustainability
- cause hazardous pollution.
- disposed plastics break down and release harmful chemicals.
- causes soil and water contamination
- cause food contamination
- soil quality degradation
- decrease in nitrogen fixation
- huge loss of nutrients in the soil
- decrease in crop harvest
- disparity in flora and fauna on soil etc.

## RESEARCH METHODOLOGY

The research was conducted in the Calabar Agricultural Zone of Cross River State which lies between latitudes 5°32' and 4°27' North and longitudes 7°50' and 9°28' East of the Greenwich meridian. It has a tropical humid climate with wet and dry seasons and average temperature ranging between 15°C – 30°C and annual rainfall between 1300 – 3000mm. The Calabar Agricultural Zone has seven blocks which are; Calabar South, Akamkpa, Calabar Municipality, Biase, Akpabuyo, Bakassi, and Odukpani (CRS LEEDS, 2016). The vegetation consisted; Mangrove, Swamp, and Rainforest. Major crops produced in the area include; Cocoa, Rice, Cassava, Oil Palm, Rubber, Banana and Pineapple among others. Occupation is mostly farming, marketing and civil services. Farming activities includes; fishing, crop and livestock production, agro-marketing, processing and milling of agricultural produce among other. The zone is chosen for this study because of the huge presence of plastic companies and plastic use in the area.

The population of the study included all registered 1230 agro-firms and their owners in the Calabar Agricultural Zone that use plastic materials for their farm activities. The five enterprise categories were as follows; processing and packaging agricultural enterprise, Vegetable

farm/garden, Poultry farm, nursery/horticultural enterprise and agro-marketing enterprise.

Multi-stage and purposive sampling techniques were adopted to have a sample frame of 153 respondents who were used for the study. Both primary data and secondary data were used for the study. Descriptive statistics such as; percentages, means score and ranking were used to analyze the data. Data collected were sorted and coded before being analyzed.

### **Measurement of Variables**

Objective 1: The number of registered agro-enterprises which utilizes plastic materials was derived, indicated and discussed based on data provided by the Cross River State Ministry of Agriculture on the number of registered agro-enterprises in Calabar zone.

Objective 2: The ways in which the Government can discourage the use of plastic was presented using tables, frequency, and mean, and measured using binomial regression. Variables were coded as: Yes = 2 and No = 1.

Objective 3: The level of participation in sustainable plastic use by agro-firms was measured with a three-point Likert type of scale such as; High = 3, Average = 2 and Low =1 on variables such as production, processing, packaging, marketing and storage activities carried out by agro-firms in the study area.

Objective 4: The inhibiting factors to effective use of plastic by agro-firms was measured with a four-point Likert type of scale such as; Strongly Agree (SA) = 4, Agree (A) = 3, Disagree (D) = 2 and Strongly Disagree (SD) = 1.

## **RESULTS AND DISCUSSION**

### **1. Registered Agro-Enterprises in Calabar Agricultural Zone which utilizes plastic materials in the Calabar Agricultural Zone**

Table 1. Distribution of Registered Agro-Enterprises in Calabar Agricultural Zone which utilizes plastic materials in the Calabar Agricultural Zone

Enterprises	Blocks							Total
	Calabar South	Calabar Municipality	Akamkpa	Akpabuyo	Odukpani	Biase	Bakassi	
1. Poultry	27	30	71	39	60	21	22	270
2. Nursery/Horticulture	21	26	27	40	30	43	41	228
3. Processing/Packaging	20	25	12	13	27	56	86	239
4. Vegetable/Garden	79	40	15	10	80	24	26	274
5. Agro-marketing	40	50	27	23	31	28	20	219
<b>Total</b>								<b>1230</b>

Source: Cross River State Ministry of Agriculture, 2019.



Table 1, provide statistical data on the number of agricultural enterprises registered and operated in Cross River State’s Calabar Agricultural Zone which uses plastic materials as input in their Agro-market, horticultural, Poultry, Packaging and Vegetable Enterprises.

Indications revealed that the Cross River State Ministry of Agriculture registered more farmer that operates a vegetable or garden enterprises than any other block that made up this Agricultural Zone. This is followed by Poultry enterprises. This implies that there is a considerable utilization of plastic materials by these enterprises to ease out their production needs.

The table indicated that a total of 1230 enterprises were registered by the Cross River State Ministry of Agriculture that utilizes plastic materials in the Calabar Agricultural Zone of Cross River State.

## 2. Ways in which the Government can Discourage the Use of Plastic Materials

Table 2. Distribution of Respondents Based on their Mean Rating on the Ways in which the Government can Discourage the Use of Plastic Materials

S/No	VARIABLES	YES	NO	MEAN	REMARK
1.	Government policies that restrict the import/export of plastic materials	120	33	1.7	Significant
2.	Government taxes on plastic production	140	13	1.9	Significant
3.	Total or partial ban on plastic materials	109	44	1.7	Significant
4.	Deliberate increment in the cost of plastic materials input	132	21	1.8	Significant
5.	Increment in import duties and restrictions on plastic materials	144	9	1.9	Significant
6.	Restrictions on the quantity of plastic materials that can be lifted or imported at a particular time	123	30	1.8	Significant
7.	Flagrant enforcement of environmental laws on plastic companies by federal and state enforcement agencies	123	30	1.8	Significant
8.	Exploitation of plastic companies by government agencies based on perceived widespread condemnation by global environmental agencies	140	13	1.9	Significant
9.	Unavailability of adequate policy on urban waste management that will have curb plastic liters	120	33	1.7	Significant
10.	Increment in the exchange rate for plastic commodities to discourage usage	145	8	1.9	Significant

11.	Support and stimulations for alternative materials to plastic	131	22	1.8	Significant
12.	Restrictions on who can trade on plastic products to limit the number of traders	133	20	1.8	Significant
13.	Restriction of plastic company on government subsidy	128	25	1.8	Significant
14.	Increment of interest rates for bank loans on plastic companies	117	36	1.7	Significant
15.	Social enforcement and laws that prohibit littering of plastic materials by consumers.	125	28	1.8	Significant

Field survey, 202 *Benchmark mean  $\geq 1.5$  implies significant*

Findings from Table 2 revealed that all the variables are strong indications and dimensions by which the government of Cross River State and Nigeria can effectively reduce, obstruct, prohibit and limit the use of plastic in the agricultural development of the selected agro-enterprises in the study area.

This implies that; Government policies that restrict the import/export of plastic materials ( $\bar{x}=1.7$ ), Government taxes on plastic production ( $\bar{x}=1.9$ ), Total or partial ban on plastic materials ( $\bar{x}=1.7$ ), Deliberate increment in the cost of plastic materials input ( $\bar{x}=1.8$ ), Increment in import duties and restrictions on plastic materials ( $\bar{x}=1.9$ ), Restrictions on the quantity of plastic materials that can be lifted or imported at a particular time ( $\bar{x}=1.9$ ) and the rest of all the variables are significant ways the government can use to effect a gross reduction in utilization of plastic materials among agro-enterprises and farmers in the Calabar Agricultural Zone of Cross River State.

These findings corroborate assertions by a wide range of researchers. The global call to ban plastic materials due to its environmental problem according to Muhammad (2014), has attracted a wave of ban which is in a rapid action across the globe which has pushed into Africa and is expected that Nigeria as one of the biggest economies of Africa should take the lead. The prohibition of plastic usage in countries like Bangladesh, India, Pakistan, Malaysia, Ireland, Hong Kong, Australia, Dhaka (Bangladesh), Zanzibar, San Francisco, South Africa, Senegal, Côte d'Ivoire, Mali, Ghana, Kenya, Ethiopia, Malawi, Mauritius, Zanzibar (Tanzania), Uganda and Cameroon. This also presents a strong pressure for Nigeria to enact a banning policy on the use of plastic materials as a leading economy in Africa. According to a facebook.com report 1 (one) million Malaysians want the government to ban plastic bags in Malaysia following Singapore and other

countries in Asia and Europe (Plastic bags Malaysia, 2011). Again, iGeorge Town Penang (2011), in her research has requested that the Malaysian government should impose a high levy on the plastic bags or better can ban it as soon as practicable and urge the people to use environment friendly biodegradable bags for sustainable development of the environment and agriculture (iGeorge Town Penang, 2011; iGuide Nigeria 2016; and Miller, 2012).

### 3. Level of Participation of Respondents in Sustainable Plastic Use.

Table 3 - Distribution of Respondents Based on the Levels of participation in sustainable plastic use

Agricultural Activities	High	Average	Low	Mean	Rank
<b>Production</b>	92	44	17	2.4	3 <sup>rd</sup>
<b>Processing</b>	91	42	20	2.4	3 <sup>rd</sup>
<b>Marketing</b>	100	40	13	2.5	2 <sup>nd</sup>
<b>Packaging</b>	111	26	16	2.6	1 <sup>st</sup>
<b>Storage</b>	109	23	21	2.5	2 <sup>nd</sup>

Field survey, 2022. The benchmark mean is equal to 2.0. values are significant if they are equal to or above the benchmark mean, and are insignificant if they fall below the benchmark mean.

Results in Table 3 showed the distribution of respondents based on the levels of participation in sustainable plastic use in agriculture. From Table 14, the highest level of participation of plastic users in sustainable plastic use in agriculture occurred at  $\bar{x} = 2.47$  (f = 91; r = 1<sup>st</sup>). This implied that plastics are mostly used by respondents to address their packaging needs.

Next in the rank were shown at;  $\bar{x} = 2.37$  (f = 89; r = 2<sup>nd</sup>) for Storage activities, Marketing ( $\bar{x} = 2.35$ ; f=80, r=3<sup>rd</sup>), Production ( $\bar{x} = 2.29$ ; f=73, r=4<sup>th</sup>) and Processing at  $\bar{x} = 2.25$  (f=73, r=5<sup>th</sup>) respectively. The findings of this study support the assertion by Denkstatt (2015), that packaging innovations have been shown to extend freshness. That continued innovation and adoption of new packaging technology could extend shelf life and reduce household food waste.

4. Constraints to effective use of plastics products by agro-firms owners in the stud area.

Table 4 – Distribution of Respondents Based on the Constraints to Effective Use of Plastics by Agro-firms owners

	CONSTRAINTS TO EFFECTIVE UTILIZATION OF PLASTIC	SA	A	D	SD	MEAN	REMARK
1.	Entanglement and ingestion by wildlife or livestock leading to death.	15	14	64	60	1.8	Not significant
2.	Liters on the environment.	80	50	10	13	3.2	Significant
3.	Reduced soil fertility	75	48	22	8	3.2	Significant
4.	Affect Human Health (Immune and enzyme disorders, hormonal disruption, endocrinal disorders, infertility and cancer).	8	12	80	53	1.8	Not Significant
5.	Disruption of tillage operation and land preparation activities	95	41	8	9	3.4	Significant
6.	Cause hazardous pollution.	12	6	80	55	1.8	Not Significant
7.	Disposed plastics break down and release harmful chemicals.	20	40	59	34	2.3	Not Significant
8.	Causes soil and water contamination	20	10	90	33	2.1	Not Significant
9.	Cause food contamination	10	18	35	90	1.6	Not Significant
10.	Soil quality degradation	50	50	20	33	2.7	Significant
11.	Land pollution and reduction of the size of land for farming	80	40	13	20	3.1	Significant
12.	Serve as breeding site to harbor dirt, disease and contaminants	65	52	20	16	3.0	Significant
13.	Decrease in crop harvest	29	35	80	9	2.5	Significant

Field survey, 2022. SA = Strongly agreed, A = Agree, D = Disagree and SD = strongly agree. Bench mark mean = 2.5. Values are significant if they are equal to or above the bench mark mean and insignificant if they are below the benchmark mean.

Table 4 represent the distribution of respondents based on the constraints to effective utilization of plastic products by agro-firms in the study area. Respondents had perceived some factors that constrained the effective use of plastic by their agro-firms. They included; liters on the environment ( $\bar{x}$ =3.2), reduced soil fertility ( $\bar{x}$ =3.2), disruption of tillage operation and land preparation activities ( $\bar{x}$  =3.4), soil quality degradation ( $\bar{x}$ =2.7), land pollution and reduction of the size of land for farming ( $\bar{x}$ =3.1), serve as breeding site to harbour dirt, disease and contaminants ( $\bar{x}$ =3.0) and decrease in crop harvest ( $\bar{x}$ =2.5). These were significant.

Factors which were insignificant constraints to plastic use by agro-firms were; entanglement and ingestion by wildlife or livestock leading to death ( $\bar{x}$ =1.8), affect human health ( $\bar{x}$ =1.8), cause hazardous pollution ( $\bar{x}$ =1.8), disposed plastics breakdown and release harmful chemicals ( $\bar{x}$ =2.3), cause soil and water contamination ( $\bar{x}$ =2.1) and cause food contamination ( $\bar{x}$ =1.6)

This findings buttress the fact that the accumulation of plastic materials on arable land has increased the level of land pollution hindered tillage operation, decreased microbial action and water infiltration which thus have caused a reduction in soil fertility and have mostly affected vegetable and garden enterprises. This findings of the study is also in congruence with the position of Giuliano et al., (2015) that plastic materials dumped into the earth prevent the production of nutrients in the soil. Plastic debris are often mistaken for food as various particles of plastic cork, rubber-ban, poly bag, among others have been ingestion and entangled with animals which led to their death (Giuliano,et al., 2015).

While enterprises such as Agro-marketing, poultry, Nursery and Horticulture, and processing and packaging enterprises are less affected, more of these constraints accrue from vegetable and Garden enterprises. In an interview, respondent have also listed other challenges that plastic pose to their production in their vegetable farms and Gardens which incorporate drudgery such as clearing, stumping, burning, strolling and planting among others. The problems listed are; disruption of tillage operation, reduction in the size of land available for planting in places where arable land is used for dump sites, causes dirt and disease, and serve as breeding sites for disease when refuse dump sites with plastic components are close to vegetable farms and it leads to injury when also plastic waste bags contain sharp and dangerous objects. Some times these materials are carried by wind, flood or deposited by man. In support of the findings of this study, Bernard (2015) had reviewed that plastic is badly appreciated by civil societies because it is unknown. Bernard (2015) had gone further to say that the use of plastic materials in agriculture is one of the good things that has happened to agriculture, entrepreneurship and/or skill development.

## CONCLUSION AND RECOMMENDATIONS

This study reveals that about 1230 agricultural enterprises with plastic input were registered under the Cross River State Ministry of Agriculture. It also revealed that a considerable number of agricultural enterprises beyond the ones selected in this study also utilizes plastic materials in one form or level or the other including production, processing, storage, packaging and marketing. This study therefore recommend the support of the government at all level to support

the use of plastic in agriculture due to its many benefits, while seeking better ways to manage plastic menace.

This study showed that there is a high level of participation of respondents in packaging activities than other. Product packaging apart from improving the physical condition should be seen as a way of value addition. The study recommends that agro-firm owners should utilize the good qualities of plastic to rebrand their products in ways and forms that can attract customers, as well as promote better designs that can improve the packaging needs of the people in the study area amid several constraints.

Most of the challenges identified by agro-firm owners which constrain the effective utilization of plastic products in the study area were peculiar to the vegetable/garden enterprises which mostly involve farm activities that turn over the soil. Plastic has hindered infiltration, decrease microbial activities, disrupt tillage operation, among other. This is as a result of poor municipal disposal system and ineffective waste collection mechanism in the study area. The government should formulate policies that will discourage littering on the environment and dumping of non-biodegradable waste on arable land.

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