

PERCEPTION OF FARMERS ON THE IMPACT OF GAS FLARING ON CROPS IN ETCHE, RIVERS STATE

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ABSTRACT

The study examined the perception of farmers on the impact of gas flaring on crops in Etche, Rivers State. Two (2) research questions were posed for the study while cross-sectional survey design was adopted. The population of the study comprised 249,939 adult between the ages of 18-50 in Etche Local Government of Rivers state and the sample for the study was three hundred 300 farmers drawn from 30 villages in Etche LGA. A multistage sampling procedure was applied. In Stage 1, 30 villages were selected from the 104 villages in the study area using simple random sampling. In Stage 2, lists of farmers in each selected village were compiled. From each village list, 10 farmers were selected using simple random sampling, giving a total sample of 300. To ensure representation across key demographics, a proportionate stratified sampling approach was applied. Instrument for data collection was a self-constructed closed ended questionnaire titled Gas Flaring and Negative Impact on Crops and Vegetation Questionnaire (GFNICV).” The instrument was validated by the two experts in the Department of Geography and Environmental Management and the reliability of 0.89 was established using the Cronbach Alpha which shows high internal consistency. Data were presented in tables and chart and mean score were used to answer the research questions while the Chi-Square statistical tool was used to test the hypotheses at 0.05 significance level. The results revealed that farmers perceive that gas flaring negatively affects cassava and yam yield in Etche, Rivers State among other findings. It was concluded that gas flaring negatively affects both cassava and yam yield in Etche, River State as it directly impact soil fertility, crop yield and destroys their vegetation which impoverish farmers. It was recommended among others that federal and state environmental agencies should increase monitoring and issue penalties for illegal flaring.

Keywords: Gas Flaring, Gas Flaring in Nigeria, Environmental Implications of Gas Flaring and Climate Change.

Introduction

Gas flaring, the combustion of natural gas associated with crude oil extraction, has remained a persistent environmental challenge in oil-producing regions around the world. The method releases heat, carbon dioxide, methane, and other pollutants into the environment by burning the gas off rather than using it for useful things like electricity generation. Gas flaring poses a major danger to local environmental quality and climate stability because it contributes significantly to air pollution and greenhouse gas emissions worldwide. Nigeria and many other oil-producing nations still struggle with the socioeconomic and environmental effects of this practice, despite worldwide appeals for its cessation.

The Niger Delta region of Nigeria, which serves as the hub of the nation's oil and gas industry, has been particularly affected by gas flaring. Oil exploration activities have caused extensive environmental damage in the area for decades, including oil spills, pipeline leaks, and ongoing gas flaring. Soils and water bodies have become contaminated, local weather patterns have changed, and air quality has decreased due to the ongoing release of pollutants and heat into the atmosphere. Communities in the Niger Delta that rely mostly on farming and fishing are frequently the ones who suffer the most from these environmental risks, which can result in decreased agricultural output, food insecurity, and loss of livelihoods. Anejionu, Whyatt, Blackburn, and Price (2015) state that scientists have found that extended exposure to gas flaring causes changes in vegetation cover, soil acidity, and nutrient depletion, all of which directly threaten the region's agricultural sustainability.

Farmers in particular face severe consequences as gas flaring affects both the natural environment and the agricultural systems upon which they depend. Crops require fertile soil, adequate rainfall, and balanced environmental conditions for optimal growth, yet gas flaring introduces heat stress, alters soil chemistry, and deposits soot on vegetation. These conditions disrupt photosynthesis, reduce soil fertility, and in turn lower crop yields. For subsistence farmers in rural communities, such as those in Rivers State, the loss of productivity translates into reduced household income and heightened poverty. Studies have further suggested that gas flaring contaminates the microclimate around farmlands, with direct implications for crop health and harvests. This makes farmers' perceptions vital in understanding how local agricultural systems are being affected by oil and gas activities.

In Etche, a local government area in Rivers State, the impact of gas flaring is particularly pronounced because of the community's dependence on farming as the major source of livelihood. Etche is often referred to as the "food basket" of Rivers State due to its rich agricultural output in crops such as cassava, maize, plantain, and vegetables. However, the prevalence of gas flaring in nearby oil-producing zones has raised concerns about its implications for soil quality, crop yield, and long-term agricultural sustainability in the area. Farmers, as frontline observers, provide important insights into how gas flaring affects their crops and environment.

It is on this backdrop that the study seeks to understand the perception of farmers on the impact these activities (gas flaring) on crops and vegetation in Etche and ways to ameliorate them.

Aim and Objectives of the Study

The aim of this study is to ascertain the perception of farmers on the impact of gas flaring on crops in Etche, Rivers State. Specifically, the study sought to:

1. Ascertain the effect of gas flaring on cassava yield in Etche, Rivers State.
2. Examine the impact of gas flaring on yam yield in Etche, Rivers State.

Research Questions

The following research questions were answered in the study;

1. What is the effect gas flaring on cassava yield in Etche, Rivers State?
2. What impact does gas flaring have on yam yield in Etche, Rivers State?

Hypotheses

The following hypotheses were tested in the study:

H₀₁: Gas flaring has no significant effect on cassava yield in Etche, Rivers State.

H₀₂: Gas flaring has no significant impact on yam yield in Etche, Rivers State.

Conceptual Clarification

Concept of Gas Flaring

Gas flaring is defined in different ways by different scholars as the burning of gas. It is the burning of natural gas that is associated with crude oil when it is pumped up from the ground (Anselem, 2013). In petroleum-producing areas where insufficient investment was made in infrastructure to utilize natural gas, flaring is employed to dispose of this associated gas (Jinn, 2010). Ozabor (2014) defined it as the irrational burning of superfluous hydrocarbons gathered in an oil/gas production flow domain. Canadian Association of Petroleum Producers as the controlled burning of natural gas that cannot be processed for sale or use because of technical or economic reasons. Gas flaring can also be defined by the combustion devices designed to safely and efficiently destroy waste gases generated in a plant during normal operation. It is coming from different sources such as associated gas, gas plants, well tests and other places.

Gas Flaring in Nigeria

Nigeria oilfield in the Niger-Delta area produce about two million barrels of oil and most of this oil comes from reservoirs containing gas, which is produced with the oil (Onosode, 1996). This associated gas, a by-product of the country's lifeline petroleum exploration activities is separated from the oil at flow station and more than 95% of it is flared. Currently are total sum of two billion Standard Cubic Feet per day (SCF/day), which is estimated to be about a quarter of the world gas flares. The main components of this flared include carbon (iv) oxide (CO₂), methane (CH₄), nitrous oxide (NO₂), water vapour and sulphur dioxide (SO₂). It is estimated that the Nigerian gas flared has released 35 million tons of carbon dioxide and 12 million tons of methane in a year. The low combustion efficiency of Nigerian flare stack (60% - 80%) results in a large portion of the gas emitted being methane and since methane has a higher global warming potential (64 against 1 for CO₂) (Thomas & Allen in Morrison & Vincent, 2013).

The Nigerian oil industry probably contributes more than any other company of these serious global commons environmental problems. Penner (1999) opined that as carbon dioxide and methane are the main greenhouse effect and consequently, this phenomenon has been confirmed to raise the average global temperature by about 0.5 °C within the last century. The gas flaring in Nigeria have for years been criticized by environmental groups as the world's largest sources of global warming pollutants this acts, which experts attributes to the rise in sea level. In Nigeria however, environmental policies and regulations can be conveniently characterized as minimal and poor, as the Nigerian government puts profits ahead of the environment and the welfare of its citizens.

Gas Flaring and Soil

The impact of gas flaring on soil is obvious, especially when considered on the basis of the long duration of the flaring. Exchangeable cations are one of the most important chemical bases of soil fertility; deficiencies of these mineral elements are responsible for poor nature of

tropical soil. However, the cation exchange capacity (CEC) of the soils under gas flaring is very low and reduces the fertility and nutrients of the soil. The results of studies carried out by Alakpodia (1989) and Ogidiolu (2003) showed that exchangeable cation or base (Ca; Mg', K' and Na') in soils under gas flaring is low. According to their studies, the mean exchangeable cation/ base value of the soils under gas flaring is far below the values of 20 milliequivalent/100g of soils which, Young in Morrison and Vincent (2013) observed as required for high soil fertility. The mean value is also lower than 4.0 milliequivalent/100g of soils, which Sanchez (1976) suggested for retaining most nutrient cations in the soil. Thus, soils within the 100 metre radius of the site of gas flaring are mostly affected because their nutrient levels are very low. Therefore, no meaningful human activity can be carried out within the area due to excessive heat. They noted also that the low mean value of exchangeable base indicates that gas flaring is detrimental to the accumulation of these basic mineral nutrients in soils and thereby promoting soil fertility loss. That gas flaring leads to increase in soil acidity means that, it renders soils unproductive agriculturally, because solubility and hence the uptake of nutrients from soil is reduced. In line with this Achebe and Epstein (2004) opined that one of the major causes of "rural flight" to urban areas is the pollution of the soil and land (soil depletion). Abiodun (2004) noted also that the environment of the oil bearing region has borne to gas flaring. Thus, the valuable wetlands of the Niger Delta in which oil prospecting and production take place have been virtually destroyed.

Environmental Implications of Gas Flaring

The environmental issues of gas flaring are generally global, but to some extent regional and local as seen in the Niger Delta region. Mafimisebi and Thorne (2016) asserted that gas flares are a distinctive feature of the Niger Delta landscape. Most of these flares are burn 24 hours a day and some have been doing so for over 50 years in the Niger Delta region of Nigeria. Mafimisebi and Ogbonna (2016) opined that the communities within these flare areas are usually deprived of even the comfort of night's natural darkness. Though it has not been conclusively assessed, the impact of gas flares on the local ecology and climate change as well as people's health and property is evident. Steiner (2010) argued that the extremely high levels of Carbone dioxide and methane gases that are released to the atmosphere also impact climate patterns beyond the local level. It has been revealed that gas flaring usually lead to ozone layer depletion, climate change, global warming, acid rain and rise sea level. Acid rain, for example, a direct result of gas flaring is taking its toll on the Niger Delta region of Nigeria. The negative impact of gas flaring contributes to global warming causing health and environmental challenges, and this affects the quality of the environment. Ismail and Umukoro (2012) argued that gas flaring contributes to the environmental problems that affect the agricultural pattern of the region, forests and other ecological resources in the region.

Adelekan (2010) noted that the presence of primary forest is almost completely absent due to oil exploration in the region and the uncontrolled logging, acid rain, urbanization and mining activities. All these human factors together with gas flaring have all contributed to the loss of vegetation in the Niger Delta region of Nigeria, and their impacts are also felt globally in the form of climate change. According to Ebegbulem et al., (2013), recent research also showed the impact of gas flaring/oil spills on agriculture and natural resources management in Africa and other developing countries. While other factors like lack of governance have contributed to the severe impact of gas flaring in the region, it emerged that developing countries are more vulnerable to climate change due to gas flaring than developed countries, because of the predominance of rain-fed agriculture in their economies and scarcity of capital.

Climate Change

Gas flaring contributes to climate change, which has serious implications for both Nigeria and the rest of the world. The burning of fossil fuel, mainly coal, oil and gas-greenhouse gases- has led to warming up the world and is projected to get much, much worse during the course of the 21st century according to the intergovernmental panel on climate change (IPCC). Together and crudely, these gases make up about 80% of global warming to date. Steiner (2010) opined that gas flaring releases greenhouse gases including carbon dioxide and methane into the atmosphere. Of these two, methane is actually more harmful than carbon dioxide. It is also more prevalent in flares that burn at lower efficiency. Those less efficient flares tend to have more moisture and particles in them that reflect heat and are said to have similar effect on the ozone layer like aerosols do (ERA, 2005). These are more harmful than more flares that burn more efficiently. In such flares the produced methane gets converted into carbon dioxide..

Global Warming

Nkwunonwo and Mafimisebi (2013) stated that the greenhouse effect refers to the phenomenon whereby carbon dioxide and other gases trap long-wave infrared radiation (heat) in the atmosphere thereby warming the earth. It is an entirely natural phenomenon: without the effect, the average temperature on earth would be 33 degrees C lower than at present. The infra-red radiation emitted by the earth can be tapped by atmospheric carbon dioxide (CO₂), nitrous oxide (N₂O), chlorofluorocarbons (CFCs), methane (CH₄), ozone (O₃), and other gases. The concentration of these greenhouse gases (GHGs) in the atmosphere reduces the re-radiation of heat into space. The operation of this mechanism has become a pollution problem because of the rate at which anthropogenic emissions of infra-red trapping gases have increased, creating a larger stock in the atmosphere. However, major sources of CO₂ are the combustion of fossil fuels, such as oil, coal and gas; CO₂ is also produced naturally by decay. Major natural sinks for CO₂ exist, where the gas is locked up. These include the world's oceans and peat bogs. The concentration of CO₂ in the upper atmosphere has risen from roughly 280 parts per million (ppm) in 1880 to 355 ppm today (IPCC, 1992).

The principal cause of this increase has been the combustion of fossil fuels. Major sources of N₂O are the combustion of fossil fuels and the production of fertilisers. CFCs are produced as propellants, refrigerants and foam expanders, and are used in air conditioning systems. Methane is produced from sewage treatment, livestock wastes and landfill sites. The four major greenhouse gases vary in terms of their lifetimes in the atmosphere before they are broken down (CO₂: 50 years; N₂O: 150 years; CFCs: 75-110 years; and methane: 9-13 years; and methane: 9-13 years (IPCC, 1992). They also vary in terms of the 'radiative forcing' that each induces and in their current contribution to the level of warming potential. In terms of the physical results of the greenhouse effect, these are subject to wide range of predictions. Jamieson cited in Mafimisebi and Ogbonna (2016) argued that current mainstream predictions show a rise in global climate of between 1.5 to 4.5 degrees C by the next century for a doubling of CO₂ and a rise in sea level of between 0.6 – 3.5m by 2100.

Stratospheric Ozone Layer Depletion

High above the earth's surface a relatively thin layer of the gas ozone (O₃) performs a vital function. Nisbet cited in Mafimisebi and Ogbonna (2016) reported that if the earth's atmosphere were compressed to a pressure of 1000 millibar the atmosphere would be 5 miles thick. Of this, the ozone layer would only account for some 3mm. This is how ozone levels are now measured: in Dobson units. Ozone is formed naturally in the upper atmosphere when oxygen molecules are struck by ultra-violet light from the sun. Ozone absorbs ultra-violet (UV)

light, and is continually being broken (into oxygen) and recreated in natural equilibrium. Ozone also acts as a greenhouse gas. The chlorofluorocarbons can break down ozone. The process is a complicated one. CFCs contain chlorine atoms. These can attach themselves to oxygen atoms in ozone, forming oxygen and chlorine monoxide, the presence of the latter being one test for ozone thinning. One chlorine atom can break down 100,000 molecules of ozone in this way. As the concentration of ozone falls, so does the temperature of the stratosphere. This leads to the formation of ice clouds which greatly speed up the ozone degradation process, by providing a surface for reactions to take place which allow chlorine atoms to be separated from their constituent molecules, and thus become available for ozone destruction.

Acid Rain

Acid rains have been linked to the activities of gas flaring (Foe, 2004.). Corrugated roofs in the Delta region have been corroded by the composition of the rain that falls as a result of flaring. According to Hassan and Kohny (2013), the primary causes of acid rain are emissions of sulphur dioxide (SO₂) and nitrogen oxides (NO) which combine with atmospheric moisture to form sulfuric acid and nitric acid respectively. Size and environmental philosophy in the industry have very strong positive impact on the gas-flaring-related CO₂ emission. Acid rain acidifies lakes and streams and damages vegetation. In addition, acid rain accelerates the decay of building materials and paints. Prior to falling to the earth, SO₂ and NO₂ gases and their particulate matter derivatives, sulfates and nitrates, contribute to degradation and harm public health.

Impacts of Gas Flaring on Water Quality and Vegetation Resources

According to Enetimi and Sylvester (2017) gas flaring typically has two valves, the high and low gas pressure valves. Hence, the concentration of emissions, noise, released is a function of the valve used in flaring the gas as well as the physical composition of the gas prior to flaring. The flared gases affect several environmental components as well as its biotic composition.

Changes in Water Quality

Water resources are typically needed for the sustenance of life, growth and development. Water serve as habitant to several biodiversity especially fisheries (shelled and finfish), aquatic reptiles, mammals, birds and breeding ground for several other diversity such as frog, parasite of medical importance such as Schistome, and vectors transmitting diseases such as mosquitoes. As such water has a unique place for life to thrive. Water is also used for domestic purposes such as washing, cooking, bathing (Oyoroko and Ogamba, 2017). According to Izah and Srivastav (2017) most water resources are from surface water, groundwater and rainwater. Izah et al (2016) is with the opinion that groundwater is mostly consumed in the Niger Delta and surface water and rainwater also serve as potable water sources in regions that groundwater/ borehole water is unavailable. Water is typically impacted by gas flaring activities. Among the water quality parameters commonly affected by gas flaring is nitrate, carbonate, sulphate, nitrate, lead etc. Amadi (2014) asserts that gas flaring reduces pH (pH tending toward acidity), moisture content and bacteria density/population. Ubani and Onyejekwe (2013) observed that rainwater acidification also increased the rate of corrosion and depreciation of metal roofing sheet in buildings leading to reduced life span and increased cost of building maintenance in the region. Jideani et al. (2012) reported that natural gas flaring advances the risk of respiratory diseases, asthma, cancer and premature death.

Impact on the Vegetation

Plants are a major source of active nutrients required by the body. Plants are source of carbohydrate, protein, lipid and other minerals and vitamins depending on species. Vegetation is also source of food for livestock especially omnivorous animals such as goat, cow, grass cutter,

rabbits etc. Vegetation cover is also a source of habitat to several wildlife species especially bush meat that do not burrow. Some notable vegetation is found in close to farmland and residential area such as cassava and oil palm. These are two predominant vegetation cover used as food found close to gas flaring location in the Niger Delta (Enetimi and Sylvester, 2017). Achi (2003) posit that Gas flaring has the tendency to affect several plant species especially productivity and growth. According to Lawanson (2016) gas flaring decreases the length and weight of cassava and increases its amino acid and total sugar contents as the distance from the flares decreases. He further posited that such decreases were also correlated with decreases in the content of starch and ascorbic acid (vitamin C) in the tubers.

Methodology

The study adopted cross-sectional survey design and the study area was Etche Local Government Area of Rivers State. The population of the study comprised 249,939 adult between the ages of 18-50 in Etche Local Government of Rivers state. An estimate of this population was based on the last census report (source: population census report 2006). The study sample comprised 300 farmers drawn from 30 villages in Etche LGA. A multistage sampling procedure was applied. In Stage 1, 30 villages were selected from the 104 villages in the study area using simple random sampling. In Stage 2, lists of farmers in each selected village were compiled. From each village list, 10 farmers were selected using simple random sampling, giving a total sample of 300. To ensure representation across key demographics, a proportionate stratified sampling approach was applied at the stage of selection so that age groups, gender and educational attainment were represented in approximately the same proportions as in the local farming population. Inclusion criteria were: resident farmer in the village for at least 4 years and who are active in cultivating cassava or yam during the last cropping season. Instrument for data collection was a self-constructed closed ended questionnaire titled Gas Flaring and Negative Impact on Crops and Vegetation Questionnaire (GFNICV).” The reliability of 0.89 was established using Cronbach Alpha. Data were presented using tables and mean score while the Chi-square statistical tool was used to test the hypotheses formulated for the study at 0.05 level of significance.

Results and Discussion of Findings

Section A: Demographic Data

Table 4.1.1 Sex Distribution of Respondents

Sex	No. of Respondents	Percentage %
Male	230	76.7
Female	70	23.3
Total	300	100

Source: Author’s field work 2025

The result on the distribution of respondents on gender shows that 76.7% of respondents were male while 23.3% of the respondents were female which gave a total of 300 respondents.

Table 4.1.2 Distribution of Respondents by Age

Age	No. of Respondents	Percentage %
18-24	15	5
25-31	30	10
32-38	60	20
39-45	100	33.3
46+	95	31.67
Total	300	100

Source: Author's field work 2025

The table above shows the age bracket of respondents, 5% of the respondents were in the age bracket of 18-24, 10% of the respondents were in the age bracket of 25-31, 20% of the respondents were in the 32-38, 33.3% of the respondents were in the age bracket of 39-45 while 31.67% of the respondents were in the age bracket of 46 and above.

Table 4.1.3 Distribution of Respondents by Educational Qualification

Age	No. of Respondents	Percentage %
FSLC	90	30
SSCE/WAEC	100	33.3
NCE/ OND	60	20
HND/B.SC	40	13.3
OTHERS	10	3.3
Total	300	100

Source: Author's field work 2025

The table above indicates that 30% of the total respondents had their first school leaving certificate, 33.3% of them had their secondary education, 20% of the respondents possess NCE/OND, 13.3% possess HND/ B.SC qualification, while 3.3 possess other certificate. This is an indication that the respondents can read and write.

SECTION B: Issues Relating to Gas Flaring and Impact on Crop

Research Question 1

What is the effect of gas flaring on cassava yield in Etche, Rivers State?

Table 1: Mean Responses of Respondents on the Effects of Gas Flaring on Cassava Growth and Yield

S/N	Items	Mean Score	Remarks
1.	Cassava tubers grown near gas-flaring sites are smaller in size	4.03	Agreed
2.	Gas flaring reduces the overall harvest quantity of cassava and as such have negative effect on cassava	3.78	Agreed
3.	Cassava plants have stunted growth when exposed to gas flaring emission	3.81	Agreed
4.	Leaves of cassava plants show signs of stress or discoloration due to flaring	4.02	Agreed
5.	Gas flaring negatively affect your cassava growth and yield	4.15	Agreed
Grand Mean		3.96	Agreed

Criterion mean =2.50

The table indicates the effect of gas flaring of cassava growth and yield. In item 1, the mean score of the respondents is 4.3 which revealed that respondents agreed that cassava tubers grown near gas-flaring sites are smaller in size. In item 2, the mean score of the respondents is 3.78 which indicate that respondents agreed that gas flaring reduces the overall harvest quantity of cassava. In item 3, the mean score of respondents is 3.81 which reveal that respondents agreed that cassava plants have stunted growth when exposed to gas flaring emission. In item 4, the mean of the respondents is 4.02 which show that respondents agreed that leaves of cassava plants show signs of stress or discoloration due to flaring. In item 5 the mean score of respondents is 4.15 which reveal that respondents agreed that gas flaring negatively affect their cassava growth and yield. In summary, with the average mean of respondents 3.96 greater than the criterion mean of 2.50; the respondents agreed that gas flaring has negative effect cassava growth and yield in Etche, Rivers State

Research Question 2

What impact does gas flaring have on yam yield in Etche, Rivers State?

Table 2: Mean Responses of Respondents on the Impacts of Gas Flaring on Yam Growth and Yield

S/N	Items	Mean Score	Remarks
8.	Yam tubers grown near gas-flaring sites are smaller in size	4.01	Agreed
7.	Overall yam yield has reduced due to gas flaring activities	3.17	Agreed
8.	Yam vines and leaves show signs of stress when exposed to gas-flaring emissions	4.13	Agreed
9.	My yam harvest is less reliable because of gas-flaring disturbances	3.80	Agreed
10.	Gas flaring negatively impact your yam growth and yield	4.05	Agreed
Grand Mean		3.83	Agreed

Criterion mean =2.50

The table indicates the impact of gas flaring of yam growth and yield. In item 8, the mean score of the respondents is 4.01 which revealed that respondents agreed that yam tubers grown near gas-flaring sites are smaller in size. In item 7, the mean score of the respondents is 3.17 which indicate that respondents agreed that overall yam yield has reduced due to gas flaring activities. In item 8, the mean score of respondents is 4.13 which reveal that respondents agreed that yam vines and leaves show signs of stress when exposed to gas-flaring emissions. In item 9, the mean of the respondents is 3.80 which show that respondents agreed that their yam harvest is less reliable because of gas-flaring disturbances. In item 10, the mean of respondents is 4.05 which reveal that respondents agreed that gas flaring negatively impact their yam growth and yield. In summary, with the average mean of respondents 3.83 greater than the criterion mean of 2.50; the respondents agreed that gas flaring has negative impact on yam growth and yield in Etche, Rivers State.

Hypotheses Testing

In order to test the hypotheses of the study, the Chi-square statistical toll was used.

Hypotheses One

H_{01} : Gas flaring has no significant effect on cassava yield in Etche, Rivers State.

Table 3: Calculated /Decision table

Significant level	X^2_{cal}	X^2_{crit}	Degree of freedom df	Decision
0.05	42.8	3.84	1	Ho: Reject

The table above revealed that the $X^2_{calculated}$ is 42.8, while $X^2_{critical}$ or tabulated at 3.84 at 1 degree of freedom and at 0.05 significant levels. Since the X^2_{cal} 42.8 is greater than X^2_{crit} value 3.84 ($X^2_{cal42.8} > X^2_{crit3.84}$). We reject the null hypotheses and accept the alternate which means that gas flaring have significant effect on cassava yield.

Hypotheses Two

H_{02} : Gas flaring has no significant impact on yam yield in Etche, Rivers State.

Table 4: Calculated /Decision table

Significant level	X^2_{cal}	X^2_{crit}	Degree of freedom df	Decision
0.05	99.04	3.84	1	Ho: Reject

The table above revealed that the $X^2_{calculated}$ is 99.04, while $X^2_{critical}$ or tabulated at 3.84 at 1 degree of freedom and at 0.05 significant levels. Since the X^2_{cal} 99.04 is greater than X^2_{crit} value 3.84 ($X^2_{cal99.04} > X^2_{crit3.84}$). We reject the null hypotheses and accept the alternate which means that gas flaring have significant impact on yam yield in Etche, Rivers State.

Discussion of Findings

The first finding of the study revealed that gas flaring negatively affects cassava yield in Etche, Rivers State, and some of these impacts include reduction in the yield of crops in the locality; such as cassava, yam and plantain as reported by the respondents. The finding also support the work of Lawson (2016) that gas flaring decreases the length and weight of cassava and also decrease its amino acid. This implies that farmers farming around these flaring horizon witness reduction in cassava production.

The second finding of the study revealed that gas flaring negatively affects yam yields in Etche, Rivers State; these impacts include reduction in the size of yam tubers, withering of leaves and decay of tubers in the ground as reported by respondents. This finding is in line with Ozabor and Obisesan (2015) that gas flaring affect food such as yam and plantain. This implies that yam cultivation will reduce drastically with time if proper measures are not taken to restore the hope of farmers in the land.

Conclusion

Based on the findings of the study, it was concluded that farmers in Etche perceive that gas flaring negatively affects both cassava and yam yield in Etche, River State as it directly impact soil fertility, crop yield and destroys their vegetation which impoverish farmers.

Recommendations

Based on the findings and conclusion of the study, the followings are recommended.

- i. Federal and state environmental agencies should increase monitoring and issue penalties for illegal flaring.
- ii. Oil companies should endeavor to adopt gas-capture and flare-reduction technologies
- iii. There should be provision of soil testing, liming, organic amendments (compost), and phytoremediation programs to restore soil fertility
- iv. Awareness should be created to all on the impact of gas flaring in the environment, through seminars, lectures, jingles and symposium.

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