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# Agriculture: Constraints and Possible Solutions to Food Security in Nigeria

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## ABSTRACT

The invaluable importance of agriculture cannot be over emphasized with regards to provision of food for man, feed for animals, environmental management, medicine and vaccines, and provision of employment opportunities and raw materials for industries. Productivity is hindered by many factors, some of which include; pollution, conservative attitude to old cultural practice, illiteracy/ignorance, lack of processing and storage facilities and lack of power supply. Others include; insecurity, finance/funding and Government policy formulation and execution. Productivity can be increased and the potentials of agriculture enjoyed, if Government in synergy with NGOs and Multi-National companies work to provide solutions by providing necessary support like; processing and storage facilities for farmers, providing extension services for farmers and funding through subsidy for farmers and grant to researchers. Provide improved planting materials (seeds, stem, suckers, etc.). Multinationals especially the Oil and Gas companies to bioremediate the polluted land by establishing integrated farms and application of new technologies discovered which is capable of controlling pollution and bioremediate polluted land naturally. This will provide job opportunities for the teeming unemployed youths. Create peace and good environment for them to operate and also increase food security in the country.

## INTRODUCTION

Agriculture is an applied biology that deals with cultivation of food crops, rearing of animals, fish and culturing of fungi and pro-bacteria for the goods and services of man and the environment. It is the cultivation and breeding of plants, animals, probacteria and fungi for food, raw materials, vaccines, medicines and other products used to sustain and improve human life. Agriculture is abounding with enormous potentials with regards to employment opportunities, income, food security, raw materials production, medicinal plants, etc. Agriculture is a renewable resources. Investing in agriculture is a promising business venture. This is because, the demand for agricultural products are unlimited and continuous as long as life exist.

The three basic requirements of human beings are food, shelter and good health (Ikuli, *et al*, 2017). These three are encompassed in agriculture. Food is a necessity in life, and no matter the advancement in science and technology, there can never be an alternative source of food other than agriculture, but rather, agriculture will provide alternatives to what other natural resources that are non- renewable do. The Nigerian population today is a good market for produced goods. There is therefore the need to support agriculture.

Food Security is not just sufficiency in food supply but also to ensure sufficient essential macro and micro nutrients supply. To meet the geometric growing population of the world, different evolutions were made to attain sufficient food supply. Unfortunately, these foods supplied were deficient of certain nutrients which are necessary for body build/growth, regulations and functions. This results to the use of nutritional supplements which is only affordable by the rich (Ikuli, *et al*, 2017). About 44 known nutrients in sufficient quantity need to be met to have a healthy and productive live. Micronutrients deficiency alone affects two billion and above people in the world, especially the poor families in undeveloped countries (WHO and FAO, 2003). The most prevalent deficient micronutrients are iron (Fe), Iodine (I), Zinc (Zn) and Vitamin A (Kennedy *et al*, 2003). Bearing in mind, the World Health Organisation (WHO 1996) definition of food security, which says that food security is the process whereby everyone has access to sufficient nutritious food at all times and at affordable price. Biofortification is a new measure employed to increase the nutritional value in food.

Nigeria is not feeling the potentials and dividends of agriculture fully because of low productivity. For Nigeria to feel the potentials of agriculture, at most 40% of its primary products should be sufficient for domestic use. As a result of the low productivity, many investors that supposed to unveil the potentials by going into production of secondary goods are afraid. This is because, for investment of such category, the initial capital is always intensive. It will not be profitable after spending huge amount of money for feasibility study,

Certificate of Occupancy, Environmental Impact Assessment (EIA), etc. which ordinarily will take two to three years even more for the firm to recover, and between two years of production the company starts falling short of raw materials. For these firms to be active, they need at least 60% of the total primary products produced locally. Many companies in Nigeria, a good example is the "Mosaconi Cassava Processing Factory" which started operation in 1993 was forced to close down in 1999 as a result of shortage of raw materials. The Nigerian Breweries and International Breweries; they are still existing because the raw materials they use for their production is imported which supposed not to be so (Personal interaction with NB staff). Importation is necessitated due to limited available raw materials resulting from low productivity.

## Constraints of Agricultural Productivity

There are several problems hindering productivity in agriculture. Let us look into some of the basic problems, which include: pollution, government, available necessary inputs (machineries, seeds, power supply, and finance) and infrastructures.

Biological indication of pollution is the process in which living things (plants, animals and micro-organisms) are used to detect the degree of pollution of an environment. The populations of living things/organisms in an environment determine the degree of the condition of the environment. Either atmospheric or soil pollution. When a viable seed refuse to germinate when been planted, indicates an imbalance or inadequacy of the necessary conditions required and this is caused by pollutants in soil or atmosphere. Pollution causes changes in seed structure, morphology, seed chemical composition, seed viability and makes seeds to be susceptible to pathogen attack and cause or induce dormancy. Pollution and impurities in the atmosphere or soil reduce photosynthesis because they may be toxic to the plant or leaves. Presence of parasites, diseases or injuries affects photosynthetic potential of plants. Pests, especially insects act on the defoliation of the shoots with consequent minimization of photosynthesis. Oil pollution effect has shown to decrease growth of plants. The environment also influence the activities of enzymes by reducing the enzyme rate of action on photosynthesis and this affects the synthesis of carbohydrate in the plant.

## Effect of Pollution on Seed Structure and Morphology:

The seed is the hereditary bank of a plant. It is the representative structure from where a plant emerges. It plays an important role in providing or ensuring the continuity between successive generations of seed plants.

Polluted environment affects or determines the size of a seed, structure and morphology. In an

environment that is polluted, the poor conditions may cause mutation during seed formation of a plant thereby changing either, its size, structure or morphology.

Pollution afflicts development of the embryo. After fertilization, the egg cell secretes a cellulose wall around itself and become the Oospores which finally grow to the embryo. In the initial stage, the Oospores normally divide by a transverse wall into two cells. This two celled stage is called pro-embryo. If the environment is unfavorable for this process and stages for the embryo to develop, mutation may occur. The process of embryo development in angiosperm has been divided into six different types; The Piperad type, Crucifer type, Asterad type, Caryophyllad type, Solanad type and the Chenopodiad type (Johansen, 1950).

Pollution affects development of the endosperm. The definitive nucleus as a result of triple fusion called the endosperm nucleus tends to grow into a food storage tissue termed the "endosperm" usually triploid (3n), and sometimes tetraploid (4n) (Dutta, 2007). In due course, the endosperm may be a permanent feature of the seed as in all endospermic seeds or it may represent only a temporary phase, i.e. its development does not proceed far and whatever be the extent of development, it become totally absorbed by the growing embryo as in all non-endospermic seeds. Usually, endosperm nucleus begins its division and even a large portion of the endosperm may be formed before the oospore begins to divide. Oppressions from pollutants are an adversary to this developmental stage. There are two main types of endosperm development, namely; the nuclear type and the cellular type. In some times the third type: Helobial type. The formation of the seed-coat is determined many times by the environment. The two integuments develop into two seed-coats, of which the outer one is named the testa or the pericarp and the inner one, the tegmen (endocarp). In some seeds, as in water lily (*Nymphaea*), nutmeg (*Myristica*), etc., there is normally found an outgrowth of the funicle, which grows up around the ovule and more or less completely envelopes to form the seed.

Pollution sometimes causes abnormality in vernalization of seed following the two morphological changes associated with seed vernalization:

1. Large development of vascular tissues leading to the growth points.
2. Enlargement of embryo, at the expense of the endosperm.

Temperature fluctuation may also cause mutation in the structure of some macro-molecules in the seed, which may prevent germination in its original form.

**Effect of Pollutants on Seed Viability:** A viable seed is a healthy seed; healthy in structure, chemical composition and morphology. The different parts of the seed are composed of chemical substances which have vital role to play in the seed, beginning from its formation

to maturity, storage and germination. However, element constituents in seed are determined genetically, appreciable amount of these constituents are sometimes dependent on environmental factors such as mineral nutrients and climate. Pollutants like excess O<sub>2</sub> increases respiration and this is the metabolic action which occur in the seed. The breaking down of stored energy (carbohydrate) which is the source of energy/food for a newly planted seed until it germinates, establish leaves and roots to carryout photosynthesis. Haven spent all the reserve energy (food), the seed become nonviable. Most seeds become nonviable due to biochemical ultra-structural or morphological changes (Verma and Verma, 2007). Pollution affects the formation and maturity of seed.

#### **Impacts of Pollution on the Seed Chemical Composition:**

DNA is the most crucial and important and fundamental component of all living beings including plants. It is the basic genetic material, the chemicals like plastoquinone and plastoquinol involved in the photosynthetic light reaction show their peak absorption spectra between 260 and 320nm. When Ultra-violet blue (UV) rays are absorbed by DNA, it produces mutation genetic defects and cancer development due to its disorder. Impact of UV on DNA brings about photochemical changes as pyrimidine dimmers, 6-4 photoproducts, DNA protein cross links and lesions that can lead to single and double strand breaks.

**Effects of Pollution on Seed Germination:** Seed germination is the process in which a seed wake-up from its rest, sprouts either epigeally or hypogeally and establish into a seedling under necessary and suitable conditions (Adequate water, air, temperature, light, relative humidity and good soil condition). Pollution affects germination in many ways through atmospheric and soil pollution.

- ❖ **Atmospheric Pollution:** The atmosphere consists of several gases like; O<sub>2</sub>, CO<sub>2</sub>, N<sub>2</sub>, etc. Oxygen increases respiration rate. The percentage of O<sub>2</sub> for germination usually varies from 8-20. Excess CO<sub>2</sub> concentration decreases germination in general but in few seeds like *Phleum pretense* show increase in germination (Verma and Verma, 2007). Most of the pollutants like NO<sub>2</sub>, SO<sub>2</sub>, O<sub>3</sub>, NH<sub>3</sub>, H<sub>2</sub>S, F and high concentration of ethylene inhibit germination (Verma and Verma, 2007).
- ❖ **Soil Pollution:** A polluted soil is an infertile soil as a result of toxicity of the soil caused by pollutants which have adverse effects on plants and microorganisms. It is an up-building of the persistent toxic compounds, chemicals, salts and disease causing agents which has adverse effect on plant development and animal health (Akonye,1999). In soil toxicology, toxic

compounds are referred to as contaminants until when they have economic effect or cause economic damage, they become pollutants. Hence, a polluted soil can be defined as accumulation of contaminants in the soil which have negative effects on plant growth and development and animal health. The availability of water for imbibition depends to a large extent on the composition of the environment in which germination takes place. As the solute concentration increases, imbibition decreases and germination is affected. Factors which inhibit germination probably impinge on the activation system and hence retard germination.

**Relation between Pollutant Concentration and Dormancy:** Dormancy is a resting stage. It is the condition of seed when it refuses to germinate even when all the favorable conditions are present. Dormancy in seeds may be due to lack of some necessary external environmental needs or as a result of internal causes. Pollution causes deficiency of environmental resources necessary for seed germination.

- ❖ **Post dormancy:** When a dormant seed gradually emerges from full dormancy and in the germination or growth stage, dormancy can be re-induced by changing environmental condition. It is called post-dormancy or after-rest.
- ❖ **Secondary dormancy:** When a seed has not fully emerged from dormancy and is again thrown back to full dormancy by certain environmental conditions; some seeds may enter dormancy due to interaction of seed with environment (temperature). Such dormancy may continue even after removal of seed from such environment. Some seeds have dormancy thrust upon them due to conditions of inadequate O<sub>2</sub>, excess CO<sub>2</sub>, cold temperature, ethylene, etc. induced by humans or nature called enforced or environmental dormancy (Reddy, 2008).

**Allelopathic effect of Soil Chemical and the Seed Bank:** Chemicals that restrict or prevent life around them. Anywhere they are, they hinder the growth of any life. Chemicals that inhibit metabolic activities may also inhibit germination and cause dormancy. Such chemicals are azides, cyanides, fluorides, dinitrophenol (DNP), hydroxylamine, etc. They inhibit germination at concentration similar to but not usually identical with those inhibiting the metabolic process. Chemicals like herbicides and pesticides used during weed and insect/disease control usually cause dormancy, especially pre-emergence herbicides which are applied before planting. They induce dormancy on the weed seeds. Most growth retardants, such as Cycocel, Phosphon D, and AMO1618, if applied in sufficient high concentration also inhibit germination, apparently due to

their being inhibitors of gibberellic acid synthetic (Akonye, 1999).

The presence of osmotic inhibitors is the most frequent occurrence in seeds and prevents the germination of seeds, if they are placed in a solution of low osmotic potential. Substances that may be responsible for the low osmotic potentials are sodium chloride (NaCl), Potassium K, (inorganic salt), sugars. The threshold of osmotic potential at which germination is prevented differs widely for different seeds (Akonye, 1999). Transient exposure to low osmotic potential is not always toxic; sometimes it rather promotes the subsequent germination, after the osmoticum is removed.

**Susceptibility of Seeds to Pathogens under Environmental Pollution:** The weather and soil conditions influence the seasonal development and regional distribution of plant diseases. Jones in 1924 directed increased attention toward the relation of the environment to the inception and development of diseases. The effects of environmental factors on plant diseases have been reviewed by different scholars. The connection between nutrition and susceptibility to parasitic and non-parasitic diseases in plant has also been discussed. The influence of the environment on the development and control of diseases has been reviewed by M C Cartney (1997).

According to Mehrotra and Agarwal (2006), the environment comprises all external conditions influencing the life and development of an organism, which include temperature, light and moisture and living factors such as competing organisms or vectors. They also said that the environment can influence development of plant diseases in different ways. It can affect perpetuation or overwintering of the pathogen from one growing season to the next, the build-up of both primary and secondary inoculums, the dissemination of inoculums, germination and host penetration. The environment can affect growth development of host prior to being affected in such a way as to affect its susceptibility. It can influence actual development of diseases after the host becomes infected. Establishment of all parasitic diseases significantly varies with the pathogen, host, interactions between the pathogen and the host and environmental resources in the air and soil. When we talk of environment, we have to differentiate between the macro-climate and microclimate, between weather in the general atmosphere and the one of a particular place.

**Cultural Practice:** Greater percentage of farmers are still conservative to their old cultural practice. No enlightenment for new innovations and the need to change or adopt the new and current cultural practice that will enhance productivity.

**Ignorance/ Illiteracy:** Many farmers see agriculture only as a means to provide their household food and not as a business. Because of this mentality, as long as what

they harvest is sustaining their household, they don't bother to search for better skill and high yielding cultivars, they feel satisfied except it gets to them on its own.

**Lack of Improved Cultivars and Extension Officers:**

Poor accessibility to improved seeds and other planting materials also contribute to low productivity. This results from lack of extension services. The existing extension service in Nigeria is about 0.01% available compared to what is needed for the population of farmers. Farmers in the rural villages are not aware or even informed of new innovations and their challenges in their respective areas are not also sent to the research institutes for solution.

**Lack of Storage and Processing Facilities and Power supply:**

Power supply is a major constrain in agriculture. This is because, greater percent of the processing and storage devices need power supply. Cool rooms for preservations need constant power supply.

**Lack of Capital and access to Credit Facilities:**

Greater percentage of farmers that have passion for agriculture and as their major source of income and livelihood do not have the finance to fund their activities. They do not have access to financial Institutions that will support them. Even those that have access do not have what it takes (COLLATERAL) to access the fund.

**Insecurity:** Many farmers are prone to death by Nomadic farmers attack. The indiscriminate invasion of herdsmen and their cattle into farmers' farm, eating and destroying their cultivated plants has discouraged many from going into farming because, whenever they interrogate or have arguments with these herdsmen, they are always attacked at home killing hundreds and destroying properties without any reliable effort from the Government to stop it.

**The Government:** Government failure to implement certain agricultural policies has also contributed greatly to low productivity in agriculture. Government set of decisions and actions regarding foreign agricultural product importation and domestic agriculture; Making policy to import agricultural products without considering the economic effect in the future. Government usually, supposes to execute agricultural policies with the aim of getting a specific output in the domestic agricultural product markets. Government focused on mono-economy by diverting from agriculture to and concentrating only on the nonrenewable natural resources (crude oil and gas) when it was found in commercial quantity. The oil boom era blind folded the leaders in government. Government taking decision without considering the future implications was the greatest mistake Government made. Such decision was taken without vision and plan for the future population and needs. Instead of supporting agriculture with the surplus revenue from the oil, the government decides

and lifted embargo for importation. The consequence is what we are facing today. The government failed to understand that food is a necessity in life and that no matter the advancement in science and technology, there can never be an alternative source of food other than agriculture, but rather agriculture will provide alternatives to what other natural resources do. Agricultural policies also supposed to touch food quality, making sure that the food supply is consistent and of known quality, food security, making sure that the supplied food meets the population's needs. Policy programs can range from financial assistance, such as subsidies, to encouraging producers to enroll in voluntary quality assurance and consultancy programs. There are many influences on the creation of agricultural policy, including consumers, agric Allied, trade lobbies and other groups. Businessmen in Agriculture (agribusiness) interests hold a large amount of influence over policy making, in the form of sorting/lobbying. Political action groups, including those interested in environmental issues also, also provide influence, as do lobbying organizations representing individual agricultural commodities.

Government failed to implement positive policies that will improve agricultural productivity even when created. Conflict of interest is always introduced. For example, Government will say, it wants to give loans at no interest or low interest to farmers, at the end of the exercise, you will discover that only relatives of those in government gets these money of which many times, they do not pay back. The worst of all is that at times 70%-80% of the beneficiaries are not even farmers. Sometimes, individual in the government will go and meet the poor resource families, collect their names to form a corporative as government may want to dispense the cash, even the farmers' farms will be inspected, but when government pays, the money goes to an individual account leaving the poor farmers at the same level. Eighty (80%) to 90% of money released by government to aid agriculture do not enter into the hands of those who are really ready to farm.

Government do not provide infrastructure that will encourage farmers. Many farmers are discouraged after a tedious labor and at the end, products are lost to lack of storage facilities, lack of processing facilities or access roads which often induce "farm- gate" market, where buyer dictate to farmers price to buy a particular product, because the farmer has no choice, since he/she cannot transport his/her products to the open market to get its real value.

Government spending on agricultural research as a proportion of agricultural GDP in Nigeria decreased over the years. The current average level of public expenditure to support agriculture is about 4 percent. Nigeria invests about 2-3% of her national budget into agriculture annually while countries like Burkina Faso invests 10% and most Asian nations invest 16% of their national budget into the agricultural sector. Some countries in Asia who have successfully managed to

transform their agricultural status and raised their economies have consistently spent a much higher percentage of public expenditure to support agriculture (Wikipedia). Government funded research is necessary and will continue to play a vital role since agricultural research is needed to alleviate poverty, it will involve a continued investment

## POSSIBLE SOLUTION FOR FOOD SECURITY

In this section, let us start with the government; things that government can do to encourage farmers and bring in more people into agriculture. There many ways government can attract people into agriculture. Some of which include;

**Subsidy:** Government should provide subsidy and revive "Market Board" for agricultural products. For this to be successful and free of fraud to a higher percentage the subsidy should not be in inputs or lesser percent should be in inputs. It should be in finished products. This is because, even if inputs are subsidized it is only few people that will have access to these inputs and later sell at a higher rate to the real users. Government should carryout production cost survey, calculate the average and the pay certain percent to the farmer in every unit product. In order to make more profit, it will now be the farmers' responsibility to employ innovations that will minimize cost of production to earn more revenue. For example, if the average cost of producing one bag of rice is #15,000 plus let's say a profit of #1000 per bag totaling #16,000 and the government wants a bag of rice to be sold at #10,000, the government can provide a subsidy of #6,000 for every bag of rice. This will encourage farmers to produce more and market for even those who are not producing in large quantities or up to a bag because someone who wants to benefit from the subsidy may decide to buy from those in small quantities or they may form a corporative after which they share according to their percentages. This will help government to get real data of what is produced in the country and also stop or prevent frauds in subsidies provided for inputs. Government should remove all wavers on any naturally abound and producible agricultural product.

**Provision of Amenities:** Government should provide infrastructures; roads linking the rural areas where bulk of these products are produced to the urban areas. Government make sophisticated facilities accessible to the common farmer e.g. by building rice processing mills in strategic areas where rice is produced, so that farmers after harvest can come and mill their products at a cheaper rate, less labor and obtain acceptable product in the market. Government should build silos so as to control waste at a bountiful harvest, control price and scarcity at out of season.

**Research Centres:** The government should build multidisciplinary research centres across the country.

Centres where the plant physiologist, the breeder, the nutritionist, the pathologist, the ecologist and the agronomist can come together as a team to produce cultivars of short gestation period, high yielding, high nutritional, adaptable and resistant to diseases with simple agronomic practice. Government should increase and strengthen the relationship between the farmers and the research centres by providing more extension services.

**Security:** Government should stop Nomadic farming. The herdsman should be compelled and taught how to cultivate pasture for their grazing field.

**Pollution Control:** The multinationals, specifically the oil operating companies like Shell Petroleum Development Company (SPDC), Nigeria Agip Oil Company (NAOC), TOTAL, etc whose activities contribute greater percent of the pollution hazard do not keep to the international rules and regulations regarding their social corporate responsibilities in their areas of operation especially in the Niger Delta Region. They are just after to get the natural resources and earn their revenues without putting the environment into consideration. They don't follow environmental impact assessment (EIA) recommendations. If these multinationals mean well for the people, they should provide social amenities to their host communities (good water, health centres, schools and electricity). For them to control pollution and also contribute to food security, instead of giving a little amount of money to communities or group of people which often lead to communal conflict whose action I, interpret to mean "take, fight and kill yourselves while we collect the resources from your land", they can establish an integrated farm which will employ thousands of the unemployed in those communities. The farm to an extent will control pollution (both air and soil) which in turn clears the climate. In a period of 6-7 months, these farms will be able to generate revenue that settles all employees' salaries and allowances. The establishment of such farms will reduce youth's involvement in an unwholesome act. It will reduce youth's restiveness and unemployment. It will increase standard of living of the people and reduce pollution rate because agriculture is the best environmental and economical friendly pollution control measure. The waste from agricultural products (poultry droppings, animal dunks, etc) will bioremediate the polluted soil through the activities of microbes involved due to complicity of organic matter. These microbes break down the bonds of the pollutants while the growing plants reduce the carbon in the air which is obtained via the stomata through a process called carbon fixation in the dark reaction phase of photosynthesis.

Microbes play vital role in improving the soil condition for better productivity. Microorganisms activities in the soil increase water holding capacity of the soil, increase mobility and availability of phosphorus (P) and micronutrients in the soil due to organic matter complicity. It increases soil organic matter. The activities

of microbes improve the soil structure and balance the soil texture, decrease soil bulk density and increase infiltration rate. Microbe's activities increase buffer capacity of the soil and reduce  $Al^{+3}$  toxicity in acidic soil. In every 1% increase in SOM results in a 1,000 pound increase in nitrogen and a 100 pound increase in each of phosphate, potassium and sulphur. Every 1% increase of SOM results in a 2-3 fold increase in the soils water holding capacity (Hoorman, 2010). Increasing soil organic matter reduces both inorganic fertilizer runoff and nutrient leaching. Microbe - rich soil attracts organisms help restore and maintains the natural balance of soil: Arthropods, nematodes, earthworms, fungi, bacteria and protozoa. Soil microbes suppress pathogenic bacteria and fungi and enhance nutrients absorption (Grotz, 2014). Food products produced from this process have longer shelf-life, healthy and highly nutritious.

When this is achieved, you see that these multinationals while trying to control pollution and maintain peace in their areas of operations will also contribute significantly to food security.

The use of compost manure, poultry droppings and other animal dunks and livestock wastes in general can restore soil without the need for potentially harmful chemicals or genetically modified technologies. This natural process remediates contaminated soil so that it can be used again for growing all kinds of plants.

At first, the oil is washed out by using a water solution of biosurfant, and subsequently separated. The biosurfant solution used in the washing process can be applied up to ten times and is easily biodegraded into a common natural compound. Then micro-organisms specially selected can then be employed to lower contamination concentration of the oil that still remains in the soil to a level that phytoremediation can start. This process may be within a period of few months to one year, depending upon the severity of the contamination and the location. The location determines how fast or slow the process will be. This is because; the bacteria used in the process remain inactive at negative temperatures, but then come to life as the temperature rises. However, some organisms can start to degrade oil at a very low temperature that is only a little higher than is required to melt ice. In fact, it is much more effective in warmer climates. Nigeria is a hot country and as such, this technology will be effective if applied.

Prof. Eugene Rosenbery and Prof. Eliora Ron (2010) of Tel Aviv University, Department of Molecular Microbiology and Biotechnology have developed bacteria that are capable of cleaning up the hard -to-reach oil pockets that occur when oil mixes with sand and organic matter on beaches and forms a thin layer in water ways. According to Prof. Ron, it worked to clean up an oil spill on the coast of Haifa Israel, so it could work in Florida too. If it worked in Haifa Israel and Florida, then it will also work in the Niger Delta in Nigeria.

Naturally occurring varieties of sea-borne bacteria have been identified by researchers that can digest oil. Through their genetic knowledge scientists have developed solutions that could clean-up the residual oil that cannot be removed by mechanical means.

Prof. Ron also said that sucking up surface oil pools containing the oil are important and necessary first-step action. But her solution addresses the smaller amounts of oil left behind that which is not easily removed from the sand and water. It is this small percentage of oil that sits under rocks and forms a thin film on the water surface. Her bacterial solution can remove this oil, which is necessary to protect the sea's wildlife.

There is also another technology by T.C. Mike Chung and Xuepei Yuan (2012) whose solution is a polymer material that transforms oil into a soft, solid oil-containing gel. One pound of the material can recover appreciable gallons of crude oil. The gel is strong enough to be collected and transported. Then it can be converted to a liquid and refined like regular crude oil. If the Government and the multinational companies mean well for the Niger Deltans, technologies like these can be applied to restore hope for the vast area of land lost to crude oil pollution.

## CONCLUSION

Bioremediation as a natural environmental purification strategy faces many challenges. Understanding and quantifying the type and number of micro-organisms or plant required for a particular environment base on the pollutants determining the rate or degree of pollution and enhancing researches on bioremediation and the use of microbial soil enhancer remains a focused goal. Showing how effective and simple natural purification is, needs to be approached carefully, particularly because these micro-organisms in most cases will in turn become factors of infections in the target environments of interest. Despite the efficacy of bioremediation, using seed as a bio-indicator of pollution, the knowledge is still limited with little group of people compared to population that need the knowledge.

The Government in synergy with these multinationals and NGOs need to device measures to encourage agriculture, information dissemination of all new innovation to get to the doorstep of rural dwellers (farmers) who provide bulk of all the agricultural products and whose activities can be used to combat environmental issues like; Global warming, Desertification, Erosion/ Earth quake threat and important of all ensure food security. They should provide grants for more research to acquire more effective solutions to revive areas for agricultural productivity. An effective implementation of good agricultural policies and measures to stop fraud in agricultural funding and application of these strategies

will drastically reduce unemployment rate in the country. It will restore the lost glory of our environment in term of agricultural potentials, increase standard of living of the people and in turn improve the country's economy.

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