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Research Paper

Organochlorine Pesticides Characterization Of Igbide Wetland Isoko Delta For Happa Aquaculture In Secondary Schools As A Pathway For Repositioning Education In Nigeria

Ogwu C. Ph.D, Ph.D, Obi-Okolie, F.&Ibuanokpe V.
Department Of Vocational Education
Agriculture Unit
Delta State University, Abraka, Nigeria

Abstract
This study was an ex-post facto research that investigated the organochlorine pesticides content of Igbide wetland for happa aquaculture deployment in secondary schools. This study answered three research questions and tested a hypothesis. To achieve these, the research area Igbide was mapped out into 5 research stations corresponding to the 5 (five) quarters in Igbideand these research stations were further mapped out into 5 research cells. From each of the research cells, water samples were collected from 5 sampling spots at 10cm depth,bulked and a composite drawn, fixed with HNO_3 and stored in ice cool boxes for analysis. The analytical standards adopted were CEAM and ASTM 490 and the instrument used for the determination of the organochlorine pesticides was Agilent HPLC 1260 infinity. The results obtained were; DDD 0.29±0.12; DDE, 0.20±0.17, DDT, 1.72±0.44, adrin 0.20±0.13 and diedrin 0.23±0.21. The mean results obtained were further subjected to test of significance with ANOVA deploying SPSS model 21 at 0.05 level of significance. The p-value is 0.31. thus rejecting Ho. The study recommends other that happa aquaculture should not be deployed in Igbide wetland in its present pollution state, the pollution sources should be identified and plugged and clean up and remediation should be commissioned to bring the wetland back to its hitherto healthy status.

Keywords: *happa aquaculture, organochlorine pesticides, bioaccumulation, human health*

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I. Introduction

Educational system of any country requires consistent restructuring, remodeling and repositioning so as to bein consonants with global trends and on same page with comity of nations. Repositioning according to Spencer (2018), Wang (2019) is to change a position, strategy, mode or pattern of doing a thing. It is a shift from status quo, to redirect and transpose a business model, product or service (Jackson, 2017, Tuff, 2019, Padden, 2019). Reposition refers to a major change in process of product and services. It is the act of replacing an old ways of doing a thing with a more recent method for an enhanced productivity or market value of a product or service (Brent, 2019, Sabastine, 2020). Thompson, (2018) enthused repositioning as changing known method or mechanism or process of achieving an objective to a more seemingly efficient mechanism for the purpose of profit maximization. Anthony (2014) refers to repositioning as changing strategy, methods hitherto employed in achieving a set objectives to more efficient method for higher profitability. Franklin (2017) opined that every system requiresconstant anpersistent repositioning to be in tandem with global players in all facet of the economy. There is no one system or method that continue to survive the test of time in anorganisation, repositioning is therefore determines an organisational existence (Tuder, 2018).Succinctly putby Osward(2018), Drake (2018) repositioning is a vital tool for organisational product or service survival and for efficient service delivery. A change in the method of achieving a goal is imperative as every method demands repositioning for product continual acceptability and service satisfaction after a long period of adoption(Michael, 2018).

Nigeria educational curriculum requires repositioning through changing emphasis from scholarship to psychomotor, manipulative and productive curriculum (Odogwu, 2019). Hassan (2020), Lember (2020)

reiterated this position that Nigeria educational system has not been able to achieve the yearnings of its citizens due to its overemphasis on scholarship. Education in Nigeria has not been able to take the country to a technical advanced stage that will stimulate job and wealth creation for poverty eradication and zero hunger (Adebayo, 2019), Haliru, (2020), Adedapo, 2020). Ndukwe, 2017, Maduaku, 2019, Ojevwe, (2020) enjoined Nigeria government to place emphasis on vocational and technical education for youths empowerment, job creation and poverty eradication. Ademolua (2019) Biobaku, (2020) admonished youths to acquire vocational skills in agriculture to check unemployment while Sodiq, (2019), Ochu (2019) advocated that youths should acquire skilled in aquaculture because of the rate return on investment to create wealth and solve unemployment problems. This position was equally canvassed by Osadeke (2019) that youths involvement in aquaculture will solve youths unemployment problems among Nigerian youths. Nigeria annual fish demand is 3.1 million metrictonnes but produced only 1.1 million metric tonnes (Abubakar, 2021, Ruwani, 2021). The difference between demand and supply is bridged through importation. Fish importation imports unemployment and exports employment (Ogbe, 2018). Osawaru (2018), Ogwu (2021) advocatedyouths engagement in aquaculture deploying happa aquaculture due to its low capital involvement and as a means of repositioning aquaculture in secondary schools for youths empowerment, wealth creation and hunger eradiation in line with United Nations Sustainable Development Goal 2. Happa aquaculture is more pocket friendly as it eliminates the costs of ponds construction, water pumps, and water sources (Jimoh, 2018). Happa aquaculture is the process of raising fish in nets anchored on stilts and submerged into natural water. Ogwu (2020, Pere, (2013).Bamgboye (2015) caution that water analysis should be carried out in any water to be utilised for happa aquaculture for the presence of pollutants to avoid bioaccumulation and biomagnification.Bioaccumulation is the entry of pollutants in aquatic ecosystem into the tissues of aquatic organisms while biomagnification is the tendency of the pollutants to multiply geometrically once in the tissues of such organisms (Atshana&Ashana, 2012, United States Environmental Protection Agency (USEPA), 2012).Water pollutants include microplastics, dioxins, furans, polyaromatic hydrocarbons, heavy metals, pesticides such as organophosphate, carbamates, and organochlorines. Organochlorines are compounds containing carbon and chlorine atoms that are utilised in pesticides formulation (USEPA, 2012). Organochlorines presence in human system above the maximum allowable limit result in health complications such as cancer endometriosis lung problems and infertility in both male and female (Agency for Toxic Substances and Disease Registry, 2012, Brooks, 2017). A wetland is an ecosystem that has the tendency of holding water for at least 3 to 6 months in a year (Ogwu, 2022, Sunil, 2019). The problem to be investigated in this study therefore is the concentration of organochlorine pesticides inIgbide wetlands Isoko south local government area Delta state for happaaquaculture in secondary schools as a way of repositioning education in Nigeria. The Organochlorine pesticidesinvestigated are dichlorodiphenyldichloroethane (DDD), dichlorodiphenyldichloroethylene (DDE), dichlorodiphenyltetrachloroethene (DDT), adrin and endrin.

The study was guided by research questions as follows:

1. What are the concentrations of DDD, DDE, DDT, adrin and endrin in Igbide wetlands
2. Are the concentrations of the oganochlorines within the maximum allowable concentrations stipulated by World Health Organisation (WHO), 2014.
3. Can happa aquaculture be practiced in Igbide wetlands by schools and youths in Igbide and environs?

The study was guided by a hypothesis as thus

H_o: There is no significant difference between the concentrations of the organochlorine pesticides in Igbide wetlands and World Health Organisation maximum allowable concentrationsfororganochlorines in water.

Figure 1: Map of Isokosouth showing Igbide
Source: Edwin, Ito. (2019).

Study Area

Igbide is an Isoko clan in Isoko South local government area Delta State Nigeria. Igbide lies within the geographical coordinates of latitude 5° 22' 00" N and longitude 5° 8' 24" E and has a population of 465,500 inhabitants (National Population Commission, 2006). Igbidepeople are predominantly fishermen and farmers with some of the women into cassava processing, some are petty traders while a few of the people are civil servants teaching in primary and secondary schools. Some men and women are artisans (Evrero, 2021). Igbide is a wetland settlement as all the quarters in Igbide has its share of wetland. The farmers utilize chemical pests control in warding off pests from their crops and animals and this is evident in the presence of backpack sprayers in virtually every home in Igbide clan. The wetlands are the recipients of the wastes from chemical pest control through runoff and erosion

II. Materials and Methods

The research area Igbide wetland was mapped out into 5 research stations corresponding to the quarters in Igbide. These were Ubrenye, Owodokpokpo, Uruwhe,Oteri and Okporhro. Each of the research stations was further mapped out into 5 research cells (Abdulsalam, 2015, Obrogo (2017). From each of the reseach cells, water was sampled with a clean sampling bottle tied to a graduated string from 5 spots and at 10 cm depth and covered subsurface. Samples from each sampling cells were bulked, a composite drawn and fixed with nitric acid to preventoxidation and stored in ice cool boxes with which they were taken to the laboratory for analysis. The analytical standards adopted were Chemical Analysis of Ecological Matter (CEAM) and America Society for Testing and Materials (ASTM) and the analytical Instrument adopted for determination of the organochlorine pesticides is Agilent high performance liquid chromatography HPLC model 1260 infinity.

III. Results

The results of the organochlorine pesticides content of Igbide wetlands are as in Table 1

Table 1: Organochlorine pesticides content of Igbideweland and WHO maximum allowable concentration of organochlorine pesticides in water in ug/l

	A	B	C	D	E	$\bar{x}$	Sd	WHO MPC in µg/l
DDD	0.21	0.46	0.32	0.16	0.31	0.29	0.12	0.01
DDE	0.02	0.03	0.4	0.22	0.31	0.20	0.17	0.01
DDT	2.02	1.26	2.02	1.24	2.11	1.73	0.44	1.10

Adrin	0.12	0.04	0.21	0.32	0.33	0.20	0.13	0.03
Diedrin	0.06	0.13	0.41	0.22	0.31	0.23	0.14	0.005

The organochlorine pesticides content of Igbide wetland were presented in graph as in Figure 2.

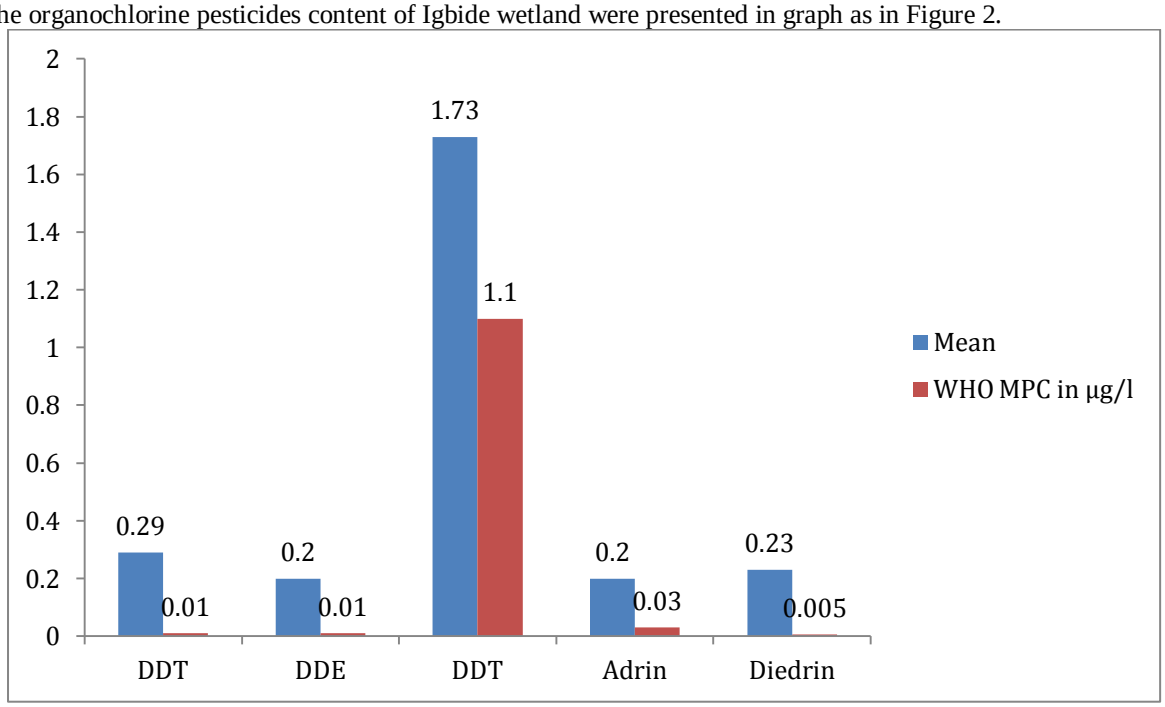

Figure 2: Organochlorine content of Igbide wetland in ug/l

The concentration of the organochlorine in decreasing order DDT > DDD >diedrin>adrin> DDE
The results of the organochlorine pesticides content of Igbide wetland were subjected to test of significance with special package for social sciences (SPSS) model 21 at 0.05 level of significance. The p value is 0.31 thus rejecting Ho.

IV. Discussion of Findings

Analysis of the organochlorine pesticides content of Igbide wetland varying various concentrations of the pesticides measured. The mean concentration of DDD the analysis showed is 0.29µg/l. the WHO (2014) maximum allowable concentration of DDD in water is 0.01 µg/l. The DDD is higher than the recommended.High concentration of DDD in Igbide is a consequence of application of pesticides to protect crops and animal by the farmers. This result is similar to the results of Oche and Tondo (2018) in River Tchada in Benue State. Ikpe and Asuquo (2017) also recorded high DDD content in Qua Iboe River in River in AkwaIbomState Nigeria. The analysis of the Igbide wetland showed that the mean concentration of DDE is 0.20µg/l. The WHO maximum allowable concentration of DDE in water is 0.01µg/l.the high concentration of DDE in Igbide wetland is concomitant effect of chemical pesticide control methods adopted by Igbide farmers. This report of high concentration of DDE is similar to the report by Abduwaheed (2019) in Asa River Kwara state. The report is however at variance with the result recorded by Adelayo and Ugolo (2018) in Okan River, Agbarho, Delta state.

The analysis of Igbidewetalnd revealed that the mean concentration of DDT is 1.72 µg/l. The WHO maximum allowable concentration for DDT is 1.1µg/l. the high concentration of DDT in Igbide wetland is an aftermath of chemical pest control mechanisms deployed by Igbide farmers. High concentration of DDT in water was reported by Eromofele (2015) in Ovia River, Benin City. Okoro (2018) also recorded high concentation of DDT in EmedewetalndIsoko south Delta state. The mean concnetraiton of adrin in Igbidewetalnd is 0.20 µg/l. The maximum allowable concentration of adrin in water by WHO is 0.030 µg/l.

This increasedadrin in water is an anthropogenic effect of pest management technique adopted in Igbide. This result is in consonance with the reports of Ogwu (2021) who reported high DDT in Atuh wetland in Ugiliamai Delta state and also Ogwu (2022) reportedof high DDT in Otorgo wetlands in UghelliNorth local government area. The mean concentration of diedrin as recorded by the analysis of Igbide wetland is 0.23 µg/l. The WHO allowable concentration of diedrin in water is 0.005 µg/l. This elevated concentration of diedrin is the product of organochlorine pesticides utilisation by the Igbide farmers. Similar result was recorded by Clarke

(2018) in Olomoge lagoon in Lagos state. Ojomu (2018) however reported lowdiedrincontent in Ofiki River, Osun state.

V. Conclusion

Education has been globally rated as instrument par excellence for achieving nations aspirationsfor economic growth and development and for food security. This goal can only be met if the educational curriculum of a nation is constantly repositioned to be on par with changing demands of the global community. Youths aquaculture has been adjudged as a viable tool for repositioning education to achieve its desired goal, of youths' empowerment, job and wealth creation and food security especially aquaculture deploying happa culture method. The result of the analysis of Igbide wetlands for happaaquaculture deployment in secondary schoolsreveals that the wetland has been polluted with organochlorine pesticides imputed into the aquatic environment through chemical pest control,thus implementing happa culture may not be encouraged in its present state because of health implication therein.

VI. Recommendation

Consequent upon the results of the analysis, the study recommends:

i. That happa aquaculture should not be deployed in Igbide wetland because of its pollution status.
ii. The pollution source should be identified and discontinued.
iii. Clean up exercise should be implemented and remediation commenced to resuscitate the wetland to enable the deployment of happaaquacutlure as a vehicle for repositioning education in Nigeria.

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