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Short Communication

The effect of selected refined fossil oil on the survival of *Oreochromis niloticus* fingerlings

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This study was designed to investigate the effect of selected refined fossil oil on the survival of *Oreochromis niloticus* fingerlings. There was a significant (p.<0.05) difference among treatment means for the survival rate in different treatments with gasoline (C5-C10) 30% having the least mean rate of survival while the highest mean rate of survival was recorded in the light distillate oil (C12-C20) 15% which recorded 16 ± 0.25 and 73 ± 0.08 respectively. There was no significant variations in different water quality parameters in fossil oil treated waters. However, higher pH and conductivity values were recorded. In conclusion, fossil oils pollution is harmful for aquatic life and especially Tilapia (*O. niloticus*).

Key words: Oil pollution, Survival and Fish fingerlings.

INTRODUCTION

Refined oil pollution are harmful release of oil into the environment, susually in the water, sometimes killing area flora and fauna (fish), Gundlach and Hayers (1978). It is most common pollutant in the oceans. More than 3 million metric tons of oil contaminates the sea every year (Gundlach and Hayers, 1978). According to Daoji and Dag (2004), majority of this oil pollution in the oceans comes from land, runoff from streets and waste from cities.

The presence of oil on the water surface will block sunlight and prevent air from reaching the plants live in the water. This will prevent the plants from producing food through photosynthesis. Without photosynthesis, the plant will not be able to grow, germinate and produce oxygen. If this condition persists the plant will eventually die. Further, Aquatic animals are also not speared by oil spills. They are affected through physical contact, inhalation, ingestion and absorption of oil. Oil contaminates the algae plankton, fish eggs and larvae that are food for fishes.

In view of the above, the present study was carried out to determine the effect of different types of refined oil pollution on the survival of *Oreochromis niloticus* fingerlings and water quality.

MATERIALS AND METHOD

Fingerlings of the specie Oreochromis *niloticus* where obtained from the University of Agriculture Makurdi Department of fisheries and Aquaculture Research farm where their rearing age is known. The refine oils that constitute the normal type of oil spills on water bodies from land bases sources, Daoji and Dag (2004) were obtained from gas stations around Makurdi metropolis. The experiment were carried out in the open in plastic aquaria at the department of fisheries and aquaculture so as not to interfere with conditions such as evaporation and photo-oxidation which can transform several petroleum hydrocarbons into hydroxyl compounds such as aldehydes and ketones and ultimately to low molecular weight carboxylic acids.

The fish, *Oreochromis niloticus* fingerlings were exposed to different types of refined oil. The fingerlings (10) were stocked in 4 aquarium tanks containing 3 litres of water and treated with four types of refined oils including; Gasoline (C5-C10) 30%, Kerosene (C10-C12) 10%, Light distillate oil (C12-C20) 15% and Heavy distillate oil (C20-C40) 25%. The fish survival was monitored for a period of 8-10hrs ± 0.02 which is the normal time taken for oil spills to have impact on water bodies. Further, the analysis of selected water quality parameters was

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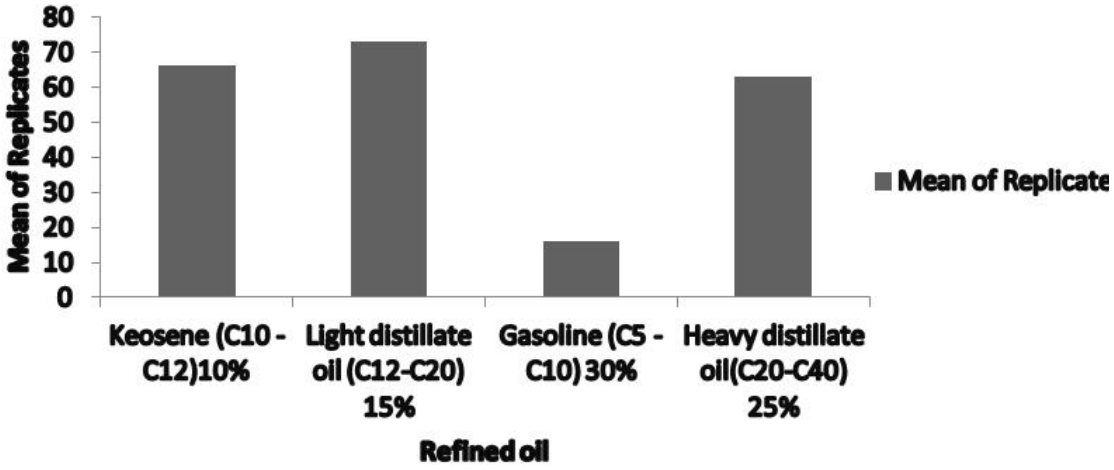

Figure 1. Percentage survival rate of *Oreochromis niloticus* fingerlings(8-10 hours of exposure to refined oil).

Table 1. Mean values of selected water quality parameters in fossil oil treated.

Variables	Gasoline (C5-C10) 30%	Kerosene (C10-C12) 10%	Light distillate oil (C12-C20) 15%	Heavy distillate oil (C20-C40)25%
Temperature	25.167± 0.133^{x}	24.467± 0.233^{x}	24.417± 0.217^{x}	24.45± 0.183^{x}
D. O	6.500± 0.100^{x}	6.667±0.06^{x}	8.933± 0.183^{y}	6.65± 0.117^{x}
PH	6.898± 0.058^{x}	6.827± 0.032^{x}	6.835± 0.025^{x}	6.900± 0.050^{x}
Conductivity	1145.500± 3.833^{x}	106 667± 0.667^{x}	1145.002± 0.833^{x}	97.167± 0.833^{y}

Means in each row with same superscript were not significantly different from each other (P > 0.05)

performed as per the standard methods of APHA (1998).

RESULTS AND DISCUSSION

The results of the present study are presented in Table 1 and Figure 1. It would be seen from Figure 1 that the highest mean survival (73±0.08) was in Light distillate. While the lowest (16±0.25) being in gasoline. Further, it is clear from the Table 1 that after the application of fossil oils, there was no visible change in water quality parameters.

It was observed that the oil poured on the water surface spread out evenly within a few minutes to form a thin layer (sheen). Gundlach and Hayers (1978) observed that fish exposed to oil becomes contaminated due to physical contact although other causes of mortality due to oil spill impact do exist but physical contact is main reason of mass mortality of fish and other aquatic life. The Figure1 shows the percentage survival rate for the *Oreochromis niloticus* fingerlings from 10.00 ± 0.09 to 20 ± 0.08 in Gasoline with a chemical nature of (C5-C10) 30% while in Kerosene with a chemical nature of (C10-C12) 10% ranged from 60.00 ± 0.04 to 200.00 ± 0.10. The light distillate oil with a chemical nature of (C12 – C20) 15% have a percentage survival rate ranging from 70.00 ± 0.03 to 220.00 ± 0.08 In heavy distillate oil with a chemical nature of (C20-C40) 25% recorded a survival rate of between 60.00 ± 0.04 to 190.00 ± 0.11.

The highest survival rate (220.00 ± 0.08) was observed in the light distillate oil while the least survival rate was observed in Gasoline (C5- C10) 30% with a survival rate of 10.00 ± 0.09. The mean values are depicted in Figure 1.

In view of the above, it is concluded that the survival rate of *Orechromis niloticus* fingerlings exposed to different types of refined oil were not similar in all the refined oils studied. Gasoline (C5-C10) 30% gave the least rate of survival in comparison with other types of refined oil. Hence it can be concluded that Gasoline (C5-C10) 30% is more toxic to fish in comparison with other types of refined oil investigated while light distillate oil (C12-C20) was less toxic. Also car park and underground storage tank operators should take drastic steps to prevent leaking of refined oil which constitute the normal type of oil spill on water bodies from land base sources.

REFERENCE

APHA (1998). Standard method for the examination of water and waste water. 20th edition. American Public Health Association. American Water Works Association and Water Environment Federation. Washington D.C.

Daoji L, Dag D (2004). Ocean Pollution from land based sources: East China Sea, China Royal Swedish Academy of Sciences, Ambio 33(1-2), http://www.ambiokva.se

Gundlach ER, Hayers MO (1978). Vulnerability of coastal environments to oil spills impacts. Marine Technology Society, 12(4): 18 -27^ abNOAA (2008).