Influence of kerosene and palm oil on hatchability of eggs of the African Sharptooth Catfish (*Clarias gariepinus*) (Burchell, 1822)

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ABSTRACT

Reproductive success in African catfish can be negatively influenced by changes in optimum habitat conditions. Introduction of alien substances such as petroleum products or effluents could impact hatchability of eggs. This study was carried out to assess the effect of kerosene and palm oil on the hatchability of *Clarias gariepinus* eggs. Standard hatchery breeding procedures for the species were followed for this study. Gravid brood stocks of *C. gariepinus* (1 male, 1 female) weighing 802g and 707g respectively were used for breeding. The female fish was injected intramuscularly with *ovaprim* at 0.5ml/kg body weight to induce spawning. After hypophysation, the eggs were extracted by stripping the female. The eggs were fertilized with milt from a sacrificed male. The fertilized eggs were then incubated in vats. Kerosene and palm oil were introduced at the concentrations of 3ml/L and 5ml/L for each treatment with replicates. A controlled system was also included with its replicate. Optimum water quality for the culture of *C. gariepinus* was ensured throughout the study. Average number of eggs, percentage of eggs fertilized and percentage of hatchlings were recorded. Average percentage of eggs that were fertilized was 83% in control, 79% in palm oil treatment with 3ml/L and 5ml/L respectively, 83% and 77% in kerosene treatment with 3ml/L and 5ml/L respectively. Average percentage of eggs that hatched in the control was 55%, 86% and 48% in palm oil treatment with 3ml/L and 5ml/L respectively. Results showed that the percentage of hatchlings in the control (55.5%) was significantly higher (T-test, $P<0.05$) than that of the palm oil (28.3%) treatment. No egg hatched in any of the kerosene treatments. It was therefore recommended that effluents containing kerosene should be properly treated before releasing into the aquatic environment.

INTRODUCTION

Nigeria is one of the major petroleum producing countries of the world and kerosene is one of the end products of petroleum commonly used by house-holds in Nigeria as energy in cooking and lighting (Ogolo *et al*., 2017). Palm oil has been linked with the destruction of the world's precious rain forest and water bodies. Development of new oil palm plantations, coupled with small holders expanding their farms to meet the rising demand for palm oil has resulted to significant deforestation (http/Wikipedia/palm oil).

The African catfish is a large, eel-like fish, usually of dark gray or black coloration on the back, fading to a white belly (Fig. 1). The African catfish (*Clarias gariepinus*) has an average adult size of 1.5m in length and 60kg in weight.

African catfish has contributed immensely to aquaculture since 1970 because of its tolerant to a wide range of culture conditions. However, their inability to spawn successfully in captivity led to the improvisation of the artificial breeding technology known as hypophysation.

Although induced spawning has been applied successfully in catfish production (Shourbela *et al*., 2020), reproductive success in African catfish can be negatively influenced by changes in optimum habitat conditions. Introduction of alien substances such as petroleum products or effluents can adversely affect hatchability of eggs. This could have untold effect on recruitment and fishery.

FIGURE 1: Diagram of the African Catfish
Source: http/Wikipedia/catfish

AIM AND OBJECTIVES

This study was carried out to assess the effect of kerosene and palm oil on the hatchability of *Clarias gariepinus* eggs.

MATERIALS AND METHODS

Standard hatchery breeding procedures for the species were followed for this study. Gravid brood stocks of *C. gariepinus* (1 male, 1 female) weighing 802g and 707g respectively were used for breeding.

The female fish was injected intramuscularly with *ovaprim* at 0.5ml/kg body weight and kept for 14 h latency period at 28 °C to induce spawning. After hypophysation, the eggs were extracted by stripping the female.

Before fertilization, a mature male broodstock was sacrificed, sperm sac removed and cleaved to ease the collection of milt. Milts were collected in a plastic bowl containing 0.9 % sodium chloride solution (Shourbela *et al*., 2020).

The eggs were then fertilized with the sperms from the sacrificed male.Thereafter, the fertilized eggs were incubated in vats. Kerosene and palm oil were introduced at the concentrations of 3ml/L and 5ml/L for each treatment with replicates.

A controlled system was also included with its replicates. Optimum water quality for the culture of *C. gariepinus* was ensured throughout the study. Average number of eggs, percentage of eggs fertilized and percentage of hatchlings were recorded.

Student's T-test was used to determine the difference in hatchability rate between the control and treatment at $P<0.05$.

RESULTS

Average percentage of eggs that were fertilized was 83% in control, 79% in palm oil treatment with 3ml/L and 5ml/L respectively, 83% and 77% in kerosene treatment with 3ml/L and 5ml/L respectively. Average percentage of eggs that hatched in the control was 55%, 86% and 48% in palm oil treatment with 3ml/L and 5ml/L respectively (Table 1).

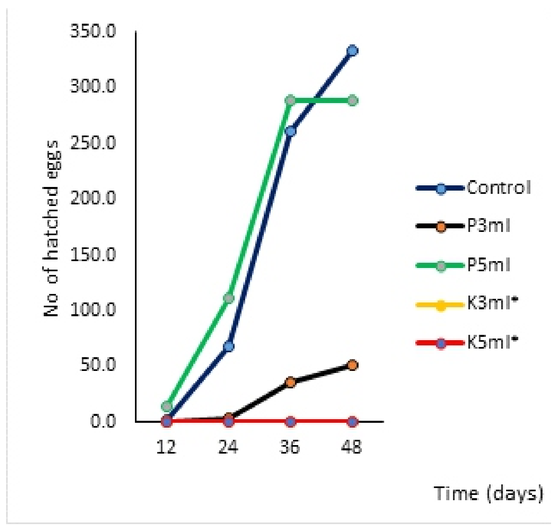
Results showed that the percentage of hatchlings in the control (55.5%) was significantly higher (T-test, $P<0.05$) than that of the palm oil (28.3%) treatment.

TABLE 1: Average number and percentage of eggs hatched in the different treatment vats

VAT	Average no of Eggs incubated	Fertilized eggs (%)	Average percentage that hatched
Control	600	83%	55%
P3ml	600	79%	86%
P5ml	600	79%	48%
K3ml	600	83%	0%
K5ml	600	77%	0%

P=palm oil, K= kerosene

It was observed that no egg hatched in the groups treated with 3ml and 5ml of kerosene throughout the experimental period portraying the limiting effect of kerosene on the hatchability of *C. gariepinus* eggs. Hatchability was also observed to increase precipitously with time (Fig. 2).



*Trend lines for kerosene groups were at ground level on the chart due to their inhibiting effect / zero hatching potentials

FIGURE 2: Number of hatched eggs exposed to 3ml and 5ml of palm oil (P) and kerosene (K)

Observed effect of kerosene and palm oil on the condition of *C. gariepinus* eggs and hatchlings show that viable eggs were greenish in colour while dead eggs were white. Green eggs were observed in the control and palm oil groups throughout the experiment. Kerosene group had green eggs with patches of white on them at the beginning of the experiment and suddenly turned white within 6 h of experiment.

The control group recorded a significant number of hatched eggs and the hatchlings were vibrant, increasing in number every 6h of incubation. For group treated with 3ml of palm oil, most hatched eggs were weak but became stronger and increased in number every 6 h. for group treated with 6ml of palm oil, hatched eggs were vibrant and increased in number every 6 h. However, the kerosene group did not record any successful hatchling, as all eggs were dead.

CONCLUSIONS

The study showed variable embryonic developments of *C. gariepinus* eggs in the different treatments. It was concluded that kerosene has adverse effects on the fertilization and hatchability success of *C. gariepinus* eggs. Since kerosene has these adverse effects, it should be used with restraint and effluents containing kerosene should be properly treated before releasing into the aquatic environment.

REFERENCES

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