



## USE OF PINEAPPLE JUICE IN THE ELIMINATION OF EGG STICKINESS IN MUDFISH (*Heterobranchus bidorsalis*)

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### ABSTRACT

A study was carried out to determine the use of pineapple juice in the elimination of egg stickiness and improved hatchability rate in Mudfish (*Heterobranchus bidorsalis*) the total number of fish used was two males and three females' broodstock. The females were injected above the lateral line with hormone (ovaprim) at the rate of 0.5ml/kg. After a latency period of 9 hours. Females whose eggs were already oozing out at slight touch were stripped into a dry bowl and fertilized with milt gotten from the males. Four treatments including three different concentration of pineapple solution (1%, 3% and 5%) and the control (without juice) were used to eliminate egg stickiness of *Heterobranchus bidorsalis*. The mean hatchability rate were found to be 78%, 88%, 45%, and 27% for the control, 1%, 3%, and 5%. The use of natural product like pineapple reduces the danger of fish kill when applied in excess and increases the hatchability rate of incubated egg.

**KEYWORDS:** Pineapple, Hatchability, Fertilized, Eliminate and Concentration

### INTRODUCTION

The high demand of fish fingerlings in the high growing aquaculture industry has stimulated the need for artificial propagation of cultured warm water fisheries (FAO 2007). Breeding has turn from being science concept to art because of extra skill required in pre and post management of fishes. It is a fact that availability of fish seed is important for continuity. A domestic fish production in Nigeria shows that artisanal fisheries sector contributes about 90% of the annual fish production; the industrial sector contributes about 5% while aquaculture contributes about 3%. (Tobor,1993)The fish produced from the aquaculture sector can be increased if quality seed is produced and used in raising the fish. According to Lawson, et al, 2010 and Nwadukuwe, 1993, the breeding of fish using different hormonal materials like Ovaprim, Ovulin and stimulating materials like the pituitary of various fish species increases fish production. Artificial propagation under controlled hatchery condition of fry and fingerlings is a deliberate act to increase fish production (FAO 1998) the use of various production receptacles in hatchery is a recent production procedure which is aimed at producing quality fish feed at a reduced price, this can be refer to as the marriage of art and scientific protocol this combination can only yield results worthy acknowledging if the combination of science and the art together can be used to produced good quality and quantity fish seed and if the species of fish egg to be incubated will not drastically affect the hatching receptacle because of the nature of egg (stickyness). Pineapple is commonly found in many countries pineapple juice contains abundance of photolytic enzymes, principally bromalases which can digest protein. Pineapple is known scientifically from Bromalianses family. It is known to originate from South America and believes to be brought

to Europe by Spanish explorers centric and malefic acids are found in good quantities in pineapple fruits. Ascorbic acid is also found in moderate quantity in pineapple fruits pineapple contains calcium, potassium, and magnesium, fiber and vitamin C. It is low in fat and cholesterol, it is also a good source of fiber, it promotes bone growth and strengthens bones in the absence of sufficient amount of magnesium, a mineral considered responsible for healthy bones and connective tissue, believed to be useful for maintaining oral health and juice, it is considered helpful in healing process after a dental surgery, bromeliad, a protein digesting enzymes in pineapple, has been shown to be a effective treatment in upper respiratory tract infections by suppressing coughs and reducing the thickness of mucus. Treating cold, sore throats and acute sinusitis are other health benefits of pineapple, it is skin firming (by boosting the production of collagen) sloughing off dead skin cells, evening out skin and making thing wrinkles' less noticeable. But the purpose of this research, pineapple would utilize in elimination stickiness of egg to avoid eggs clumping together and blocking the egg micropile.

### MATERIALS & METHODS

#### Procurement and selection of brood stock

A total of six healthy parents stock of *H. bidorsalis* (3 males, 3 females) were used in this study they were procured from the Brood stock pond of Teaching and Research Farm of Delta State University Abraka. Asaba Campus. They were of age (15) months old, weighing between 1.5 and 3 kilogram's body weight care was taken when selecting the male and female brooders. The male brooder selected papilla was elongated with slightly swollen reddish urinogenital organ. It was ensured that the female brooders have the attribute of maturity such as

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a well rounded and soft abdomen, which extended anteriorly beyond the pectoral fins to the genital opening; also the genital opening was swollen and reddish.

### Administration hormone (ovaprim)

The female brooder (*H. bidorsalis*) was injected with hormone (trade mark "Ovaprim") at a dosage rate of 0.5ml per kilogram body weight. The injection was done intramuscularly above the lateral line just below the dorsal fin. The injected area was rubbed with a finger in order to distribute the ovaprim evenly throughout the muscle and to prevent a backflow of the ovaprim. The injected fish were kept in a bowl and covered with a netting piece to prevent it from jumping out. The temperature of the water holding the fish was measured with mercury in glass thermometer another corresponding latency period was calculated to be eight hours at 28.3<sup>0</sup> (Eric, 2002).

### Procurement of milt

The milt used was procured by sacrificing and dissecting the male (*H. bidorsalis*) in order to remove the gonad (testis). Prior to this section the physiological solution was prepared by dissolving a gram of salt (NaCl) in one liter of water. Incisions was made into the creamy colored lobes of the testis and then squeezed and washed out of the testis sac with the physiological solution into a beaker.

### Stripping of egg from female brood stock

The first step taken during the stripping process will be to mop the body of the female brooder with a towel, this was done to prevent the egg from coming in contact with water, which may consequently seal up the micropyle and prevent fertilization. Gentle pressure was applied on the abdomen of the female brooder and the ovulated eggs that were ooze out easily from the genital opening was collected in a stainless steel bowl where the eggs were collected for experiments.

### Pineapple juice preparation

Pineapple juice was prepared by squeezing peeled fresh fruit and made up to 1% by mixing 1ml of juice with 99ml of pond water, 3% by mixing 3ml of juice with 97ml of pond water and 5% was produced by mixing 1ml of juice and 95% of pond water. A total of 8 pineapple juice solution was produced per trails.

### Experimental design

Four trials of hatchery procedure was carried out to test the effect of various percentage of pineapple juice (1%, 3% and 5%) in disticking the egg of *H. bidorsalis*. After fertilization on each occasion the egg were divided into three and set up in duplicate the pineapple solution were used to disticking the eggs in each occasion after which the incubation process is completed and fertilized egg were allowed to undergo normal hatchery process.

### Data analysis

At the end of the experiment the effect of treatment on disticking and hatchability were enumerated.

## RESULTS & DISCUSSION

All treatments reduced the stickiness of the egg.

**TABLE 1:** The weight of female, mean weight of egg and the approximate number of eggs used in each treatment.

Female (g)	Mean Egg Wt (mg)	No of Eggs
800	0.7	288,000
900	0.8	324,000

**TABLE 2:** Mean ( $\pm$  SD) hatching rate of *H. bidorsalis* egg treated using different concentration and pineapple juice.

**TRIAL 1:** Treatment 1 with 1% pineapple juice showed the highest hatching rate (86.6%) Compared to the control (70.2%) the 3% and 5% with hatchability rate of (47.4%) and (25.3%) respectively.

Treatment	Hatching Rate (%)
Control	70.2 $\pm$ 1.1 <sup>a</sup>
Pineapple (1%)	86.6 $\pm$ 1.4 <sup>b</sup>
Pineapple (3%)	47.4 $\pm$ 1.5 <sup>c</sup>
Pineapple (5%)	25.3 $\pm$ 2.9 <sup>d</sup>

**TRIAL 2:** Treatment 2 with 1% of pineapple juice showed the highest hatching rate (80%) compared to control (74%) 3% and 5% with rate of (49%) and (26%) respectively.

Treatment	Hatching Rate (%)
Control	74 $\pm$ 0.4 <sup>a</sup>
Pineapple (1%)	80 $\pm$ 1.2 <sup>b</sup>
Pineapple (3%)	49 $\pm$ 1.4 <sup>c</sup>
Pineapple (5%)	26 $\pm$ 1.74 <sup>d</sup>

**TRIAL 3:** Treatment 2 with 1% of pineapple juice showed the highest hatching rate (84%) compared to control (75%) 3% and 5% with rate of (46%) and (24%) respectively.

Treatment	Hatching Rate (%)
Control	75 $\pm$ 0.6 <sup>a</sup>
Pineapple (1%)	84 $\pm$ 0.9 <sup>b</sup>
Pineapple (3%)	46 $\pm$ 1.3 <sup>c</sup>
Pineapple (5%)	24 $\pm$ 1.6 <sup>d</sup>

**TRIAL 4:** Treatment 2 with 1% of pineapple juice showed the highest hatching rate (88%) compared to control (78%) 3% and 5% with rate of (45%) and (27%) respectively

Treatment	Hatching Rate (%)
Control	78 $\pm$ 0.6 <sup>a</sup>
Pineapple (1%)	88 $\pm$ 1.0 <sup>b</sup>
Pineapple (3%)	45 $\pm$ 1.5 <sup>c</sup>
Pineapple (5%)	27 $\pm$ 1.7 <sup>d</sup>

This experiment indicated that the application of pineapple juice disticking of *H. bidorsalis* eggs reduces egg handling time and positively affect the hatchability rate.

**TABLE 5:** Mean Hatchability rate

Treatment	Hatching Rate (%)
Control	78 $\pm$ 0.6 <sup>a</sup>
Pineapple (1%)	88 $\pm$ 1.0 <sup>b</sup>
Pineapple (3%)	45 $\pm$ 1.5 <sup>c</sup>
Pineapple (5%)	27 $\pm$ 1.7 <sup>d</sup>

Reduction of stickiness of eggs is very important procedure in controlled artificial reproduction in fresh water aquaculture. It improves hatching of fish under hatchery conditions (Rottmann *et al.*, 1991). Elimination of egg stickiness in fin fishes is traditionally carried out by using salt, Urea and tannin. The use of this combination (salt, Urea and tannin) as desticking solution requires the treatment of eggs with more than one solution, which at its best only give the breeder grace period of two to three minutes and chemical like tannin can be toxic to eggs if not well used, or at a contact exceeding a few seconds. (Horvath, *et al.*, 2002). Billard (1999) suggests the use of egg and milk mixtures in Zoug Jars with the aid of bubbled air. However, this technique is also disadvantaged as it requires extensive egg handling and requires keeping the egg bobbling for the duration of incubation a requirement that can be difficult to achieve in most developing countries. Pineapple fruits have a high concentration of ascorbic acid (Vitamin C) in their composition. The juice is extracted and mixed with water; the solution (juice and water) is added to the egg which reacts with the egg shell, thereby reducing the blood vessel and the hardness (thickness) of the egg shell. This helps to improve hatchability.

Desticking of egg using pineapple is quick and simple and requires 3 minutes only instead of the one hour (1hr) for conventional desticking. In this experiment which involves the use of 1%, 3% and 5% of pineapple juice and control (without application of pineapple) on the eggs, 1% of pineapple juice application on the egg was found to be most effective in all treatments with hatching rate of (88%), followed by the control with hatching rate of (78%), then 3% of juice (45%), the 5% of pineapple juice application had the lowest hatchability rate of (27%). This technique does not only increase hatchability rates, but has the advantage over conventional procedures by dramatically reducing egg handling period. Eliminating stickiness of eggs makes it possible to use makeshift incubating receptacle that is readily available to the local farmers in rural area.

### CONCLUSION

In conclusion, pineapple juice solution effectively reduces stickiness of *Heterobranchus bidorsalis* eggs and also reduced handling time from almost one hour as necessary for conventional desticking, to just 3 minutes. This method is therefore recommended to hatcheries in Nigeria because of the simple technology, however the effect of temperature on the time of egg treatment needs to be researched.

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