

Acute Toxicity Test of Four Disinfectants to Juvenile *Pinctada maxima*

Md Kamal Uddin, Md Robiul Hasan*, Shyamal Kumar Paul and Tasnim Sultana
Fisheries and Marine Science Department, Noakhali Science and Technology University, Noakhali-3814,
zhoufalin@aliyun.com

ABSTRACT

The acute toxicity of glutaraldehyde, dibromohydroxydantoin, methionine iodine and bleaching powder to juvenile *Pinctada maxima* was studied. The results showed that the order of toxicity was bleaching powder > dibromohydroxydantoin > methionine iodine > glutaraldehyde and the median lethal concentrations (LC50) of above disinfectants were 13.05 mg/L, 27.49 mg/L, 53.20 mg/L and 67.36 mg/L, respectively in 24 h and the LC50 were 10.15 mg/L, 9.35 mg/L, 29.27 mg/L and 35.58 mg/L respectively in 48 h; and their SC (safe concentration) were 1.86 mg/L, 0.32 mg/L, 2.66 mg/L and 7.52 mg/L respectively. The research indicated that we can use glutaraldehyde to disinfect *P. maxima* under safe concentration, but should not use bleaching powder, and can use dibromohydroxydantoin and methionine iodine carefully. Based on the results of the pre-experiment, the LC0 and LC100 treated by dibromohydroxydantoin were 3.0 mg/L and 94.0 mg/L, respectively. Five mass concentration of dibromohydroxydantoin were determined according to the two mass concentrations above by equal spacing method, the results of the test of the toxicity of dibromohydroxydantoin to the larvae of *P. maxima* were shown in Table 2. During the whole test, there was no death in control groups. Regression analysis showed that the regression curve equation of the rate of death rate of 24 h and drug concentration was $Y=3.12 \times +0.51$, $R^2=0.98$ (Figure 2a). It calculated the 24 h LC50 was 27.49 mg/L with the method of linear interpolation and the 95% confidence limit was 23.94 ~ 31.78 mg/L. The regression curve equation of the medicine bath for 48 h was $Y=3.07 \times +2.02$, $R^2=0.99$ (Figure 2b), it calculated that the 48 h LC50 was 9.35 mg/L with the method of linear interpolation and the 95% confidence limit was 8.06 ~ 10.80 mg/L, the SC was 0.32 mg/L (Table 2). Test results of acute toxicity of dibromohydroxydantoin to *P. maxima* larvae (Figure 2). Effect of dibromohydroxydantoin treatment for 24 h (a) and 48 h (b) on the mortality of *P. maxima* larvae.

When choosing the microbicides during the aquaculture of the *P. maxima*, it is necessary to consider the safety of the pearl oyster larvae, the convenience and cost of disinfectants, the degree of pollution to water and effectiveness of the pathogen inhibition. In the culture of *P. maxima*, especially in the stage of larvae breeding, it is prone to break out the bacterial disease and cause large-scale death of shellfish. Therefore, the phenomenon that disinfectant and antibiotic abused in production occurs, the arising of the resistance problem further aggravated the epidemic of disease. So the selection of suitable disinfectants as well as rational use of sterilization drugs is particularly crucial.

The Tables 1-4 showed that 24 h LC50 of the four kinds of disinfectant was all higher than that of 48 h LC50. When prolonging the contact time, the toxic effect of *P. maxima* larvae enhanced, which caused the pearl oyster larvae mortality increased. From the perspective of setting range of the disinfectant concentration, the sensitivity of the *P. maxima* larvae to four kinds of disinfectants was different from the range of the concentration of each disinfectant. *P. maxima* larvae was most sensitive to bleaching powder which concentration was 4.8-17.5 mg/L, dibromohydroxydantoin, methionine iodine and glutaraldehyde followed, the concentration was 3.0-94.0 mg/L, 16.0-100.8 mg/L, 16.0-159.0 mg/L, respectively. The result was similar to what Zhao did to juvenile *B. areolata* [7]. The results of four kinds of disinfectants to larvae showed that the 24 h LC50 value of bleaching powder to *P. maxima* larvae was 13.05 mg/L, 48 h LC50 was 10.15 mg/L, the difference between the two data was the least, which illustrated the toxicity of bleaching powder was more stronger than others to larvae. The toxicity of three kinds of disinfectants in descending order was dibromohydroxydantoin, methionine iodine and glutaraldehyde. By calculating the safe concentration (SC), the sensitiveness of *P. maxima* larvae to four kinds of disinfectants in descending order was bleaching powder, dibromohydroxydantoin, methionine iodine and glutaraldehyde.

Keywords: *Pinctada maxima*; Juvenile shell; Acute toxicity; Disinfectant