Development of a suitable culture media for mass culture of *Moina macrocopa*

G. N. M. De Silva and S. C. Jayamanne
Faculty of Animal Science and Export Agriculture, Uva Wellassa University of Sri Lanka

and

W. P. R. Chandrarathna
Ornamental Fish Breeding and Training Centre, Rambadagalla, Sri Lanka

Introduction

Live food organisms contain of all the nutrients such as essential proteins, lipids, carbohydrates, vitamins, minerals, amino acids and fatty acids (Das *et al.*, 2012). Mostly, *Artemia naupli* is cultured as live feed in large amounts in Sri Lanka. However, the high cost is a problem. In Sri Lanka, brine shrimp can be replaced by *Moina macrocopa*. It is a cost effective live feed and important to find out a cost effective culture medium to get the highest production of *Moina macrocopa*. Therefore, this research was carried out to develop a suitable culture medium for mass culture of *Moina macrocopa*.

Methodology

Two experiments were conducted to develop a suitable method for culturing *Moina macrocopa* in National Aquaculture Development Authority (NAQDA) at Rambadagalla. Experiment 1 was conducted to find out possible culture media and to determine its concentration for mass culture. Experiment 2 was conducted to find out the best culture medium and its concentration for mass culture of *Moina macrocopa*. All bottles and tanks used in experiments were cleaned, drained and sun dried for two days and then filled with water, left for two days before using. *Moina macrocopa* for all experiments were taken from stock culture developed in NAQDA Centre at Rambadagalla. Pure culture of *Chlorella vulgaris* (1×10 cells per 1 ml) was acquired from NAQDA Centre at Rambadagalla. Filtered tap water was used in both experiments. In experiment 1, five culture media; mineralized cow dung, steamed cow dung, 15 min. boiled chicken manure, 30 min. boiled chicken manure, and 1 hr. boiled chicken manure were prepared with four different concentrations such as 5 $g\ l^{-1}$, 10 $g\ l^{-1}$, 15 $g\ l^{-1}$and 20 $g\ l^{-1}$. Different concentrations with various media tested with and without adding *Chlorella* into the medium. As control, a medium only with *Chlorella* and water was maintained. Three replicates from each treatment were maintained during experiment. Five individuals of *Moina macrocopa* were inoculated into each bottle. After that, top of the bottles were covered with a mosquito net to prevent entrance of undesired insects. They were allowed to stay 10 days and after that data were collected. Three samples from every tank were collected using 3 ml of fine dropping pipette. Samples were taken from the surface to bottom at three random points. Collected data (number of *Moina macrocopa*) were analyzed using Minitab 16 software with ANOVA, general linear model. According to the results of experiment 1, the positive culture media and their concentrations were used in experiment 2.

Selected treatments were prepared as same as in experiment 1. 150 individuals of *Moina macrocopa* were introduced into each tank. After ten days, 25 ml samples were taken as earlier and preserved using two drops of 1.007 g cm^{-3} Lugol's solution. Values of all tanks were recorded. Data were analyzed as in experiment 1.

Results and Discussion

According to the preliminary experiment, there was a significant relationship between number of *Moina macrocopa* and culture medium ($p<0.05$). There was a significant relationship between medium and concentration to the number of *Moina macrocopa* ($p<0.05$). There were no results of *Moina macrocopa* in both 15 g l^{-1} and 20 g l^{-1} of mineralized cow dung media. There were no results of *Moina macrocopa* in 15 g l^{-1} and 20 g l^{-1} of steamed cow dung media. Those media may be not favorable for growth of *Moina*. There were no results found in 15 min. boiled chicken manure and 30 min. boiled chicken manure media. The major reason for boiling chicken manure is to prevent the *Salmonella* effect. Low time duration for boiling might be not enough for destroy the undesirable pathogens. There may be not a favorable environment for growth of *Moina macrocopa* in both of those media. Fig. 1 shows the possible culture media to be developed for experiment 2.

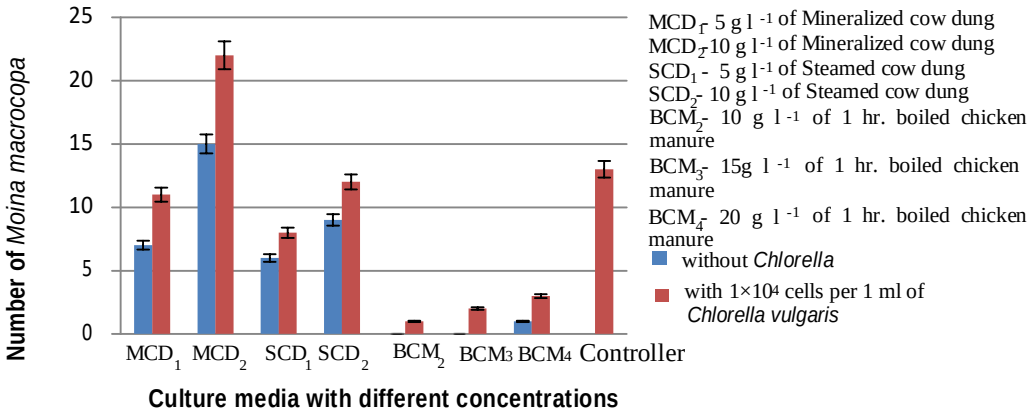

Figure 1: Suitable culture media and it's concentrations for culturing Moina macrocopa

In experiment 2, according to ANOVA, general linear model, there was a significant relationship between total number of *Moina macrocopa* and medium ($p<0.05$). Table 1 shows the mineralized cow dung media and steamed cow dung media had higher results than the 1 hr. boiled chicken manure media. According to Begum *et al.*, (2013), the survival rate of individuals in cow dung is higher than chicken manure and nutritional composition of cow dung compare to the chicken manure is higher. This would be the reason for higher total number of *Moina macrocopa* in cow dung media than the chicken manure media. According to Table 1, mineralized cow dung media was better than steamed cow dung media and that results were better than the controller. Nutritional deficiency and destruction of favorable microbes which can convert complex compounds into simple absorbable minerals due to steam can be the reason for lower results in steamed cow dung. Cow dung is freely available in Sri Lanka and it is low in cost in Sri Lanka. According to the analyzed data, there was no significant relationship between total count and *Chlorella* ($p>0.05$). It means the selected culture media can be used with *Chlorella* or without *Chlorella*. But, Table 1 shows all positive resulted culture media gave higher yield with *Chlorella* than without *Chlorella*. *Chlorella* is a major food for *Moina*.. Finally, it can enhanced the available food for *Moina*.

Table 1: Relationship of different concentrations of media and availability of *Chlorella* to the total number of *Moina macrocopa*

Medium	Concentration	Availability of 1×10^4 cells per 1 ml of *Chlorella vulgaris*	Mean ± SE Mean
Mineralized cow dung	5 g l^{-1}	With *Chlorella* Without *Chlorella*	090.00 ± 0.33 084.22 ± 0.22
	10 g l^{-1}	With *Chlorella* Without *Chlorella*	140.00 ± 0.50 129.78 ± 0.28
Steamed cow dung	5 g l^{-1}	With *Chlorella* Without *Chlorella*	065.00 ± 0.41 050.11 ± 0.35
	10 g l^{-1}	With *Chlorella* Without *Chlorella*	099.89 ± 0.35 072.00 ± 0.29
1 hr. boiled chicken manure	10 g l^{-1}	With *Chlorella*	007.89 ± 0.26
	15 g l^{-1}	With *Chlorella*	007.89 ± 0.35
	20 g l^{-1}	With *Chlorella* Without *Chlorella*	017.00 ± 0.23 007.78 ± 0.22
Controller		With *Chlorella*	100.78 ± 0.47

Conclusion

10 g l^{-1} of mineralized cow dung with *Chlorella vulgaris* can be used as a best culture medium to obtain highest total number of *Moina macrocopa* among the tested culture media.

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References

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