

NUTRIENT-ENRICHED ROTIFER BRACHIONUS SP., AS LARVAL FOOD

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Abstract

The present study tested SELCO and Nutrient A, two sources of essential highly unsaturated fatty acids, for incorporation into the body of *Brachionus* sp. Enriching of live *Brachionus* sp. is effected by 'soaking' them in the enrichment solution for 3-4 hrs.

The study was originally divided into two phases: first, a bioassay on the different proportion of Nutrient A, a laboratory concoction, and SELCO as enrichment substances for *Brachionus* sp.; and the second, to determine the survival and growth of finfish and crustacean larvae fed with enriched *Brachionus* sp.

The latter phase remained unimplemented because of time constraint, lack of culture tanks and insufficient number of larvae. SELCO was purchased from a local supplier. Nutrient A, the enrichment substance prepared at MSU Naawan Laboratory, is composed of Scott's Emulsion and mashed boiled eggs mixed at different proportions.

The high survival of non-enriched rotifers at a density of 1000 individuals/ml was highly significant compared to the survival of enriched rotifers 3 hours and 6 hours after enrichment. No significant difference in survival was observed in the various levels of enrichment of Nutrient A. Lowest survival of 1.44% was recorded for SELCO-enriched rotifers.

The survival of rotifers at 500 individuals/ml and 1000 individuals/ml and enriched with Nutrient A and SELCO appears to point out that as the population of nutrient-enriched rotifer per ml is increased, survival rate decreased.

The survival rate of rotifers at a population density of 88 individual/ml (concentration of rotifers at the culture medium) using 200 mg/L level of enrichment was determined. No significant difference was observed between non-enriched rotifers and enriched rotifers. But the survival decreased as exposure to enrichment is increased regardless of the initial population and type of enrichment.

The initial population density of rotifers to be enriched appears to greatly affect the survival rate. Workers from Artemia Systems suggest that the enrichment of rotifers should be done in the culture medium, i.e., enrichment is done prior to harvest/concentration of rotifers. This would mean more enrichment media to be used compared to the method when enrichment was done after the rotifers were harvested and concentrated in smaller volume.

Rationale

Rotifers have been used extensively as initial food for rearing larval fish. In the culture of fish larvae, mass mortalities were reported during metamorphosis and this problem was believed to be associated with the absence of essential highly unsaturated fatty acids in larval diets. Hence, in recent years efforts have been made towards improving the nutritional value of *Brachionus* sp. as source of nourishment for fish larvae. A notable direction for improvement was to incorporate the essential fatty acids into the diet of *Brachionus* sp. during the production of *Brachionus* sp. in mass culture or by immersing highly concentrated *Brachionus* sp. into the enrichment substance before the *Brachionus* sp. is fed to the cultured larvae. For the present study the two sources of essential highly unsaturated fatty acids are the SELCO and Nutrient A.

Objectives

For its general objectives, the present study was originally divided into two phases: first, a bioassay on the different proportion of Nutrient A, a laboratory concoction, and SELCO as enrichment substances for

Brachionus sp.; and the second, to determine the survival and growth of finfish and crustacean larvae fed with enriched *Brachionus* sp. The latter phase remained unimplemented because of time constraint, lack of culture tanks and insufficient number of larvae.

For specific objectives, this study expected:

1. To determine the effect of different concentrations of enrichment substance on the survival of *Brachionus* sp.; and
2. To determine the effect of *Brachionus* sp. fed with various concentrations of enrichment substance on the survival and growth of fish and crustacean larvae.

Methodology

SELCO was purchased from a private supplier. Nutrient A, the enrichment substance prepared at MSU Naawan Laboratory, is composed of Scott's Emulsion and boiled eggs mixed at different proportions. Boiled egg yolk was prepared by dissolving 1 part boiled egg yolk in 2 parts water. The egg yolk was mashed and sieved before it was mixed with Scott's Emulsion or directly fed to the rotifer.

The following proportions were the treatments tested on *Brachionus*:

Treatment	Scott's Emulsion	Boiled egg yolk
1	50%	50%
2	75%	25%
3	25%	75%
4	100%	0%
5	0%	100%
6	Control (non-enriched rotifer)	
7	SELCO	

The rotifers were enriched at a concentration of 3ml enriching substance per million rotifers in a one-liter capacity container. This level of concentration was based on the enrichment rates for rotifers and brine shrimps using SELCO as practiced by SEAFDEC.

Enrichments of rotifers was done 6 hours before feeding.

Monitoring of rotifer survival was done 3 hours and 6 hours after enrichment. The treatment of Nutrient A that could result to the highest survival of rotifer was to be employed in enriching rotifers which would be fed to the larvae. In a preliminary test clumping of rotifers was observed in the treatment using SELCO dosage. Hence, the effect of various population density namely 1,000 ind/ml, 500 ind/ml and level of enrichment using 1.5 ml/L and 3.0 ml/L were tested on the survival of rotifer. Percentage of survival of rotifer was transformed to arc sin values and tested statistically using the Complete Randomized Design (CRD).

Results and Discussion

The high survival of non-enriched rotifer at a density of 1000 individuals/ml was highly significant compared to enriched rotifers 3 hours and 6 hours after enrichment. No significant difference in survival was observed in the various levels of nt of Nutrient A (Appendix Tables 1 & 2).

Lowest survival of 1.44% was achieved in SELCO-enriched rotifers. Rotifers at 500 individuals/ml and 1000 individuals/ml were enriched with Nutrient A and SELCO and it was observed that as the population of nutrient-enriched rotifer per ml is increased, survival rate decreased (Table 1).

The survival rate of rotifers at a population density of 88 individual/ml (concentration of rotifers at the culture medium) using 200 mg/L level of enrichment was determined. No significant difference between non-enriched rotifers and enriched rotifers was observed (Appendix Table 3). But the survival decreased as exposure to enrichment is increased regardless of the initial population and type of enrichment.

Based on the results, the initial population density of rotifers to be enriched appears to greatly affect the survival rate. Workers from Artemia Systems suggest that the enrichment of rotifers should be done in the culture medium, i.e., enrichment is done prior to harvest/concentration of rotifers. This would mean more enrichment media to be used compared to the method when enrichment was done after the rotifers were harvested and concentrated in smaller volume.

Recommendation

Further studies should be conducted to determine the optimum population density of rotifers to be enriched and time of exposure to the nutrient should be conducted.

Appendix Tables

Table 1. Survival rate (transformed in arc sin values) of rotifer after 3 hours enrichment at 1,000 individuals per ml initial stocking rate

Treatment	Replicates		Treatments		Treatment
	1	2	3	Total	Mean
1	41.55	52.93	42.13	136.61	45.54
2	12.48	22.79	42.71	77.98	25.99
3	38.84	28.43	32.58	99.85	33.28
4	35.87	20.27	17.46	73.60	24.53
5	12.48	32.79	044.62	89.89	29.96
6	90.00	90.00	90.00	270.00	90.00
7	26.33	27.97	24.35	78.65	26.21

Table 2. Survival rate (transformed in arc sin values) of rotifer after 6 hours enrichment at 1,000 individuals per ml initial stocking rate

Treatment					Treatment
	1	2	3	Total	Mean
1	31.74	31.95	26.33	90.02	30.00
2	11.54	13.35	16.78	41.67	13.89
3	24.10	15.00	8.13	47.23	15.74
4	31.52	18.75	-	50.27	25.14
5	13.35	.8.13	-	21.48	10.74
6	90.00	90.00	90.00	270.00	90.00
7	10.51	4.70	3.29	18.50	6.17

Table 3. Survival rate of rotifers at a density of 88 individual per ml after 6 hours exposure to 200 mg/li enrichment media (arc sin transformed values)

Treatment	Treatment	Treatment	No.	Total	Mean
control	1	37.76	180.97	60.32	
	2	73.62			
	3	69.59			
Scott's emulsion	1	45.19	162.62	54.21	
	2	27.43			
	3	90.00			
Egg Yolk	1	31.24	115.17	38.39	
	2	34.57			
	3	49.36			
Selco	1	24.1	91.03		
	2	30.75			
		36.18			