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MUSSEL CULTURE BY USING DIFFERENT CULTURE METHODS & ESTIMATION OF GROWTH PARAMETERS OF *LAMELLIDENS MARGINALIS* FROM NANDED REGION, MAHARASHTRA

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ABSTRACT

A culture of mussels by using a different cultural systems such as basket culture, rack culture, and hanging culture. In basket culture, Lamellidens marginalis showed a 60% survival rate and maximum length gain percentage was 5.797and minimum of 1.428. Maximum WG% was 8.663 and minimum of 1.102. Height gain percentage was maximum HG%= 14.841% minimum of 7.692. In rack culture Lamellidens marginalis showed a 60% survival rate and maximum length gain percentage was LG%= 6.153 and minimum 1.538. Maximum WG%=17.056 and minimum WG% = 1.500. Height gain percentage was maximum 11.76 % minimum of 3.030. Mortality rate was also recorded. From hanging culture Lamellidens marginalis showed 80% survival rate and maximum length gain percentage was 10.606 minimum 1.587. Maximum WG%=7.154 and minimum WG% 3.661. Height gain percentage was maximum 12.5 and minimum was 3.030. Survival rate was also recorded.

KEYWORDS: *Lamellidens Marginalis, Basket Culture, Rack Culture and Hanging Culture*

INTRODUCTION

Freshwater mussels are used as host animals for the cultivation of freshwater pearls and as a food. For the study mussels were culture by adopting different methods such as basket culture, Rack culture, hanging culture in the same environmental condition **(McCoy and Chongpeepien, 1988)**. Many scientific studies were on bivalve culture in the marine environment. Growth rates and weight are strongly influenced by environmental conditions such as Temperature, salinity, particulate matter, food availability, current speed and water depth etc. Mussel aquaculture around the world is practiced using two main approaches: bottom culture, accounting for approximately 15% of overall production, and suspended and off-bottom culture, accounting for about 85%. Although bottom culture is used in the US, it is mainly practiced in Europe, particularly in the Netherlands, Germany, Ireland and the UK. (McKindsey *et. al.* 2011).

MATERIALS & METHODS

For estimation of growth parameters by using different types of culture method such as hanging method, cage culture, trey or rack culture **(McCoy and Chongpeepien, 1988).** Mussels were collected in January 2013 from Nanded region and acclimatized in laboratory condition and afterword they were cultured by using different culture methods and Growth parameters were calculated by using the method described by **(Bagenal, 1978).**

Basket Culture

It was a very easy method of culture. 10 mussels were tagged and kept in round baskets of size 12 cm diameter from Jan 2013 to Dec 2013 monthly observations were recorded for growth.

Rack Culture

Plastic racks of 14 cm in size were used for the culture. 10 mussels of each species were kept in rack after tagging at depth 1 m.

Hanging Method Culture

In this method, nylon net pockets were used. For culture, two mussels, tied together were kept in nylon pocket in the hanging condition in a water body at a depth 1 m. Plastic tags with a number were used for tagging the nylon pocket net.

Weight Gain Percentage (WG%)

$$\text{Weight gain percentage} = \frac{Final\ weight - initial\ weight}{Initial\ weight} \text{ X } 100$$

Length Gain Percentage (LG%)

$$\text{Length gain percentage} = \frac{Final\ length - initial\ length}{Initial\ length} \text{ X } 100$$

Height Gain Percentage (HG%)

$$\text{Height gain percentage} = \frac{Final\ height - initial\ height}{Initial\ height} \text{ X } 100$$

Survival Rate (SR%)

$$\text{Survival rate} = \frac{Number\ of\ mussels\ survived}{Total\ number\ of\ mussels\ cultured} \text{ X } 100$$

Statistical Analysis

T-Test was used to test the significant difference between sampling stations

For assessing physical chemical parameters of water. Paired T-test is used to estimate

Changes in the growth of mussels. It was carried out with the help of **MINITAD** software.

RESULT & DISCUSSION

Result of Basket Culture

Lamellidens marginalis showed a 60% survival rate and maximum length gain percentages were 5.797 and minimum LG%= 1.428. Maximum WG% was 8.663 and minimum WG% was 1.102. Maximum height gain percentage was HG%= 14.841% and minimum HG%= 7.692. (Table No.1.1)

Paired T-Test for Length from Basket Culture of *Lamellidens Marginalis*

Paired T-test for length showed the average final length is more than the average initial length. (Table No.1.2)

Paired T-Test for Height from Basket Culture of *Lamellidens Marginalis*

Paired T-test for height showed average final height is more than the average initial height. (Table No.1.3)

Paired T-Test for Weight from Basket Culture of *Lamellidens Marginalis*

Paired T-test for weight showed the average initial and final weight of the mussels is the same. (Table No.1.4)

RESULT OF RACK CULTURE

Lamellidens marginalis showed a 60% survival rate and maximum length gain percentage LG%= 6.153 and minimum LG%= 1.538. Maximum WG%=17.056 and minimum WG% = 1.500. Maximum Height gain percentage was HG% = 11.76 and minimum of 3.030. Mortality rate was also recorded. (Table No.1.5)

Paired T-Test for Length from Rack Culture of *Lamellidens Marginalis*

Paired T-Test for length showed average final length is more than the average initial length. (Table No.1.6)

Paired T-Test for Height from Rack Culture of *Lamellidens Marginalis*

Paired T-test for height showed average final length is more than the average initial length. (Table No.1.7)

Paired T-Test for Weight from Rack Culture of *Lamellidens Marginalis*

Paired T-test for weight showed average final weight is more than the average initial weight. (Table No.1.8)

RESULT OF HANGING CULTURE

Lamellidens marginalis showed 80% survival rate and maximum length gain percentage was LG%= 10.606 and minimum LG%= 1.587. Maximum WG%=7.154 and minimum WG% = 3.661. Height gain percentage was maximum HG%= 12.5, minimum HG%= 3.030. Mortality rate was also recorded. (Table No.1.9)

Paired T-Test for Length from Hanging Culture of *Lamellidens Marginalis*

Paired T-test for length showed average final length is more than the average initial length. (Table No.1.10)

Paired T-Test for Height from Hanging Culture of *Lamellidens Marginalis*

Paired T-test for height showed average final height is more than the average initial height. (Table No.1.11)

Paired T-Test for Weight from Hanging Culture of *Lamellidens Marginalis*

Paired T-test for weight showed average final weight is more than the average initial weight. (Table No.1.12)

Table 1: Shows Month Wise Changes in Length, Weight and Height and Growth Parameters of *Lamellidens Marginalis* from Jan – Dec 2013 in Basket Culture

Tag no.	Month	Initial Length (cm)	Final Length (cm)	Initial Height (cm)	Final Height (cm)	Initial Weight (cm)	Final Height (cm)	LG%	WG%	HG%
1	Jan-Dec	6.1	6.4	2.8	3.1	15.090	15.620	4.918	3.512	10.714
2	Jan–Jul	7.0	7.2	3.2	3.6	25.710	23.100	2.857	-10.151	12.5
3	Jan–Jul	7.2	7.4	3.4	3.6	24.280	26.100	2.777	7.495	5.882
4	Jan-Oct	7.2	7.4	3.5	3.8	26.500	27.520	2.777	3.849	8.571
5	Jan-Jun	7.0	7.1	3.0	3.3	29.660	30.000	1.428	1.146	10.000
6	Jan-Dec	7.3	7.5	3.2	3.6	29.280	29.400	2.739	0.409	12.5
7	Jan-Dec	7.8	8.1	3.9	4.2	32.320	35.120	3.846	8.663	7.692
8	Jan-Dec	7.5	7.7	3.6	3.8	32.800	34.555	2.666	5.350	5.555
9	Jan-Dec	6.1	6.4	2.7	3.1	16.112	17.220	4.918	6.876	14.814
10	Jan-Dec	6.9	7.3	3.1	3.4	24.500	24.770	5.797	1.102	9.677

LG%- length gain percentage, WG%- weight gain percentage, HG%- height gain percentage. Survival rate (SR %) = 60%

Table 3: Shows PAIRED T-Test for Month Wise Changes in the Length of *Lamellidens Marginalis* from Jan – Dec 2013 in basket Culture

	N	Mean	St Dev	SE Mean
Initial length (cm)	10	7.01000	0.54661	0.17285
Final length (cm)	10	7.25000	0.52757	0.16683
Difference	10	-0.240000	0.084327	0.026667

Paired T for Initial length (cm) - Final length (cm)

Table 3: Shows Paired T-Test for Month Wise Changes in Height of *Lamellidens Marginalis* from JAN – Dec 2013 in Basket Culture

	N	Mean	St Dev	SE Mean
Initial height (cm)	10	3.24000	0.36878	0.11662
Final height (cm)	10	3.55000	0.34075	0.10775
Difference	10	-0.310000	0.073786	0.023333

Paired T for Initial height (cm) - Final height (cm)

Table 4: Shows Paired T-test for Month Wise Changes in Weight of *Lamellidens Marginalis* from Jan – Dec 2013 in Basket Culture

	N	Mean	St Dev	SE Mean
Initial weight (gm)	10	25.6252	6.0670	1.9185
Final weight (gm)	10	26.3405	6.0670	2.0544
Difference	10	-0.715300	1.440673	0.455581

Paired T for Initial weight (gm) - Final weight (gm)

N-total number, St Dev- standard deviations, SE Mean- sample estimated mean.

Table 5: Shows Month Wise Variations in Length, Weight and Height and Growth Parameters of *Lamellidens Marginalis* from Jan – Dec 2013 in Rack Culture

Tag no.	Month	Initial Length (cm)	Final Length (cm)	Initial Height (cm)	Final Height (cm)	Initial Weight (cm)	Final Height (cm)	LG%	WG%	HG%
1	Jan–Aug	6.0	6.2	3.0	3.2	13.420	14.890	3.333	10.953	6.666
2	Jan–Dec	6.6	7.0	3.6	3.8	22.220	26.010	6.060	17.056	5.555
3	Jan–Oct	7.0	7.2	3.6	3.8	27.690	27.220	2.857	-1.697	5.555
4	Jan–Dec	6.5	6.7	3.3	3.5	22.660	23.000	3.076	1.500	6.060
5	Jan–Aug	6.5	6.6	3.3	3.4	21.080	20.200	1.538	-4.174	3.030
6	Jan–Dec	6.0	6.3	3.2	3.4	19.520	19.920	5.000	2.049	6.25
7	Jan–Dec	6.5	6.9	3.4	3.8	26.430	29.100	6.153	10.102	11.76
8	Jan–Aug	6.1	6.3	3.3	3.5	21.270	21.780	3.278	2.397	6.060
9	Jan–Dec	6.1	6.4	3.1	3.3	18.340	19.560	4.918	6.652	6.451
10	Jan–Dec	5.8	6.1	2.9	3.1	15.020	16.210	5.172	7.922	6.896

LG%- length gain percentage, WG%- weight gain percentage, HG%- height gain percentage. Survival rate (SR %) = 60%

Table 6: Shows Paired T-Test for Month Wise Changes in the Length of *Lamellidens Marginalis* from Jan – Dec 2013 in Rack Culture

	N	Mean	St Dev	SE Mean
Initial length (cm)	10	6.31000	0.36652	0.11590
Final length (cm)	10	6.57000	0.37133	0.11743
Difference	10	-0.260000	0.096609	0.030551

Paired T for Initial length (cm) - Final length (cm)

Table 7: Shows Paired T-Test for Month Wise Changes in Height of *Lamellidens Marginalis* from Jan – Dec 2013 in Rack Culture

	N	Mean	St Dev	SE Mean
Initial height (cm)	10	3.27000	0.23118	0.07311
Final height (cm)	10	3.48000	0.25298	0.08000
Difference	10	-0.210000	0.073786	0.023333

Paired T for Initial height (cm) - Final height (cm)

Table 8: Shows Paired T-Test for Month Wise Changes in Weight of *Lamellidens Marginalis* from Jan – Dec 2013 in Rack Culture

	N	Mean	St Dev	SE Mean
Initial weight (gm)	10	20.7650	4.4783	1.4162
Final weight (gm)	10	21.7890	4.6181	1.4604
Difference	10	-1.02400	1.39856	0.44226

Paired T for Initial weight (gm) - Final weight (gm)

N-total number, St Dev- standard deviations, SE Mean- sample estimated mean.

Table 9: Shows Month Wise Variations in Length, Weight and Height and Growth Parameters of *Lamellidens Marginalis* from Jan – Dec 2013 in Hanging Culture

Tag no.	Month	Initial Length (cm)	Final Length (cm)	Initial Height (cm)	Final Height (cm)	Initial Weight (cm)	Final Height (cm)	LG%	WG%	HG%
1	Jan–Dec	6.2	6.5	3.3	3.5	18.200	19.300	4.838	6.043	6.060
2	Jan–July	6.3	6.4	3.3	3.4	19.590	18.300	1.587	-6.584	3.030
3	Jan–Dec	6.7	7.2	3.5	3.8	24.740	26.510	7.462	7.154	8.571
4	Jan–Dec	6.6	7.3	3.5	3.9	28.250	30.230	10.606	7.008	11.428
5	Jan–Dec	6.0	6.4	3.3	3.6	17.140	17.900	6.666	4.434	9.090
6	Jan–Dec	6.3	6.6	3.1	3.3	16.550	17.230	4.761	4.108	6.451
7	Jan–Dec	6.3	6.6	3.2	3.5	17.920	19.200	4.761	7.142	9.375
8	Jan–July	6.0	6.2	2.9	3.1	15.950	15.100	3.333	-5.329	6.896
9	Jan–Dec	6.2	6.2	3.2	3.6	18.570	19.250	6.451	3.661	12.5
10	Jan–Dec	6.4	6.8	3.2	3.5	18.120	18.930	6.25	4.470	9.375

LG%- length gain percentage, WG%- weight gain percentage, HG%- height gain percentage. Survival rate (SR %) = 60%

Table 10: Shows Paired T-Test for Month Wise Changes in the Length of *Lamellidens Marginalis* from Jan – Dec 2013 in Hanging Culture

	N	Mean	St Dev	SE Mean
Initial length (cm)	10	6.30000	0.22608	0.07149
Final length (cm)	10	6.62000	0.37947	0.12000
Difference	10	-0.320000	0.198886	0.062893

Paired T for Initial length (cm) - Final length (cm)

Table 11: Shows Paired T-Test for Month wise Changes in Height of *Lamellidens Marginalis* from Jan – Dec 2013 in Hanging Culture

	N	Mean	St Dev	SE Mean
Initial height (cm)	10	3.25000	0.17795	0.05627
Final height (cm)	10	3.52000	0.22998	0.07272
Difference	10	-0.270000	0.094868	0.030000

Paired T for Initial height (cm) - Final height (cm)

Table 12: Shows Paired T-Test for Month Wise Changes in Weight of *Lamellidens Marginalis* from Jan – Dec 2013 in Hanging Culture

	N	Mean	St Dev	SE Mean
Initial weight (gm)	10	19.5030	3.9138	1.2376
Final weight (gm)	10	20.1950	4.5762	1.4471
Difference	10	-0.692000	1.035919	0.327586

Paired T for Initial weight (gm) - Final weight (gm)

N-total number, St Dev- standard deviations, SE Mean- sample estimated mean

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REFERENCES

1. *Araujo R., Quiros M., M.A. Ramos (2003): laboratory propagation and culture of juveniles of the endangered freshwater mussel Margaritifera auricularia (Spengler, 1793). Journal of Conchology. Vol. 38, (1).*
2. *Bagenal T. (1978): Methods for assessment of fish production in fresh waters. 3rd Edn., Blackwell scientific publications, Oxford, London.*
3. *Brady Tony R., Doug Aloisi, Roger Gordon, Gary Wege (2011): A Method for Culturing Mussels Using In-River Cages. Journal of Fish and Wildlife Management Vol 2 (1): 85-89p.*
4. *Celik M. Yesim, Sedat Karayücel and Đsmihan Karayücel (2009): Effects of environmental factors on growth and mortality of raft cultivated mussel (Mytilus galloprovincialis L.) cultivated in lantern nets in Black Sea. AACL BIOFLUX. 97- 108p.*
5. *Christian Alan D., Chris L. Davidson, William R. Posey II, Peter J. Rust, Jerry L. Farris, John L. Harris and George L. Harp. (2000): growth curves of four species of commercially valuable freshwater mussels (Bivalvia: Unionidae) inArkansas. Journal of the Arkansas of Academy of Science, Vol. 54: 41-50p.*
6. *Commons Deanna M. (2010): growth increment analysis of archaeological Freshwater mussels from interior northern California. A Thesis submitted to the Faculty of California State University, Chico.*
7. *Jagadis I. and Rajagopal S. (2007): Age and growth of the venus clam Gafrarium tumidum (Roding) from south-east coast of India. Indian Journal Fish, 54(4): 351-356p.*
8. *Kovitvadhi Satit, Uthaiwan Kovitvadhi, Pichan Sawangwong, Premjai Trisaranuwatana and Jorge Machado (2008): Morphometric relationship of weight and size of cultured freshwater pearl mussel, Hyriopsis (Limnoscapha) myersiana, under laboratory conditions and earthen pond phases. Springer Aquacult Int.s10499008-9180-z.*

9. *Maney Ted, Mark Fregeau, Joseph K. Buttner Scott Weston and Bill Lee (2008): Mussel culture on long lines on Cape Ann, Massachusetts- an update. a project of Northeastern Massachusetts Aquaculture center and department of Biology, Salem State College.*

10. *McCoy E. W. and Tanittha Chongpeepien (1988): Bivalve molluscs culture research in Thailand. ICLARM Technical Reports 19, 1-156p.*

11. *McKindsey Christopher W, Philippe Archambault, Myriam D. Callier and Frédéric Olivier (2011): Influence of suspended and off-bottom mussel culture on the sea bottom and benthic habitats: a review. Canadian journal of Zoology, vol. 89 (7): 622-646p.*