On the Seedling Time of the Mangrove Oyster, *Crassostrea rhizophorae*, in the Lagoon of Cocineta in Venezuela

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Venezuela國 Cocineta湖産 Mangrove oyster의 採苗時期

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1976년 2월부터 5월까지 사이에 Venezuela國 서북부에 있는 Cocineta湖産 굴의 採苗時期에 대하여 조사했다.

수분 함량 중 개체간의 수분 함량 범위는 2월에서 부터 5월로 되면서 차차 넓어졌고, 月別 수분 함량의 평균 값은 그 범위가 80.67~82.25%로서 큰 차가 없었다.

성숙 부유 유생 및 전 부유 유생의 출현수로 부터 채묘 시기로서 가장 좋다고 생각되는 시기는 4월 하순에서 5월 상순 사이이고 채묘 장소로서 가장 좋다고 생각되는 곳은 station 3이었으며 그 다음이 station 4였다.

INTRODUCTION

There are two papers which dealt with oyster in Venezuela. One (Angell, 1972) is on the gonad maturity and seed adhesion of the Mangrove oyster, *Crassostrea rhizophorae*, in a lagoon of high salinity of Margarita Island, which is located off the northeast of Venezuela, and the other(Yoo, 1976) is on the transplantation of the Pacific oyster, *Crassostrea gigas*, into the lagoon of Cocineta, which is located on the northwestern coast of Venezuela. However, there are none which deal with the seedling period of the Mangrove oyster in Venezuela.

This study was carried out to get some fundamental data for oyster culture in the lagoon of Cocineta in Venezuela.

METHODS AND MATERIALS

The lagoon of Cocineta is located in the northwestern part of the State of Zulia and its connection with the Gulf of Venezuela is a narrowed canal (Fig. 1).

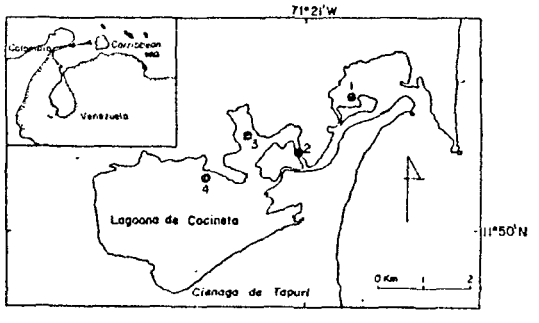

Fig. 1. Location of lagoon of Cocineta and studied area.

Water content of the oyster meat and the numbers of planktonic oyster larvae were examined from March through May of 1976. About one hundred oysters every month were collected randomly. Moisture in a weighed sample of oyater is removed by heating in a drying oven

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under 105°C. Measured weight loss is calculated as moisture. Plankton larvae were caught vertically with a Kitahara plankton net (ϕ 30*cm*, XX13) at four stations (Fig. 1), about every fifteen days. The larvae were counted under a microscope. Ancillary data were recorded at ten o'clock in the morning. Water temperature was measured with a conventional thermometer, specific gravity with an Akanuma hydrometer (B type), and transparency with a Secchi's disc (ϕ 30 *cm*).

RESULTS

Surface water temperature, specific gravity, and transparency in the lagoon of Cocineta during the experimental period are shown in Table 1.

Table 1. Monthly changes of water temperature, specific gravity and mean transparency depth near the lagoon of Cocineta

Month	Station	Water temp. (°C)	Specific gravity	Transparency depth(*m*)
Feb.	1	25.68	1.02588	—
	2	25.70	1.02580	1.85(*62%)
	3	〃	1.02582	—
	4	25.55	1.02584	1.15(*29%)
Mar.	1	26.50	1.02586	—
	2	25.95	1.02585	1.88(*63%)
	3	〃	〃	1.65(*55%)
	4	26.00	1.02582	1.48(*37%)
Apr.	1	26.95	—	—
	2	26.90	—	2.40(*80%)
	3	〃	—	1.80(*60%)
	4	27.70	—	1.30(*33%)
May	1	28.03	—	—
	2	28.00	—	—
	3	27.83	—	—
	4	28.60	—	—

*Rate of transparency depth to total water depth

The lowest water temperature was found at station 4 in February, and it was 25.5°C. The highest water temperature was recorded also at station 4 in May, being 28.60°C. Specific gravity during two months from February to March varied only slightly between 1.02580 and 1.02588. A minimum transparency of 1.15 *m*, only 29% of the total water depth, was recorded at station 4 in February. The maximum of 2.40 *m*, and about 80% of the water depth was found at station 2 in April.

Water content data of oyster meat are shown in Fig. 2. The range of water content in meat for February was 76.60 to 87.50% with an average of 82.25%, and for March it was 73.97 to 88.89 % with an average of 80.67%; March showing a relatively wider range than February. In April a slightly wider range of 73.64 to 90.71 % was found, with an average of 81.21%. The widest range was found in May being 65. 22 to 93.23% with an average of 81.94%. The overall, monthly average water content of oyster meat was 80.67 to 82.25%, showing not much variaton during the experimental period. However, the range of monthly water content of meat became wider and wider from February to May.

The numbers of planktonic larvae which occurred are shown in Fig. 3.

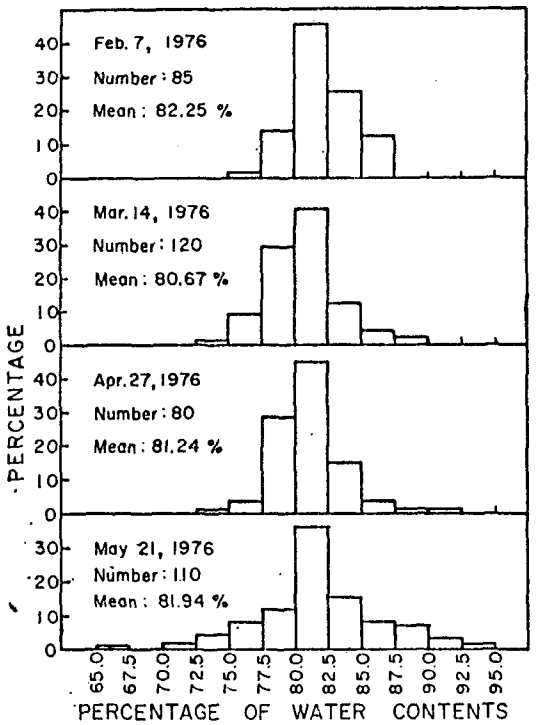

Fig. 2. Monthly distribution frequency of water content of the Mangrove oysters.

With regard to stations, the maximum numbers of larvae were recorded at stations 3 and 4, station 4 showing only slightly fewer than station 3. station 2 showed the third largest number, and station 1 the smallest number. Regarding monthly larvae catches, in March a maximum of 15 individuals per net towing were found. This was the minimum for the months studied. April showed an increase at stations 3 and 4 during the first ten days to more than 30 individuals and to about 50 individuals during the last ten days of April. The catch was largest during the first ten days in May: 53 individuals were found at station 3 and 50 at station 4. However, at station 3 where the larvae were always more abundant during the last ten days in May the number rapidly dropped to 28 individuals per net towing.

The numbers of matured planktonic larvae at station 3 were found to be 3 individuals during the first ten days, and 8 during the last ten days of April; 9 individuals were found during the first ten days and 4 during the last

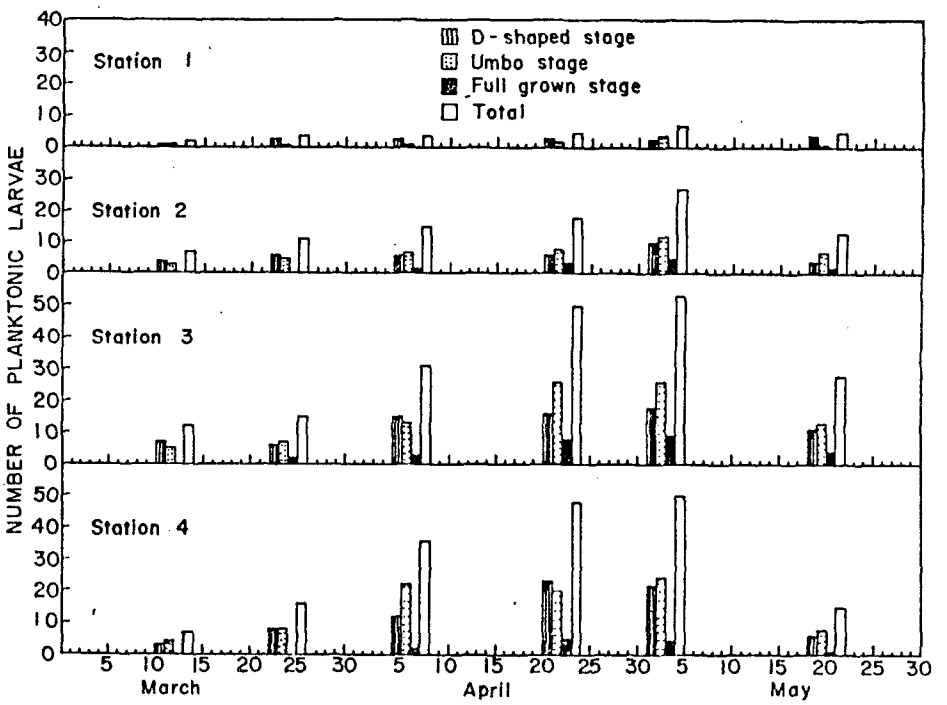

Fig. 3. Numbers of planktonic oyster larvae in accordance with months and stations.

ten days of May. At station 4, the matured larvae found were 5 individuals during the last ten days of April and 4 during the first ten days of May. In all, the greatest abundance of matured planktonic larvae occurred at station 3, from late April through early May.

As above, the numbers of planktonic larvae at station 3 from early April through late May were always greater than 30 individuals per net towing. From early April through early May at station 4 the catch was also always more than 30 individuals. The numbers of matured planktonic larvae were always more than 3 or 4 at station 3 from early April through late May and at station 4 from late April to early May.

DISCUSSION

Water content of the oyster, *Crassostrea gigas*, in the coastal waters near Geoje Island, Korea, is at its maximum in September of 83.20%, and over 80.00% between September and November, However, it remains a rather constant 70 to 80 % during the other months (Lee *et al.*, 1975). The breeding season of the oyster in the coastal waters near Changwon county, Tongyeong county, and Geoje Island in Korea is from the middle of July to early September (Yoo *et al.*, 1971), and of those in the coastal waters near Geoje Island is during September (Yoo *et al.*, 1972; Yoo *et al.*, 1975). This shows that the water content of oysters just after breeding season is very high. The water content between, after, and before breeding is not constant.

By comparison, the breeding season of the oyster, *Crassostrea gigas*, in Ariake, Japan is from the late spring to early autumn, and during this period there are several breeding peaks (Tanaka, 1954). The breeding season of the oyster, *Crassostrea virginica*, in the Long Island Sound in the United States of America is from spring to fall, and there are also several breeding peaks (Loosanoff *et al.*, 1951). However, the Mangrove oyster, *Crassostrea rhizophorae*, in a lagoon of high salinity in Margarita Island in Venezuela breeds throughout the year(Angell, 1972). This shows that the breeding season of oysters is short where water temperature is low but is long where water temperature is high, and in tropical waters, oysters breed the whole year round.

From experimental results such as water content which was almost a constant 80.67 to 82.25% throughout the experimental period (Fig. 2), and the fact that the place where the experiments were carried out is in the tropics, it is presumed that oysters in the lagoon of Cocineta breed the whole year round. Planktonic larva occurred throughout the experimental period. However, for a good seedling condition to exist, planktonic larvae should be abundant and more mature planktonic larvae should be plentiful. Therefore, we may deduce that the seedling period in the lagoon of Cocineta is from early April through late May. However, the best seedling period seems to be from late April to early May.

SUMMARY

An investigation on the breeding time of the Mangrove oyster, *Crassostrea rhizophorae*, in the lagoon of Cocineta which is located in the northwestern part of Venezuela was carried out from February through May in 1976.

Surface water temperature was high, over 25 °C and specific gravity was around 1.0258. Transparency to water depth varied between 29 and 80%. The range of water content of the oysters increased from February through May. However, the averge monthly range of water content varied only slightly from 80.67 to 82.25%.

From the numbers of matured planktonic larvae together with total numbers of planktonic larvae found, we may assume that the best seedling period is from late April through early May. We may also assume that the best area is

around stati ons 4 and 3, station 3 being slightly better than station 4.

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