WASHU-X-80-004 C2

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AUTHOR: RONALD CURTIS DAVIS

TITLE: ADVANCES IN THE AQUACULTURE OF TWO ECONOMICALLY IMPORTANT RED ALGAE, GIGARTINA EXASPERATA HARVEY AND BAILEY AND PALMARIA PALMATA (L.) O. KUNTZE FORMA MOLLIS (SETCHELL AND GARDNER) GUIRY IN THE PACIFIC NORTHWEST

DEPT: DEPARTMENT OF BOTANY

DATE: JUNE 10, 1980

ABSTRACT: Two economically important red algae have been studied from an aquacultural standpoint. One of these, Gigartina exasperata, is valuable due to the cell wall component carrageenan. A review of past aquacultural work with this alga indicates that future studies will be physiological and genetical in nature. Crucial to the success of these types of experiments is the reproducibility of results. A major step toward this goal of reproducibility would be achieved if G. exasperata could be grown in an artificial seawater medium. Such a medium would have precisely defined components, could be made exactly the same at each preparation, and would lack spores of algal competitors which are common in natural seawater.

Two artificial seawater media were tested. One, "Marine Environment," is a seawater aquaria mix. The other, ASP-6f-M1, is a modified version of the commonly-used ASP-6 medium. Both show promise as an artifical seawater medium for the culture of Gigartina exasperata.

The other alga studied, Palmaria palmata forma mollis, is a potentially valuable food source being high in protein, vitamins, and minerals. Intensive culture of this alga, commonly called dulse, was performed in two types of culture vessels. One of these vessels was a standing tank approximately 1.2 m square and 0.75 m deep while the other was a floating bag 2.6 m long by 1.3 m wide by 0.89 m deep. Preliminary results indicate that on a small scale, the standing tank gives almost a two-fold greater growth rate per surface are for dulse than the floating bag.

Seven major factors are believed to be primarily responsible for influencing growth rates of algae in intensive culture. These are culture density, water motion, solar radiation, salinity, temperature,

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nutrients, and biotic factors. Three of these factors, water motion, nutrients, and biotic factors, were maintained as closely to constant as possible. The other four were tested statistically to determine if they correlated with growth rate. Density was negatively correlated with growth rate while light intensity was positively correlated with growth rate. Salinity and temperture were not significantly correlated.

Additional experiments with dulse seemed to further emphasize the importance of light intensity to growth. One experiment was performed in a culture vessel called a strain selection tank. Dulse plants were grown at three different light intensities. Those grown in the highest light regime had markedly greater growth as evidenced by a photographic series. In the field, populations of dulse were sought to ascertain the feasibility of aquaculture based on harvesting from the wild. The largest and densest beds of dulse found were at Gray's Marsh Wildlife Refuge in Sequim, Washington. Sequim, coincidentally, is located in one of the sunniest coastal regions of the state, being in the rain shadow of the Olympic Mountains. However, these beds of dulse were much lower in density than in Iceland where harvesting from the wild is feasible.

Finally, the dulse market of Seattle was surveyed to determine current demand, suppliers, and retail prices. Then, the cost of a one-man dulse farming industry based on a floating bag culture system was calculated. Currently, the demand for dulse in the Seattle area is low. Nevertheless, a modest floating bag aquacultural system could supply that demand and result in a small monthly profit.

WSG-TH 80-20

This thesis is the result of work sponsored by the Washington Sea Grant program under grant number NA79AA-D-00054 project number R/A-11 from the National Oceanic and Atmospheric Administration. It is available on interlibrary loan from:

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