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Transplantation of Edible Oysters: A Review

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Abstract: Oysters have been introduced worldwide to 73 countries. Introductions of oysters in new waters or transplantation from an oyster bed with non-oyster bed area of the same water can greatly enhance the oyster population abundance and production as well as populations of associated native species. Introduced oysters composed a majority of oyster harvests in many areas in the USA and Europe. Oysters may also be transplanted for the restoration of native oysters or other native species. The transplanted oyster species may be good bio indicators of metals. Ecosystem level consequences of oyster transplantation are not well understood.

Key words: Oyster, Transplantation, Population, Native species.

INTRODUCTION

Oysters are ecosystem engineers that influence ecological processes such as maintenance of biodiversity, population and food web dynamics, nutrient cycling and water qualitymaintenance[1].The biology of oysters is greatly influenced by the environmental factors in the habitat. Feeding, growth, maturation, spawning and development are greatly influenced by the varying environmental factors such as water temperature, salinity, pH, dissolved oxygen, current velocity and phytoplankton[2]. The temperature regime affects the life of the oyster by controlling the rate of water transport, feeding, respiration, gonadal development and spawning[3]. The temperature along with salinity determines the solubility of oxygen in the water and affects the metabolism, reproduction and behavior of associated organisms[4]. Salinity is the one of the most important environmental factors affecting oyster populations[5]. Oysters can be adapted to

diurnal, seasonal and annual fluctuations of salinity. Dissolved oxygen influences on population growth and individual growth of the oysters[6].

Transplantation of oysters: Oysters have been introduced worldwide to 73 countries[7]. Introductions of oysters in new waters can greatly enhance the oyster population abundance and production as well as populations of associated native species [8]. Introduced oysters composed a majority of oyster harvests in many areas in the USA and Europe[9]. Oysters may also be transplanted for the restoration of native oysters or other native species [10, 11, 3].

In the spring of 1952, European flat oysters, *Ostreaedulis* and Portuguese oysters, *O. angulata* were transplanted from Holland to Onagawa Bay in Japan[12]. They were cultured in Onagawa Bay and used for breeding experiments during following summer. Oysters survived and grew well in Japanese waters and liberated healthy larvae which were used for tank breeding. The Pacific oyster, *Crassostrea gigas* was first introduced as an exotic species by oyster farmers in 1964 in the Oosterschelde estuary (SW Netherlands) [13]. The initial phase was not well documented, but first spat fall was recorded in 1975. The excessive spat fall occurred in 1976 and this was considered the start of the expansion phase of the wild oysters. Oyster beds in intertidal and sub tidal areas of the Oosterschelde estuary have grown since. Expansion has also occurred into adjacent water bodies, including the Wadden Sea. Japanese oysters were successfully introduced into Humboldt Bay, USA[8]. A significant commercial aquaculture activity continued around the planting, growth and harvesting of Japanese oysters in the Humboldt Bay.

The introduction of oysters with superior disease resistance (e.g. Oysters from different geographical area or genetically improved strains) may be useful in restoration efforts[14]. In 1997, the Oyster Recovery Partnership and the University of Maryland Center for Environmental Science planted more than 4 million Louisiana oysters in the Chop tank river, Maryland, USA. These oysters were displayed enhanced survival and reproduction as a result of their superior resistance to Dermo disease. Rapid growth and the ability of the European oyster to live in a wide range of environments have made this species as an ideal candidate for mariculture. The first European oyster was introduced in Milford, USA in 1949[15, 16]. The European oysters were also introduced in Lockhart Lake (Canada) at the end of the 1990's. Since, they have established a self- sustaining population in some parts of the lake[17]. As they are able to reproduce naturally, it would be possible to undertake their culture without relying on hatchery reared juveniles.

Bivalves are commonly used to detect metal pollution in the marine environment. Cultured Milky oysters (*Saccostreacommercialis*) were transplanted in various sites along the North Queensland coast, Australia and analyzed for two metals of potential anthropogenic origin (Cd & Zn) [18]. This study indicated that the oyster species transplanted were good bio indicators of metals.

Recently, in Mulky estuary, Karnataka, south west coast of India, the oysters were transplanted from oyster bed areas to non-oyster bed areas to study the growth and survival rate[19]. The growth was determined in terms of increase in weight, height and length of oysters. The initial and final weight, height and length of the transplanted oysters varied from 18.05 to 30.40g, 38.90 to 48.73cm and 28.86 to 34.48cm respectively. The survival rate of the transplanted oysters varied between 86.60 and 100%.From the present investigation, it is understood that the large scale transplantation of oysters may be carried out from oyster bed areas in the non-oyster bed areas of the Mulky estuary to enhance wild stock.

Ecosystem level consequences of oyster introductions such as impacts on flow patterns, sediment and nutrient dynamics and native Bioengineering species are not well understood[1]. Both their losses, through interaction of over harvest, habitat degradation, disease, poor water quality and detrimental species

interactions and their gain, through introductions, can cause complex changes in coastal ecosystems[20]. However, oysters would be successful, high-impact members of recipient ecosystems[21].

CONCLUSIONS

Introductions of oysters in new waters or transplantation from an oyster bed to non-oyster bed area of the same water can greatly enhance oyster population abundance as well as populations of oyster bed associated native species. Transplantation of oysters may enhance the oyster production so as to enable the fishermen to harvest more and earn a good livelihood. Since the oyster is considered as a keystone species, its transplantation may be beneficial in the restoration of ecosystems. Transplantation of oysters may also enhance the assemblages of benthos in and around oyster beds and larvae of oyster may serve as an important zooplanktonic food for nektons including fish. Therefore, transplantation of oysters may also improve the fish production. Furthermore, oyster transplantation is also beneficial to the ecological processes such as maintenance of biodiversity; food web dynamics, nutrient cycling and water quality maintenance. However, ecosystem level consequences of oyster introductions such as impact on flow patterns, sediment and nutrient dynamics and native Bioengineering species are not well understood.

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