NSW DEPARTMENT OF PRIMARY INDUSTRIES

Introduction to Nurseries for Hatchery Produced Oyster Spat

Introduction

This information sheet is an introductory guideline for farmers interested in operating field nurseries for on-growing of small (0.75 mm) ex-hatchery oyster spat. It is not intended nor should be used as a manual.

Spat Supply from the Hatchery

Irrespective of the species of oyster (Sydney rock, Pacific or flat), the larvae are about 330 - 350 microns (1000 microns = 1 mm) in shell length when they settle and transform into spat (juveniles). Newly settled spat (Figure 1) are usually held in the hatchery for a week or more until they are large enough to be retained on a 500 micron sieve

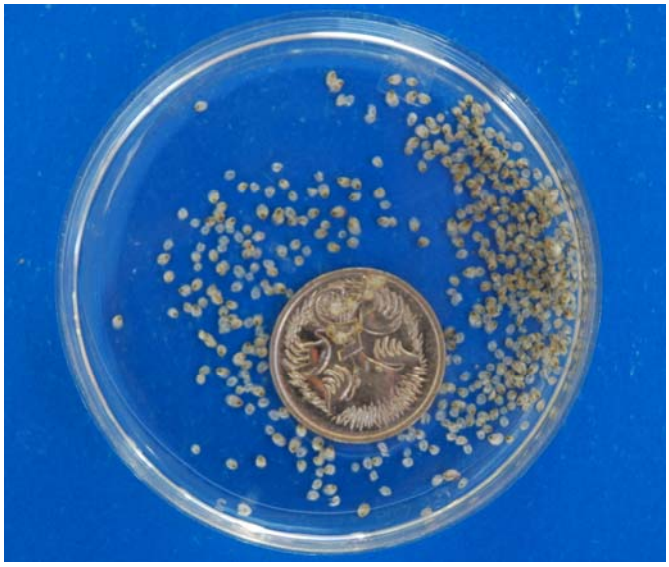

Figure 1. Newly-settled hatchery-produced Sydney rock oyster spat.

Apparatus

Upweller nurseries of the type illustrated in Figures 2 & 3, are one way that these spat are on-grown to a size at which they can be handled on leases by most farmers. The name upweller is derived from a system in which spat are held on a screen in a tank or trough. Seawater is pumped into each tank, which then "wells up" through the screen before passing to waste through a screened outlet into the sump. The example pictured (Figure 3), is a twin tank system with a central overflow sump.

The design and construction of the upwellers varies. Upweller screens have been made from plastic, wood or fibreglass. The example (Figure 2), is the most common in NSW and is made from sheet plastic that is welded in to a 45 cm diameter cylinder. Fine mesh is glued to the base of the cylinder and then secured with an additional ring of plastic that is heat–shrunk around the rim of the screen. An outlet (sleeve) is glued or welded through the upper wall of the screen. This sleeve serves to bayonet mount the screen to the inner wall of the tank connecting it to the sump. A small (1.5 cm) hole in the wall of the screen, opposite the outlet, is used to hold a rod or peg that braces the screen (Figure 2). Plastic mesh secured with a cable tie or similar is placed over the outlet as a back-up screen to prevent spat being accidentally flushed from the screen.

Figure 2. 45 cm diameter upweller screen fitted with 0.35 mm mesh, with an outlet screen and a support peg.

Upweller tanks have been constructed from fibreglass, plywood or moulded plastic and are designed to hold a number of screens. The example (Figure 3) is 2.7 m long x 1.25 m wide x 0.5 m deep, with a central trough or channel 12 cm wide. This tank holds 10 screens.

Figure 3. Upwelling tank

Flow rates of water through the screens are an important consideration and vary in accordance with the numbers of spat held, the size of the spat and the amount of suitable food in the water. It is impossible to predict in advance what will be required, however, as a rule of thumb we allow 20 L/minute for each 45 cm upweller screen. Flows however should not be strong enough to lift the spat off the screen into the water column as they will clog the outlet and cause the screen to overflow.

Stocking Upweller Screens

Stocking densities for the screens vary with the size of the spat. Spat from the hatchery are usually large enough to be retained on at least a 500 micron mesh sieve, however, for safety these spat are placed on a 350 micron screen in the nursery. We stock 250,000 spat (120 ml) on each 350 micron screen. The spat remain on the 350 micron screen until they are large enough to be retained on 670 micron mesh, at which time they are moved to 500 micron screen. When the spat are large enough to be retained on 1.25 mm mesh, they are moved to 1 mm screen. As the spat grow the number of spat on each screen is reduced.

Each 10-screen upweller unit described is capable of handling batches of 750,000 to 1 million spat at a time. But this allows for differences in growth rates within each batch of spat and requires that spat are progressively removed from the system when they reach a size at which they can be transferred to the leases. This transfer is usually not attempted until the spat are at least large enough to be retained on 2 mm mesh and more often occurs when they are large enough to be retained on 3 mm mesh.

Growth is the best indicator of a good nursery and, given suitable water temperatures, the volume of newly stocked spat should increase steadily. Another rough rule of thumb is that the volume of spat should double every 7 to 10 days. If growth is slow or inconsistent, the general health of the spat should be checked and consideration should be given to either increasing the flow rates to screens or spreading the spat into additional screens at the same flow rate per screen.

Maintenance

Upwellers require regular maintenance, particularly when 350 and 500 micron screens are in use as they are very fine and clog easily. Generally, the tanks are drained and the spat are rinsed twice daily to remove any faeces, silt and debris. Spat also require regular grading to keep the size of spat on each screen as uniform as possible. Grading is achieved by gently wet-sieving the spat through different sized screens. The frequency with which grading takes place will be a function of the rate at which they are growing but generally occurs once every one to two weeks.

Grading is also an ideal time to record the volumes of spat within the screens. This is done by placing the spat into measuring cylinders with some seawater and gently tapping the cylinder until the spat settle down to a steady packed volume. The volume is recorded and provides both an indication of the growth since their last volume measurement as well as allowing the nursery operator to make an estimate of the numbers of spat.

Costs

Setting up an upweller system requires a pump and the plumbing necessary to supply water to and remove wastewater from the tank. Upweller screens can be purchased locally and currently cost approximately $150 each. Several existing nursery operators have chosen to build their own screens, which cut costs considerably. To set up a single unit will require 3-4 x 350 micron screens, 4-6 x 500 micron screens and 6-8 1000 micron screens. A 670 micron and 1250 micron grading screen would be valuable, along with either a 2mm or 3mm grading screen – depending on the size at which spat are to be removed from the system to go to the estuary.

As with screens, some nursery operators have chosen to build their own tanks, otherwise the cost will depend on the type of tank chosen and can vary from $500 to $1500 for a bare tank without fittings.

Providing the upweller unit with a cover helps to prevent the growth of algal fouling in the system and helps to keep out other wind-born contaminants (leaves and dust). The cover can be as simple as a sheet of shade mesh.

Selecting a Nursery Site.

There are no guarantees for a good nursery site, but when deciding on a site some questions to consider are:

- In your experience as an oyster farmer would you choose this site to grow small spat?
- Does the site have the necessary infrastructure (power and water)?
- You may have to visit the site twice a day, every day. Is the site readily accessible and will it be comfortable to work there in all weather conditions?
- Is the site prone to high levels of silt or frequently prone to freshwater inundation?
- If prone to freshwater inundation is it sufficiently deep and stratified to reliably access deeper, higher salinity water during such occasions?
- Is the site suitably secure?
- Spat growth is highly temperature dependent. Warmer sites will extend the season over which the nursery can operate.

Technical Assistance

Should you require any technical assistance or advice regarding the handling or on-growing of hatchery spat, please do not hesitate to contact one of the following DPI staff:

- Dr Wayne O'Connor (02) 4916 3906
- Dr Mike Dove (02) 4916 3807

There are now several well-run nurseries in NSW and if you cannot visit the Port Stephens Fisheries Centre, we strongly recommend visiting a nursery near you to see the systems first hand, discuss their operation and appreciate what is involved.