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Fresh Water a Cure for Deadly Salt Water Pest

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A sea squirt that threatens New Zealand's mussel industry may be stopped by a simple and environmentally safe treatment – fresh water – developed by biosecurity scientists at Cawthron in Nelson.

Didemnum vexillum is a spongy textured, light mustard coloured marine organism originally brought to New Zealand on the hull of a steel logging barge from the Philippines. It thrives on underwater surfaces like wharf piles, boat bottoms, mussel lines and salmon cages. When a mussel line is smothered by the pest, the shell fish are eventually dragged off the ropes and onto the seafloor.

By 2005, the pest was spreading through the Marlborough Sounds and an industry-led *Didemnum* Working Group was set up to mastermind a clean-up. Aaron Pannell, from the Marlborough Mussel Company, led the project which used plastic wrap and sleeves to cover underwater structures and mussel lines to stop *Didemnum* feeding and breeding.

“But the problem with plastic wrapping is the collateral damage on mussels – everything underneath the plastic is killed – so we began a research and development effort to find a simple, effective and safe way of controlling *Didemnum*,” he says. The industry was particularly interested in a method to eliminate *Didemnum* from mussel seed stock so that the pest was not spread when mussels were transferred between growing areas.

Both Aquaculture New Zealand and the Foundation for Research, Science and Technology contributed funding totalling NZ\$42,000 for research to address the issue. Senior Scientist Dr Barrie Forrest, who heads the Marine Biosecurity Group at Cawthron, trialled a range of possible treatments, building on knowledge from previous research into biosecurity management tools that had been funded by the Foundation and the Ministry of Fisheries.

“Treatments included dipping mussel seed stock in supermarket-strength concentrations of vinegar and also bleach. Both were effective against *Didemnum* but the risks were high – if the seed stock was treated too long or the mix was too strong, it killed the mussels,” says Dr Forrest.

He had earlier explored the possibility of using freshwater and went back to the laboratory to test its effectiveness, with excellent results. “We found that Greenshell mussels have a surprisingly high tolerance to freshwater – you can leave them in it for as long as three days with very little effect on their survival and we have successfully killed *Didemnum* by immersing infected seed stock in water for as little as one hour.”

The solution is ideal for treating seed stock which is thinned by being stripped off mussel lines at regular intervals and can be immersed in fresh water before being re-attached.

Aaron Pannell says the project is one of the best ‘bang for bucks’ success stories the industry has experienced.

“We already lose up to 15 per cent of our seed stock through fouling. If *Didemnum* got established it could take another 20 per cent of our seed out and really threaten the industry. For a relatively small number of research dollars, industry has received a beautifully simple and effective solution.”

Marie Bradley, Southern Regional Manager with the Foundation for Research, Science and Technology, says the Didemnum treatment is a great example of long term investment in science delivering answers to industry problems.

“The knowledge bank at Cawthron about marine biosecurity challenges and treatments has been built up over many years. When a real life issue arose, this knowledge was able to be quickly applied by industry players who are proactively tackling their issues.”

Dr Forrest says the treatment presents a few challenges for mussel farmers.

“It can be difficult to find sources of fresh water and because the mussels slowly release seawater the solution is diluted over time. But, with proper management it’s a viable control method which is consistent with New Zealand’s reputation for environmental safety and the desire of the mussel industry to protect its clean, green brand.”

Apex Marine Farm Limited, owned by Bruce and Jill Hearn, is experimenting with the new treatment to kill off the Didemnum that has infected five of the nine farms it owns or manages.

“I inadvertently spread the sea squirt myself by growing spat in Tory Channel and then transferring it to various properties without realising the Didemnum was present. We are working hard to get it under control and I think we are winning.”

Mr Hearn says when it’s not controlled, Didemnum can become so large and prolific that mussel lines actually grow together and get so heavy the mussels are in danger of falling off.

He says none of the earlier treatments Apex trialled were nearly as effective as freshwater although he is having to develop systems for carrying out the fresh water immersion. “I am investigating stripping any badly infected lines at sea and treating them with freshwater on the boat before re-seeding them.” He says another idea being considered is to use small scale desalination plants to provide mussel farmers with a source of fresh water where and when they need it.

Dr Forrest says the key to the success of the research and development project is the close involvement of industry partners and their willingness to test and trial various methods.

“The mussel industry is really on board with the Didemnum work. It also sees that the freshwater treatment has potential to be used on a wide range of soft-bodied marine pests, not just Didemnum, so it’s a very useful tool the mussel industry can use in the future.

"It's an ambitious idea, but a lot of new aquaculture space is being designated around New Zealand and with good management of the things that spread fouling pests, including recreational boats, it's possible that some of these areas could be maintained as pest-free zones."

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