'Tea bags' hanging from Santa Cruz wharf detect domoic acid

By Michael Torrice - *San Jose Mercury News*

Meiling Roddam, a UCSC senior, displays one of the “tea bags” (Karen T. Borchers/San Jose Mercury News)

SANTA CRUZ -- Do not confuse the plastic bags soaking in the waters around the Santa Cruz wharf for trash. They may help warn scientists when shellfish is unsafe to eat.

UC Santa Cruz researchers developed the bags as a cheap and simple way to detect domoic acid, a toxin that causes brain damage in sea lions, pelicans and humans. The new method may allow public health officials and marine life experts to prepare for future blooms.

"The goal was to give us an early warning when something is going on in the ocean," said Raphael Kudela, the UCSC ocean scientist who is leading the project.

Along the California coast, spring is domoic acid season. Microscopic algae called phytoplankton produces the toxin. Small sea life, such as mussels and sardines, then eat the algae and the poison starts traveling through the food chain.

People that eat the creatures ingest high levels of the toxin. Symptoms of domoic acid poisoning start like normal food poisoning, but can lead to short-term memory loss as the toxin starts to burn out circuits in the brain, Kudela said.

Larger marine life, such as sea lions and brown pelicans, that feed on domoic acid-laced shellfish or fish become disoriented. Infected pelicans start flying miles away from the shore and sick sea lions become stranded on beaches.

Scientists normally monitor domoic acid levels by testing mussels and algae in coastal areas, said Gregg Langlois, a senior environmental scientist at the California Department of Public Health. When concentrations reach 20 parts per million, the federal limit, the department closes commercial fishing areas to prevent people from eating toxic seafood.

Compared to these traditional tests, Kudela's testing method is more sensitive and versatile.

Instead of collecting living organisms, Kudela's team fills plastic mesh bags with a resin that absorbs domoic acid.

"We looked at the silk bags you use with high-end teas," Kudela said. "But no one wanted to sell them without tea in them."

The researchers attach their plastic tea bags to embroidery hoops and let them soak in the ocean. Every week, the researchers walk down to the wharf, collect the bags and measure how much toxin the resin absorbed.

"The more domoic acid in the water, the more toxins absorbed onto the resin," Kudela said.

This spring, Kudela detected a slight domoic acid surge with his bags a month before traditional methods. The toxin concentrations were less than half the federal limit.

"The more warning you have, the better managers can respond to an event," said Vera Trainer, a biologist at the National Oceanic and Atmospheric Administration's Northwest Fisheries Science Center.

Anticipating a domoic acid bloom would allow marine life experts to prepare how they will handle disoriented animals before they start appearing on beaches, Trainer said.

The UCSC scientist plans to deploy his tea bag monitors at the Cal Poly pier in San Luis Obispo for more testing. Kudela also hopes they can use similar bags to monitor other toxins, such as microcystins that have killed sea otters.

Besides early detection, the bags can also go places mussels cannot.

For the traditional mussel monitoring system, researchers lower bags of the shellfish into the ocean to see if they ingest any domoic acid. But mussels can only survive in salty seawater and cannot be used in freshwater.

Also fishermen sometimes pilfer the bags for bait. Kudela's method would protect the data, Langlois said, because no one wants a bag filled with resin.