

# *Kina, he kai pai*

Multidisciplinary research has revealed ways in which New Zealand's kina fishing industry can maximise its export potential.



Professor Phil Bremer and Pat Silcock:  
... aiming to find ways to  
improve the consistent  
quality of kina roe.

**Sea urchins, or kina, are a familiar sight on New Zealand's coastline, and their roe has long been a delicacy enjoyed particularly by Māori and Pacific peoples.**

The largely iwi-based fishing industry that supplies the local market has done so with much the same practices for decades: the wild shellfish are harvested by free divers and their roe extracted, piled into pottles and sold, with little distinction made in product quality.

Currently New Zealand kina fishers realise \$NZ30 to \$70 per kilogram for their efforts. Professor Phil Bremer (Department of Food Science) and Pat Silcock, of Food Science's Product Development Research Centre, wondered what needed to happen to enable the local industry to successfully export kina roe to the lucrative, but extremely demanding Japanese market, where sea urchin roe can reach up to \$NZ1,300 a kilogram, depending on origin, flavour, colour and size.

To answer this question Bremer and Silcock set up a multidisciplinary research project working with Associate Professor Mike Barker in Otago's Department of Marine Science, Dr Alan Carne (Biochemistry), and Dr Mary Sewell in the School of Biological Sciences at the University of Auckland. Fifteen postgraduate students were also involved, including doctoral candidates Dan Garama (Ngāi Tahu), the recipient of a Te Tipu Pūtaiao Fellowship, Kylie Phillips and Wasseela Verachia.

The group's principal aim was to solve the major barrier that stood in the way of local fishers accessing this opportunity: namely, the inconsistency in New Zealand kina roe quality, by determining the causes of variables such as taste, colour, texture and shelf life that impact on roe quality, and what might be done to make these more predictable or controllable.

They focused on three areas: identifying the effect of season on roe quality, determining whether roe quality could be improved by controlling the diet of harvested kina held live in "sea cages" for several weeks, and improving processing and handling techniques.

A project of this scope required the participation of a number of people across the country, as well as the research team. Bremer and his colleagues enlisted the help of Ngāi Tahu Seafood fishers to supply them with freshly harvested kina for testing and ranching, and also worked with Nelson/Marlborough and North Island iwi members to supply kina and hold them in cages on their mussel farms. In addition, the project involved the training of teams of dedicated sensory panellists who rigorously analysed roe quality on a monthly basis.

Their findings were interesting – and even unexpected. The sensory tastings revealed a marked difference between the flavour of female and male roe, for example, with female roe generally being more bitter than the

sweeter male counterpart, and characterised by a metallic and/or sulphur taste. This difference was least pronounced in autumn prior to the roe increasing in size as the animals entered the spawning season.

Roe colour generally considered more attractive (more creamy yellow/orange than brown) was found to occur more frequently in smaller kina and those sourced from warmer North Island waters. The researchers believe this is due to the age of the animal and diet, as cold-water kina consume mainly kelp in contrast with the more varied diets of their warmer water counterparts.

This was borne out by trials with kina held in "sea cages" and labs, which were fed a variety of natural and artificial ingredients in soy-based diets. Bremer explains that the researchers were able to enhance the yield and the flavour of kina roe by manipulating the animals' diets.

The researchers also explored different handling techniques of live kina prior to processing, such as the temperature they're stored at. They found that the way in which the animals are handled and stored prior to processing impacts on the subsequent quality and shelf-life of the extracted roe.

Having found answers to many of the questions posed at the outset, Bremer and his team hope the industry will take advantage of the findings and adapt their processes to maximise the return on a resource which must, after all, be managed sustainably.

On the domestic market, harvest return is linked solely to gross weight rather than quality, therefore there's little incentive to alter harvesting practices to make them more conducive to product quality.

As a result, kina harvesting tends to be concentrated in the late spring, when the animals' roe size is at its largest. Yet the research team have proven the average roe flavour across both sexes is at its optimum in autumn. Furthermore, kina rely on relative population density to successfully reproduce, but a late spring harvest removes mature, reproductive adults at the peak of the breeding season.

The researchers have held industry workshops to present their findings and say the kina industry has picked up and acted on some of the data relating to harvesting.

"Our integrated, science-based approach combining ecology, biology, food science, chemistry and sensory science has provided information that will underpin the development of a successful kina export industry," says Bremer, who hopes the industry will utilise more of the information they've uncovered to help it make a mark on the international kina roe industry.

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