

Kiwi Ingenuity: Bigger is not Necessarily Better at Solving Complex Scientific Problems

New Zealand-based dnature offers a full menu of innovative DNA-based diagnostics and custom assays featuring Quantabio reagents for critical agricultural and clinical pharmacogenetics testing applications



John Mackay, Technical Director,
at work in the dnature laboratories.

Quantabio kits and ToughMix chemistry are the standard DNA and RNA qPCR reagents in the dnature laboratory.

For more than a decade, the team at dnature has solidified its reputation across New Zealand and the South Pacific as the expert resource for all types of PCR and qPCR testing applications. The company offers a full portfolio of innovative reagents and all the required equipment to create high-quality, rapid diagnostic tests that solve critical problems. The test kits are designed to work with challenging samples and detect everything from plant pathogens, bee viruses & diseases to other primary industries, as well as clinical pharmacogenetics. In fact, the dnature team was responsible for introducing New Zealand's first diagnostic test for COVID-19 before developing a new multiplex method. The company currently sells its products to various academic universities, private testing facilities, breweries, wineries, and government-funded Crown Research laboratories across the country, as well as to customers in the South Pacific and Europe.

dnature prides itself in the fact that many of its products undergo extensive testing in its own laboratory prior to making them available to customers. The company only offers products that meet its strict quality and performance requirements. This commitment to quality was what originally brought dnature to Quantabio. Back in 2013, dnature technical director John Mackay was searching for higher-quality reagents that could

work with challenging samples for specific applications. John was in the process of developing a duplex qPCR assay for a devastating kiwifruit pathogen and the test requirements led to conversations with David Schuster, Senior Director & Head of R&D at Quantabio. At that time, David was working on a new ToughMix featuring proprietary chemistry that was more sensitive and produced higher yields than alternative options. The two scientists immediately bonded over a love of science and new molecular technologies. David sent over a prototype version of the Quantabio PerfeCtra® qPCR ToughMix for the dnature team to test with the assay. John soon saw the performance advantages of the Quantabio technology firsthand. The dnature and Quantabio relationship continued to strengthen ever since. Today, the Quantabio kits are the standard DNA and RNA qPCR reagents in the dnature laboratory.

The team at dnature uses its expertise and the latest best practices in DNA diagnostics to address specific customer requirements and help solve problems that other industry testing methods, where other industry testing methods are inaccurate, insufficient or simply not fast enough. The DNA-based diagnostic tests are used to detect everything from Psa in Kiwifruit to spoilage yeasts in wine to American Foulbrood (AFB) in honeybee hives to COVID-19 in human beings.

Saving the Kiwifruit

Pseudomonas syringae p.v. *actinidiae* (Psa) is a very serious disease that causes bacterial canker of green and gold kiwifruit. The bacterial infection causes shoots to die back, buds and canes to wilt, and a milky bacterial substance to ooze from natural openings or pruning injuries.

In 2010, Psa was discovered in kiwifruit orchards in New Zealand. This was a significant, and potentially devastating discovery, for one of the country's most profitable crops. Over the following year, orchards were destroyed, and incomes were lost. A containment program, hinging on the early detection of the bacteria in orchards, was developed and dnature was contracted to develop the qPCR test. To this day, the dnature test remains the industry standard. It was the second dnature-developed test. The first was a high-resolution melting test that differentiated the virulent from non-virulent 'strains' and reduced the culturing and sequencing time from two weeks down to 24 hours.

A Psa streptomycin resistance kit (PSA-STR-100) was also designed to rapidly detect Streptomycin resistance. The multiplex qPCR kit features the Quantabio PerfeCta qPCR ToughMix, a 2X concentrated ready-to-use reaction cocktail for PCR amplification of DNA templates that overcomes several types of PCR inhibitors commonly encountered with crude extracts, environmental specimens, plant tissues, animal tissues, and complex food matrices. Since it can often be challenging to extract DNA from the kiwifruit leaves, it was imperative to have a robust real-time qPCR reagent that is tolerant to common PCR inhibitors and provides maximum sensitivity and PCR efficiency even with low copy targets.

Thanks to the team at dnature and its assays, the kiwifruit industry across New Zealand has largely recovered. The country now has a better understanding of the origin and evolution of the various Psa strains. Today, you'll see more gold kiwifruit varieties that are more tolerant of the strains of Psa.

Wine and Beverage Spoilage Testing

dnature is also well known throughout the region for its wine and beverage spoilage testing services. Common organisms such as *Brettanomyces* and *Pediococcus* are inherent in winemaking, yet their presence may not be recognized until the effects produce a damaging impact on wine quality and cause significant financial losses to wineries. Traditional testing methods often require long wait times with inconclusive results, and other molecular methods are expensive and complex.

The dnature wine and beverage spoilage testing services are designed to rapidly detect viable but non-culturable populations of the bacteria and yeasts that cannot be seen on a plate, providing customers with an accurate answer much earlier than they could before. Customers can now intervene while the threat is low, prevent cross-contamination, and avoid costly remediation and potential loss of wine quality and value.

For example, dnature helped identify why a manufacturer of Methode Traditionelle was having issues with its bubbles. The wine testing services allowed dnature to not only detect the problem (*Zygosaccharomyces*) but also specifically where the problem was occurring in the winemaking process. It was discovered that the yeast was not in the winery but in the trucks, which delivered the wine to the location where it was bottled. After extensive testing, the team selected the Quantabio PerfeCta SYBR® Green FastMix because it provided the most sensitive and precise DNA amplification with SYBR-based quantification. The user-friendly, 2X concentrated reaction mix features a proprietary formulation that stabilizes SYBR Green I dye to deliver maximum efficiency, sensitivity, and robust fluorescent signal.

Global Expansion

dnature is currently looking to expand its distribution channels and enable more customers around the world to benefit from its proven menu of assays. For more information on dnature's services, please contact info@dnature.co.nz.

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