

Reduce Storage Costs and Preserve Wine Quality with GeneDisc® Rapid Microbiology System

Overview

The role of yeast within fermentation is central for the production of fermented alcoholic beverages and specific yeast strains are selected to achieve the desired fermentation, flavor and aroma characteristics in the end product. In addition to this beneficial role, yeasts are also able to cause spoilage to alcoholic beverages both during and after fermentation.

Spoilage yeast growth can affect the chemical composition of the beverage, generating off flavors, undesirable aroma or altered appearance. It can also lead to broken bottles due to increasing pressure. Such spoilage can generate high economic losses and impact brand image.

Labor intensive and lengthy investigations after spoilage detection can increase impact of spoilage as origination can come from a wide variety of sources throughout the production process. Long

investigations can increase losses as higher volume of spoiled product could be produced or production could be interrupted for a long period of time.

As a result, wineries have implemented microbial monitoring for their finished wines and in-process control at critical points, using a testing program unique to each winery. These programs are mostly based on traditional culture methods. These methods have a limited cost-effectiveness and decision-making value due to their drawbacks. They are time-consuming, and do not provide an early warning of contamination. These methods display weak sensitivity when even one single spoilage organism can cause full batch damage. Additionally, they are not specific. Further yeast identification is needed to assess contamination sources and plan for effective countermeasures.

Figure 1: The GeneDisc System including the GeneDisc Cycler and GeneDisc Plate



The Challenge

A large US based winery was using culture for end-product release control. Their standard product release time was within 3-5 days. This winery was accustomed to sending samples to an outside service laboratory for positive sample identification which was causing a time delay and incurring additional cost for identification. The long workflow was generating high storage costs.

The winery was already familiar with using Polymerase Chain Reaction (PCR) for *Brettanomyces* quantification for fermentation monitoring and during barrel aging. Typically, this PCR method involved a cumbersome sample preparation protocol requiring intensive hands-on labor and providing results in approximately 5 hours.

The customer was looking for faster and streamlined methods for both applications.

The Solution

To address the customer's need for a rapid method for product release and simplification of *Brettanomyces* testing, Pall offered its polymerase chain reaction based method using the GeneDisc system (Figure 1). With sensitive and specific detection and identification of wine spoilage yeast in a matter of hours, this extremely accurate tool was easily implemented in the customer's quality control laboratory eliminating the cost to send sample to an external service laboratory.

The GeneDisc method for spoilage yeast offers two types of testing reagents: plates for yeast screening enabling detection of all spoilage yeasts and plates for identification of the major spoilage associated yeast genera and species. Additionally, there are different testing options that can be implemented. Direct yeast monitoring is possible for fast results within 2 hours. However, for high sensitivity applications, analysis with enrichment can be performed with results available in as little as

30 hours. Finally, testing for *Brettanomyces* quantification can help winemakers make decisions at various stages within their process.

Before implementing GeneDisc, the customer performed validation trials as described below to determine how this technology fit into their quality program.

End-Product Testing

For analysis with enrichment, Wort Broth is the enrichment media recommended by Pall.

The customer performed an internal validation with their preferred broth (WLN) to confirm they were obtaining similar results to their current culture method also using this media. The outcome of this evaluation showed that implementation of a product release in 30 hours with GeneDisc method using WLN was a suitable alternative to their current 3-5 day culture method.

Furthermore, as the customer decision for product release is based on the genera or species of spoiler yeasts present in their product, they chose to perform end-product release directly using the GeneDisc Plate for yeast identification.

Brettanomyces Quantification

Similarly, the customer performed a comparison between their incumbent PCR method for *Brettanomyces* quantification and the GeneDisc solution. This comparison highlighted a difference in the scale of quantification. After implementation of adapted action limits, similar decisions could be taken with both methods.

In addition, sample preparation workflow with GeneDisc reagents was considered greatly simplified when compared to the incumbent method, reducing hands-on time.

Customer Control Plan with GeneDisc Method

After this evaluation, the customer implemented the following control plan for yeast testing (Figure 3, next page):

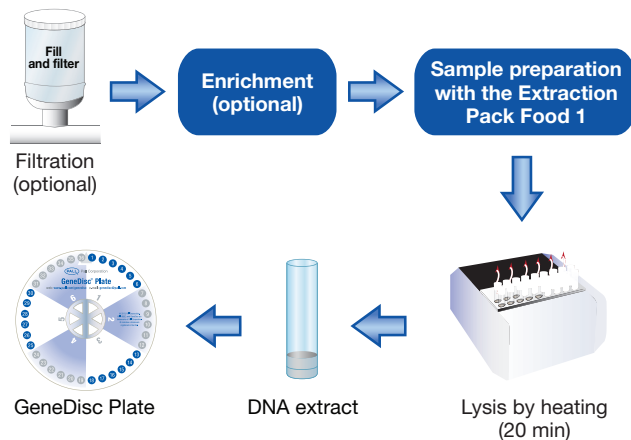


Figure 2: Workflow of the Pall GeneDisc Method for Yeast Detection

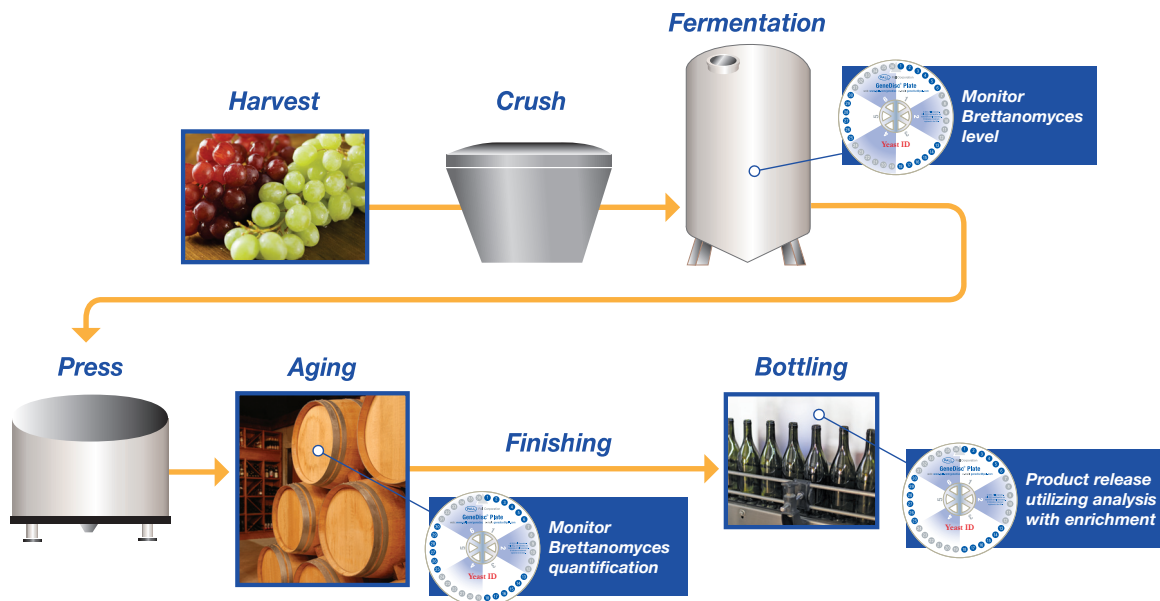


Figure 3: Customer Control Plan for Yeast Testing

The Benefits

This winery was successfully able to reduce their storage cost by accelerating product release from their previous standard of 3-5 days down to 30 hours. To help accelerate release decisions, implementation of the GeneDisc system allowed them to receive direct identification with Pall's Yeast ID plate.

The need to send samples to an external laboratory has been removed, therefore reducing time to final result as well as testing costs.

The winery was able to replace their previously cumbersome PCR method for *Brettanomyces* quantification requiring long hands-on time, with a new, easy and straightforward method. More importantly, time to result was reduced to less than 3 hours.

Finally, this winery experienced a 50% reduction in *Brettanomyces* testing cost with an additional benefit of simultaneously detecting other yeast spoilers such as *Zygosaccharomyces bailii* which was not possible with their previous method.



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Pall Food and Beverage provides products and services to ensure product quality and maintain process reliability in beverage and food production.

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