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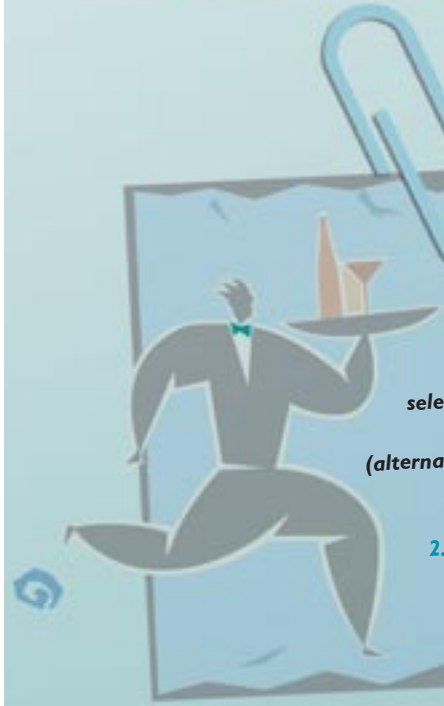
Bug News

THE SWIFT MICRO LABORATORIES NEWSLETTER

March / April 2003



Win with Swift & Vergelegen!

3 lucky entrants will each win a hamper containing 2 bottles of wine selected by our co-sponsors, a wine cooler, and a 2003 Platter Wine Guide.

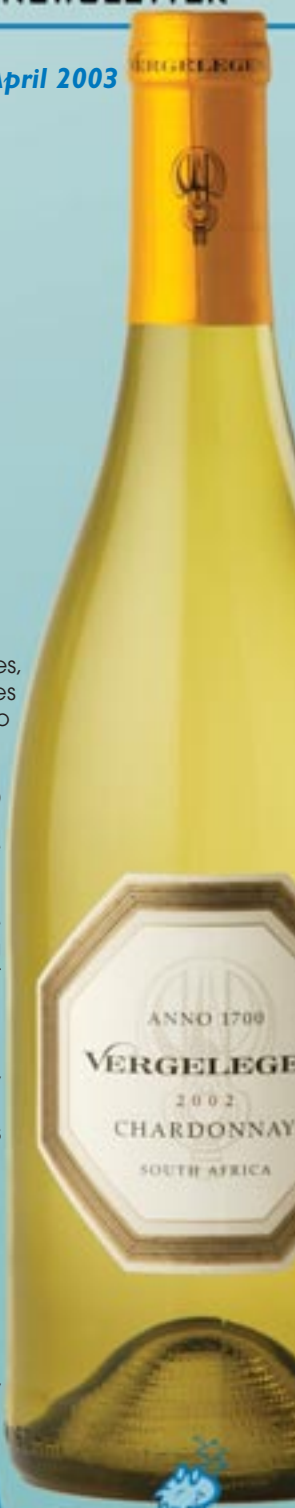
To enter simply answer the questions below and fax or e-mail it to us (alternatively enter via our web-site: www.swift.com), together with your name, the name of your company, and telephone number.

1. Name two micro organisms associated with winemaking.

2. Name one of the Swift services mentioned in the article on "Collecting and Handling of Samples".

Closing date: 30 April 2003.

www.vergelegen.co.za



Most of us who are in some way involved in the Food, Beverage, Hospitality, or related Industries, tend to focus our attention on topical issues such as "quality" and "food safety", sometimes without giving a second thought to the daily struggle faced by farmers and food scientists to keep food production in line with massive population increases.

The Biotechnology Revolution has brought about genetically improved (GI) and genetically modified (GM) crops. The debate which has raged in Europe about safety and ethical issues surrounding Genetically Modified Organisms (GMO's) has now reached Africa, where many countries have limited arable soil and extreme climates.

In keeping with our mission to always meet the needs of the market with the most innovative and up-to-date technology, Swift undertook a feasibility study and market survey regarding the need for commercial testing facilities to offer tests for the presence of GMO's in Foodstuffs. Read more about the results of this study and our negotiations with a European Consortium of Biotechnology Companies in this issue of Bug News.

Other interesting topics in this issue:

- We have responded to the many requests for information on micro organisms relevant to the Wine Industry in our guest feature "Focus on……Yeasts and Bacteria Associated with Winemaking".
- "In the Spotlight" covers the collection and handling of samples for microbiological testing, as well as related services offered by Swift.

Congratulations to the following readers who each won meal vouchers at Primi Piatti in our last competition:

- **Russel Makin** of Denmar • **Cindy Miller** of Bindi's Dressings
- **Wendy Vermeulen** of Pioneer Foods • **Yolanda Smith** of Coppoolse Finlayson
- **Shirley Bowers** of Southern Sea Fishing

We are sure you enjoyed the "Primi experience".

In keeping with the wine theme of our feature article, the prizes in our latest competition are co-sponsored by Vergelegen. We look forward to receiving your entries, and as always we welcome any feedback on/or requests for articles for future issues of Bug News.

www.swift.co.za

Focus On ... Yeasts & Bacteria Associated with Winemaking

A guest article by Maret du Toit
- Institute for Wine Biotechnology, Department of Viticulture and Oenology, Stellenbosch University

The association of micro organisms with the fermentation of alcoholic beverages dates back to ancient times. Grape must is naturally seeded with yeasts, lactic acid bacteria (LAB), acetic acid bacteria (AAB), and fungi. Winemaking is a complex ecological process where the biochemistry and interaction of yeasts, bacteria, and fungi play a pivotal role in the final product. There are three stages at which micro organisms can enter the winemaking process and influence the quality of the end product. The first stage involves the grapes and winery equipment (crushers, presses, tanks, pipes, pumps, etc.). The second stage is during the actual fermentation, and the third stage is post-fermentation (in the bottle or during barrel maturation).

The winemaking process is characterised by an *alcoholic fermentation* initiated by **yeast**, followed by a secondary *malolactic fermentation (MLF)* which is performed by **lactic acid bacteria**.

The growth of micro organisms in the wine environment is restricted by conditions such as low pH (3-4), a high alcohol content (10-14%), the presence of sulphur dioxide, low temperature conditions, the manner of clarification used, and low nutrient content. It should also be noted that wine is free from any pathogenic micro organisms.

• YEASTS

Yeasts associated with winemaking can be divided into two groups, namely

i. wine yeasts *(Saccharomyces yeasts),* which can perform complete alcoholic fermentation without the production of off-flavours, and

ii. wild yeasts *(non-Saccharomyces yeasts),* which can only perform partial conversion of the grape sugars into alcohol.

At the start of the fermentation process, the wild yeasts *Kloeckera and Hanseniaspora* (lemon-shaped) are the dominant genera, representing 50-75% of the total yeast population. Other wild yeasts found in lower numbers are *Brettanomyces, Candida, Cryptococcus, Kluyveromyces, Metschnikowia, Pichia, Rhodotorula, Schizosaccharomyces,* and *Torulaspora*. The wine yeast *Saccharomyces cerevisiae* represents less than 1% of the flora at this stage.

The dominant yeasts associated with the winery belong to *Saccharomyces, Candida,* and *Brettanomyces*. Due to the sensitivity to alcohol of most of the wild yeasts the mortality rate is high, and *S. cerevisiae* begins to dominate the alcoholic fermentation process due to it's tolerance of alcohol. It is therefore not surprising that *S. cerevisiae* is the yeast of choice used today in active dried wine yeast starter cultures.

Although the wine yeasts positively contribute to the quality of the final product, the non-*Saccharomyces* yeasts are mostly associated with wine spoilage. The defects caused by these yeasts in wine are re-fermentation, ester tainting, the production of high levels of hydrogen sulphide, volatile acidity, volatile phenols, film formation, deacidification and the formation of ethyl carbamate.

• LACTIC ACID BACTERIA

Lactic acid bacteria (LAB) are Gram-positive, catalase-negative, non-motile, non-spore forming rods, cocci, or coccobacilli, and mainly produce lactic acid from the fermentation of carbohydrates. There are four genera of LAB associated with grapes and wine: *Lactobacillus, Leuconostoc, Oenococcus,* and *Pediococcus.*

Lactic acid bacteria in wine originate from the grapes and the winery equipment. As the alcoholic fermentation process proceeds, LAB numbers will decrease, and after the completion of the alcoholic fermentation process only the alcohol tolerant species are left. (O.oeni being the most dominant in low pH wines and pediococci and lactobacilli in high pH wines (>3,5)). LAB are more sensitive to SO2 than yeasts are.

The malolactic fermentation process (MLF) is mainly conducted by *O. oeni* and therefore they are the preferred species used in commercial starter cultures. MLF is performed for three reasons, namely deacidification, the production of flavour compounds, and microbial stability. It should, however, be noted that LAB can be detrimental to wine quality if their growth is not timed correctly during the wine making process. LAB can cause off flavours and cosmetic problems in wine, such as acid formation, refermentation, ropiness, mousiness, organic acid utilisation and acrolein formation (which can lead to bitterness in wine). LAB can also affect the wholesomeness of wine by producing biogenic amines, and arginine metabolism can produce precursors for the formation of ethyl carbamate.

• ACETIC ACID BACTERIA

Acetic acid bacteria (AAB) are commonly known as the vinegar bacteria and are Gram-negative, aerobic, catalase-positive micro organisms which utilise glucose, with acetic acid constituting the main end product. AAB vary in cell morphology and may range from spherical, club-shaped, elongated, swollen, curved rods, to filamentous, which makes it difficult to identify this group under the microscope. Some AAB also have the ability to produce brown pigments when grown on culture media. There are three genera of AAB that have been associated with the wine environment namely *Acetobacter, Gluconacetobacter,* and *Gluconobacter*. *Gluconobacter* is associated predominantly with unspoilt grapes, due to its low ethanol tolerance and high sugar preference, whereas the other two genera are more ethanol tolerant and may survive through the alcoholic fermentation process to exert their influence on the final product if care is not taken. AAB can increase in numbers in high pH must (pH >3,7), whereas at a pH below 3,5 the numbers decrease during the alcoholic fermentation. AAB can affect the wine through the production of high levels of volatile acidity, acetaldehyde, dihydroxyacetone, and acetoin. The latter three substances can bind SO2 and therefore the antimicrobial activity of the wine can be adversely affected.

As micro organisms can occur throughout the winemaking process, it is of utmost importance to determine the microbiological status of the fermentation process at critical stages, eg to determine the yeast viability of the alcoholic fermentation, the progression and species involved in the MLF, or to detect spoilage micro organisms and thereby assess the risk of a faulty final product. This can be done by using microscopic analysis or plating onto selective media to determine the viable micro organisms present. The SA Wine Laboratory Society, which is part of the SA Society for Enology and Viticulture, has developed a manual which includes standardised methods for the microbiological analyses (enumeration, identification, differentiation, yeast viability, etc) of samples.

Additional reading: • *Du Toit, M. & I.S. Pretorius.* ***2000.*** *Microbial spoilage & preservation of wine: Using weapons from nature's own arsenal – A review. S. Afr. J. Enol. Vitic. (Special Issue)* ***21:*** *74-96.* • *Du Toit, W.J. & I.S. Pretorius.* ***2002.*** *The occurrence, control and esoteric effect of acetic acid bacteria in winemaking. Ann. Microbiol.* ***52:*** *155-179*

About the Author

Maret du Toit lectures both undergraduate and postgraduate courses at the Department of Viticulture and Oenology, as well as postgraduate modules in Wine Biotechnology at the Institute for Wine Biotechnology, Stellenbosch University. Fields of specialisation include alcoholic fermentation, malolactic fermentation, microbial spoilage, and biopreservation of wines.

NEWS FLASH

During the Feb-March 2003 harvesting season Swift launched a pilot project together with Vinlab, placing a Microbiologist at the Vinlab premises in Stellenbosch for "on-the-spot" microscopic analysis of Yeast & Bacterial Viability. This Stellenbosch-based service, which started out as a "one-morning-a-week" venture, could be expanded as the demand increases. These tests are routinely offered by Swift from our Rosebank, CT, laboratories.

In the spotlight ... Sampling

The objective of sampling is to obtain a representative sample of a product and to submit sample units to the laboratory in a condition bacteriologically unchanged from that existing at the time of sampling. All persons concerned should take appropriate measures to prevent, as far as possible, any contamination of either the product consignment or the sample units. Sample integrity should be maintained in order to prevent any additional microbial growth or death within the sample during transport to the laboratory as well as during subsequent storage and handling.

General Guidelines for Aseptic Sampling:

1. Materials

• Sample containers – Use clean, dry, sterile, leak proof containers such as wide mouth glass jars or bottles or disposable plastic bags. Instruments for opening product/packaging must be sterilised. • Sampling utensils (sterile scoops, spoons, tongs, forks, cork borers, pipettes, etc) or swabs can be used for collecting samples. Sterile knives or scissors may be needed to cut portions from large items. • Labels or markers – Containers can usually be labelled by marking them with a permanent marking pen. Waterproof labels can also be used to identify samples. • Storage and transport of samples – polystyrene or other insulated container is needed for holding and transporting samples. Frozen ice packs are needed to keep samples cool when appropriate.

2. Sterilising Sampling Containers and Utensils

Sterilise all sample containers and utensils that can come into contact with the product by one of the following methods:

• Autoclaving at 121°C for 15 minutes. • Exposing containers and utensils to hot air (170°C) in an oven for at least 1 hour. Alternatively a pressure cooker can be used. • Immerse utensils in 95% alcohol for 3 or more seconds and flame to burn off alcohol. Repeat this procedure twice, making sure on each occasion that the flame is out before reimmersing the utensil in the alcohol. • Sterile containers are also commercially available.

3. Collecting Sample Units

- Submit sample units to the laboratory in the original unopened packaging whenever practical. This will reveal the condition of the product as offered to the public.
- Take at least twice the amount required for analysis to provide a reserve portion in case needed for further testing.
- If sample units are too large to be easily transported to the laboratory, sample from the bulk container into sterile containers under aseptic conditions as recommended below.
- Where possible, mix contents of original (larger) sample unit thoroughly before sampling as follows:
  - Remove surface contaminants from the outside of packaging by wiping with 70% alcohol. • Open sealed packages carefully with a sterile cutting instrument. • Use a separately sterilised instrument for each sample to avoid cross contamination. • Sample consistently from various places in the container rather than just from the top or bottom.
  - When sampling from an outlet of a bulk container allow some product to pass through to 'flush' the outlet before collecting samples. • Use a utensil appropriate to the physical state of the product for sampling. For example: scoops for dried products, pipettes for liquids or forceps (tweezers) for solids like meat or cheese. • Avoid contamination when transferring a sample from the bulk container or packaging to the sample container. Do not touch the inside of a lid or neck of a jar or sampling bottle, or any surface which will come into contact with the sampled product.

4. Number of Sample Units

- A representative number of samples should be taken per batch. It is important to avoid bias and draw a sufficient number of samples to confidently make a judgment about a batch. Random sampling is the universally recognised way of avoiding bias. For example samples could be taken at various stages during production – beginning, middle and end- or from different areas during storage – draw containers from different areas in the warehouse or fridge/freezer and take different samples from the containers.

5. Labelling Sample Containers

- Label all sample containers before or immediately after sample is taken. Label in such a way as to prevent accidental removal of sample identification during handling or transport.
- It is important to note that any information regarding sample ID required on the analysis report must accompany the sample to the laboratory.

6. Transporting and Storing Samples

- Samples should be transported to the laboratory as soon as possible.
- If the product is canned or in a dry condition, cooling the sample is unnecessary but avoid temperatures above 40°C. Canned products which are likely to blow should be refrigerated.
- If the product is perishable, cool sample rapidly to between 0 and 5°C and maintain this temperature during transport. Frozen samples must be packaged and transported in such a way that they reach the laboratory in a frozen condition.

Extracted from: • *Micro organisms in Foods 2 – Sampling for microbiological analysis: principles and specific applications Second edition ICMSF*

In addition to offering a service to collect you samples from your premises, Swift also offers the following related services:

- *Supply of sterile sampling containers.*
- *Qualified personnel to perform sampling at your premises.*
- *Training of your staff in aseptic sampling techniques.*
- *Consultants to assist with tailor-made sampling plans.*
- *Technical expertise and problem solving.*

Testing for the presence of genetically modified organisms in foodstuffs

What is genetic modification?

A genetically modified organism is any organism where the genes or genetic material of that organism have been modified in a way that does not occur naturally through mating or recombination or both. An example of a GMO is a maize plant that has been modified to be resistant against insects which attack maize crops.

In October 2002 Swift Micro Laboratories was contacted by a European Consortium of Biotechnology Companies and offered the opportunity to become their sole licensee in Africa. This would enable Swift to expand it's services into the GMO-testing arena, offering customers the most up-to-date, internationally recognised test methods available for GMO testing.

A feasibility study was immediately undertaken by Swift. This included discussions with local role players in this industry, attendance of a National GMO Conference in December 2002, and a survey among prospective users of this type of testing service.

After months of investigation it was decided that Swift would decline this potentially lucrative offer from the European Consortium for a number of reasons, some of which are listed below:

- Although South Africa already has legislation in place regarding GMO's, eg Labelling Regulations (Dept of Health: Foodstuffs and Cosmetics Act) and the SA GMO Act, 1997, implementation and more importantly enforcement of such legislation would not be immediate.
- A recently conducted public survey (2002) revealed that 43% of South Africans "do not have an opinion" when it comes to taking a stand about GMO's, which means that there won't be a huge public drive to encourage testing for GMO's in the foreseeable future.
- It also emerged that instead of extensive testing for the presence of GMO's along the processing chain of foodstuffs, companies would rather opt for implementation of an IP (Identity Preservation) System. This system provides a paper trail from "seed to table", ie documents relating to the origin of the seed (seed certification), harvesting, processing, etc. Although some verification and testing would still be necessary when implementing and maintaining this system, it cuts down particularly on the amount of testing needed and would therefore be more cost effective.
- Finally, and most importantly, it was concluded that Swift would not be adding value to our existing or target market by adding GMO tests to our current service portfolio.

Through negotiations with these International Companies Swift has forged some invaluable partnerships which will undoubtedly benefit our clients in future. We have some exciting ventures planned for the not-too-distant future and will keep you updated as these unfold!

International Women's Forum (IWF) Conference

Sandton Convention Centre:
30 January 2003 – 01 February 2003

Our Managing Director, Valmé Stewart, was one of an estimated 50 South African Business women to be invited to take part in the first IWF conference to be held in Africa. More than 350 delegates representing nearly 20 countries attended this 3-day conference on "Courageous Leadership for Global Transformation". Guest speakers included, among others, past-president Nelson Mandela, past-president FW de Klerk, vice-president Jacob Zuma, and Business Leaders from across the world.

A wide range of topics, including social, economical, entrepreneurial, and leadership issues, were hotly debated. Networking opportunities turned new acquaintances into potential business partners.

In the words of Bridgette Radebe, president of the SA branch of the IWF: "Thanks to globilisation, the world is never too big for us to work together as partners."

As a company we strive to continually improve our service and to always stay abreast of developments in our field, and international contacts prove invaluable in reaching these goals.

Staff News

Colette Steyn, Marketing & Technical Liaison for the Gauteng Region, will be leaving the company at the end of March 2003. She has decided to simplify her life, with less time spent travelling, and has accepted a post as Laboratory Manager with a cosmetics company.

Our National Marketing Manager, *Karen Eksteen,* will be visiting our Gauteng clients soon to introduce our new Marketing Representative for the region to them.

We would, however, like to remind all our clients that our Laboratory Manager, *Sean Swatton,* can also be contacted in addition to our Marketing Team with anything relating to samples, results, or technical queries.

Swift MICRO LABORATORIES (Pty) Ltd

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