BrewTimes™

JANUARY 2022

Balaji Enzyme and Chemical Pvt Ltd

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Introducing BrewTimes :

WISHING ALL OUR READERS A VERY HAPPY NEW YEAR !!!

We M/s Balaji Enzyme & Chemical Pvt Ltd, are pleased to bring to you our January 2022 month edition of BrewTimes.

This year we hope for all our readers that we have seen the last of the pandemic. We are proud to announce BarthHaas new product "Spectrum".

In our expert section of BrewTimes we bring to you 'India and it's rising beer trends' by Mr Bijay Bahadur. We also have experts showcasing us the importance of water and common off flavors in beer along with the various safety aspects of the brewing industry in our various expert columns.

Our association with M/s Bioneemtec India Pvt Ltd, is for R&D and they are our sample testing partners. We bring an opportunity for all our valuable customers and encourage them to utilise this association which will help them in testing their raw material and finished products quality standards.

About Our Company :

We M/s Balaji Enzyme & Chemical Pvt Ltd are a leading supplier of Enzymes, Filter aid, Yeast, Hops, Processing aids, Clarifiers and food fortification products to breweries, distilleries, malt extract industry, starch industry, juice and beverage industry, and other food industry.

BarthHaas®

SPECTRUM

INCREASES BREWING YIELDS

DELIVERS STABLE HOP FLAVOR

100% HOPS

NEXT GENERATION LIQUID DRY HOPPING

BarthHaas®

SPECTRUM

DRY HOPPING UNLIKE ANYTHING BEFORE!

Dry Hopping is great for adding an extra dimension to your beers but with traditional dry hopping products it also comes with increased beer losses and the extended processing times.

With SPECTRUM you can dry hop in a way that achieves a substantial increase in yields, and a reduction in tank turnover times, while maintaining the full dry-hop flavor in your beer.

SAVE TIME AND MONEY

Unlike any other dry hopping-product SPECTRUM is the only product that is 100% dissolvable leaving you with more beer to sell and less cleaning.

GREAT STABLE HOP FLAVOR

SPECTRUM delivers the full range of true-to-type dry-hop flavor compounds including all of the glycosidically bound fractions, making them available for amazing bio-transformation reactions in your beer.

JUST HOPS

SPECTRUM is 100% hops in liquid form with no carriers or synthetic solvents.

Currently available in
Citra® and Mosaic® varieties with more to follow.

Discover more about the benefits you and your customers can gain from BarthHaas SPECTRUM.

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BarthHaas®

SPECTRUM

Technical Data Sheet

SPECTRUM (formerly termed “paste” or “dry hop paste”) is 100% natural and 100% hop-derived prepared from hop pellets by specific extractions. No additives, solvents or carriers are included in the formulation. SPECTRUM is rapidly dispersible in beer and is an alternative product to standard dry hopping.

COMPOSITION

SPECTRUM contains 3 – 10 ml/ 100 g hop oil (depending on the variety) and less than 30% water.

TYPICAL PROPERTIES

Appearance:	Thick brown paste
Colour:	Brown
Aroma:	Variety-dependent
Category:	Hop extract, dry hopping

STORAGE CONDITIONS

Sealed containers should be stored at a temperature of 5 – 15 °C and used within 12 months. Avoid lower temperatures as this may provoke crystallisation of the product and affect dispersibility. Opened bottles should be blanketed with inert gas and resealed if placed back in storage. Once opened, use within 1 month.

ORIGIN AND SOURCING

100% Natural, 100% Hop-Derived

DOSING

SPECTRUM is dosed on its oil content, typically at 0.5 – 5 ml oil/ hL beer. For tastings, a starting concentration of 0.5 – 1 ml/hL is recommended, particularly if dosing into lager beers. The replacement rate for pellets with SPECTRUM is typically 1:5 to 1:8, depending on the application. SPECTRUM should be warmed to room temperature and stirred thoroughly before use. It should be dispersed in water or wort (at a ratio of 1:5 to 1:10) first and then dosed into beer. N.B. as iso-α-acid losses are reduced when dry-hopping with SPECTRUM, bittering may need to be adjusted accordingly.

BarthHaas®

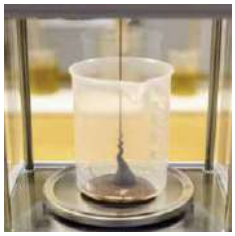
NEXT GENERATION LIQUID DRY HOPPING

SPECTRUM

SPECTRUM is a revolutionary new, fully dispersable liquid hop product, that delivers full true to type dry-hop characteristics.

The final product is 100% hop material with no solvents or artificial additions. Imagine the finest hop pellets in liquid form and you will understand the impact and efficiency gained when using SPECTRUM. Here are some tips on how to use it.

NOTE: *We find best flavor outcomes are achieved with Spectrum when dosing into (secondary) fermentation.*



1. **ROOM TEMPERATURE**
   Store cold but allow the product to warm up to room temperature.

2. **MEASURE QUANTITY**
   Weigh the required amount into a jug or beaker.

   NOTE: *The replacement rate for pellets with SPECTRUM is typically 1:5 to 1:8 w/w, depending on your application. If you are aiming to match an existing recipe, we recommend starting with partial substitution or benchtop trials to establish dose rates. When dosing into bright beer, dose Spectrum on oil content. A starting dose rate of 0.5 to 1 ml oil per hl is recommended.*

3. **ADD LIQUID**
   Add cold or lukewarm deaerated water or wort for dispersion.

   NOTE: *The product should be dispersed in 5 – 10 times the amount of liquid.* ***In some dynamic dosing systems, pre-dispersion may not be necessary****.*

4. **STIR**
   Stir thoroughly to ensure full dispersion of the product. If necessary, rinse out the SPECTRUM packaging and add this to your pre-dispersion.

5. **FLUSH WITH CO_2**
   Flush your tank or dosing system with CO_2 to reduce air ingress.

6. **ADD TO TANK OR DOSING VESSEL**
   Add the pre-dispersion directly to the beer tank or dosing vessel and proceed as you would with pellets.

PLEASE CONTACT YOUR USUAL BARTHHAAS CONTACT OR OUR BREWING SOLUTIONS TEAM WITH ANY QUESTIONS:

brewingsolutions@barthhaas.de

INDIA AND IT'S RISING BEER TRENDS

BIJAY BAHADUR

B.Sc. (Hons.); B.Tech. (Gold Medallist); PGDEE; FIE; Chartered Engineer (India) PE (ECI); LMIIChE; LMAFST (I)

Growth Drivers – Beer preferred alcohol

India's alcohol market is the third largest in the world. Sales of low alcohol drinks, such as beer, are growing, especially among younger members of the burgeoning middle class. Beer is being increasingly accepted as a social drink and the urban youth in particular favorite as the preferred alcoholic beverages. Indian consumers are looking for choices away from hard alcoholic drink. It is not just the male population that is charmed by beer but female populations equally enjoy beer.

In 2021, consumption of beer in India was 5.5 liters per capita as compared with the global average of 6.2 litres and the East Asia and Pacific average of 6.4 litres (Source: The Times of India, December 17, 2021). In India, young growing middle class with rising disposable incomes will lead to greater spending on alcoholic drinks, and in particular beer. They associate beer, which is an easy-to-drink product, with celebration, friendship and enjoyment.

The India beer market was stood at a value of nearly INR 371 billion in 2020. The industry is further expected to reach approximately INR 662 billion by 2026, exhibiting an estimated compound annual growth rate (CAGR) of about 9.2% during 2022-2027 (Source: EMR).

However, the market growth was severely affected amidst the outbreak of the COVID-19 pandemic due to the initial ban on sale of alcoholic beverages and the duty hikes that led to a spike in beer prices. The pandemic, while detrimental to the growth of the market, has also opened up the industry to innovations and an expansion of distribution channels, with suppliers turning to home deliveries and online platforms to help their sales amidst the closure of physical stores.

High Level of Risk on Account of Regulatory Environment

The Indian liquor industry is a high-risk industry, primarily on account of high taxes and innumerable regulations governing it. As a result, liquor companies suffer from low pricing flexibility and have inefficient capacities, which in turn, have led to low margin and weak financial profiles.

Government regulations at every level have affected the Indian liquor industry, introducing structural rigidities. Apart from the high level of taxes and levies, regulations pertaining to licensing, Greenfield or Brownfield brewery project, manufacturing process, distribution and advertising impinge on the industry. Further liquor being a state subject, every state has different regulations and tax rates for the industry apart from restrictions as well as levies on the inter-state movement of liquor.

These regulations have impacted the industry on all fronts. The high level of taxes and levies and the facts that companies have little control over distribution system mean limited pricing flexibility. Consequently, have low margin levels. As a result of the restrictions on capacities expansion and inter-state movement of liquor, larger players have either acquired or entered into contract manufacturing and bottling agreements with local players in various states. This means fragmented capacities with high overheads and poor economies of scale, which has further impacted margins.

In the long term, the liquor industry is expected to witness a shakeout and further consolidation, with weaker players exiting the industry. Larger players and those with strong parent support are likely to survive.

In spite of the complex taxation structure, it is believed that there is a significant long-term growth potential as a beer-drinking culture is growing in momentum. It is also expected that increasing levels of investment into the market from both local and global players.

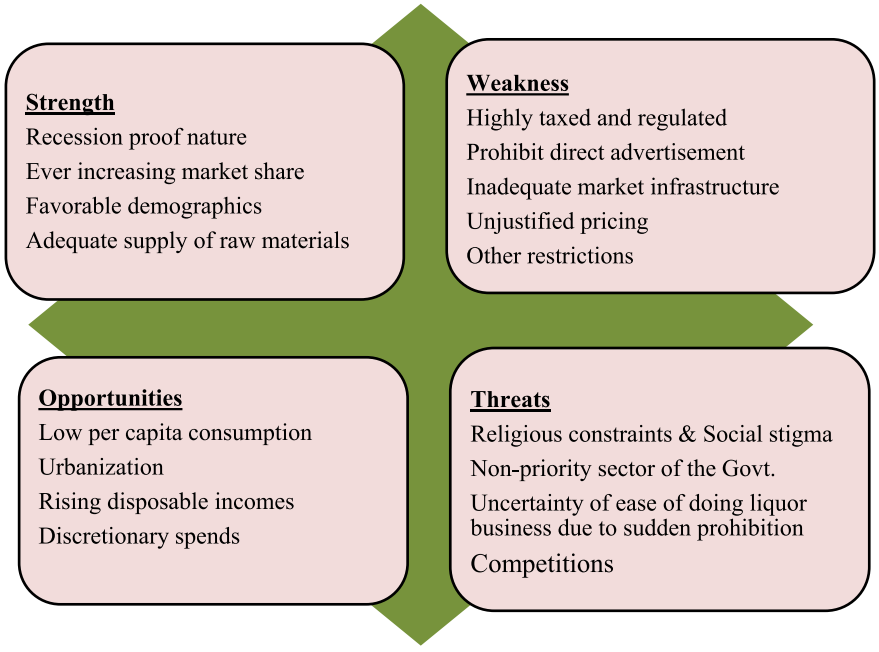
Higher liquor taxation has forced consumers to shift to strong beer, which continues to corner more than 80% of the total beer sales in India.

As the novel coronavirus (COVID-19) continues to spread across the world, analysts are constantly tracking the impact of this rapidly evolving situation on the markets and the consumer purchase behaviors. Thus, the current market trends and forecast will exhaustively reflect the effects of this emerging pandemic.

New Challenges Every Day

What is really attractive about beer brewing is that brewer should always do something that is connected directly to the approach, science and technology and art of the beer brewing. Indian beer market is changing very fast because of the Government policies so liquor business in India faces new challenges every day and there are always decisions that need to be taken as per the strategy of the industry.

SWOT Analysis



Technology Advancements

Many breweries are using a technology that remained basically unchanged over a period of more than 5 decades. New technological breakthroughs are rarely applied to the brewing process because most of the brewers are afraid that the change would harm either the quality or the image of their beer. In recent years, the situation has been changing - mergers and takeovers have created big brewing groups, and increasing competition in a shrinking beer market has forced the brewery to be more cost effective than before. Now, technological innovations are used to increase productivity, to save energy, or to create new products.

There will probably always be a market for the small, traditional brewery. The larger brewing groups, however, need to closely follow technological changes. Successful incorporation of the technological innovations in the brewing process will largely determine the strength and the competitiveness of the brewery in the future.

India's brewery industry has enjoyed impressive growth in recent decades, and demand for high-quality beer with specific taste and character has grown in parallel. Demand for the highest quality has a profound effect on process technology in beer brewing – ***"Quality is best served through dedication and long working hours".***

The technological side of brewing has changed radically over the past few decades. All the stages in brewing have become and are still becoming faster, more effective, more flexible and more product- and environment friendly.

In India, most of the practicing brewers are managing beer brewing by experience only i.e., learning by doing and practices beer brewing with no formal diploma/degree in brewing science and technology. It has been observed that there is an acute shortage of the book on beer brewing which will meet the requirement of the trade in India. Bearing in mind, I have written a book titled "Brewing – A Practical Approach" published by M/s Notion Press Media Pvt. Limited, Chennai in the year 2016 in order to bridge the gap (available in Amazon.in).

The book "Brewing – A Practical Approach" is for the practicing brewers, students perusing career in Brewing Science and the consultants who are imparting technical services to the breweries and has interest to learn, and determined to extend knowledge accordingly.

Water, the science that goes into making your cold `Aqua Vitae'!

SATYAM PANDYA

MSc. Brewing & Distilling, U.K

Quantitatively water is the predominant raw material in brewing, as almost all beers comprise of 90-95% water. The conditions of this raw material is of paramount importance to a brewer, as this will have immediate consequences to the quality of beer. Traditionally, the importance of water was so significant in terms of suitability and availability that the survival of a brewery was dependent on its water supply.

The fact, which is more frequently ignored is that water has its own unique taste and a variance (from one city to another and one country to the rest). If we were to produce the exact same beer in different worldwide locations, using the same production conditions in each brewery, the finished beer at each location would be slightly different even if the beer were intended to be the same.

Modern day brewers have limited options to draw water from: a) Surface water (local borehole supplies, wells and river) or b) Municipal water supply. The source thus influences the characteristic of the water, in terms of the mineral composition and hardness, which in turn dictates the suitability of its application. A classic example of this would be Burton on Trent (England) famous for its pale ales, Dublin (Ireland) for its stouts, Munich (Germany) for its dark lagers and Pilsen (Czechoslovakia) for its pilsners.

The ideal situation for a brewer would be to have a source of water that is pure, clean, untainted, and free of microbial/chemical contaminants and of course free of charge! However, in reality that is never the case. This is why brewers resort to water treatment and create a water profile best suited for the beer being brewed. Understanding water chemistry completely is very complex (imagine a giant iceberg) and this article is just the tip of it.

There are two aspects to a water treatment, one is physical and the second is chemical. The physical treatment involves filtration. The nature of the treatment would be dictated by the source of water. The physical/microbiological impurities are removed using one or a combination of filtration methods. The chemistry however, is where things get interesting. The brewer uses this tool to get the most out of the beer. The concentration of certain ions have significant effect on not only the process but also the final product.

The ions in brewing water are classified into positively charged (cations) and negatively charged (anions). In the Cation group the ones of primary interest are Calcium (Ca^{+2}), Magnesium (Mg^{+2}) and Sodium (Na^{+1}). Similarly, in the Anion group Carbonates (CO_3^{-2}), Sulfates (SO_4^{-2}) and Chlorides (Cl^{-1}) are key to focus on.

Calcium: Calcium plays an important role in giving water the hardness but has positive effect by reducing the pH throughout the brewing process. It increases the extract recovery, provides better fermentability to the wort and aids in reducing the extraction of tannins from the husk material. Although in excess, it has a detrimental effect on the hop isomerization thereby reducing the potential extraction from the bittering hops.

Magnesium: Magnesium also contributes to hardness in water but has a lower influence and is more soluble in water. Magnesium salts usually in 15-20 ppm range have a tendency to impart a sour after taste making it an obvious choice for sour beers. Lately, magnesium salts have also made it into hop forward IPAs' for their tendency to increase the perceived bitterness of hops. This cation is also very important to the yeast as it acts as an enzyme co-factor and helps in growth of healthy yeast cells especially during the initial stages of fermentation.

Sodium: Sodium being the last of the focus cations helps in providing subtle sweetness and palate fullness. The salts of sodium are more commonly added in traditional style ales and more malt forward beers. Gosé is also a beer style that has sodium salt added to give it the salty effect.

Carbonate: Carbonates heavily influence the alkalinity in the water. The presence of this anion has generally a negative impact on the beer. Beers brewed with water having high carbonate levels tend to be harshly bitter. Although, a high carbonate level in presence of calcium giving calcium carbonate is regarded as an asset when brewing dark beers like porters and stouts. Now you know why Munich, Dublin and London, are famous for their dark beers.

Sulfates & Chlorides: These two anions are generally used in combination despite the fact that their nature are quite complimentary to each other. Sulfates to Chloride ratio of 2:1 tend to make the beers feel drier on the palate and bring the hop flavours forward. The ratio of 1:2 on the other hand make beers less bitter, rounder and brings malt perception in the foreground.

In addition to these, there are other trace ions such as zinc, manganese, copper, iron etc. presence or absence of which have potential effect on the finished product. However, addition of salts to the brewing water (commonly referred to as Burtonizing water) is like seasoning for the food. A little, can go long way so the brewers have to be very careful about the quantities added and the outcome desired. The first step to this is to understand the existing water profile irrespective to the source. This can be done internally in the brewery lab, or get it tested at outside laboratory or obtain reports from local Municipal Corporation. Moreover, since the profile of incoming water changes every so frequently the brewers have to stay on top of it and ensure the baseline of the water profile is consistent.

Therefore, the next time you enjoy a pint of your favourite brew think of the amount of careful considerations that went in to make the beer taste the way it is. There is more to brewing than meets the eye.

Brewing accidents and safety guide

ANKUR AGGARWAL

Owner, Arishtam

April 9, 2020

Accidents never happen in isolation, it is a series of near-misses and mistakes that get compounded. While fermentation is a 5000-year-old ancient trade, one should not confuse simplicity with a lack of skill. Today we will be talking of some common mistakes that home brewers do which can cause bodily harm.

1. **Glass shards:** Be careful in moving around your glass carboys, beer bottles. If they shatter, it is a mess to clean. Worse if they shattered when filled. The beverage will carry off the broken glass pieces all over the work area and below the furniture which makes it a mess to clean. That is the reason why be extra cautious when you have kids or pets at home. Use stainless steel or other non-fragile material when possible.

2. **Boiling water:** Mashing would require 10-20 liters of boiling water which has to be stirred, boiled and transferred. Please be careful around flames and doing the heavy lifting of hot liquids. There is no manhood or bravado in using improper gear to hold and transfer your hot containers. Asking your friends and family to assist during the transfer is also a good idea. More people can prevent oversight and lead to a better grip on things.

3. Using **harsh cleaning agents:** If you are using strong acids, alkaline lyes or other corrosive industrial cleaning agents, please exercise caution. Not only gloves are required to prevent chemical burns, but proper eye gear and masks can prevent vapor and splash damages.

4. Shoes, gloves and safety glasses. I have seen home brewers wear chappals, shorts and an apron during brewing. What they fail to appreciate is that **wearing shoes** can prevent most foot injuries. Covering your arms and legs can prevent most burns, gloves are essential when dealing with harsh chemicals and safety glasses when dealing with hot liquids or chemicals is always a good idea.

5. **Spills:** All equipment has to be sanitized before and after every use. So we are dealing with large quantities of water during brewing. One thing most brewers forget is to clean the spills immediately. This can create accident zones due to a slippery floor.

6. **Bottle bombs** (separate article).

7. **Infected beer:** separate topic on how to prevent contamination of your ferments.

8. **Loose connections:** One of the reasons why we sell wort chillers instead of plate chillers is that amateurs often attach pumps to hot wort without fastening it properly leading to accidents. Avoid touching hot brew kettles directly. A simple rag or vessel grip is all you need.

9. **Short Circuits:** Keep water and electricity away.

10. **Malt Grain dust:** Milling and moving craft malts can lead to grain dust in the air that can cause nasal irritation.

11. **Boil Overs:** Mashing can take up to 2 hours and sometimes we leave it unattended leading to boil over of wort. This is often the first near misses in the series of mishaps that cascade to the accident.

brewing accidents and safety tips

Home brewing is a simple and rewarding hobby for those who want to make unique food experiences from scratch. It does not need a heavy investment in expensive equipment, but having a bit of common sense can make it really safe.

Common off flavors in beer, understanding cause and control over it to create perfect beer.

SAURABH N. PERKAR

HEAD BREWER
B.TECH CHEMICAL ENGINEER
BREWMASTER
BROTHER BARLEY BREWING COMPANY

Esters are most important byproduct from fermentation process as we know, and its reaction of formation are affected by yeast , wort composition and different ion concentration from vessel and water used.

we will have overview of all esters produced by different yeast and its affect on beer quality and how to control its formation.

1. Diacetyl (2,3-butanedione)

Diacetyl is usually considered as an off flavor because it have buttery or butterscotch kind of slick sensation on palate. this is easily detected in lager beers but if present in darker beers its not easily detected because get overpowered by other robust flavors.
Diacetyl is and off flavor for all beers except some styles like bitters, scotch ale , dry sided stouts.
once diacetyl is formed it can get more promoumced over time because if not stored at chilling higher temparature can lead to breakdown of alpha acetolactate into diacetyl.

CAUSE

Usually formed by yeast itself if fermented at really low temparature than optimum. also can caused if boil time was too short or not properly boiled.

CONTROL

Always boil properly for appropriate time.
Avoid aeration after fermentaion starts. for example if we did 2 single batches 1 day each to fill fermenter so dont aerate your wort for 2nd day of wort chilling.
Always rise your fermentation temparature at the end of fermentation so yeast can reabsorb diacetyl. or atleast 48 hrs of warm maturation depending of yeast optimum temparature.

2. Mercaptan (ethanethiol)

This one feels like rotten veggie, sulphury reminds of propane or natural gas. can we considered for marzen but other than that its and off flavor because this will never reduce with maturation instead it will increase.

CAUSE

Mercaptan is caused by autolysis and infection by anaerobic bacteria. autolysis caused by dead yeast cells if stayed in beer for longer time.

CONTROL

Always keep vessels and line cleaned before brewing to avoid uptake of wild bacteria. make sure to remove most of dead yeast after fermantation if no need of biotransfornation.

3. Hydrogen sulphide (H2S)

This one feels like rotten eggs, sulfury. will feels like desired flavor at first but with time becomes off flavor for most beers.

CAUSE

Usually produced by yeast at low concentration that can be reduced with longer maturation time, but if wort doesnt consist of enough yeast nutrients so it will be produced at higher concentration. and can cause by autolysis by dead yeast cells.

CONTROL

Try to drain yeast as quick as possible after fermentation.
suppliment yeast with enough aeration so yeast cells will not be under pressure , give enough yeast nutrients mainly zinc.

4. Grainy \ husky

Feels like fresh wheat, grainy , raw grain harshness. usually an off flavor for most beers but a desired flavor for malty lagers.

CAUSE

Caused by higher level of isobutyraldehyde in fresh malts which were not given rest phase. during brew it can cause by longer mash time , oversparging or sparging at higher temparature. during miling if 2mm crush size is way too much more than 7mm can lead to this problem also.

CONROL

First of all try to maintain a good balance of fine and coarse crush size during milling. try to avoid longer mash time if by mistake did overcrushing.
try to sparge maximum of 78 degree celcius hot water over bed and never collect wort once lautering run gravity goes below 1.008 sp.gravity .

5. Metallic (ferrous sulphate)

Feels like iron, harsh rusty an off flavor always.

CAUSE

Usually caused by metallic ions from vessels and brewing water also.

CONTROL

Best way to avoid this, is to check water ions concentration. and usually happens with new plants. to avoid this better do repeatadly cip of vessels before brewing first batch.

Malo-lactic Fermentation

MANJUSHA NARSINENI

Alcohol Technologist

Malolactic fermentation (MLF) is the process by which bacteria convert malic acid into lactic acid and carbon dioxide. These lactic acid-producing bacteria can include Oenococcus oeni and other species of Pediococcus and Lactobacillus. Bacteria may be naturally present in the winemaking equipment (such as used oak barrels), or the winemaker may inoculate the wine with a specific malolactic culture, such as O.oeni. Malolactic conversion happens after or during yeast fermentation (primary fermentation), which is why it's sometimes called secondary fermentation.

The development of the malolactic fermentation, bioconversion of L-malic acid to L-lactic acid, is a difficult and time-consuming process that does not always proceed favorably under the natural conditions of wine . Instead of yeasts, bacteria play a key role in malolactic fermentation, that has the advantage of reducing some of the acidity and making the resulting wine taste smoother. Depending on the style of wine the winemaker intends to produce, malolactic fermentation can take place at the same time as the yeast fermentation. Moreover, some yeast strains can be developed that can convert L-malate to L-lactate during alcohol fermentation.

It was just in 1900 that people started to study this phenomenon, after they had understood that the reduction of the acidity in wines was ascribable to the beneficial effect of some bacteria, Leuconostoc and Lactobacillus. They were naturally present in the must and were reactivated due to changes of the conditions of conservation which transformed the malic acid into lactic acid and carbon dioxide. But let's try and better understand what this critical mechanism is, analysing it step by step.

Once the alcoholic fermentation is concluded and the sugar have all been consumed by the action of the yeasts, the carbon dioxide decreases and it is replaced by a higher volatile acidity of the wine.
If all the ideal conditions are present:

- Constant temperature between 18 and 20 C°
- Wine pH between 3,4-4: wines should not be too acidic
- Sulphur dioxide under 5mg per liter
- Ethyl alcohol under 15%
- the malolactic fermentation takes place and its equation is the following:

COOH-CHOH-CH2 –COOH à COOH-CHOH-CH3 + CO

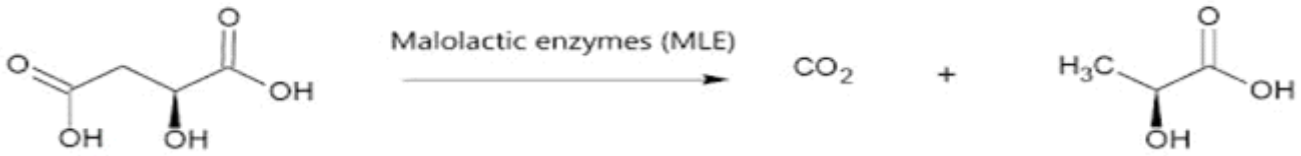


Fig: Degradation of L-Malic acid

The same bacteria responsible for production of lactic acid is also responsible for the production of acetic acid which is the acid that gives typical vinegar flavor.Therefore, uncontrolled malolactic fermentation is unacceptable.Malolactic bacteria are not remarkably alcohol tolerant and a wine with alcohol level higher than 14% will not support it. Because malolactic fermentation can cause the pH of the wine to rise, it may make it susceptible to other bacterial infections. Therefore sulphite levels needs to be adjusted.

If the wine is kept at relatively warm temperatures the fermentation will be complete within two months. If you wish to know that malolactic fermentation is complete, an accurate chromatography test is the only way to find out.

Purpose of Malolactic Fermentation:

There are three main reasons why winemakers facilitate malolactic fermentation:

1. **Acid reduction:** Malolactic fermentation decreases acidity, since malic acid is more acidic than softer lactic acid. The reduction of total acidity can lead to spoilage, so winemakers sometimes have to re-acidify wines by adding tartaric acid.

2. **Flavor:** MLF can add a buttery, creamy complexity to wine by mellowing out tart fruity flavors. It also can make for softer wines with a full, smooth mouthfeel.

3. **Stability:** Allowing wines to undergo MLF before bottling increases stability by preventing malolactic fermentation from occurring after bottling. If wine undergoes malolactic fermentation during bottling, the wine can look cloudy (due to the presence of malolactic bacteria) and become slightly sparkling.

Why do winemakers use Malolactic Fermentation?

One of the many compounds in grape juice is malic acid, named after the Latin word for apple, malum, it is found in many fruits and plays a big part in the development of flavour compounds during ripening. Fundamentally malic acid tastes... well, there's no way around this... harsh and sour.
Now sourness is not a terrible thing to have in wine, acidity offers balance to the palate, but some wines would be better with less of it. Acids are pretty reactive and with a little help malic acid can be chemically changed into a less harsh acid called lactic acid, the name derived from the Latin for milk. Lactic acid is softer; the light freshness found in yoghurt is the result of a lactic acid fermentation. So by encouraging the growth of lactic acid bacteria such as Lactobacillus, the wine can go through a second fermentation to reduce the perceived acidity; this is the malolactic fermentation – changing malic acid to lactic acid.

Malolactic fermentation is said to improve the biological stability of wines as well as to increase the complexity of aroma and flavour. The effect of stabilization of the wine against further growth by other lactic acid bacteria is the most important consequence of the malolactic fermentation.

The change in acidity is caused by infection of wines by spoilage strains of malolactic bacteria. The importance of strain selection for malolactic fermentation, not only for deacidification, but with respect of flavours, contrasts with the situation for the selection of wine yeast strains for the alcoholic fermentation. It is expected that desirable end metabolites, specifically associated with various non-spoilage strains of malolactic bacteria, are also made. In red wine the flavour effects of most of these malic fermenters is subtle and generally not perceived except under rigid taste panel conditions, in which case, one bacterial strain might be said to produce a wine with more complexity of flavour than another. An exception is diacetyl an end product with a low sensory threshold.

Lactococcus lactis is able to ferment citrate that is converted into pyruvate by additional pathways, and this can lead to the formation of the flavour compound diacetyl. Diacetyl is an important flavour compound in the dairy and winemaking industries. There is interest in the construction of Lactococcus lactis strains which can generate increased yields of diacetyl. Genetic manipulation of the biochemical pathway results in enzymes related to diacetyl production being induced. Several genes are involved: the ldh gene, encoding lactate dehydrogenase; the ilvBN gene encoding an α-acetoacetate synthase; the aldB gene encoding aceto lactate decarboxylase; the dar gene encoding diacetyl–acetoin reductase; the oad gene encoding oxaloacetate decarboxylase; and the pfl gene encoding pyruvate formate lyase. By using genes ldh, aldB and ilvBN in metabolic engineering experiments, an increased yield of acetoin and diacetyl production has been obtained.

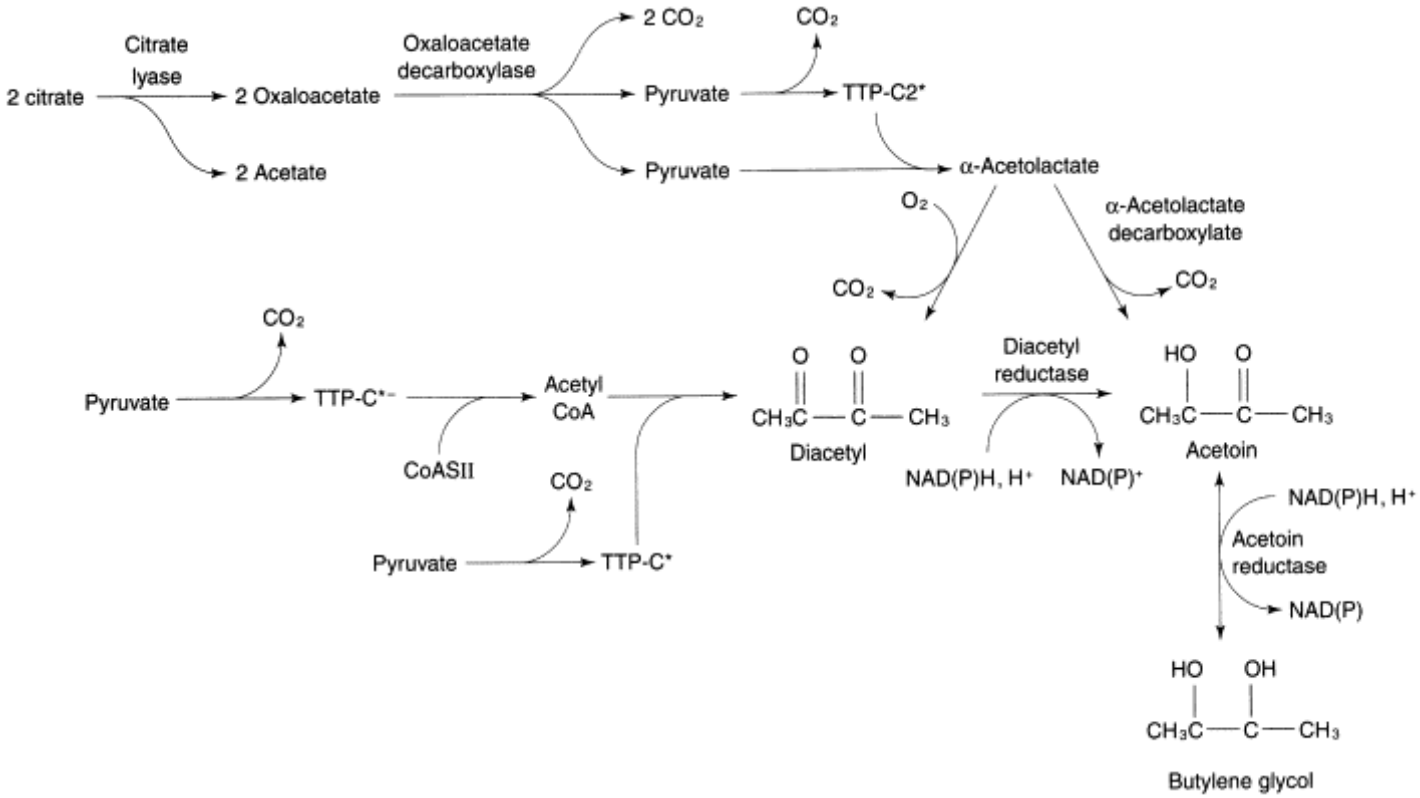


Fig: Pathways of diacetyl formation.

The benefits of malolactic fermentation include the lowering of acidity in high acid wines and enhancement of sensory characteristics through bacterial activity. Undesirable effects include the excessive reduction in acidity of high pH wines leading to the risk of spoilage, production of undesirable flavours, colour changes and formation of amines. It is necessary to seek better methods of controlling the occurrence and outcome of malolactic fermentation, including stimulation of indigenous flora, inoculation of bacteria, use of immobilized bacterial cells or enzymes and use of carbonic maceration for partial degradation of malic acid prior to natural malolactic fermentation.

The effect of malolactic fermentation also depends heavily on the grape variety. In a Chardonnay, for example, malolactic fermentation contributes strongly to aromas and compounds which have buttery, nutty, yeasty, oaky and sweet aromas. Malolactic fermentation slightly changes the aromatic profiles of wines. The Chardonnay wines are perceived as higher in hazelnut, fresh bread and dried fruit notes, whereas Pinot Noir wines lose part of their berry notes in favour of animal and vegetable notes. On the contrary, the absence of malolactic fermentation retains specific aromas such as apple and grapefruit – orange in Chardonnay and strawberry–raspberry in Pinot Noir.

How to Prevent Unwanted Malolactic Fermentation:

Some winemakers prevent malolactic fermentation to preserve acidity, usually in warmer climates where the wine is less naturally acidic. (Exceptions include the acidic white wines made in cold climates from riesling, gewürztraminer, and chenin blanc grapes.) Malolactic fermentation can only occur at temperatures higher than 68 degrees Fahrenheit, so keeping wine cold is one way of preventing malolactic fermentation. Another method is early racking; malolactic fermentation requires a specific pH and won't work with wines that have a very low pH (below 3.1). Other techniques include the addition of sulfur dioxide, which kills the lactic acid bacteria. To prevent spontaneous malolactic fermentation after bottling, winemakers can filter finished wine.

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Bottle Fermentation:

When we talk about fermentation in wine, we usually refer to the alcoholic fermentation carried out by yeasts in large vessels made of different materials, but this common term encompasses other processes that also receive the same denomination. Thus, for example,we find fermentation in the bottle . It is a typical process associated with the production of sparkling wine, initiated in the Champagne region and extended to other areas of the world. After the first fermentation carried out by the yeasts, the wine is bottled and undergoes a second fermentation in which sugar and additional yeast, known as liqueur detirage, are added to the wine. This second fermentation produces the characteristic carbon dioxide bubbles that identify sparkling wine.

Carbonic Fermentation Versus Malo:

As grapes ripen in the vineyard, the amount of malic acid can drop significantly, decreasing the probability of spontaneous malolactic fermentation—quite simply because there is little or nothing to convert. But what might not be as well known is how another process can also block it: carbonic maceration. “You don’t really get any malolactic fermentation in wines made under carbonic maceration, because it eats up malic acid,”. Malic dehydrogenase, an enzyme, is the compound responsible for this. It transforms malic acid into ethanol and two kinds of acid, succinic and aminobutyric, with the former contributing a small amount of saline and occasionally bitter notes. As the malic acid disappears, the wine’s pH rises, contributing to a smoother, rounder profile, not unlike what would be provided by malolactic fermentation.

While the basic process is clearly beneficial, there are risks involved as well. If there are still some sugars left in the wine at the end of alcoholic fermentation, even less than 3 grams per liter (which would normally be considered dry), "lactic bacteria can lead to the piqûre lactique," a spoilage that was traditionally quite common in Beaujolais wines.

Carbonic Maceration

This process is characterized by the induction of fermentation inside the grapes, without the addition of external yeasts. The production of Beaujolais wine, which consists of storing whole bunches of grapes in a closed container in which oxygen is replaced by carbon dioxide, is an example of this process. In this process, enzymes inside the grapes break down cellular matter to form ethanol and other chemical properties. Wines made by carbonic maceration presented higher aromatic quality due to their higher total content of esters and acetates, as well as a greater color intensity due to a higher phenolic content and higher rates of ionization and polymerization. In addition, it was observed that the antioxidant activity, the content in coumaroyl derivatives of anthocyanins and the vitamins A and B were considerably greater in wines made by carbonic maceration.

In the last 20 years, this scenario has resulted in the search for and selection of new strains by the scientific community, as evidenced in the high number of publications related to non-Saccharomyces yeasts of oenological interest as well as in the development and market launch by commercial houses of products based on these selected non-Saccharomyces strains in various formats included in Resolution OIV-OENO 576B-2017 of the International Organization of Vine and Wine (OIV), which includes

active dry yeast (ADY, dry matter > 92%),
active frozen yeast (AFY, dry matter 40–85%),
compressed yeast (COY, dry matter 30–35%), and
cream yeast (CRY, dry matter 18–25%),

in addition to encapsulated yeasts (pearls) or immobilized yeasts (ENY) with more than 86% dry matter. Additionally, several commercial products in the form of fresh liquid yeast have been identified from an online review.

Micro-Oxygenation

Another advance in the winemaking process is oxygenation. There are two stages in the winemaking process where it is particularly important—fermentation and ageing. Oxygenation is intrinsically correlated with phenolic compounds, directly influencing the quality of the wine. Among polyphenols, anthocyanins and tannins contribute to the organoleptic characteristics of wines, improving both color and astringency. Since the phenols extracted from grapes change gradually due to biochemical reactions, and this promotes a decrease in astringency and a stabilization of colour, the addition of a small amount of oxygen was proposed to improve the quality of the wine. This process, called micro-oxygenation accelerates the transformation of phenols. The final objective is to obtain products with more color and less astringency.

Non-Saccharomyces Yeasts Available on the Market:

Various reviews have addressed aspects such as the metabolic characteristics and the most important contributions of non-Saccharomyces to wine, improvement in wine properties such as acidity, and its influence on various oenological parameters, as well as statistical information regarding the providing companies, more commercialized species, quantity of commercial strains, regulations, and patents, among other aspects.

Based on an Internet search, as a part of this study, it is estimated that about 42 commercial products based on non-Saccharomyces yeasts are available for winemaking in different formats, of which 52% are represented by three species: Torulaspora delbrueckii, Lachancea thermotolerans, and Metschnikowia pulcherrima. In addition, 79% are marketed as pure cultures (monoculture) and the remaining available products are offered as multi-starters (blends of various yeast species).Four companies produce 52% of the supply.

Genetic Modification of Yeasts and Vines:

The great advance in wine production focuses on the immense possibilities offered by biotechnology, focused on the genetic modification of both the vines and the microor-ganisms that intervene in the production of wines, mainly yeasts, but also lactic acid Fermentation bacteria . The technological possibilities are ahead of the market, since there are currently advances that allow simultaneous alcoholic and malolactic fermentations. The inoculation of lactic acid bacteria together with yeast starter cultures is a promising system to enhance the quality and safety of wine. However, there are numerous legal limitations as in the case of Europe, as well as the reluctance of some consumers who choose not to consume products manufactured in whole or in part, using genetic manipulation. In the US and Australia, it is not a problem, nor is the marketing of these wines in other regions of the world.

NAGPUR WINE CLUB CELEBRATES 8TH NAGPUR WINE & FOOD FESTIVAL 2021

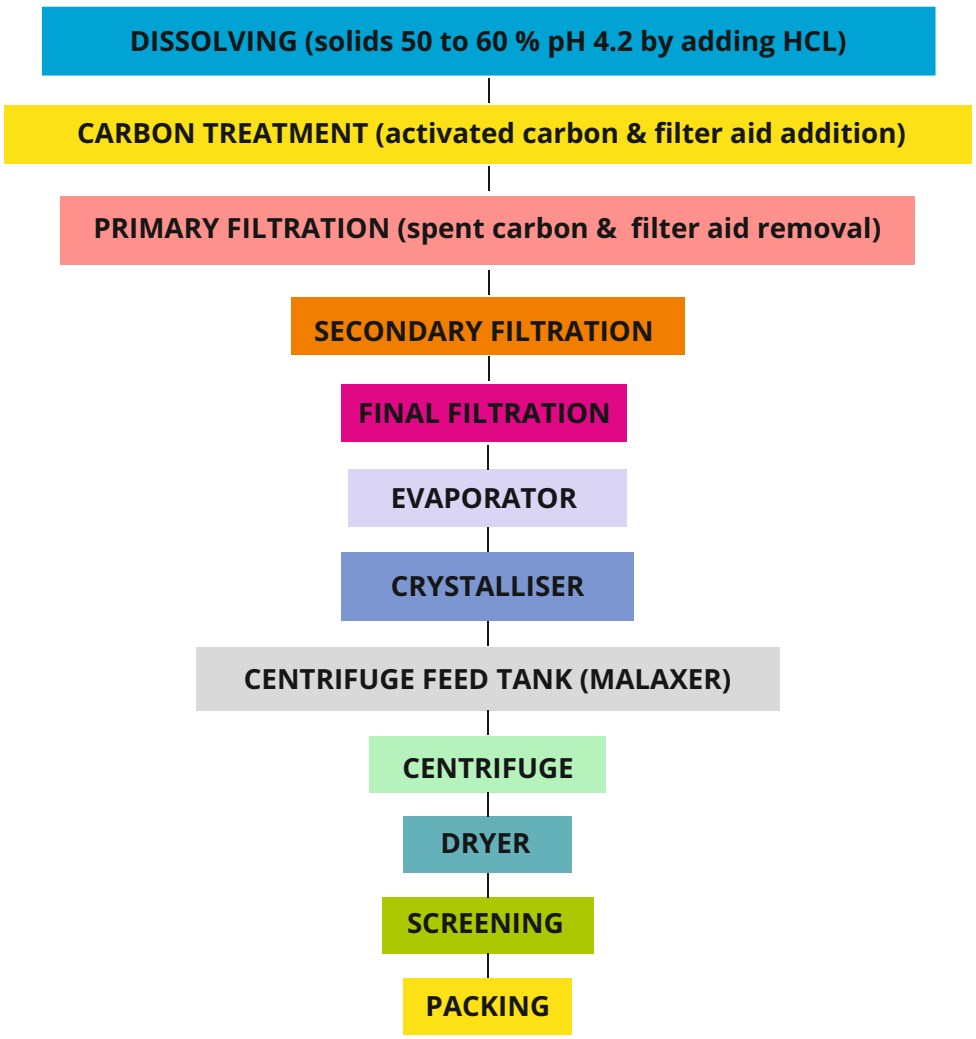
MANUFACTURING PROCESS OF DEXTROSE

Mr. GOPAL DHANDE

ANHYDROUS

Manufacturing of dextrose anhydrous is removal of water molecule, micronic particles (slit or dirt) and endotoxins by dissolving dextrose monohydrate in hot D.M. or RO water, filtration and recrystallization. Dextrose anhydrous is coming under pharmaceutical products so plant and human (workers working in production area) hygiene to be maintained as per good manufacturing practices, process parameters to be maintained as per standard operating procedures. For manufacturing dextrose anhydrous evaporator cum crystalliser or separate evaporator and crystalliser are used for crystallisation. In evaporator cum crystalliser partical size is bigger and coming uniform so bulk density is lower and uniform as against separate evaporator and

FLOW CHART



DISSOLVING – Dextrose monohydrate is dissolve in hot D. M. or R.O water of 70°C upto getting 50 to 60% solid. pH of the solution is adjusted 4.2 by adding HCL. Through out the process temperature of syrup is maintained 70°C till final filtration.

CARBON TREATMENT – After adjusting 4.2 pH activated carbon and filter aid is added for decolourisation and to in enhance filtration respectively.

PRIMARY FILTRATION – After one half hour of adding activated carbon and filter aid syrup of 70°C is passed through primary filter press for removal of activated carbon and filter aid and clear filtrate syrup is transferred to storage tank and waste carbon and filter aid is separated as waste. For primary filter press polypropylene filter cloth of 20 micron used as a filter media.

SECONDARY FILTRATION – Syrup 70° C is passed through secondary filter press and filtrate syrup is transferred to storage tank. Synthetic fibre cloth of 10 micron used as filter media.

FINAL FILTRATION – Syrup 70° C is passed through final filter press and filtrate syrup is transferred to storage tank. Filter pads of 5 micron used as filter media.

EVAPORATOR – In evaporator cum crystalliser clear syrup is evaporated under vacuum(to avoid colour formation) upto getting 82 % solid, then seeding of 50 kgs dextrose anhydrous done at 65°C. Till getting proper crystals temperature of syrup is maintained 65°C and solid 82 % by adding little quantity of D. M. or RO water. Continuous agitation is done by agitator having round blades till batch released. Total 7 to 8 hours required for proper crystal formation. For separate crystalliser syrup of 80 to 82 % having 70 to 72° C released in crystalliser for crystallisation.

CRYSTALLISER – Syrup of 80 to 82 % solid transferred to crystalliser for crystallisation where 150 to 200 kgs crystallised material from previous batch is kept for seedding. Each crystalliser has a water jacket and coil for hot water circulation and cooling the syrup to 62 to 65° c till getting crystals. Total 7 to 8 hours required for proper crystal formation. After getting crystals formation magma transferred to jacketed centrifuge feed tank (malaxer) with continuous agitation to avoid lumps formation.

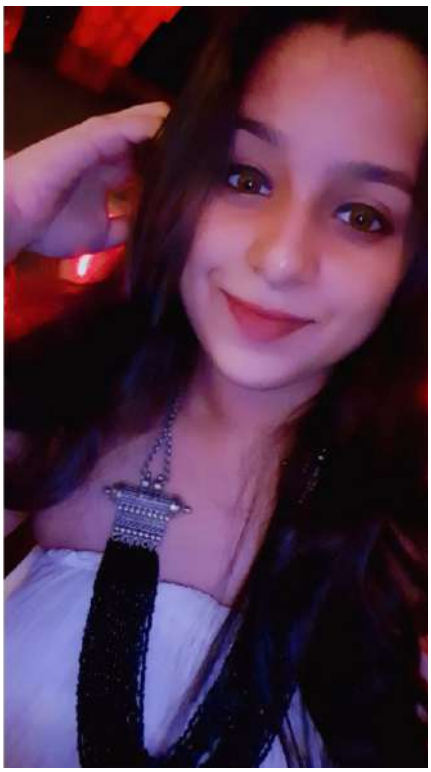
CENTRIFUGE FEED TANK (MALAXER) – Magma from centrifuge feed tank (malaxer) feeded to centrifuge. Hot water is circulated in jacket of malaxer till emptiout.

CENTRIFUGE – Magma passes into a centrifuge, which separates the dextrose anhydrous crystals from magma and uncrystalised syrup i.e. mother liquor. Inner side of centrifuge basket stainless steel perforated screen and stainless steel mesh is provided to avoid come out fine crystals with uncrystalised syrup while separation and washing of crystals with hot D. M. or RO water. The crystal are washed in the centrifuge to remove excess uncrystalised syrup called as wash water, and then the crystal discharged from centrifuge transferred to dryer feed hopper. And wash water and mother liquor recycled with next fresh syrup. After few cycles mother liquor seperated as hydrol.

DRYER – For drying of dextrose anhydrous
Flash dryer, fluid bed dryer and rotary dryers are used. Mainly in india most of the companies used flash dryer. Before dryer wet dextrose anhydrous are collected in hoper with spiral ribbon agitator to avoid lumps formation of wet dextrose anhydrous and continuous conveyer is used to feed wet dextrose anhydrous in dryer. The wet dextrose anhydrous conveyed into the flash dryer pipe, in the effect of high speed hot air flow(air heated by steam heat exchanger) rotating with along the hot pipe wall the rotating movement aggravates the continuous rolling of the wet dextrose anhydrous in the pipe which hot air and wet dextrose anhydrous fully contacted. Inlet temperature of hot air is maintained 145°c by adjusting steam valve of heat exchanger. Dried dextrose moisture is maintained below 1%.

SCREENING – Screening of dextrose anhydrous done by vibro shifter having 30 and 120 mesh stainless steel screen. Over size of 30 mesh and under size of 120 mesh recycled by dissolving.

PACKING – Packing of dextrose anhydrous is done in double HDPE bags with linear.



SHRADHA SINGH

Member - APEX WINE CLUB

THE EARLY YEARS

WINE HAS A RICH HISTORY DATING BACK TO ROUGHLY 6000 B.C

ARCHAEOLOGICAL EVIDENCE SUGGESTS THAT THE EARLIEST WINE PRODUCTION CAME FRO SITES IN GEORGIA (a former kingdom and province of RUSSIA)

AND THE CAUCASUS (kaw-keh-ses) MOUNTAIN RANGE BETWEEN THE BLACK SEA AND THE CASPIAN SEA THAT FORM PART OF THE TRADITIONAL BORDER BETWEEN EUROPE AND ASIA MINOR . AS SOCIETIES MOVED AROUND , CIVILIZATION TRANSPORTED & CULTIVATED THE WINES WHEREVER THEY COULD GROW




ANCIENT EGYPT

- HISTORICAL RECORDS ILLUSTRATE EGYPTIAN VINEYARDS DATING BACK TO 2900 BC .
- AT THAT TIME THE CONSUMPTION OF WINE WAS THE DRINK OF THE PRESTIGIOUS AND PRIVILEGED , LIMITED TO THE NOBILITY AND CLERGY IN ANCIENT EGYPT
- THE HIEROGLYPHICS & ARCHAEOLOGICAL EVIDENCE THAT WINE WAS USED IN RELIGIOUS CEREMONIES
- AND WAS BURIED WITH THE DEAD .
- WHEN TOMBS OF PHARAOHS WERE OPENED , CLAY JARS USED FOR HOLDING WINE .
- THE JARS WERE MARKED IN A MANNER THAT WAS SIMILAR TO THE WAY BOTTLES ARE LABELLED TODAY
- THE BOTTLES OR THE JARS USED TO INDICATE :-

  A) WHERE THE GRAPES WERE GROWN

  B)THE YEAR WHEN THE GRAPES WERE HARVESTED

  C) & WHO MADE THE WINE

APPARENTLY , THIS WINE WAS A PART OF THE DECEASED PHARAOH'S PROVISIONS FOR THE AFTER LIFE

WINE REPORT

KANCHAN SINGH

Chapter Head - South Delhi, India
Apex Wine Club India
1 December 2021, Wednesday

Winter is incomplete without delicious wine and the first which is worth a try is Riesling. Riesling is a grape which creates exquisite winter wines and these pair well with good food and dessert. Christmas is the perfect opportunity to savour this wine which ranges from dry to sweet. Riesling is fragrant and rarely oaked. It can be served chilled.

ENVIRONMENTAL DEGRADATION

DR. SEEMA MISHRA

Human activity is causing environmental degradation, which is the deterioration of the environment through depletion of resources such as air, water and soil; the destruction of ecosystems; habitat destruction; the extinction of wildlife; and pollution. It is defined as any change or disturbance to the environment perceived to be deleterious or undesirable. As indicated by the I=PAT equation, environmental impact (I) or degradation is caused by the combination of an already very large and increasing human population (P), continually increasing economic growth or per capita affluence (A), and the application of resource-depleting and polluting technology.

According to a 2021 study published in Frontiers in Forests and Global Change, roughly 3% of the planet's terrestrial surface is ecologically and faunally intact, meaning areas with healthy populations of native animal species and little to no human footprint. Many of these intact ecosystems were in areas inhabited by indigenous peoples.

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