BrewTimes™

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BALAJI ENZYME & CHEMICAL PVT LTD

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Introducing BrewTimes :

We M/s Balaji Enzyme & Chemical Pvt Ltd, are pleased to bring to you our February 2023 month edition of BrewTimes.

We would like to use this platform to introduce our association with BetaTec, UK for their natural solutions for ethanol recovery in grain and molasses distilleries. The product is revolutionary and unlike any in the market is 100% natural and antibiotics free. Vitahop series of products helps in ensuring optimum yield and keeps the yeast healthy all naturally.

We are extremely proud of announcing our association with IIT Bombay Research Park. We have begun a journey together to work on sustainable, reliable and innovative solutions for the Food and Beverage Industry.

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.

CHARACTERISTICS

Our newest proprietary hop is bursting with sweet mandarin, zesty citrus peel and fresh pine needles. It can be used in large doses to make a hazy fruit bomb, or pared back to make a lighter style. This depth is best accessed through late additions or dry hopping.

ANCESTRY

Eclipse® was created by the HPA breeding program in 2004 and commercialised in 2020. Its ancestry is the result of cross pollination of high alpha Australian and North American hops.

FLAVOUR PROFILE

Mandarin, Citrus Peel, Pine

RECOMMENDED BEER STYLES

IPA, NEIPA, XPA, Lager

ANALYTICAL DATA

Cultivation Area	Australia
Ancestry	High Alpha Australian, North American
Alpha Acids (%)	15.7 - 18.7
Beta Acids (%)	5.9 - 9.0
Alpha/Beta Ratio	1.8 - 2.7
Cuhomulone (% of alpha acids)	33.0 - 37.0
Total Oils (ml/100g)	1.7 - 1.9
Oil Concentration (microlitres of oil/g alpha)	108.0 - 119.0
Myrcene (% of whole oil)	42
Linalool (% of whole oil)	0.6
Caryophyllene (% of whole oil)	11.1
Farnesene (% of whole oil)	0.2
Humulene (% of whole oil)	1.4
Selinene (% of whole oil)	17.9
Humulene/Caryophllene Ratio	0.1

HPA

Hop Products Australia
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LAGER-BF16

Description

BF16 is produced under a series of rigorous processes, including pure expanding culture, separation, drying processes and so on. The whole processes meet the requirements of international food safety and health laws. BF16 is an excellent lager yeast to help produce lagers of the finest quality. It is a natural strains and GMO free , classified as Saccharomyces cerevisiae. It can be used in craft beer houses and small beer factories.

Brewing properties

Vigorous fermentation, high attenuation and high flocculation.
Quick start to fermentation, which has been repeatedly validation.
Suitable for high drinkable and neutral flavor lagers
Displays slight fragrance of malts and exquisite aroma with little unpleased smell if properly handled.
Best when used at traditional lager temperature in the suggested manner.
Help to taste refreshing and present a clear and bright body.

Application

Rehydrate the yeast in 5~10 times its weight of boiled water or diluted wort(2:1 water to wort) at 22~30℃ in a disinfectant container.
Gently stir for 5 minutes to suspend yeast completely and leave it for 10~20 minutes.
Then adjust temperature to that of the wort if there is a temperature shock greater than 10℃ by mixing some wort.
Just inoculate without delay and blend the yeast and wort by the circulating pump.
The whole process should be limited to 30 minutes to reduce risk of other microbial invasion.
It not necessary to aerate wort to help the yeast achieve active growth.

INGREDIENTS: Yeast (*Saccharomyces cerevisiae*), emulsifier E491
Fermentation temperature:10~20℃
Dosage instructions: 50 to 100 g/hl , increase dosage up to 100 to 300 g/hl at special conditions of fermentation

Typical analysis

Dry weight: ≥93%
Living yeast cell: ≥8.0*109 cfu/g
Wild yeast:≤1.0*103 cfu /g
Total bateria: ≤5.0*103 cfu /g
Lactobacillus: ≤1.0*103 cfu /g
Pathogenic micro-organisms: none
Before releasing to markets, all products must pass a series of detection in our factory.

Packaging

Vacuum aluminum foil packaging, 500g / bags， 20bags/carton, 10kg/bag,1bag/carton

Storage

Store in low temperature and dry place, with the shelf life of 24months.

ALE-CN36

Description

CN36 is produced under a series of rigorous processes, including pure expanding culture, separation, drying processes and so on. The whole processes meet the requirements of international food safety and health laws. CN36 is an excellent ale yeast to help produce varieties of the common ale styles. It is a natural strains and GMO free, classified as Saccharomyces cerevisiae. It can be used in craft beer houses and small beer factories.

Brewing properties

Vigorous fermentation, high attenuation and high flocculation.
Quick start to fermentation and reaching a final gravity during 4 days at 18℃.
Suitable for high concentration of beer ,more than 6%(v/v).
Displays slight ester aroma without any unpleased smell if properly handled.
Meanwhile, it can be used for lager-style beer at a low temperature.
Help to taste soft and present a clear and bright body.

Application

Rehydrate the yeast in 5~10 times its weight of boiled water or diluted wort(2:1 water to wort) at 22~30℃ in a disinfectant container.
Gently stir for 5 minutes to suspend yeast completely and leave it for 10~20 minutes.
Then adjust temperature to that of the wort if there is a temperature shock greater than 10℃ by mixing some wort.
Just inoculate without delay and blend the yeast and wort by the circulating pump.
The whole process should be limited to 30 minutes to reduce risk of other microbial invasion.
It not necessary to aerate wort to help the yeast achieve active growth.

INGREDIENTS: Yeast (*Saccharomyces cerevisiae*), emulsifier E491
Fermentation temperature: 10~25℃
Dosage instructions: 50 to 100 g/hl , increase dosage up to 100 to 300 g/hl at special conditions of fermentation

Typical analysis

Dry weight: ≥93%
Living yeast cell: ≥8.0*109 cfu/g
Wild yeast:≤1.0*103 cfu /g
Total bateria: ≤5.0*103 cfu /g
Lactobacillus: ≤1.0*103 cfu /g
Pathogenic micro-organisms: none
Before releasing to markets, all products must pass a series of detection in our factory.
※According to ASBC and EBC methods of analysis.

Packaging

Vacuum aluminum foil packaging, 500g / bags，20bags/carton, 10kg/bag,1bag/carton

Storage

Store in low temperature and dry place, with the shelf life of 24months.

ALE-CS31

Description

CS31 is produced under a series of rigorous processes, including pure expanding culture, separation, drying processes and so on. The whole processes meet the requirements of international food safety and health laws. CS31 is an excellent ale yeast to help produce ales of fruit aroma. It is a natural strain and GMO free, classified as Saccharomyces cerevisiae. It can be used in craft beer houses and small beer factories.

Brewing properties

Vigorous fermentation, high attenuation and high flocculation.
Quick start to fermentation, which has been repeatedly validation.
Suitable for high drinkable and neutral flavor lagers
Displays slight fragrance of malts and exquisite aroma with little unpleased smell if properly handled.
Best when used at traditional lager temperature in the suggested manner.
Help to taste refreshing and present a clear and bright body.

Application

Rehydrate the yeast in 5~10 times its weight of boiled water or diluted wort(2:1 water to wort) at 22~30℃ in a disinfectant container.
Gently stir for 5 minutes to suspend yeast completely and leave it for 10~20 minutes.
Then adjust temperature to that of the wort if there is a temperature shock greater than 10℃ by mixing some wort.
Just inoculate without delay and blend the yeast and wort by the circulating pump.
The whole process should be limited to 30 minutes to reduce risk of other microbial invasion.
It not necessary to aerate wort to help the yeast achieve active growth.

INGREDIENTS: Yeast (*Saccharomyces cerevisiae*), emulsifier E491

Fermentation temperature: 15~25℃

Dosage instructions: 50 to 100 g/hl , increase dosage up to 100 to 300 g/hl at special conditions of fermentation

Typical analysis

Dry weight: ≥93%
Living yeast cell: ≥8.0*109 cfu/g
Wild yeast:≤1.0*103 cfu /g
Total bateria: ≤5.0*103 cfu /g
Lactobacillus: ≤1.0*103 cfu /g
Pathogenic micro-organisms: none
Before releasing to markets, all products must pass a series of detection in our factory.
※According to ASBC and EBC methods of analysis.

Packaging

Vacuum aluminum foil packaging, 500g / bags，20bags/carton, 10kg/bag,1bag/carton

Storage

Store in low temperature and dry place, with the shelf life of 24months.

ALE-WA18

Description

WA18 is produced under a series of rigorous processes, including pure expanding culture,separation and drying processes. The whole processes meet the requirements ofinternationalfood safety and health laws. WA18 is an excellent wheat beer yeast to enhance the typical esteryaromas of wheat beer. It is a natural strain and GMO free and has been widely used in craft beerhouses and small beer factories.

Brewing properties

Medium to high flocculation.
Apparent attenuation of 80~91% and alcohol tolerance of 10%(v/v).
Quick start to fermentation, which can be finished during 96h at 18 ℃
Suit for the most common variety of wheat beer styles and German Hefeweizen.
Display typical banana and slight spicy aromas.
Give a high drinkable beer, and present a bright and nice body.

Usage

Rehydrate the yeast in 5~10 times its weight of boiled water or diluted wort (2:1 water to
wort) at 22~30 ℃ in a disinfectant container.
Gently stir for 5 minutes to suspend yeast completely and leave it for 10~20 minutes.
Then adjust temperature to that of the wort if there is a temperature shock greater than
10 ℃ by mixing some wort.
Just inoculate without delay and blend the yeast and wort by the circulating pump.
The whole process should be limited to 30 minutes to reduce risk of other microbial invasion.
It not necessary to aerate wort to help the yeast achieve active growth.

INGREDIENTS: Yeast(Saccharomyces cerevisiae), emulsifier E491

Fermentation temperature: 15~25 ℃ , ideally 18~22 ℃

Dosage instructions: 50 to 100 g/hl , increase dosage up to 100 to 300 g/hl at special conditions of fermentation.

Typical analysis

Dry weight: ≥ 93%
Living yeast cell: ≥ 6.0*10 9 cfu/g
Wild yeast: ≤ 1.0*10 3 cfu /g
Total bateria: ≤ 5.0*10 3 cfu /g
Lactobacillus: ≤ 1.0*10 3 cfu /g
Pathogenic micro-organisms: none
Before releasing to markets, all products must pass a series of detection in our factory.
※According to ASBC and EBC methods of analysis.

Packaging

Vacuum aluminum foil packing, 500g/bags, 20bags/carton, 10kg/bag, 1bag/carton.

Storage

Store in low temperature (≤ 10 ℃) and dry place, with the shelf life of 24months.
The information is ture and accurate to the best of our knowledge. However, the data sheet is not to be considered as a guarantee, expressed or implied, or as a condition of sale of this product.

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LAGERING & FINISHING
(MATURATION & FILTRATION, STANDARDIZATION, CARBONATION)

BIJAY BAHADUR

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

Lagering/Maturation

The maturation of the green (immature) beer to produce a stable, quality product suitable for filtration and packaging is called lagering or, alternatively, cold conditioning or cold storage.

A. <u>Objectives of Lagering (Aging) and Finishing</u>

Lagering refers to flavor maturation. At the end of fermentation, many undesirable flavors and aromas of a “green” or immature beer are present. The lagering process reduces the levels of these undesirable compounds to produce a mature product.

Finishing refers to the production of a brilliantly clear beer after lagering that remains that way until consumed.

B. <u>Component Processes</u>

The component processes of aging and finishing are:

1. Lagering or aging
2. Clarification
3. Stabilization
4. Carbonation
5. Blending or standardization

Each process can be accomplished in a variety of ways, but each is independent and can be treated as a unit operation.

In modern practice, cold aging or lagering is the storage of beer for the purpose of flavor maturation.

Table 1: Unit Operations for Lagering & Finishing

Unit Operation	Purpose	Equipment & Method
Transfer	Yeast Separation	Decant beer /Centrifuge/ Filter
Lagering	Flavour maturation	Some yeast present for VDK reduction / CO_2 purging
Stabilization	Protect beer from:	
	1. Oxidized flavour	Keep yeast present / Use CO2 during transfer of beer / Add antioxidant
		Pasteurization/ Sterile filtration
	2. Biological haze and off flavours	Use proteolytic enzymes/Isinglass fining
	3. Physical haze (chill proofing)	Filters
Clarification (Filtration)	Removal of all suspended particles	
		Traditional lagering/ Pressurized fermentation / CO_2 injection
	Attain proper CO_2 concentration	
Carbonation		
	Uniformity of packaged beer	Blenders
Standardization (Blending)		

After lagering, clarification is required to remove any remaining yeast and suspended particles formed during cold storage. At least one filtration step is needed before beer is suitable for packaging if a clear, brilliant beer is desired.

Stabilization refers to protecting the finished product from changes that may occur after packaging. These changes are:

- Flavor changes primarily due to oxidation.
- Non-microbiological haze caused by the formation of molecular complexes.
- Haze produced by the growth of bacteria or yeast.

Blending or standardization is the process of mixing batches of beers to achieve uniformity of flavor or analytical characteristics.

Carbonation is the process of adjusting the CO_2 concentration to a specified concentration. Carbonation by injection of CO_2 into beer is done as a replacement for the traditional raising of the CO_2 level by a cold secondary fermentation.

Brewers may combine some of these operations, or change the order in which they are carried out. The possible variations are too numerous to detail here, but most brewers, for reasons of economy and product uniformity, attempt to combine some of the unit operations.

Flavor Maturation

A. <u>Introduction</u>

Flavor maturation is generally considered the most significant effect of lagering. Successful flavor maturation has become more important as beers have become “lighter” in flavor. Taste thresholds of objectionable flavors are lower in lighter beers. In heavier beers, the higher concentrations of flavorful compounds will mask some objectionable flavors and aromas.

Most brewers supplement tasting with chemical tests and set specification limits on objectionable flavor compounds. In-process beer must meet such specifications and satisfy taste requirements before release to downstream processing.

Because most of the important compounds responsible for flavor maturation are a result of yeast metabolism, the central role of consistent yeast growth during fermentation is once again stressed.

B. <u>Important Flavour Compounds</u>

1. *Diacetyl and 2,3-Pentanedione*

The precursor to diacetyl, α-acetolactate, is produced by the yeast as it synthesizes the amino acids valine and leucine needed for protein synthesis. The α-acetolactate is transported out of the cell where it is converted nonenzymatically to diacetyl. This step is the slowest or rate-limiting step and is accelerated by a higher temperature and lower pH. The diacetyl is subsequently re-assimilated by the yeast and reduced enzymatically to butanediol by way of acetoin. The importance of this step is that butanediol has virtually no impact on flavor. A similar series of reactions occurs for 2,3-pentanedione, the precursor of which is α-acetohydroxybutyrate.

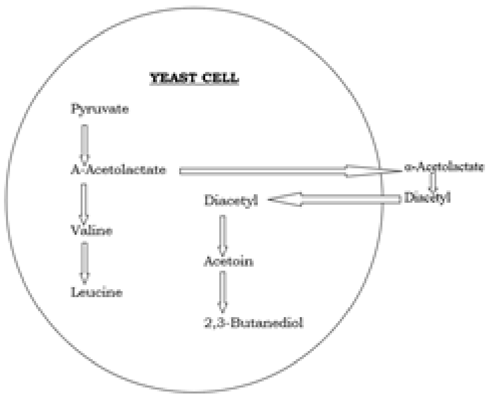

Figure 1: Diacetyl and the Yeast Cell

The brewer should be concerned about the concentration of precursors and whether or not yeast is present to remove VDKs when formed. The important concepts are:

- The precursors are produced as a result of yeast growth relative to the wort valine and other amino acid concentrations.
- The precursors are potential flavor-active VDKs.
- Conversion of precursors to VDKs is an extracellular chemical reaction that varies with temperature, pH, etc.
- These extracellular reactions are rate limiting in the conversion of precursors and removal of VDKs from beer.
- Yeast assimilates VDKs, and therefore needs to be present to reduce the VDKs as they are formed.

The maturation process has two objectives:

- Spontaneous conversion of precursors to VDKs
- Removal of VDKs by yeast.

Once the total precursors (potential VDKs) and VDKs fall below a specified level, the temperature can be lowered to help in yeast sedimentation. However, the higher temperature may lead to other off-flavors from nonvolatile yeast products or yeast autolysis.

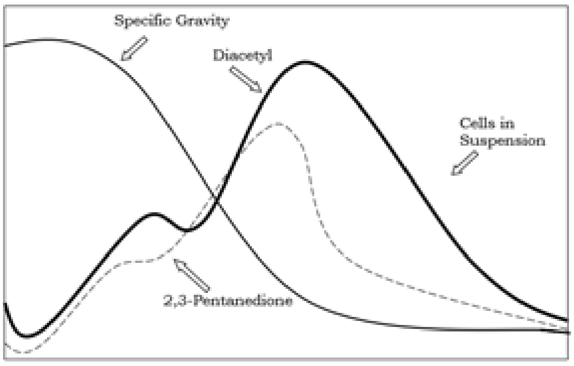

Figure 2: Diacetyl Profile

2. *Sulfur Compounds*

The subject of sulfur compounds in brewing is broad and complex. They are particularly important because of their very low flavor threshold and a flavor perception that is objectionable. Sources of sulfur in wort for yeast metabolism are sulfate ions from water, and thiols and sulfides from raw materials, particularly sulfur-containing amino acids. Sulfur compounds in beer arise through a combination of raw material sources, processing conditions, yeast strain, metabolism and autolysis, and microbial contamination.

Three of the more important volatile compounds are hydrogen sulfide (H_2S), sulfur dioxide (SO_2), and dimethyl sulfide (DMS). Some DMS is formed during fermentation by the action of yeast on dimethyl sulfoxide produced in the kettle, although most DMS comes from the conversion of a precursor in malt during kettle boil.

Production of H_2S is related to yeast growth. Hydrogen sulfide has the aroma of rotten eggs and the elimination of this compound is usually accomplished by the purging action of CO_2 gas evolution. More H_2S is produced in lager fermentations than ales because of the higher temperatures used.

Sulfur dioxide is also present in beer although usually in concentrations well below 10 ppm, at which level it does not have a flavor impact in most beers. Higher concentrations of SO_2 are produced under conditions of low yeast growth and are beneficial for flavor stability as described later in the section *"Flavor Stability."*

3. *Nonvolatile Flavor Maturation*

Packaged beer contains low concentrations of amino acids, peptides, nucleotides, organic acids, inorganic phosphates, and other ions that contribute to the overall flavor of beer. Free amino nitrogen, pH, phosphates, color, and invertase activity in beer all increase during storage. It would be reasonable to assume that these increases are dependent on temperature, time, yeast strain, physiological condition of the yeast, fermenter geometry, and so forth.

It is important to note that these changes in nonvolatile compounds are not necessarily undesirable. Nonvolatile compounds can contribute to palate fullness or mouthfeel, and act synergistically with other flavor-active substances and contribute to the overall flavor quality of beer.

- *Yeast Autolysis*

Yeast autolysis is referring to the dissolution of dead cells by their own enzymes. The autolysis products released into the beer result in a sharp, bitter taste and a yeasty aroma. Autolysis occurs under conditions of starvation and high temperature. Holding a fermentation vessel at high temperature (> 15 ^{0}C) in order to facilitate conversion of the VDK precursors is a condition that can lead to autolysis. Therefore, it is important not to allow the yeast to remain in beer for long periods at high temperature.

Lagering and Secondary Fermentation (Kräusening)

The term lagering comes from the German verb lagern, which means to store, to age, to lay down. The use of this term in the brewing industry is often synonymous with aging and storage, and sometimes other terms that are a consequence of aging such as maturation, conditioning, and secondary fermentation. The term lager beer follows from historical aging practices before refrigeration.

For clarity, the following definitions will be used:

Primary or main fermentation: The initial fermentation, during which most of the carbohydrates in the wort are assimilated. If no secondary fermentation is done, then all carbohydrates are assimilated during primary fermentation.

Secondary fermentation: Fermentation subsequent to transfer of the beer from primary fermenters with some yeast and fermentable carbohydrates present, during which residual carbohydrates are assimilated. This process is usually done at a reduced temperature. Secondary fermentation is not always used in modern practice.

Kräusening: The addition of fermenting wort to the secondary fermentation. Kräusening is not always used in modern practice.

Lagering: Nonspecific term applied to aging and other processing following primary fermentation. Historically, lagering included a secondary fermentation followed by a long, cold storage period.

Ruh storage: A practice that refers to cold aging of beer with some yeast present following the completion of fermentation.

Maturation, aging, storage, and conditioning: Terms used interchangeably to refer to the maturing of beer flavor. A secondary fermentation may or may not be included.

Kräusening

Kra¨usen is a German term meaning "rocky head"; and, in brewing, the word refers to the appearance of the foam head in the primary fermenter. When fermentation is most active, foam formation is greatest and the fermentation is at "high kra¨usen."

In the practice of Kräusening, beer is transferred to the storage cellar after primary fermentation, usually with some residual fermentable extract remaining. The degree of secondary fermentation can be controlled by the amount of residual fermentable extract at the transfer and by the amount and fermentable extract of the high kra¨usen added. In Kräusening, a somewhat more flocculant strain can be used because the secondary fermentation is more vigorous than without kra¨usen, and a flocculant strain is not needed.

Lagering without Secondary Fermentation

Historically, lagering employed shallow open fermenters for primary fermentation, but closed vessels for secondary fermentation in order to maximize carbonation. Modern equipment for refrigeration, carbonation, filtration, etc. prevents the need for secondary fermentation and a long, cold storage period. Modern practice has shortened fermentation and lagering times, and uses rapid cooling after fermentation to aid yeast settling. If the wort is fully attenuated during primary fermentation, there is no need for secondary fermentation, and the aging process is principally for flavor maturation.

This lagering can be accomplished in the presence of yeast by extending the residence time in the fermenter at the upper temperature limit after the wort is fully attenuated. If there is a lack of sufficient suspended yeast, recirculation or "rousing" with a CO2 purge may help.

With modern equipment, the use of separate vessels is unnecessary; and some unit operations may be combined in a Uni-Tank operation. For example, after a predetermined attenuation limit has been reached, yeast can be removed from the bottom cone and the beer cooled for lagering. Periodic removal of more yeast may be beneficial during the lagering phase to prevent off-flavor development.

There are compelling economic advantages for combining fermentation and aging in one tank. Other advantages of this concept are:

- Fewer microbiological and foam retention problems because of fewer transfers.
- More efficient yeast collection.
- Better control of CO_2 levels, with the possibility of eliminating carbonation.
- Better opportunities for automation.

Addition of Modified Hop Extracts

If modified hop extracts are used wholly or partially to replace the kettle addition of hops, they can be added to beer on transfer to aging. These extracts can be pre-isomerized hop extracts, which contain iso-a-acids (isohumulone and its homologs), or reduced hop extracts. The advantages for adding modified hop extracts to fermented beer compared to adding hops to the kettle include:

- Better utilization (efficiency) of hop-bittering acids (iso-a-acids added); more iso-a-acids surviving in the beer because loss during fermentation is eliminated.
- Kettle-hopping losses are eliminated, producing product with more uniform international bitterness units (IBUs).
- Degradation of iso-a-acids during kettle boil is eliminated.
- Better control of IBU in beers. IBU measurements can be done during aging, and additional extract added if the IBU is below specification.

Beer Recovery

Economics

During normal production, beer is lost in the yeast, in spent filter aids, and in tank bottoms. Yeast cropped by skimming or in connection with beer decantation will have low solids in the slurry. The beer in such slurry, may be over 50% beer by weight. It is estimated that up to 2% of total beer output is held up in collected yeast. Tank bottoms may be 2–7% solids. The recovery of beer from these sources may be economically advantageous. The recovery of beer also reduces biological oxygen demand (BOD) and chemical oxygen demand (COD) in brewery effluent, thereby reducing sewer charges, an additional cost saving.

Beer can be recovered from these various sources in several ways. In some cases, yeast strain differences may play a role in the selection of suitable equipment. Methods include centrifuges, membrane or diaphragm filter presses, and other types of filters.

Quality of Recovered Beer

I. The microbiological stability of the recovered beer is extremely important. Proper equipment, piping, etc., must be chosen so that acceptable cleanliness can be maintained. Minimum residence time for feed stocks and recovered filtrates is essential for microbiological stability.

ii. The quality of recovered beer is its dissolved oxygen (DO) content. Processing should be carried out under conditions as anaerobic as possible. However, it is nearly impossible to make transfers without some air pick-up. The introduction of any oxygen will contribute to flavor deterioration. Blending recovered beer at low percentages will help minimize any adverse effects of oxidation.

iii. The clarity of the recovered beer. The requirement for clarity after recovery depends upon subsequent processing and blending. If the recovered beer is added to primary production beer during transfer to aging, further clarification occurs downstream. If the recovered beer is added later in the process, it may be necessary to filter it before pasteurization and blending.

iv. Other properties of recovered beer that are likely to vary are the color, pH, and flavor. Color and pH changes generally are not significant because of subsequent blending. Particular attention should be paid to the flavor of any recovered beer.

The recovered beer can be blended into normal production beer at any convenient step in the operation. In any case, the brewer must determine a maximum percentage of recovered beer to blend into production beer. Normal practice is to use not more than 10%. Taste testing of blended beers gives more confidence in the use of recovered beer.

Clarification

At the completion of aging, the beer contains some yeast, colloidal particles of protein–polyphenol complexes, and other insoluble material that was driven out of solution by the low pH and the cold temperature during aging. If a brilliant, clear beer is desired, the clarification must remove these substances before beer packaging can be done. Four basic clarification techniques are used either separately or in combination:

- Sedimentation
- Use of finings
- Centrifugation
- Filtration.

Gravity Sedimentation

This is surely the simplest method for achieving clarity and was the only method before the development of centrifuges and filters. Historically, the chilling of fermented beer to about 0 ^{0}C for long periods promoted the sedimentation of yeast and other particles. However, despite its simplicity, caution is needed because yeast autolysis occurs readily, especially if the packed yeast mass begins to heat. With clarification by sedimentation, beer losses are relatively large and clean-up of tank bottoms is costly.

Finings

Although good clarity can be obtained from simple sedimentation, better results can be obtained in less time by using fining agents. Because of their chemical structure, they carry a net positive charge and interact with yeast cells, which are negatively charged, and with negatively charged proteins. Negatively charged proteins have been implicated in haze formation. Consequently, removal of these compounds improves physical stability. Finings increase the volume of tank bottoms and also increase tank clean-up costs and beer losses. The most common fining agent is isinglass, which is made by chemically treating the swim bladders of certain fishes and clays. The use of finings improves subsequent filtration.

Filtration

Filtration generally refers to clarification of beer through several stages to produce a crystal-clear product. The purpose is to remove suspended material and residual yeast, which would otherwise cause the beer to be hazy. The particle size of suspended material in beer is 0.5–4 μm. Particle size information is necessary for the brewer to set filtration parameters.

Filtration may be used at two or more stages after aging, depending on the particulars of cellar operations. The terminology for various filtrations in cellar operations differs from brewery to brewery. The first or primary filtration stage removes the bulk of yeast and suspended material and the second stage produces a brilliantly clear beer. The addition of stabilization agents occurs before primary filtration and they are substantially removed by the filter. Primary filters are almost always powder filters. A turbidity sensor can be installed at the outlet of the filter to monitor filter performance.

As a second stage, polish or final filtration removes any additional suspended solids resulting from lagering at cold temperatures and any adsorbents added for stabilization. These final finishing steps are generally preceded by a final beer-cooling operation to aid precipitation and ensure that the beer reaches the BBT at the proper temperature. Polish filtration may consist of two separate filters. After a first filter, trap filters may be used as an immediate final stage only to guard against any breakthrough from the upstream filter, not to perform further filtration. Trap filters are usually membrane filters.

Filters

Filters are used not only to clarify beer but also to clarify wort, recover wort from separated trub, and recover beer from tank bottoms.

Filters that use powders are sometimes called DE or Kieselguhr filters. DE is usually calcined after mining in order to eliminate organic matter. The high porosity of the diatom skeletons is ideal for filter beds, as the liquid passes through the bed while the suspended particles cannot. DE is available in a variety of grades from which the brewer chooses to accomplish clarification objectives. The different grades have particle size distributions that affect filter flow rates, filter bed permeability, the degree of filtration (coarse to fine), etc.

Filters that use filter aids (powders) operate on a principle of building a bed or cake of powder on a septum or filter screen. The porous bed creates a surface that traps suspended solids, thus removing them from the beer. Normally, the filter septum is pre-coated with a filter aid in advance of the beer filtration run. This pre-coat forms the base layer for the bed. The rough beer to be filtered is dosed with more filter aid, called body feed, at a concentration based on the solids content to be removed. The use of body feed helps to achieve the goal of maximum filter throughput. As beer is run through the filter, the bed increases in thickness because of the body feed, thereby maintaining bed permeability. Various grades of powders are used, depending on the filtration performance desired and beer to be filtered. For example, primary and polish filtrations will use a different grade and thickness of pre-coat. Body feed may not be required in polish filtration as it is in primary filtration. The different types of DE filters that follow are simply different implementations of these principles.

Filters are operated until the differential pressure rises beyond a designated point, which requires the flow rate to be reduced, or to the point when the bed depth reaches a thickness that bridges the spaces between the septa in the filter. Filter systems are designed to function within a specific range of pressures. An excessive differential pressure can cause: (a) the filter leaves to collapse, (b) the filter shell to burst, or (c) the pumps to fail, as they are not sized to operate with the increased energy needed to maintain the flow rate.

The relationship between filter operational parameters is:

$$\Delta P = \mu V \times L/\beta$$

Where,

ΔP = Differential pressure
V = Specific flow rate (flow rate of beer per unit filter area)
μ = Beer viscosity
L = Bed depth
β = Bed permeability

The candle filter is of a different design entirely, although the filtration principle is the same. The candles can be porous ceramic but are usually perforated or fluted, stainless steel tubes covered or surrounded by a stainless-steel support of various types. This rigid septum is easier to clean than filter leaves used in the powder filters. There is also an operational advantage. The beer is fed to the outside of the candles and the filtrate collected through the inside. The circular design means that the increase in bed thickness during operation is less than other filters, and the pressure drop increase occurs at a slower rate. The ceramic filter can be used for sterile filtration of beer.

Sterile Filtration

Sterile beer filtration is defined as an operation that produces sterile beer ready for packaging with no subsequent pasteurization. The type of filter selected for sterile filtration will depend on the brewer's needs and on appropriate features, such as throughput, ease of maintenance, cleaning, and sterilization.

The sterile filter acts as the final trap of yeast and bacteria. Sterile filters are not absolute filters. Therefore, the brewer will set a specification for the maximum concentration of bacteria in sterile-filtered beer. As it is possible for a single beer-spoiling bacterium in a bottle or can to spoil the beer, there is a need to balance the risk of spoilage against filter practicality and throughput.

Suitable microbiological sampling and methodology is needed to measure adherence to specifications. Rapid microbiological assay methods are of particular importance to reduce the quantity of product awaiting release to packaging.

To determine if the filtration system will allow microbiological specifications to be met, the brewer must measure the efficiency of the system for removal of microorganisms from beer. This is also called challenge or integrity testing. For example, for a specific yeast/bacterial load in the beer, there is a measured reduction in that load in the beer filtrate. The sterile filter cannot be expected to remedy poor microbiological practices upstream. In the end, instilling a proper attitude toward sanitation and care with regard to producing sterile beer is invaluable to reducing microbiological problems.

Transfer to Packaging

In the finishing steps of the transfer of aged beer to packaging, a major concern is oxygen pick-up. Chill proofing, dilution, carbonation, and final filtration steps generally occur in a continuous sequence leading to package release. These operations are separated by transfer tanks and connected by pipes. Minimizing oxygen pick-up in these vessels and piping/pumping systems is important because it is difficult to correct a package release tank that has a high concentration of dissolved oxygen.

To minimize oxygen pick-up, filter feed, surge, and transfer tanks should be purged with CO_2 or packed with carbonated water prior to use. For filtration, oxygen in filter pre-coat and body feed in makeup tanks is reduced by CO_2 purging for a sufficient time. Using deaerated water for makeup is also helpful.

Generally, it is advantageous to dedicate specific transfer and package release tanks for sterile-filtered beer. This reduces the possibility of contamination of tanks and transfer lines from beer which is not sterile. The number of dedicated tanks must be chosen to buffer the sterile filter output with packaging requirements. To prevent contamination of sterile beer further downstream, the use of dedicated bottle and can packaging lines is advantageous.

Beer Stabilization

The stabilization of beers may refer to flavor stability or microbiological stability, although stabilization commonly refers to physical characteristics.

Flavor Stability

Chemical reactions continue to occur after beer is packaged. Many of the changes that lead to stale beer flavor are caused by chemical oxidation. Flavor stabilization, then, generally refers to the protection of beer from oxidative changes. Stale off-flavors are generally attributed to the oxidation of higher alcohols to aldehydes by melanoidins, but there are many more chemical routes participating in the staling of beer. The topic of flavor stability is far ranging and complex, and only two important factors, SO_2 and oxygen, that have a clearly established effect on flavor stability.

Sulfur dioxide in beer occurs naturally from fermentation and is increased under conditions of low yeast growth. In addition to naturally occurring SO_2, one can add antioxidants to beer. Potassium meta bisulfite (KMS) or forms of ascorbic acid are sometimes added after fermentation as reducing agents to counteract oxidative changes.

Excluding oxygen from beer is an important step in flavor stability. Because yeast is an oxygen scavenger, once it is removed, any oxygen picked up in processing has the potential to oxidize beer. Therefore, flavor stability is enhanced by excluding oxygen from the beer during aging and finishing operations after the yeast is removed. The use of CO_2 to pack tanks and to transfer beer reduces the possibility of air pick-up. Flavor stability may be enhanced by proper handling of wort in the brewhouse, by reduction of oxygen pick-up during mashing, lautering, and wort cooling, etc.

Biological Stability

Generally, brewers conduct microbiological tests specifically for beer spoilage microorganisms. Microorganisms can also grow and form a haze by increasing their number. Proper pasteurization ensures biological stability but requires the heating of beer, which accelerates potential oxidative flavor changes. Biological stability can be achieved by sterile filtration in which microorganisms are removed by special filtration systems.

Physical Stability

Colloidal or non-microbiological haze is a result of the precipitation of insoluble complexes formed from beer constituents. There are two types of physical haze:

I. Chill haze, which appears when the beer is chilled but re-dissolves upon warming,
ii. Permanent haze, which never fully re-dissolves under any condition. Beer affected with permanent haze remains cloudy and may even develop sediment.

It is generally believed that complex proteinaceous compounds and polyphenols become associated through hydrophobic and hydrogen bonds involving proline residues of proteinaceous compounds. The presence of oxygen may play a role in polymerizing the phenolic constituents. Those portions of the proteins and polyphenols that contribute to haze formation are referred to as the haze-active fractions.

Three methods are used to “chillproof” beer, as physical stabilization is commonly called: treatment with proteolytic enzymes, use of finings such as tannic acid, and adsorption.

Brewhouse Procedures and Filtration

Some remedial measures can be taken during brewing to improve physical stability and to reduce the need for stabilization. However, removal of proteins and polyphenols must be done carefully as both contribute to the character of beer - both its flavor and physical characteristics.

Selection of malt with lower soluble nitrogen, good modification, and high diastatic power can lower the proteinaceous content of beer. Proteolysis in the mash tends to reduce protein content, although this reduction of high molecular- weight protein in the mash may be due to a precipitation mechanism rather than an enzymic one. When adjuncts are used, especially corn or rice, the wort protein level is reduced proportionally. Lower mash pH reduces the solubility of polyphenols. The last running from sparging can be high in polyphenol content if the sparge water pH is not carefully controlled.

Proper adjustment of wort boiling helps control the levels of polypeptides and polyphenols. A long and vigorous boil helps coagulate the complexes, and the presence of oxygen will aid the oxidation of polyphenols. However, oxidation of compounds important for flavor stability may also occur. A good, hot break along with efficient wort clarification enhances physical stability.

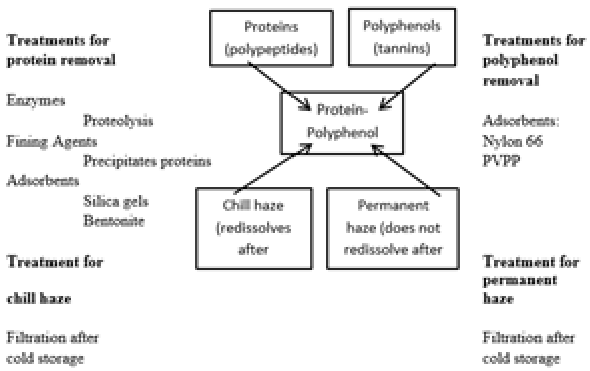

Figure 3: Chill Proofing Strategies.

Measurement of Haze

The measurement of haze or turbidity is based on the principle of nephelometry in which light reflected from particles in solution is measured. The angle of reflection is usually 90^0, although smaller forward scattering angles are also useful. The measurement of turbidity depends on the color of the incident light and on the size and shape of the light-scattering particles. In-line turbidity meters are often difficult to correlate with laboratory instruments.

It is also possible to rate beer haze visually by comparing the sample with standards usually based on different concentrations of formazin (ASBC Methods of Analysis: Beer-27, A). With this method, there is difficulty in obtaining agreement between individuals on the level of turbidity in a sample. At best, this method is qualitative.

Another element of confusion is that different measurement units are used; for example, the American Society of Brewing Chemists (ASBC) and the European Brewery Convention (EBC) use different units of measurement. The major problem, however, lies in trying to quantify the human perception of hazy beer by quantifying particles with a range of sizes and shapes and other light-scattering characteristics; the correlation is not always good.

Carbonation

Basics of Beer Carbonation

Carbon dioxide solubility in beer is usually measured in volumes of CO_2 per volume of beer at standard temperature and pressure. This means that one volume of CO_2 is equal to 0.196% CO_2 by weight or 0.4 kg CO_2/hl. Typical American lagers contain 2.5–2.8 volumes of CO_2. Ales are generally lower. Because beer contains 1.2 – 1.7 volumes of CO_2 after a normal non-pressurized fermentation, another 1 volume (or about 0.5 kg/hl must be added before packaging. Considering that other uses for CO_2 in the process consume CO_2, it is generally economical to recover excess CO_2 from fermentation. In some breweries, losses together with requirements may exceed recovery and CO_2 must be purchased, although under careful conditions breweries can be self-sufficient. The recovery of CO_2

The time required to reach a desired CO_2 concentration depends on physical factors. Finer bubbles have more surface area per unit weight and dissolve faster than larger bubbles. Moreover, finer bubbles rise more slowly. The longer it takes for bubbles to rise through a tank, the more time there is for solution. Therefore, carbonation stones are designed to form a fine mist of bubbles. If the headspace is filled with CO_2, a larger headspace–liquid interface area will shorten carbonation time. The solution of CO_2 also slows as equilibration is approached.

Pressure and temperature relationships to CO_2 concentrations are used to establish a tank concentration. In tall tanks, the CO_2 concentration will be higher at the bottom because of the greater hydrostatic head.

Modern Carbonation

Carbonation can now be done by in-line injection or by in-tank carbonation. In-line injection can be done whenever beer is transferred. However, it cannot be done upstream from DE filtration because CO_2 bubbles would disturb the filter bed. In-tank carbonation usually involves introduction of CO_2 through a carbonation stone in the bottom of the tank. The purpose of the stone is to form fine bubbles of CO_2, which readily dissolve in the beer. Another reason for carbonating in tanks is that oxygen and objectionable aromas can be swept out of the beer if the tank can be open to the atmosphere during the early part of the process. The tank is then closed and carbonation begins.

Standardization

Blending for Consistency

Blending or standardization refers to the mixing of different batches of beer to achieve product uniformity. Generally, blending is done to achieve an exact alcohol concentration, specific gravity, or original gravity. Blending can be done to achieve uniformity in other parameters, for example, bitterness units or color.

Occasionally, blending is used to attenuate an objectionable flavor note. For example, if a fermentation problem led to a high diacetyl concentration or noticeable sulfury character, the beer could be blended with a normal product in an attempt to dilute the objectionable flavor. Blending guidelines are established by brewers to prevent noticeable deviations from flavor uniformity

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CAN BEER BE THE MAGIC POTION TO HEAL THE BODY?

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We have heard a lot about how alcoholic beverages could affect our health but no one told us beer could be a magic potion to heal the body when taken in moderate level. Couldn't believe? me neither. Beer is not just a fun and fancy drink it is an emotion; a legacy of culture and it speaks about the history of civilization. Surveys say that beer is the 3rd most sought-after tea and water. So, I did some digging and here are some of the mind-blowing legitimate results from the research experiments done in various countries.

Firstly, we must remember that beer is made from the cereal grains namely barley, wheat as base malts and yeast, Hop flowers as bitter flavouring agents and spices like orange peel, star anise and others for different styles of beer.

- **Beer is an all-natural beverage:**

If you see the production process of Beer it does not involve the addition of any additives like chemical preservative, synthetic flavour or colour. The only preservative and the flavouring compound are the hops. It gives the beer a bitter flavour and helps to prolong its shelf life.

- **Low caloric and no fat or cholesterol drink:**

Beer, unlike other bottled drinks is less in calorie, contains no fat or cholesterol and is nutritious when taken in moderate quantity. Since the crowd is moving towards a healthy lifestyle the breweries have come up with low or non-alcoholic and lower caloric beers to attract them.

- **Beer as the power house of B Vitamins:**

Barley malt being the prime ingredient of beer making, is packed with Pyridoxine which is commonly known as B 6 vitamin, an active from of B 6 is the Pyridoxal 5 Phosphate which has a huge effect on clearing the arteries and lowers the risk of Cardio Vascular Disease (CVD). The other well known B vitamin high in beer is the Folate (Folic Acid). It is crucial for proper brain function and plays a vital role in the mental and emotional health so basically it helps in development. Studies done in 1977 showed people who drink beer in moderation were less likely to develop any cognitive impairment or any forms of dementia. B 9 closely works with B 6 and B 12 in order to control the levels of homocysteine in the blood which affects the Cardio Vascular health.

- **Strengthening bones and preventing osteoporosis:**

Various recent researches in California show that beer is rich in dietary silicon which is a key ingredient to increase the bone mineral density. It is found that the silicon present in beer is in the form of Orth silicic acid with 50% of bioavailability. The soluble OSA is vital for bone and connective tissue to fight osteoporosis a disease of bone mass deterioration. Studies prove that pale malts are higher in silicon than the roasted and chocolate malts and the hops contains considerably more silicon than malts, however the quantity is hops is less than that of the malt. Thus, consumption of beer at doses up to 60 g per day in men alone in the study and up to 13 drinks per week (182 g/week) in the study increased BMD shown to reduce risk of fractures in the elderly. Even very low intakes were associated with a lower fracture risk. Specifically for beer, consumption of less than one bottle per week (less than 14 g per week) was significantly associated with a lower risk of hip fracture in both men and women.

- **Reduces the risk of diabetes:**

Based on the research done in the Harvard school on 38000 middle aged men it is found that the beer increased the insulin sensitivity which ultimately controls the diabetes. The soluble fibre is rich in beer which controls the blood sugar. Some other review studies showed moderate alcohol consumption may reduce the risk of diabetes in men. A meta-analysis of 13 prospective studies showed that consumption of beer or spirits tended to slightly reduce the risk of type 2 diabetes. Some of the Dutch researchers who conducted an analysis in which they found men with moderate intake of beer over 4 years were significantly less likely to be affected by diabetes. However, moderation is the key in here.

So, these are some of the proven health benefits of beer but it is highly recommended to consider the moderation level as anything beyond control isn’t good for you.

The Health Benefits Of Hops & How To Get Them Without Boozing

AKSHAT JAIN

Business Development Manager-Craft Brewing

Health benefits of hops

The hops flower been used medicinally for more than 2,000 years to help manage a variety of ailments. Modern research, though in early stages, affirms that hops can help improve mood, relaxation, and more.

This is likely because the flower is loaded with antioxidants, polyphenols, and beneficial essential oils such as linalool, which helps with oxidative stress. With all of these compounds at play, emerging research shows hops might be able to help out with the following:

1. It can help you sleep.

First and foremost, hops is known for its calming properties. If you have trouble sleeping or you have a wonky schedule that wreaks havoc on your circadian rhythm, also known as your sleep-wake cycle, hops might be able to help.

2. It can promote a better mood.

Hops can help brighten your mood, too. "A recent study showed that mild depression, anxiety, and stress in otherwise healthy young adults was improved with daily supplementation of a hops dry extract

3. It can help with hot flashes.

Hops may also help with hot flashes4 and other symptoms of menopause, according to another 5study. A flavonoid in hops, known as 8-prenylnaringenin, is a phytoestrogen, a plant-based compound that may behave like estrogen in the body.

4. It can support immune health.

A review of existing medical data states that the compounds in hops show promise in warding off some disease processes, including those related to metabolic syndrome.

How to get your hops fix without boozing

You don't have to head to your neighborhood pub or brewery to reap the benefits of hops. You can buy the flower in many forms and use it as a supplement that suits your needs and lifestyle.

Straight-up hops supplements are available both in tincture and capsule form, or hops can be paired with other supplements for a multi-vitamin. Hops pair especially well with full-spectrum hemp oil to promote a sense of chill, since hops and hemp belong to the same plant family, Cannabaceae. They are thought to work synergistically together to support a more positive, relaxed mood.

BEER FOR HEALTH? HOP COMPOUNDS MAY OFFER PROTECTION AGAINST ALZHEIMER'S

ESHANT BHARDWAJ

Business Development Executive,
BECC

KEY POINTS

- Researchers looked at four hops varieties
- Compounds in hops inhibited protein clumping linked to Alzheimer's disease
- Results show hop's potential as a nutraceutical for the disease

Beer isn't exactly the first thing that comes to mind when people think of foods and drinks that may be beneficial for health. But a team of researchers has now found that a compound in beer hops may offer protection against Alzheimer's disease (AD).

In their work, published in the American Chemical Society's ACS Chemical Neuroscience, researchers had a closer look at the "chemical variability" of four common hop varieties: Cascade, Saaz, Tettnang and Summit.

One of the factors that make AD so difficult to treat is the "time lag" of several years that's between the biological processes of the disease and the onset of symptoms, ACS explained in a news release. By the time the person realizes they may have the disease, "irreversible damage" may have already occurred.

"In this scenario, the prevention of AD rather than treatment can represent an important strategy," the researchers wrote. "Among the preventive interventions, diet is one of the most promising ones because the intake of foods or nutraceuticals containing natural molecules can interfere with key biochemical events underlying aging in both physiological and pathological conditions."

"Nutraceuticals" are foods or parts of food that have medical or health benefits. And hop, one of the main ingredients of beer, can interrupt the collection of amyloid beta proteins linked with AD. Further, previous studies showed that consuming bitter hop acids can improve "cognitive function, attention, and mood in older adults."

Researchers have now found the hop extracts actually had antioxidant properties and may prevent the clumping of amyloid beta proteins in human nerve cells, with the "most successful" variety being Tettnang.

"We fractionated the extracts to identify a pool of molecular components mainly responsible for their neuroprotective action," the researchers wrote. "According to our data, they are feruloyl and p-coumaroylquinic acids, flavan-3-ol glycosides, and procyanidins."

The hop extracts also prevented cell death due to oxidative stress, the researchers noted. And when they tested the Tettnang extract activity on a C. elegans worm model, it actually protected the creatures from "AD-related paralysis," although the effect was "not very pronounced." While this doesn't mean people have an excuse to drink a lot of their favorite hoppy beer, it shows hop's potential as a nutraceutical for AD.

"Our results show that hop is a source of bioactive molecules with synergistic and multitarget activity against the early events underlying AD development," the researchers added. "We can therefore think of its use for the preparation of nutraceuticals useful for the prevention of this pathology."

Source: ibtimes.com

BW CONCLAVE 2023: A MUCH-AWAITED BEER & BREWING INDUSTRY SHOW

Brewer World has taken the initiative and has organised **BW Conclave**, - India's only dedicated 3-day B2B expo, conference and awards for the beer and brewing community under one roof to capitalise on the current growth potential and to close the market gap. The **2nd edition of The BW Conclave 2023** is set to take place on **23-24-25 February** at **KTPO, Whitefield, Bengaluru.**

The BW expo intends to host 75+ exhibitors showing the most recent products, services, and equipment available to existing and upcoming Indian brewers. Top companies like Falcon, SpectraA, Zytex Biotech, Lallemand Specialities Inc, Ace Technologies, Lumiere Tec, DVKSP Impex Private Limited, Brewnation, Fermentis, Biofact India, GAI Macchine, Brew Essentials, Economy Process, Rapid Bevtech Lehui India, Krome Dispense and many more will be showcasing their products.
The exhibitors would have the chance to interact, network, and conduct business with possible clients that included OEMs, project consultants, production/commercial beer producers, and craft/microbreweries.

The conference will feature more than **35+ speakers**, sharing their insights and experiences with other beer industry professionals. Panel discussions will consist of some head & upcoming brewers like Ketan Malhotra, Varsha Bhatt, Kajal Manchanda, Vignesh Muralidharan, Manu Mishra, and more. The conference intends to provide our visitors with prospects and possibilities in the business. The conference will start at 10 am and will be followed by power-packed workshops from leading companies like Lallemand, Fermentis & Ellerslie Hops.

Through a blind-tasting judging process, the awards ceremony, created by Brewer World, honours excellence in beers produced in India. The following factors are taken into consideration by the judges when awarding prizes: colour, aroma, flavour, mouth feel, and overall impression. The judges choose the top brews that follow the 2015 BJCP Style Guidelines, are sincere, and stand out.

Join us to strengthen India’s $15.92 billion-dollar beer market revenue, regulated heavily and with the exponential growth of the beer & brewing sector estimated to reach INR 662 billion by 2026.

Dates: 23-24-25 February
Venue: KTPO, Whitefield, Bengaluru
Get your visitors pass here

To know more, please visit: www.bwconclave.com

CLINKING WINE GLASSES

MAMTA BHARDWAJA

Most of us toast and clink glasses without thinking.

Clinking glasses is an important part of any toast, but do you have any idea why we do that? What's behind the clinking?

There is a tradition of clinking wineglasses.

The most popular thought of clinking wineglasses is, when wine was famous in medieval times as a beverage and is considered safe to drink than water and milk, at that time it was common to poison enemy's wine. A good host would pour a wine for you and for him to drink first or simultaneously with you just to prove that it wasn't poisoned. But if you had faith in your host, you would just clink your glass with his glass. Like, hey I'm totally trust you.

That time metal and wood glasses were more common.

We tend to clink glasses without really thinking about what we're doing. Because we are happy and in a mood of celebration. But is there a "right way" to clink glasses? Yes there is. Few small things are there you need to know.

- **Never clink At Rim of the glass.** As rims are thin, means they are fairly fragile and can break easily with a hard tap. To clink the rims of the glass, you have to tilt the glass toward your guest. The forward motion of the clink could cause wine to spill over the rim of your glass, making a mess.
- **Clink the bell.** All wine glasses have a bell, the rounded part in the middle of the glass. This is the strongest part of the glass, and the best part to clink. Not only it will reduce the risk of breakage, but it produces a delightful chiming sound that you'd never get by clinking the rim.
- **Be gentle.** Use a gentle hand as you clink your glasses together. A glass can produce the gentle clink with minimal tap.
- **Don't fill it.** With the right amount of wine in your glass, you will get a nice clink sound with a gentle tap. If your wine glass is too full, the clink will be muted. For a proper toast, fill your glass with a little wine, toast, and drink. You can always ask the waiter to pour more wine once your glass is empty.

The clinking sound brings the festive feel to event.

To ensure you get a ringing click, and not a dull clank, always hold your glass by the stem when you toast.

Cheers!!!

SCOTCH AND IRISH WHISKIES
History and evolution

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Whisky is the potable spirit obtained by distillation of an aqueous extract of an infusion of malted barley and other cereals that has been fermented with strains of Saccharomyces cerevisiae yeast

In Scotland, the distinctive product is made from only malted barley, and the fermented malt mash is distilled in relatively small pot stills. Scotch malt whisky is marketed both as a straight malt whisky, many brands of which have recently become extremely popular around the world, and as a blend with another type of whisky produced in Scotland known as "Scotch grain whisky" or "patent-still whisky" (because it is distilled continuously in Coffey-type patent stills).

The majority of Scotch whiskies available on the international market are blends of 20- 30% malt whisky and 70-80% grain whisky. Unblended Scotch malt whiskies are usually matured for a minimum of eight years. The cereals used in the manufacture of Scotch grain whisky are malted barley, together with a high proportion (up to 90%) of wheat or corn (maize). Currently wheat is the main cereal, chosen on the basis of cost and the attraction of using a Scottish-grown cereal.

Irish whisky, which is spelled with an e, is a recognisable good from either Northern Ireland or the Republic of Ireland. Irish whisky typically has a thicker body and greater flavour than Scotch, although lacking the "smoky" flavour and scent of Scotch. As opposed to the 71o GL whisky distilled in Scotland, the whisky is also distilled three times rather than twice, as is done in Scotland, to produce an extremely strong spirit.

History of whisky production

It is unknown where the craft of distilling alcoholic beverages first emerged, but it most likely originated in ancient China. However, the French chemist Arnold de Villeneuve published the first book on distillation in the year 1310. The first whisky was probably distilled, much to the dismay of the Scotsman, not in Scotland but in Ireland. Most likely, Irish missionary monks brought the craft of distillation to Scotland. Scotland saw a boom in the production of whisky, in part because drinking the alcoholic beverage enabled locals to tolerate the harsh conditions of this part of Britain's north. An entry in the Exchequeur Rolls for the year 1494 contains the first known proof of whisky manufacture in Scotland. A Royal Commission ruled in 1908 that a mixture of malt whisky and grain neutral spirit qualified as whisky.

There are four types of Scotch malt whiskies: Highland, Lowland, Islay, and Campbeltown whiskies (Simpson et al., 1974). The Highland Line is a straight line that connects Dundee in the east to Greenock in the west, dividing the Scottish regions where the first two varieties of liquor are distilled (Figure 1). After then, it continues south beneath the Isle of Arran. Whiskies distilled in regions south of the line are known as lowland whiskies, while any whisky made north of this line, including those from Campbeltown and Islay, is entitled to the moniker highland malt whisky.

EFFECT OF NUTRIENTS ON YEAST

RAGHAVENDRA SHARAN SINGH

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Yeast, a single celled fungus which is responsible for some of our important foods and beverages and are predominant in several fermented foods prepared from ingredients of plant as well as animal origin. The diversity of foods in which, yeasts predominate ranges from alcoholic beverages (wine, beer, whisky etc.), cereal based leavened products (sourdough, Kimchi, Tofu, idly etc.), milk products (cheese, Curd, Yoghurt) and condiments such as soy sauce and papas.

What is the process by which this tiny microbe can make superfoods?

Fermentation: The science of fermentation is known as zymology. Fermentation is a metabolic process that consumes sugar in the absence of oxygen. The products are organic acids, gases, or alcohol. In microorganisms, fermentation is the primary means of producing ATP by the degradation of organic nutrients anaerobically. Fermentation is one of the oldest methods for preserving foods. It is becoming increasingly popular since the fermentation increases the nutritional value of foods and that consumers perceive it as natural and free of food additives.

What does a yeast cell needs for successful Fermentation and Why?

Yeast nutrition is an essential factor in the overall health and success of fermentation. Managing nutrient requirements not only allows for regular and complete fermentations but enhances sensory quality. Yeast nutrition is widely divided into three categories (Macronutrients, Micronutrients and energy source) which includes different carbon sources, nitrogen sources, vitamins, trace elements etc.

Elements	Function
Carbon	Contribute in organic cell materials
Nitrogen	Major part of proteins, nucleic acids and coenzymes
Oxygen	Electron acceptor in respiration of aerobes
Sodium	Principal extracellular cation
Magnesium	Important divalent cellular cation, inorganic cofactor for many enzymatic reactions, incl. those involving ATP; actions in binding enzymes to substrates
Phosphorus	Constituent of phospholipids, coenzymes and nucleic acids
Sulphur	Act as building element for cysteine, cystine, methionine and proteins as well as some coenzymes as CoA and cocarboxylase.
Chlorine	Principal intracellular and extracellular anion
Potassium	Principal intracellular cation, cofactor for some enzymes
Calcium	Important cellular cation, cofactor for enzymes as proteinases
Manganese	Inorganic cofactor cation, cofactor for enzymes as proteinases
Iron	Constituent of cytochromes and other haem or non -heam proteins, cofactor for a number of enzymes
Cobalt	Constituent of vitamin B an d its coenzyme derivatives
Zinc	act as a cofactor for many enzymes and also required for the structural stability of zinc finger proteins, many of which exert important controls on cellular metabolic processes
Molybdenum	Inorganic constituents of special enzymes

What Happens in Lack of Nutrition?

The problems connected with development and nutrition are numerous and are very important. The requirement of nutrition in these small cells are not lesser than in animals and humans. Deficiency of a single nutrient during the growth phase of the cell may lead to death of the cell and a huge economic loss to the industry. Some of the possibilities which may occur in lack of nutrients are listed below: -

- Deficiency of nutrient may reduce yeast growth, slowdown fermentation and promote the accumulation of pyruvic acid and acetaldehyde, components responsible for oxidation and binding So2.
- Low levels of sterols, oxygen and/or unsaturated fatty acids may shut down sugar consumption (stuck fermentation) and increase volatile acidity.
- Without proper nutrition introduced at the right stage in their growth cycle, yeast can come under stress and produce undesirable characteristics: off-flavors (hydrogen sulfide, oxidation...), high bound SO2, stuck or sluggish fermentation.

- Loss of viability during alcoholic fermentation is usually attributed to an insufficient availability of lipids, specifically sterols or unsaturated fatty acids, given that a membrane deficiency in these compounds is thought to alter cell resistance to ethanol.
- Lack of nitrogenous compounds breaks down asparagine with final production of malic acid and this acts as poison, suppressing and finally inhibiting reproduction as soon as its acid concentration reaches certain limit.
- In lack of nutrients cells start to shrink and at the end lose their viability.

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BECC TEAM AT SUGAR & ETHANOL INDIA CONFERENCE BY CHINIMANDI ON 7TH- 8TH JAN 2023

CORN STARCH

RUPAK KUMAR CHATTERJEE

Yamuna Nagar (Haryana)

Corn starch, maize starch, or corn flour is the starch derived from corn (maize) grain. The starch is obtained from the endosperm of the kernel. Corn starch is a common food ingredient, often used to thicken sauces or soups, and to make corn syrup and other sugars. Corn starch is versatile, easily modified, and finds many uses in industry such as adhesives, in paper products, as an anti-sticking agent, and textile manufacturing. It has medical uses as well, such as to supply glucose for people with glycogen storage disease.

Uses

1) Corn starch is used as a thickening agent in liquid-based foods (e.g., soup, sauces, gravies, custard), usually by mixing it with a lower-temperature liquid to form a paste or slurry. It is sometimes preferred over flour alone because it forms a translucent, rather than opaque mixture. As the starch is heated over 203 °F (95 °C), the molecular chains unravel, allowing them to collide with other starch chains to form a mesh, thickening the liquid.(Starch gelatinization). However, continued boiling breaks up the molecules and thins the liquid.Cornstarch is usually included as an anticaking agent in powdered sugar.

2) Corn starch is the preferred anti-stick agent on medical products made from natural latex, including condoms, diaphragms, and medical gloves.

Manufacture

The corn is steeped for 30 to 48 hours, which ferments it slightly. The germ is separated from the endosperm and those two components are ground separately (still soaked). Next the starch is removed from each by washing. The starch is separated from the corn steep liquor, the cereal germ, the fibers and the corn gluten mostly in hydrocyclones and centrifuges, and then dried. (The residue from every stage is used in animal feed and to make corn oil or other applications.) This process is called wet milling. Finally, the starch may be modified for specific purposes.

WINE REPORT

KANCHAN SINGH

Chapter Head - South Delhi, India
Apex Wine Club India
1 January 2023, Sunday

Ice Wine, most famously produced in Canada, is a sweet wine made from grapes which were naturally frozen while still on the grapevine. The process freezes the water condensed within the grape.

The grapes freeze, thaw, and then freeze again near the conclusion of the growing season. Sugars and other polyphenol chemicals within will not freeze, and their concentration increases once the water is removed.

Ice Wine made from white grapes preserves a freshness on the palate despite the taste of honey, citrus, stone fruit such as peach and dried apricot, and juicy tropical fruits such as mango. Red grape ice wine includes berry aromas like strawberry and mild spice. Some ice wines are aged in oak barrels to add depth.

Ice Wine can be paired with brie or mild goat cheese, or with simple vanilla sweets like yoghurt panna cotta, sour cream pound cake, or ice cream. The grapes used to make Ice Wine are Vidal, Cabernet Franc, Riesling, and Gewurztraminer.

BrewTimes™

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