BrewTimes™

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Balaji Enzyme and Chemical Pvt Ltd

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Introducing BrewTimes :

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

It's the month of festivals, we would like to wish all our readers in advance a well Happy and prosperous Diwali !!

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.

HopHaze®

Great haze stability and flexibility from 100% hops.

CASE STUDY ANHEUSER-BUSCH BREWERS COLLECTIVE

HAAS | BarthHaas®

FEATURED COLLABORATORS

Joe Casey | Anheuser-Busch Brewers Collective

Joe Casey is a brewmaster with over 25 years experience in small- and large-scale brewing operations. Currently, he oversees North American technical brewing support for craft and hop quality at Anheuser-Busch. His expertise spans from brewing raw materials and process aids, yeast and fermentation, finishing, quality, sensory, packaging, food safety, hard cider, hard seltzer, innovation, and procurement.

Dr. Phil Chou | John I. Haas

Phil Chou is Director of Brewing Solutions at John I. Haas. He has extensive experience as a R&D chemist and fermentation scientist, using applied chemical principles to help improve the brewing process and ensure technical success of innovative hop products for HAAS® customers.

Haze stability that's clearly better.

HopHaze® is a new brewing solution from John I. Haas (HAAS®) and BarthHaas® designed to create remarkably stable haze in beer. It s an all-natural, 100% hop-derived product that s added to beer after filtration before the bright tank/pre-packaging. It s flavor-neutral and will not impact the flavor or aroma of finished beer. Year-long trials have shown that HopHaze® will last the entire shelf-life of the beer, without settling out of solution.

HopHaze®

THE STABILITY CHALLENGE

In recent years, hazy style beers New England IPAs, Hazy IPAs, Juicy IPAs, and more have exploded in popularity, helping propel the craft industry to new heights of success and winning over a generation of new beer drinkers along the way. While there are many ways to achieve haze in beers, maintaining the stability of that haze during packaging, distribution and storage can be daunting to say the least.

One of the challenges of hazy IPAs, or any hazy beer style, is to make a stable haze that doesn t settle out across time, said Joe Casey, a brewmaster with Anheuser-Busch Brewers Collective. Nobody wants their beer to look like a snow globe, and nobody wants to experience a bunch of sediment either. Haze stability has been an ongoing technical challenge for brewers for quite some time.

Casey got his start in the brewing business at Widmer Brothers, known for their flagship beer, Hefe, the original beer that defines American Hefeweizen. I have a lot of history with haze, he laughed. For Hefeweizen, we had a process down to where we were able to manage the haze really well, and it was a pretty stable haze for a timeframe that we found acceptable.

Over time, as Widmer became part of the Craft Brew Alliance (CBA) and then part of Anheuser-Busch Brewers Collective, Casey was involved with many different kinds of hazy products, across many different breweries and brands. He began to look more seriously at haze solutions.

We had our eyes out for something to help with haze for a while now, Casey noted. Other products we ve tried, they don t work very well in hazy IPAs, so we were looking for an alternative.

In one of the many and regular technical conversations about hops and beer that Joe has with Phil Chou, Director of Brewing Solutions at HAAS®, Phil suggested a new product that would ultimately become known as HopHaze®.

THE HOP-BASED SOLUTION

One of the things I really liked about it was, it s 100% hop based, said Casey. There are other products out there that are natural, but they re not made from hops; something already in beer. So you have to think about that when you talk to consumers and when you think about how you re labeling your beer. Some methods that brewers consider might break away from the traditional ingredients used in beer, but HopHaze® is hop based, so that really attracts me.

"One of the challenges of hazy IPAs, or any hazy beer style, is to make a stable haze that doesn't settle out across time. Haze stability has been an ongoing technical challenge for brewers for quite some time."

The other consideration was long-term stability. Anheuser-Busch Brewers Collective ships hundreds of thousands of barrels of beer each year, to distributors throughout North America. So any solution they found needed to be able to scale and stand the test of time.

As part of our initial trial, we collected an Imperial IPA into clear bottles to test in different storage conditions so that we could easily, visually, monitor beer haze over time. And that s really when we started to be sold on the effectiveness of the product. Casey explained. We let those clear bottles sit in cold, room temperature, and warm forced conditions for nine months. Across

that time the haze remained homogenous, didn t flake out, and didn t sediment. There were also no unwanted flavor impacts. There literally was virtually nothing on the bottom of the bottle indicating that nothing had settled out.

Casey was excited. With haze...let s just say gravity usually wins. So if you can have something that doesn t drop out over time, you re in a pretty good position if you want to make something hazy.

SENSORY TRIALS

Having a long history in hazy beers, Casey was not easily convinced. Anheuser-Busch Brewers Collective needed to see what would happen when things scaled production levels across different types of beers and different brands.

We took time to find an optimal dose rate, Casey said. We asked, What happens if you don t use enough? What happens if you use five times more than you re supposed to? What s the normal process and product variation? We wanted to understand those effects and impacts to negative brainstorm the process until we felt we had it all sorted out.

A GREAT BREWING SOLUTION

The ultimate test of any new product is, would you recommend it to a fellow brewer?

Yes, absolutely, said Casey. I fully realize, if you re at a smaller-scale operation and you re doing draft only, serving beer in your own pub, not distributing around town or in your region, you are dealing with different haze realities that live in a shorter timeframe. But I think your perspective changes when you get towards the other end of the spectrum and have requirements for many months of haze stability in many different conditions and package types.

"With HopHaze®, I think we've found another reason to love hops. I think HopHaze® is something that has the potential to move the industry forward."

The bigger a brewery gets and the bigger their geographical distribution footprint is, the different types of containers they re using bottles, cans, kegs the shelf life they re looking for, pasteurization, everything kind of changes. Having different kinds of tools is really helpful.

Casey continued, You can make a stable haze in a draft-only beer, and it looks great for three weeks at your pub. But when it takes you three weeks to get the beer from your place to distributor, and then another couple weeks to get from the distributor to the account, and then they don t tap it for another week on top of that, most hazy beer is going to settle out and you re going to have some separation issues.

With HopHaze®, says Casey, I think we ve found another reason to love hops. I think HopHaze® is something that has the potential to move the industry forward.

To learn more about HopHaze®, visit our website, contact your local HAAS® sales representative, or your favorite HAAS® Distribution Partner.

johnihaas.com/hop-haze

ABOUT ANHEUSER-BUSCH BREWERS COLLECTIVE

Brewers Collective is the craft business unit of Anheuser-Busch, which is advancing the beer category by bringing together a shared commitment to quality, communities and innovation with a mission to energize how people view, consume and experience beer.

Anheuser-Busch

ABOUT HAAS® & BARTHHAAS®

John I. Haas is a proud member of BarthHaas®. With branches in Germany, the USA, the UK, Australia and China, BarthHaas® conducts business on every continent. It is a world leader in breeding, growing, processing, and marketing hops and hops products. The group s portfolio also includes storage and logistics services, hop research and development, and application technologies for the brewing industry.

HAAS | BarthHaas®

Vitahop®

Increase profits in BIOETHANOL...naturally

Vitahop® is a range of natural hop extracts, ideal for production of bioethanol from a range of raw material feedstocks, as they protect yeast from bacterial growth, and their acid by-products, during fermentation processes. When used as part of a planned process regime with regular additions, bacterial infections do not develop and spoil yeast fermentations.

When infections do develop, they can quickly get out of control and disrupt production, potentially causing substantial losses and lost revenue. By controlling bacteria and preventing bacterial growth, catastrophic infections can be a thing of the past.

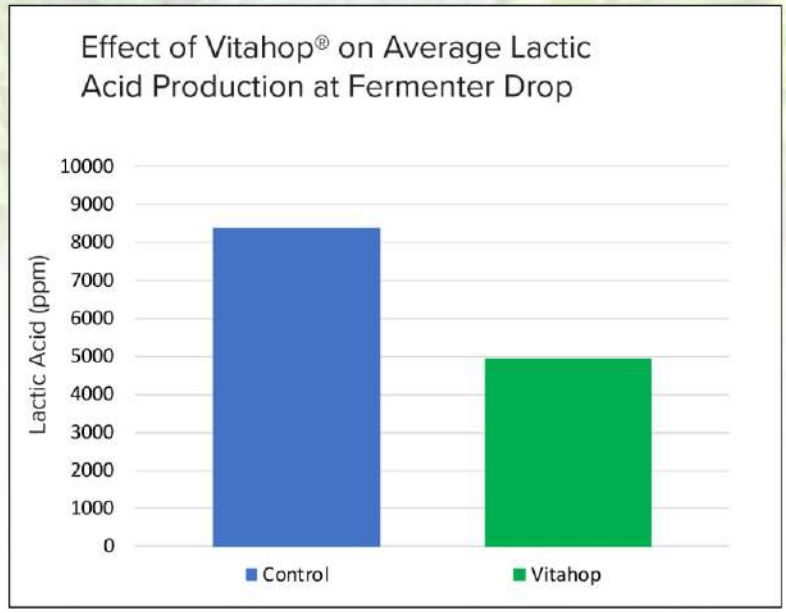
Vitahop® is used in both continuous and batch fermentations. It helps ensure healthy, vitalised yeast growth and during fermentation suppress gram positive bacteria. If bacteria are allowed to prosper, they will compete with and eventually inhibit the yeast, slowing fermentation sometimes to a complete stop, resulting in a "stuck" fermentation. Bacteria will also use up valuable feedstock producing organic acids such as lactic acid, further reducing ethanol yields. Prevent this happening with **Vitahop**®**.**

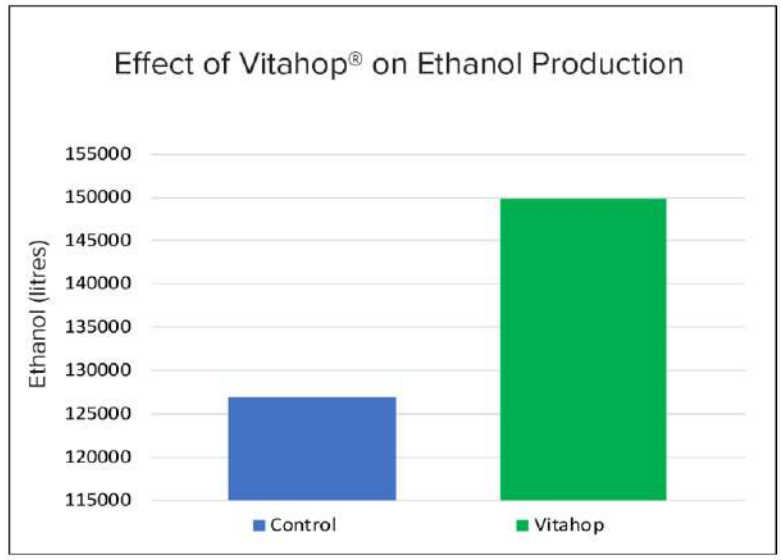
info@betatec.com | **betatec.com** | *efficient by nature*®

BetaTec® hop products

Key Benefits of Vitahop®

- Maintains optimum ethanol yields
- Ensures reliable fermentations
- Keeps yeast healthy
- Controls bacteria
- Demonstrated benefits in ethanol production plants worldwide
- Safe and natural, easy to use
- Safe DDGS for animal feed
- A natural alternative to antibiotics





Unpublished data BetaTec 2015

Vitahop®

BetaTec is the first company worldwide specialising in the application of hops and hop-derived compounds for use in "beyond brewing" industries. Our product portfolio includes natural fermentation aids, antibacterials, flavours and functional ingredients. Our key business areas are alcohol, yeast and sugar production.
All BetaTec products are accompanied by on-site support, process optimisation and consulting.

Please contact our technical experts to learn how Vitahop® can help you sustain improved ethanol yields.

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BetaTec® hop products

"Transforming your world with our natural hop solutions"

BetaStab® XL

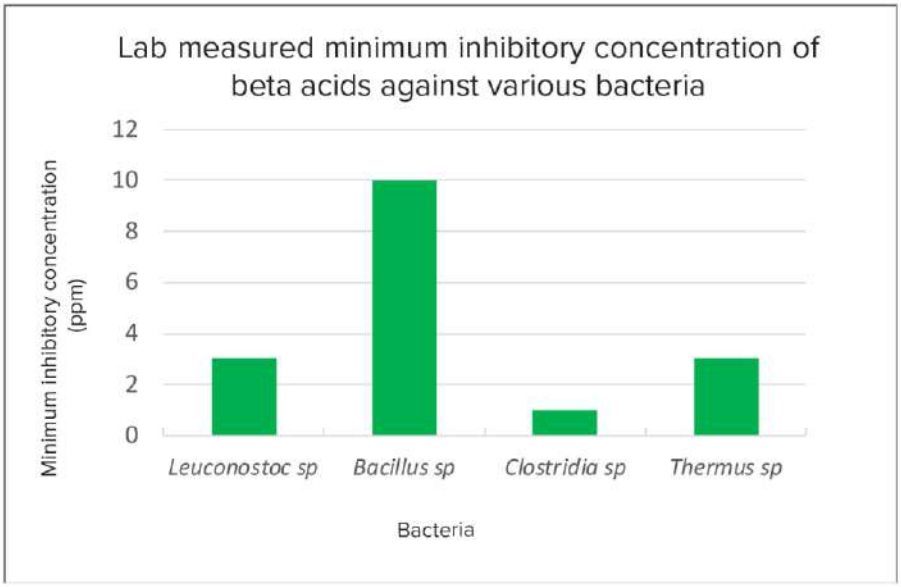
Reduce your sugar losses ...naturally

BetaStab® XL controls problematic Gram postive bacteria found in sugar extraction

Microbial sugar losses are a major problem in sugar production resulting in lower yields, increased processing problems and higher impurities such as lactic acid and dextran.

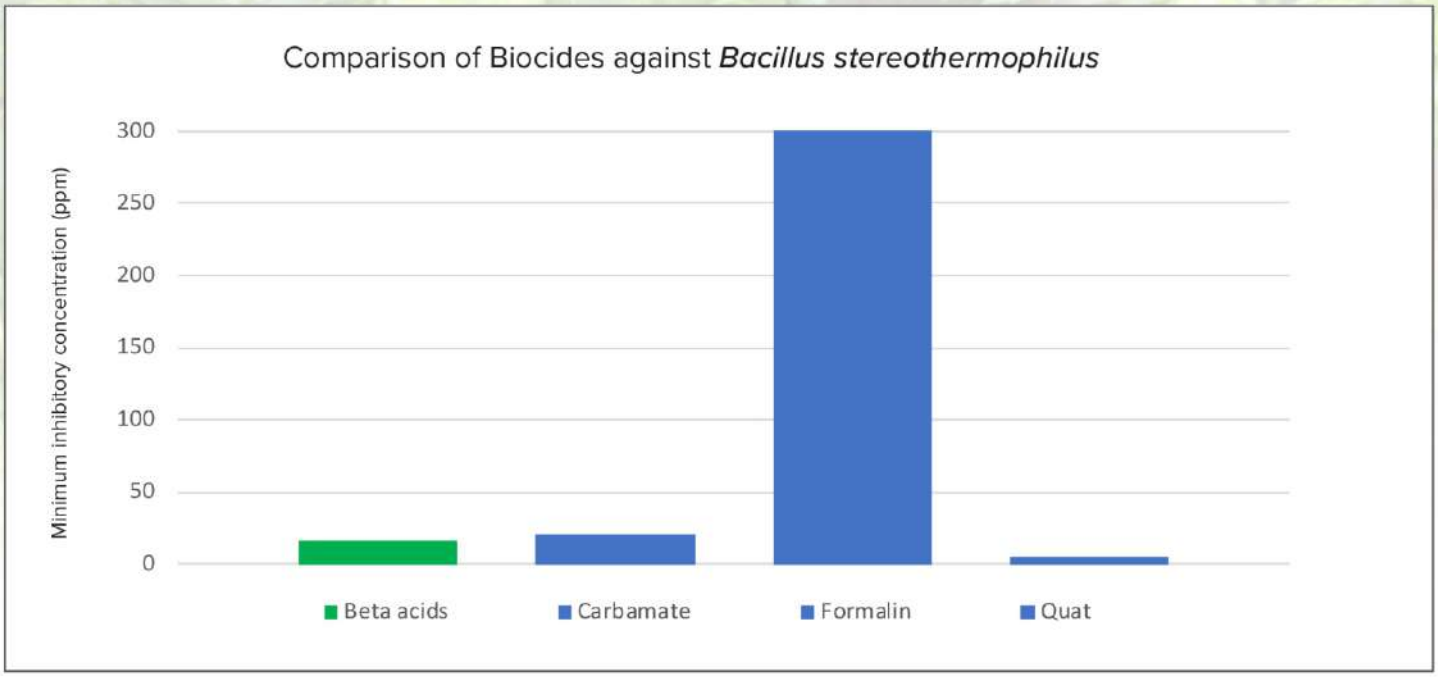
The hop product BetaStab® XL is a natural food processing aid. For more than 10 years it has proven effective at controlling bacteria in factories worldwide and is a cost effective alternative to synthetic biocides.

Our product can be applied during the production of sugar from either beet or cane. it is an aqueous solution of natural hop acids and is active over a wide range of temperatures and pH values.



Key advantages of BetaStab® XL

- **Active against bacterial contamination at ppm levels. Immediately stops bacterial growth**
- **Control of lactic acid, dextran and nitrite production**
- **Effective over a range of pH values and temperatures**
- **Demonstrated activity in sugar cane mills and sugar beet factories worldwide**
- **Cost effective alternative to synthetic biocides**
- **Can be used in thick juice storage, prolonging storage times**
- **Products are water based for ease of dosing**
- **Safe to handle and non-corrosive to equipment**
- **Coproducts suitable for animal feed**
- **Residues are beneficial for yeast and ethanol fermentation processes**



BetaStab® XL

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BetaTec® hop products

"Transforming your world with our natural hop solutions"

GLUTEN-FREE BREWING

BIJAY BAHADUR

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Introduction

Beer is one of the most ancient and consumed beverages worldwide. It is a fermented alcoholic beverage made from malted cereal grains, water, hops and yeast. The definition of beer is not the same for all countries: each gives its indications regarding raw materials and the method of production. According to Reinheitsgebot, the beer purity law introduced in Germany in 1516, the main ingredients for the beer production were water, malt and hop. Yeast was considered as a necessary ingredient for beer.

Beer market is segmented based on type of beer, by category, packaging, region or by production. Segments of beer market, growing in the recent years, are those concerning:

1. Non-alcoholic beers (divided into alcohol-free and 0.5% alcohol by volume), of interest to the consumer due to an increasing number of heart diseases, strict laws on alcohol consumption and a greater attention to a healthier life.

2. Organic beers, made only with organic ingredients and free from **genetically modified organisms** (GMO), since the consumer is more interested in avoiding undesired chemicals and in protecting environment.

3. Craft beers, processed by “small”, “independent” and “traditional” breweries, because the consumer is increasingly attracted by premiumization aspect, and by a well-detailed aromatic profile.

4. **Gluten-free** (GF) beers, brewed with GF cereals or processed to remove gluten, safe for people with **celiac disease** (CeD) but also drank by consumer who follow eating habits.

Common beer is not allowed in the GF diet. It is brewed especially with barley and wheat, which are gluten-containing cereals. Therefore, it is not safe for people with CeD because it contains a gluten content above the safe threshold established by European Legislation for “GF” status. The safe threshold was established by performing several trials. Thus, the value of 20 ppm was chosen in a preventive way as safe threshold, in order to avoid adverse effects caused by a high ingestion of gluten.

Although during the brewing process the gluten level naturally decreases, it remains above 20 ppm in the most of cases. Gluten content of craft beers may be higher than conventional ones, because protein component is not removed by filtration. Currently, brewers seek more information about strategies to produce GF beer and to satisfy consumer’s requirements.

Therefore, new technologies of brewing are developed, but the final product has different sensory attributes and a higher cost than conventional beer. The use of GF cereals as raw materials and enzymatic treatments are the main strategies used to reduce gluten content in beer. Technological and sensory aspects are also considered for each approach.

Gluten-Related Disorders

Proteins are divided in albumins, globulins, prolamins and glutelins, according to their solubility in different solvents. Prolamins and glutelins contain high glutamic acid and proline content. Prolamins are defined "storage proteins". Prolamins in wheat, barley and rye are toxic for people with celiac disease, because they are immunoreactive with celiac T-cells.

Gluten is defined as "a protein fraction from wheat, rye, barley, oat or their crossbreed varieties and derivatives, to which some people are intolerant and that is insoluble in water and 0.5 M NaCl". Gluten ingestion may cause different disorders, with different pathogenesis and a different immune response. Symptoms of gluten-related disorders are abdominal cramps, diarrhoea, gas, nausea, iron deficiency anaemia and, gastroesophageal reflux. Celiac disease is one of the best-known glutens-related disorders, but not the most widespread.

The therapy against gluten-related disorders is to follow a GF diet, excluding foods that contain wheat, rye, barley and oat (if it is produced in conventional production chain with potential contamination with cereals mentioned above) and their crossbreed varieties, or other products used as an ingredient, such as malt extract, wheat starch, bran or germ. Their presence in foods must be reported on the label even if the term "gluten" is not expressly mentioned. People with CeD, who exclude cereals containing gluten from their diet, have some nutritional deficiencies, for example, vitamin and fiber weaknesses, reduced level of iron, folate, zinc and magnesium. These macro- and micro-nutrients must be derived from increased intake of legumes, GF cereals or pseudocereals, fruits and vegetables, in order to avoid micronutrient deficiencies and an unbalanced diet.

Approaches for GF Beer Production

Gluten content decreases during germination due to a modification of grains structure, but also during wort separation, cooking, fermentation due to the pH reduction and the development of proteins-polyphenols complexes, with wort and beer clarification to prevent haze formation. However, a small percentage of gluten remains in the final beer. This is why, different approaches have been used in order to bring the gluten content below the GF threshold. The main approaches for GF beer production used so far are:

a) Use of GF cereals or pseudocereals – oats, rice, maize, buckwheat, millets etc.

b) No-grain materials - water with the adjunct of source of fermentable sugars *(for example, natural sugars, such as maltose, glucose, maltotriose, sucrose and fructose, or syrups from GF cereals obtained by enzymes activity)*, yeast nutrient, protein coagulant and hops.

c) Enzymatic Treatment – fungal peptidases, bacterial peptidases, transglutaminase, peptidases from germinated cereals

d) Precipitation Treatments – silica gel, tannin acid, poly vinyl poly prrolidone (PVPP)

e) Genetic Engineering and Innovative Approaches - not yet well established and with high costs, nevertheless, it allows the reduction of gluten concentration.

It should be taken into account that only GF beers, obtained by grains that are naturally free from gluten, are definitely safe for celiacs, because there is no trace of gluten from the beginning to the end of the brewing process.

Sensory Aspects of GF Beers

Beer is a complex matrix and its sensory evaluation is challenging. There are more than 1000 compounds, which interact each other and determine the characteristic aroma and flavour of the final beer.

One of the main disadvantages in brewing with GF cereals and pseudocereals is a different sensory quality of final product compared to traditional beer. The other described approaches have no relevant influence on sensory properties of final product. Enzymatic treatment promotes beer stabilization without influencing foam stability and beer flavour. Quality attributes depending on nitrogen content, especially foam stability and volatile compounds, are highly influenced by enzymatic treatment because of protein modification. The others sensory attributes, such as taste, aroma and mouthfeel, are not affected by this treatment.

Conclusion

Conventional beer is not allowed in the GF diet. Hence there is a need to produce GF beers, in order to meet the market demands. Summary of the different approaches for GF beer production, highlighting their technological and sensory issues. These strategies can be distinguished as follows: use of raw materials naturally free from gluten and gluten reduction treatments. In GF cereals and pseudocereals or no-grain materials are used to produce GF beers. These ones are considered safe for people with CeD, because there is no gluten in the whole brewing process. GF grains have some technological and sensory issues. Therefore, more studies are needed to optimize the malting conditions, in order to fit out the raw material for the brewing process. Further work needs to be done on the development of the right formulation of a GF beer, taking into account both technological and sensory aspects. An issue of the future will certainly be the optimization of the entire brewing process, providing breweries with well-established technologies in order to reduce the price of GF beers, which is still too high compared to conventional ones.

References

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Yeast Flocculation

Rohit Chauhan

Flocculation is the almost magical ability of yeast to clump together. It is an important and desirable characteristic unique to brewer's yeast, as it helps them to rise to the top or sink to the bottom of the fermenter. Near the end of fermentation, single cells aggregate into clumps of thousands of cells.

Different strains have different flocculation characteristics. Some strains flocculate earlier and tend not to attenuate as much, while others do not flocculate as readily and tend to attenuate more. Flocculating too early tends to result in a beer that is under attenuated and sweet. However, when yeast fail to flocculate entirely, it results in a beer that is cloudy with a yeasty taste.

Most wild yeast strains do not flocculate well and remain in suspension for extended periods. In nature, most yeast cells do not want to drop out of suspension, because in suspension they have nutrients and sugar available to them. All yeast will eventually drop out of a liquid with the help of gravity, but this can take months, and most brewers do not have that kind of time. In fact, it was selective pressure by brewers over many centuries that improved flocculation in brewer's yeast. By harvesting yeast from either the bottom or top of the fermenter for re-pitching, brewers left behind the yeast cells that did not flocculate well. The yeast left behind in the beer did not
get the chance to replicate in the next batch, removing them from the population. The flocculent yeast strains we use today are descendants of that process of selective pressure.

Scientists have studied the biochemistry of flocculation for many years, and even today, the exact mechanism is still debated. the cell wall composition is a key factor in the ability of adjacent cells to stick to each other. Yeast have a thick cell wall made up of protein (flocculins) and polysaccharides with a net negative surface charge due to phosphates in the cell wall. The extent of the negative charge depends on the yeast strain, phase of growth, oxygen availability, starvation, generation number, dehydration, and cell age (Smart, 2000). Yeast cells are also hydrophobic due to exposure of hydrophobic peptides (Hazen and Hazen, 1993). The degree of hydrophobicity is dependent on yeast strain, phase of growth, ability to form chains, starvation, generation number, flocculation onset, and fibril formation (Smart, 2000). Yeast cell walls also have mannoproteins, (proteins with large numbers of mannose groups attached, to help regulate cell shape, porosity, and cell-cell interactions, including those involved in flocculation).

The primary determinant of flocculation is the yeast strain itself. Each yeast strain has its own unique DNA sequence, which determines the exact set of proteins displayed on the cell surface. These minute differences in cell wall composition play a key role in flocculation behavior and determine the degree of flocculation for a strain. Factors that influence the degree of flocculation include the original gravity of the wort, temperature of fermentation, pitching rate, and initial oxygen content. Keep in mind anything that affects the health and growth rate of the yeast affects.

Flocculation Degree	Notes
High	Start to flocculate by day 3-5 Sometimes need to rouse the yeast Higher levels of diacetyl and lower attenuation Good for malty ales
Medium	Start to flocculate by day 6-15 Ideal for ales Clean, balanced flavor production Also called "powdery"
Low	Fail to begin to flocculate by day 15 Most wild yeast are low flocculators Good for hefeweizen, Belgians Makes filtering difficult

flocculation.
Figure1: Differences in flocculation classification.

Brewers classify yeast as high, medium, or low flocculators (Figure 1). Ale strains span each category, while lager strains are predominantly medium flocculators. For example, those strains marketed as English/ London ale strains are often high flocculators. Centuries of top cropping in
Britain have selected for highly flocculent yeast. Interestingly, even though centuries of top cropping has made those strains so flocculent, in recent times brewers have put selective pressure on them to make them better bottom croppers. Today they are just as flocculent, but often they are also excellent bottom croppers.

Those yeasts marketed as California/American ale strains are most often medium flocculators, and hefeweizen strains are good examples of low flocculators. While high flocculation quickly results in clear beer, filtering can clarify a beer even more quickly, so a brewer willing to filter can use a strain with almost any level of flocculation.

A high flocculator begins to clump in three to five days. When it drops to the bottom of the fermentor, it forms a solid, compact yeast cake. In fact, some strains are so flocculent that they can form tight plugs that block openings and clog valves. Home brewers working with small fermenters sometimes swirl the yeast cake to maintain fermentation activity, but even so, the yeast cake only breaks down into large chunks. Producing a fully attenuated beer with high flocculators can require special attention, such as rousing the yeast back into the beer. Even with such measures, highly flocculent strains usually result in lower attenuation and increased levels of diacetyl and esters.

Medium flocculators tend to produce “cleaner” beers with lower levels of diacetyl and esters. Because the cells stay in suspension longer, they attenuate the beer more and reduce diacetyl and other fermentation compounds to a greater degree. In a commercial brewery, they are slightly more difficult to work with than high flocculators, because they often require filtering for a quick turnaround. Of course, most home brewers do not filter, and with enough time medium flocculators will settle out on their own; they just take longer than highly flocculent yeast. Medium flocculators, and their tendency toward clean fermentation characteristics, make them well suited to highly hopped beers like many American-style ales. Their clean flavors allow the hop aroma and flavor to come through.

Brewers rarely use low flocculators, because they do not settle out, creating haze and filtering problems. However, some beer styles should have yeast in suspension. For example, the German hefeweizen and Belgian witbier styles both require low flocculating yeast strains to create the desired cloudy appearance. Some breweries will filter their hefeweizen and then add back lager yeast at packaging time. Because lager strains are less flocculent and tend to stay in suspension longer, they are better able to clean up a beer during an extended fermentation and lagering process. There are some very dusty lager strains, which work well for providing that cloudy yeast appearance.

One important factor in flocculation is calcium. The yeast requires certain minimal levels of calcium present for flocculation to occur. Wort usually has enough calcium, and the brewer does not need to add more. If you are working with very soft water, keep in mind the calcium requirement. In most cases, 50 ppm of calcium is enough to meet the yeast's needs.

DYMANICS OF HOPS INDUSTRY

AKSHAT JAIN

Business Development Manager-Craft Brewing

Today, the hops industry seems to be enjoying previously unseen levels of popularity. The craft beer revolution, resulting in a higher number of brewers and a more varied product offering, has heralded the end of decades of consolidation in the beer industry. Hops (Humulus lupulus) are known to be one of the most essential and characteristic ingredients in beer production as they make several contributions to the final product.

Among these are: bitterness, aroma, flavor, mouth feel, foam and lacing, flavor stability, and anti-microbial characteristics which inhibit the growth of organisms that could produce off flavors or aromas, or spoil the beer entirely.

Hops in the Brewing Process

Hops were already known in Europe in antiquity, but not in connection to brewing beer. Plinius the Elder cited above all the virtues of hop shoots and hops for medicinal purposes (Biendl and Pinzl, 2013). Modern hop variants may, however, have been introduced from China by migratory waves to Central and Northern Europe in the Early Middle Ages (Meussdoerffer, 2009).

Hops Types

According to Hop Growers of America, the hop development process takes approximately nine years, and takes place in four phases.[11] Over this time period, the hop is developed and tested extensively before being released to the industry and commercialized. The British Hop Association adds two years to this process, whereby the tenth year serves as the first commercial planting and the eleventh year as the first commercial crop.

In other words, under ideal conditions, it takes nearly a decade to prepare a new crossbred variety for commercial growth.

Demand for Hoppy Beers

Since hops are a key ingredient in the beer industry, the overall demand for hops is obviously determined by the demand for beer.There is no question that craft brewers' creativity resulted in an increased offering of beer types. As craft beer enthusiasts and brewers enjoy a higher volume of hops in many of these beers, the hops market expanded in tandem with the craft beer market. Most of these craft beers use significantly more hops than the traditional lager.As craft beer enthusiasts and brewers enjoy a higher volume of hops in many of these beers, the hops market expanded in tandem with the craft beer market.

Pricing & Hops Market

The changes in demand and cultivated hop varieties obviously have an impact on the hops market. The trend for use of higher alpha acid hops variants comes at a price. In more exotic recipes, hops are a significant part of the production cost.The rising popularity of hops and hopped beers would indicate that the market is in a better state than ever before. Out of a fear of missing out on their favorite varieties, several brewers have jumped to sign three- to five-year contracts with hop growers

Source: Book New Developments in the Brewing Industry

BECPL AT DRINK TECH 2022, MUNICH GERMANY

JAMUN WINE

ESHANT BHARDWAJ

Business Development Executive,
BECC

Jamun is the taste of an Indian summer. It reminds us of the freedom of childhood, of picking the dark fruit straight from the tree for free, of enjoying its intense sweetness and the satisfyingly purple stain it left on our tongues. But unlike other fruits, Jamun's sweetness is shadowed by dark moody notes.

Making of Jamun Wine

Step 1. Collect the Fruits

Step 2: Wash and Clean the Fruits

- Wash and clean a container and add the Jamun fruits in it
- Add a handful of crystal salt and stir the fruits thoroughly with salt
- Transfer the fruits to a strainer and clean with filtered water two to three times to remove the traces of salt.

Step 3: Remove the Seeds

- Transfer the fruits from the strainer to the clean container
- Crush the fruits with your fingers and separate the seeds and flesh
- Collect the seeds and discard. You can also make a powder from the dried seeds, which is considered as a medicine in Ayerveda.

Step 4: Add Other Ingredients

- Now we have collected the flesh and juice from about 500 grams of fruits
- Add about 150 grams of sugar to the juice
- Cut a lime and add the juice to the mixture
- Mix about 10 to 15 grams of yeast in warm water and add to the mixture
- Boil about half a liter of water and allow it to cool
- Add the water to the container and mix well

Step 5: Transfer to a Clean Bottle

- After diluting the mix, we got about one liter of mixture
- Wash and clean a 2 liters plastic water
- Transfer the mixture from the container to the bottle.
- Now we have more than half of the plastic bottle empty. I made another batch of same size from Jamun fruits and filled the bottle leaving few inches of space in the bottle.

Step 6: Store

- The plastic bottle has few inches of empty space on top. Just press the plastic bottle so that all air present in the bottle is pressed out and replace the cap.
- Keep the bottle in a safe and hygienic place. Soon you will find the gas produced from the mixture fills up the bottle.
- Release the gas twice in a day. After about ten days, the gas production seems to be under control

Step 7: Transfer to a New Bottle

- Wash and clean another bottle
- Tilt the bottle containing the mixture over the new bottle and transfer the juice
- Drain out the remaining pulp from the old plastic bottle
- Keep the new bottle with the liquid in a safe place

Step 8: Enjoy Your Jamun Wine

- The liquid in the fresh bottle still produces so much of gas.
- Open the lid and release the gas without allowing any outside air to pass back into the bottle
- After about 10 days you will find the gas formation has slowed down

WINE BROWNING

MANJUSHA NARSINENI

Alcohol Technologist

Wine oxidation changes the chemistry, sensory profile and color of wines. In wine oxidation, phenolics are oxidized to quinones and these reactive compounds can be quenched by sacrificial nucleophiles, such as the A-ring on flavanoids, preventing oxidative damage from the loss of desirable flavor molecules. The “catechol” B-ring on flavanoids, in contrast, can be oxidized by quinones through electron transfer reactions that lead to flavanoid quinones, precursors of browning products.

Browning emblem on wine glass

Among wine compounds, phenolics are those mostly affected by aging. They originate from grapes (flavonoids and non-flavonoids) and constitute one of the most important wine quality parameters. During winemaking and aging, phenolics mainly undergo oxidation reactions, which not only affect the phenolic composition itself but also determine changes in terms of sensory characteristics, such as color and astringency. Phenolic compounds are the primary reactants to be oxidized in presence of oxygen and metals (Fe^{3+} , Cu^{2+}), giving rise to a cascade of chemical transformations that may result in an excessive deterioration of wine.

[1]. Wine oxidation consists of a series of reactions: first, oxygen is reduced to hydrogen peroxide by interacting with transition metals, including iron and copper ions, in the presence of catechol subunits that are oxidized to quinones

[2]. Quinones strongly react with nucleophilic compounds, such as antioxidants (sulfur dioxide, glutathione, ascorbic acid), desirable aroma volatile thiols (i.e., 3-sulfanylhexanol), undesirable aroma thiols (i.e., hydrogen sulfide), amino acids (i.e., phenylalanine, methionine) and numerous polyphenols (mainly flavanols).

The products of these reactions may lead to the formation of condensed polymeric pigments—particularly important in red wines, or even to the loss of color and varietal characters.

[3]. ferrous or cuprous species react with hydrogen peroxide by the Fenton reaction to yield the hydroxyl radical, a strong oxidant, capable of reacting with all organic constituents in proportion to concentration.

[4]. Ethanol: The most abundant organic compound in wine is ethanol, which is converted into acetaldehyde once oxidized by the hydroxyl radical. As a consequence of oxidation, in red wine native anthocyanin pigments are quickly transformed into more stable pigments via various types of reactions such as aldehyde-mediated condensation reactions with tannins and cyclo-addition reactions leading to the formation of pyranoanthocyanins.

[5]. Oxidation reactions also contribute to modifying the wine astringency by changing the tannin structure as a consequence of intra and inter molecular reactions mediated by oxygen.

[6]. These "stabilized products" anthocyanin or pigmented tannins persist much longer in wine than their initial forms.

[7]. Thus, low amounts of oxygen in red wine are important to stabilize either color or astringency. During winemaking, oxygen plays a crucial role in the fermentation process. It promotes the yeast biomass synthesis and favors a sound fermentation.

[8]. In white wines oxidation is usually associated with important changes in color. A brown color is normally unwanted, because it is a sign of oxidation in white wine. Brown coloration can be induced by enzymatic or chemical oxidation mediated by oxygen. White wine is generally more sensible to O2 than red wine. Even small additions of O2 to white wine can lead to loss of aroma, especially fruitiness with the appearance of off-flavors described as caramel, rancid, farmed-feed, honey-like and cooked vegetables.

Bioprotection: is a current concept, so its definition is still under discussion. However, it can be considered the active or passive use of some microorganisms to preserve foods and beverages and to exclude other spoilage microorganisms, thus avoiding the production of off-flavors, sensory alterations, or even the formation of toxic molecules. Bioprotection is a hot topic in enology and foods.

Ladybug taint: (also known as ladybird taint) is a relatively recently recognized fault that has been identified in wines from a wide range of terroirs. Alkyl-methoxypyrazines—particularly 2-isopropyl-3-methoxypyrazine—have been determined as the causal compounds, and these are introduced into grape must during processing, when specific species of vineyard-dwelling Coccinellidae are incorporated into the harvested fruit. Coccinella septempunctata, and especially the invasive Harmonia axyridis, are the beetles implicated, and climate change is facilitating wider dispersal and survivability of H. axyridis in viticultural regions worldwide. Affected wines are typically characterized as possessing excessively green, bell pepper, and peanut-like aroma and flavor.

Trichloroanisole (TCA): is a fungal metabolite with an unpleasant moldy odor that can contaminate wine, producing the so-called "cork taint" or "corked taste". in wine results in a sensory defect called "cork taint", a significant problem for the wine industry. Wines can become contaminated by TCA absorption from the atmosphere through contaminated wood barrels, cork stoppers, and wood pallets. Air-depleted solvent-impregnated (ADSI) cork powder (CP) was used to mitigate TCA in wines. TCA has an extremely low detection threshold of nanograms per liter (ng/L), which indicates that it will be easily detectable by the consumer, even at low concentrations.

ETHANOL BLENDING IN INDIA 2020-25

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The national nodal department for promoting the nation's distilleries that produce fuel-grade ethanol is the Department of Food and Public Distribution (DFPD). The government has authorised the manufacturing and purchase of ethanol from sugarcane-based raw materials, including surplus rice from Food Corporation of India (FCI)10 and maize. Table 1 & Table 2 below lists the raw material-wise conversion efficiency and the % blending trend

Table 1: Feedstock cost and ethanol yield

Feedstock	Cost / MT of the feedstock (Rs.)	Quantity of ethanol per MT of feedstock	Ex-mill Ethanol Price (Rs./litre)
Sugarcane juice / Sugar / Sugar syrup	2850 (Price of sugarcane at 10% sugar recovery)	70 litre per ton of sugarcane	62.65
B Molasses	13,500	300 litre	57.61
C Molasses	7123	225 litre	45.69
Damaged Food Grains (Broken Rice#)	16,000	400 litre	51.55
Rice available with FCI	20,000	450 litre	56.87
Maize#	15,000	380 litre	51.55

#the rates vary from region to region and also in accordance with demand/supply or quality.

According to DFPD, the 20% ethanol fuel need by 2025 will be satisfied by the grain and sugar industries. The table shows projected ethanol production year-over-year and sector-over-sector according to rising blending percentages

Table 4: Year wise & Sector wise Ethanol Production Projections

ESY	Ethanol Production Projections									
	For Blending			Blending (in %)	For other uses			Total		
	Grain	Sugar	Total		Grain	Sugar	Total	Grain	Sugar	Total
2019-20	16	157	173	5	150	100	250	166	257	423
2020-21	42	290	332	8.5	150	110	260	192	400	592
2021-22	107	330	437	10	160	110	270	267	440	707
2022-23	123	425	542	12	170	110	280	293	535	828
2023-24	208	490	698	15	180	110	290	388	600	988
2024-25	438	550	988	20	190	110	300	628	660	1288
2025-26	466	550	1016	20	200	134	334	666	684	1350

Below are the expected ethanol requirements based on petrol (gasoline) consumption and the estimated average ethanol blending targets for the years ESY 2020–21 through ESY 2025–26.

Table 3: Ethanol demand projection

Ethanol Supply Year	Projected Petrol Sale (MMT)	Projected Petrol Sale (Cr. litres)	Blending (in %)	Requirement of ethanol for blending in Petrol (Cr. litres)**
A	B	B1=B X 141.1	C	D=B1*C %
2019-20	24.1 (Actual)	3413 (Actual)	5	173
2020-21	27.7	3908	8.5	332
2021-22	31	4374	10	437
2022-23	32	4515	12	542
2023-24	33	4656	15	698
2024-25*	35	4939	20	988
2025-26*	36	5080	20	1016

* The petrol projections may undergo revision due various factors like penetration of EVs, etc.

** The figures are optimistic, as the E20 fuel will be consumed by new vehicles from April 2023 only. The demand for ethanol will, however, increase due to penetration of E100 two wheelers, which are now being manufactured in the country.

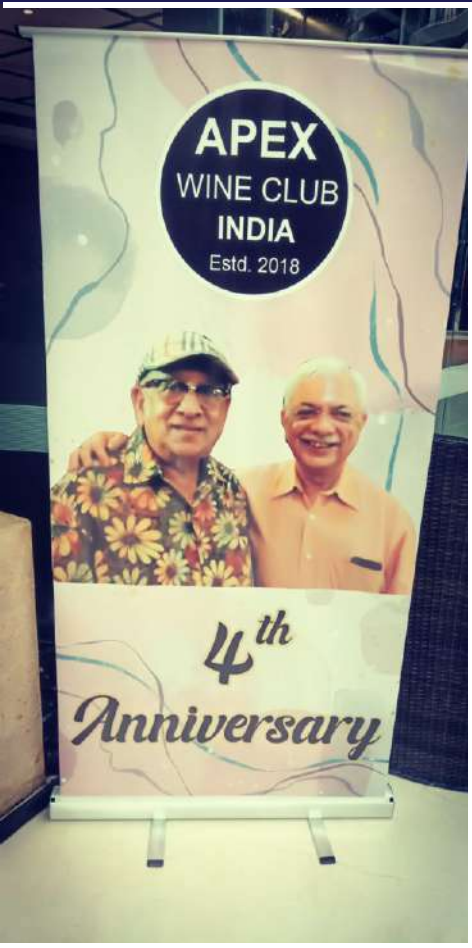
Supply of ethanol under the EBP Programme for the ongoing ESY (2020-21) has surged to 332 crore litres, which is 91% more in comparison to the ethanol supplies received during preceding ESY (2019-20)

Table 2: Quantity Supplied (Ethanol) and % Blending Trends

Ethanol Supply Year	Qty Supplied (crore Lit)	Blending %age PSU OMCs
2013-14	38.0	1.53%
2014-15	67.4	2.33%
2015-16	111.4	3.51%
2016-17	66.5	2.07%
2017-18	150.5	4.22%
2018-19	188.6	5.00%
2019-20	173.0	5.00%
2020-21	332	8.50%

Reference
Publishing Agency: NITI Aayog,Ministry of Petroleum and Natural Gas, Year of Publication: June 2021

APEX WINE CLUB INDIA 4TH ANNIVERSARY



INDIAN ETHANOL SCENARIO (SOURCE:- CHINI MANDI NEWS)

RAGHAVENDRA SHARAN SINGH

Sales & Technical Manager
(Alcohol Industry)

India has taken a step ahead in achieving energy security and transitioning towards a thriving low carbon economy by blending locally produced ethanol with petrol. This will help India strengthen its energy security, enable local enterprises and farmers to participate in the energy economy and reduce vehicular emissions.

The Expert said, "With the Hon'ble Prime Minister, Narendra Modi ji, personally overseeing and encouraging the ethanol blending programme (EBP) in the country, there are several positives for the sector. The Government has correctly attempted to first develop adequate ethanol production capacity, for which financial incentives in the form of interest subvention for 5 years, attractive ethanol prices linked to the feedstock and concessions in bank loans have been introduced in the last 5 years or so. Seeing a big opportunity for its farmers, most of the State Governments have also very swiftly announced their own ethanol policies with several incentives therein. The result has been massive excitement amongst investors, including new entrepreneurs, both in the sugar/sugarcane based and grain based ethanol plants. The available data gives us the confidence that ethanol production capacity will be adequate by 2025 to produce more than 10 billion litres of ethanol for the required blending level of 20% across the country, as targeted by the Hon'ble Prime Minister."

Speaking on the challenges that need to be addressed Expert shared, "I think we are on course to achieve the required ethanol production capacity by 2025. To produce 10 billion litres of ethanol in 2025, the production capacity has to grow by 100%. Growth of production capacity can happen gradually throughout the next 3 years. Therefore, demand and blending level has to also show a gradual growth from the current 10% (E10) in 2022, to say 12-13% in 2023 and 15-16% in 2024 to finally reach 20% (E20) in 2025. Hon'ble PM took the first step in this direction, when he announced the BIS standards for E12 and E15 fuel on World Environment Day on 5th June 2021. The annual tender for ethanol procurement for Dec.2022 to Nov 2023 will be invited within the next one month, and it will be very important that the OMCs invite ethanol bids equivalent to 12-13% all India average blending for 2022-23. In other words, the challenge is more on how smoothly we are able to roll out the blending programme and the demand/offtake of ethanol over the next 3 years, to ensure that the producers do not get stuck with excess unsold ethanol. Along with the demand growth, will come the challenge of transporting and distributing the 10 billion litres of ethanol across the country, from surplus ethanol producing States to deficit States across the country."

In the next 5 years a very bright future for the Indian ethanol industry. There will have to be heavy investments not only in building more ethanol production capacities, but also in storage, transportation as well as distribution network for procuring the ethanol from producing States and selling it in consuming States.

The Government will need to, therefore, formulate ethanol policies to incentivise and encourage investments in storage, transportation and distribution networks across the country. At the same time, there will be a need to generate adequate demand for the higher ethanol production from next year. All the above will be a waste if we do not ensure that such vehicles are developed which can run smoothly on higher blends of ethanol. Dependence on E20 compliant vehicles only, may not be enough to generate the desired demand for 20% blending by 2025. There is an immediate need to develop and roll out flex fuel vehicles (FFVs), which will help generate higher ethanol demand in a much shorter time. Looking at the numbers, it is absolutely clear that if India has to achieve 20% blending across the country, FFVs are essential in the country from next year itself, if not earlier. Therefore, I also expect a set of policies very soon from the Government to incentivise FFVs, including GST concessions and PLIs on such FFVs."

Most of the grain distilleries are facing making cost of ethanol production costly because of the prices of both the broken rice and maize, the two very important raw materials for a grain based distillery have jumped from around Rs.17,500 per ton to over Rs.22,000 per ton. The Russia-Ukraine war created a shortage of these commodities, and India exported much more than they usually did earlier, including rice, causing a very high price rise of broken rice, maize and rice in the Indian markets. At the same time, the price of coal jumped 3 times, pushing many coal users to shift their fuel use to biomass, especially rice husk. That resulted in a 3 time jump in the price of rice husk, from around Rs.3,500 per ton in the previous year to over Rs.10,500 per ton or even more now. A simple math will show that for every Rs.1,000 per ton increase in price of rice/maize enhances the cost of production by Rs.2.25 per litre of ethanol and for every Rs.1,000 per ton increase in price of rice husk/biomass, the cost increases by Rs.1.75 per litre of ethanol. In other words, the Rs.4,500 per ton price increase in rice/maize price and Rs.7,000 per ton price increase in rice husk has increased the cost of production of ethanol by around Rs.10 and Rs.12 per litre respectively (a total of Rs.22 per litre of ethanol). This has made the whole economics of ethanol production from grains completely unviable."

"Availability of surplus FCI rice at a fixed price of Rs.20,000 per ton at FCI godown, has been a small consolation, along with a temporary price incentive of Rs.1.44 and Rs.2.34 per litre from OMCs till 30th Nov 2022, but not enough to make the business of ethanol production from grains viable from any stretch of imagination. I am sure this has put a lot of doubt in the minds of prospective investors in the grain based ethanol plants. Some of them may already be rethinking about their investment plans, unless some concrete solutions are found to the problem of very high raw material and very high fuel/rice husk prices. With banks not very favourable to extending loans to grain distilleries, future expansion plans in the grain based ethanol sector are already under threat. If raw material and fuel cost problems are not solved either by reducing their prices or otherwise by increasing the ethanol procurement prices, the investors may lose interest very quickly from this very important and much favoured sector of the Hon'ble Prime Minister.

WINE REPORT

KANCHAN SINGH

Chapter Head - South Delhi, India
Apex Wine Club India

1 September 2022, Thursday

The Indian wine industry is expected to grow by $274 million by 2026, with a 29.3 per cent year on year growth in the year 2022.

It is important to note that the port wine market share is expected to increase to USD 157.04 million from 2021 to 2026, and the growth momentum of the market will accelerate at a compound annual growth rate (CAGR) of 3.13 per cent.

Further, the predicted growth for the organic wine market share from 2021 to 2026 is USD 4.60 billion at a progressing CAGR of 8.32 per cent.

Reports suggest that the demand for premium wine brands is on the increase among consumers in India. Besides, the increase in demand for premium wine has led to an increase in the launch of innovative products.

The major driver in sales is the availability of online stores and online specialty retailers which provides a variety of choices to consumers along with shopping conveniences.

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