



BrewTimes™



MARCH 2022



Balaji Enzyme and Chemical Pvt Ltd

No. 106/107, A5/1, Parasnath Complex, Owali Gaon, Dapoda Road,
Bhiwandi - 421302 | +91-72-08124000

E-mail : info@becc.org.in | Web. : www.becc.org.in

Introducing BrewTimes :

We M/s Balaji Enzyme & Chemical Pvt Ltd, are pleased to bring to you our March 2022 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.

Diacetyl in beer by Bijay Bahadur, is a severe off flavour in beer which is a challenge faced by most brewers in India. Microbial contamination of ethanol fermentation and its impact on yield.

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.





BetaStab® XL

Reduce your sugar losses ...naturally

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

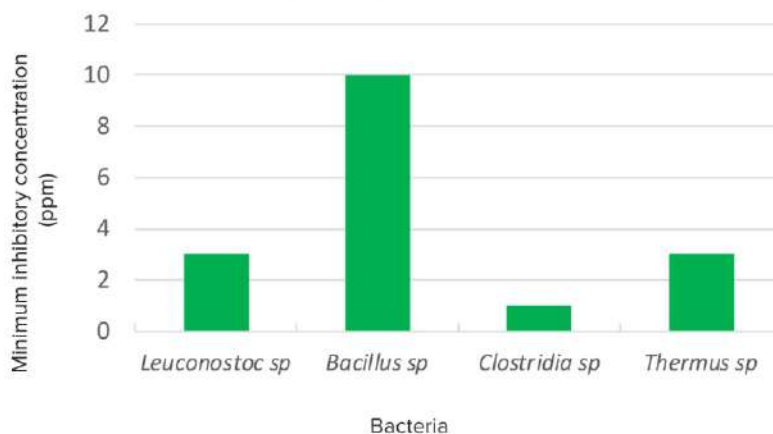
Microbial sugar losses are a major problem in sugar production resulting in lower yields, increased processing problems and higher impurities such as lactic acid and dextran.

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.



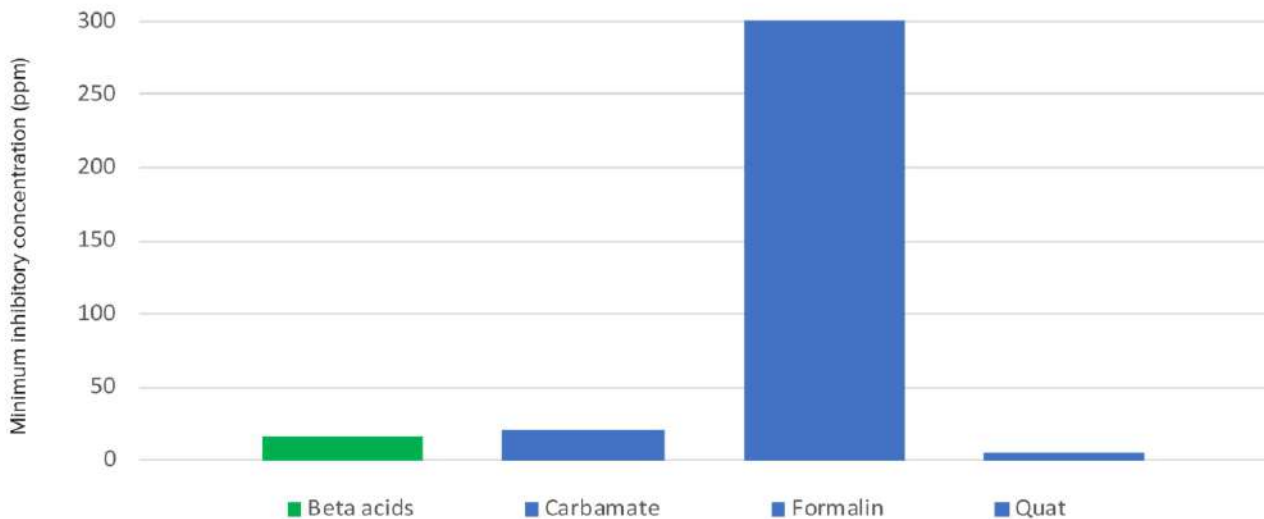
Lab measured minimum inhibitory concentration of
beta acids against various bacteria



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

Comparison of Biocides against *Bacillus stearothermophilus*



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 BetaStab® XL can help you.

BetaTec Corporate Office
5185 MacArthur Blvd NW, Suite 300
Washington, DC 20016
202.777.4800

BetaTec Innovation Centre
Malvern Hills Science Park
Geraldine Road
Great Malvern, Worcestershire WR14 3SZ
+44(0) 1684 217340

BetaTec® 
hop products

“Transforming your world with our natural hop solutions”



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®**.

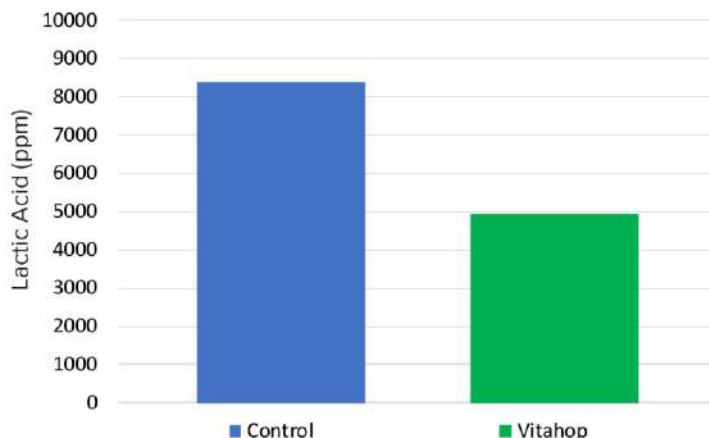


Key Benefits of Vitahop®

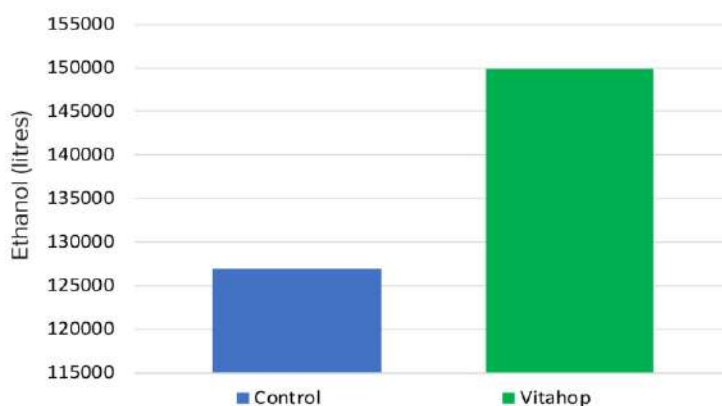
- Maintains optimum ethanol yields
- Ensures reliable fermentations
- Keeps yeast healthy
- Controls bacteria
- Demonstrated benefits in ethanol production plants worldwide
- Safe and natural, easy to use
- Safe DDGS for animal feed
- A natural alternative to antibiotics



Effect of Vitahop® on Average Lactic Acid Production at Fermenter Drop



Effect of Vitahop® on Ethanol Production



Unpublished data BetaTec 2015



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.

BetaTec Corporate Office
5185 MacArthur Blvd NW, Suite 300
Washington, DC 20016
202.777.4800

BetaTec Innovation Centre
Malvern Hills Science Park
Geraldine Road
Great Malvern, Worcestershire WR14 3SZ
+44(0) 1684 217340

BetaTec®
hop products

“Transforming your world with our natural hop solutions”



BIJAY BAHADUR

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

Introduction

Diacetyl has long been considered a severe off-flavor component in beer. The demands for beer have shifted in favor of a mild-flavored product, making the diacetyl problem even more acute. Diacetyl becomes increasingly noticeable and objectionable without more vital flavor components masking effect.

Though diacetyl is a natural fermentation product, it's undesirable – and is even considered a defect – in many types of beer. Small diacetyl is often encouraged in specific beers such as ale and stout. In lager, diacetyl usually isn't desirable – and if the diacetyl concentration is high enough, it is considered a flavor defect in any beer because it's likely due to bacterial contamination. Diacetyl contributes a buttery flavor to beer; some consumers may also interpret it as a butterscotch flavor. In addition, diacetyl gives the beer a slippery or oily mouthfeel. Some consumers find that diacetyl makes the beer seem more filling.

Diacetyl reduction

Brewers have only partially succeeded in controlling diacetyl levels in beer, usually at the expense of production efficiency. Extended lagering of the beer assures complete diacetyl removal, but the longer holding periods and storage requirements make the process burdensome. The usage of fresh whole yeast cells to fermented beer (Krausening) reduces the diacetyl content. Still, yeast autolysis may produce additional off-flavor in the finished product.

The removal of diacetyl is the critical element during the maturation of lager beer. Diacetyl may be an essential flavor attribute of some other beer brands, but it is usually an off-flavor in lager beer. Many reactions are known to occur during lagering other than those related to diacetyl reduction.

Current practice

The wort pH and the fermentation temperature also influence the amount and rate of diacetyl formed and reduced, as they affect yeast growth rate, the reaction rate of the spontaneous decarboxylation of α -acetolactate into diacetyl, and the activities of the enzymes responsible for reducing diacetyl to acetoin and 2,3-butanediol. Increased fermentation temperatures lead to higher initial diacetyl production rates as a consequence of increased yeast growth, but also produce more yeast mass to reduce the diacetyl to 2,3-butanediol and increase the reaction rate of the oxidative decarboxylation of α -acetolactate to diacetyl, which suggests that the rate-limiting conversion of α -acetolactate to diacetyl is expedited at higher temperatures, ultimately leading to sharper diacetyl concentration peaks during fermentation and thus a faster diacetyl reduction rate.

The increased decarboxylation rate of α -acetolactate to diacetyl at higher temperatures can be exploited during fermentation in a so-called 'diacetyl rest,' where temperatures are raised towards the end of fermentation to reduce α -acetolactate concentrations and shorten the maturation period.

New techniques

Diacetyl reactions

The increased understanding accumulated during the last decades has facilitated the use of new technologies to speed up lagering. The following is a summary of reactions related to the formation and reduction of diacetyl and other vicinal diketones.

The routes are schematically presented in Fig. 1. Yeast utilizes amino acids sequentially - Valine, a Group II amino acid, while yeast uses the Group I amino acids. The need for synthesis applies when the Group II amino acids are exhausted later in fermentation: valine must be synthesized once again. This leads to the customarily observed two-peak appearance of total diacetyl in beer fermentation. The upper part of the biosynthetic pathway functions faster than the lower part: α -acetolactate synthetase is more efficient than the reductoisomerase enzyme. The discrepancy in rates leads to leakage of α -acetolactate and α -acetohydroxybutyrate from mitochondria and yeast cells.

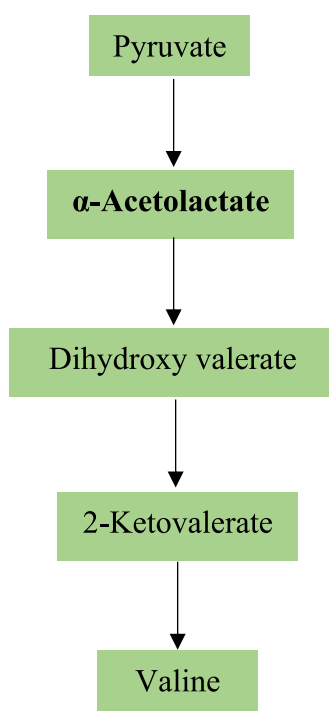


Fig. 1 The formation of vicinal diketone precursors during beer fermentation.

Once outside the cell, α -acetolactate is chemically decarboxylated to diacetyl. This is the slowest reaction, mainly because the fermentation temperature is low. After the decarboxylation step, yeast takes up diacetyl and reduces it to acetoin (Fig. 2).

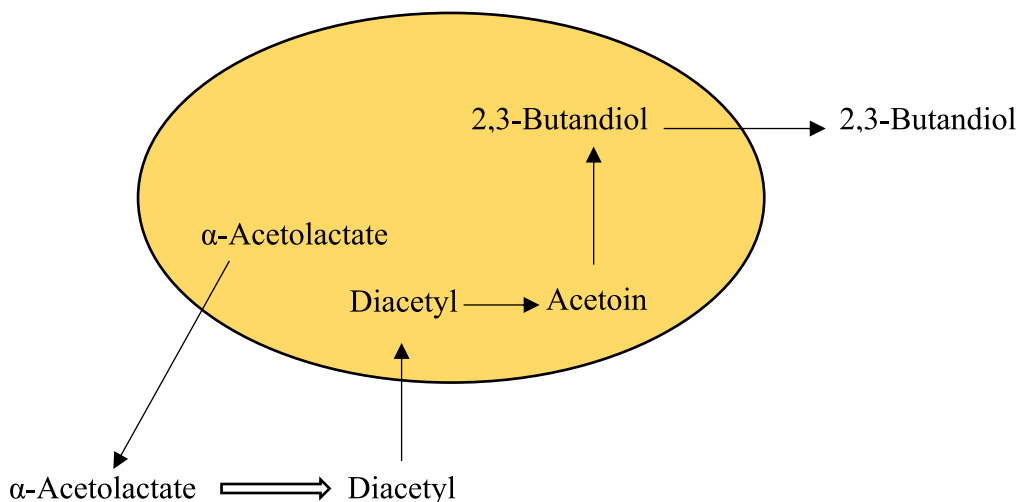


Fig. 2 The reduction of vicinal diketones during beer fermentation.

Addition of Enzyme

α-Acetolactate decarboxylase

Solving the diacetyl problem by adding an enzyme, diacetyl reductase, did not catalyse the rate-limiting step instead, it only reduced diacetyl to acetoin. The rate-limiting step is the decarboxylation of the precursor, α-acetolactate, to diacetyl. This reaction is catalysed by α-acetolactate decarboxylase (Fig. 3). The use of this enzyme decreases the levels of α-acetolactate in freshly fermented beer (green beer). In 24 hours at 10 °C level reduced below the taste thresholds of the diketone (diacetyl).

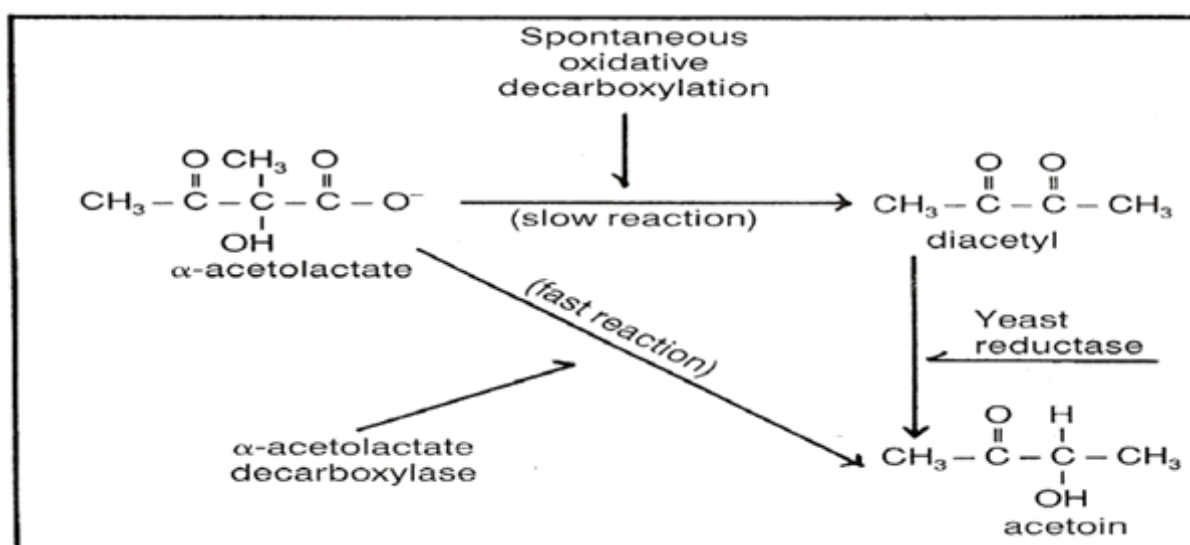


Fig. 3 Removal of α-acetolactate during fermentation

Conclusions

Since diacetyl is unwanted in beer, its removal is one of the main objectives of beer maturation, especially for lager beer. During maturation period i.e., time- and resource-consuming step in the overall production process.

To improve the qualitative and sensorial parameters at beer, it is imperious necessarily inhibition or removal of the secondary products with high sensibility (diacetyl and acetoin). The decrease of diacetyl and acetoin represents the limitative phase during the beer maturation process. The best procedure for achieving this desire is using the enzymatic preparation α-acetolactate decarboxylase. Using α-acetolactate decarboxylase for an acceleration of maturation process at beer, the diacetyl concentration remains at a low level, and the maturation period decreases with 5-6 days.



AKSHAT JAIN

Business Development Manager-Craft Brewing

Malt Extract is basically the Extract of the Malts, is a sweet, treacle-like substance used as a dietary supplement. Malt extract is made by mashing grains using the traditional process to produce wort, a hot sweet sugary liquid. The wort is then concentrated from its original gravity of perhaps 1.080 to a thick syrup with gravity of between 1.400 and 1.450. The wort is concentrated by evaporation under heat.

Malt extract is frequently used in the brewing of beer. This extract production begins by germinating barley grain in a process known as malting, immersing barley in water to encourage the grain to sprout, then drying it to halt the progress when the sprouting begins. The drying step stops the sprouting, but the enzymes remain active due to the low temperatures used in base malt production. In one before-and-after comparison, malting decreased barley's extractable starch content by about 7% on a dry matter basis and turned that portion into various other carbohydrates. In the next step, brewers use a process called mashing to extract the sugars.

Brewer warm cracked malt in temperature-modulated water, activating the enzymes, which cleave more of the malt's remaining starch into various sugars, the largest percentage of which is maltose. Modern beer-mashing practices typically include high enough temperatures at mash-out to deactivate remaining enzymes, thus it is no longer diastatic. The liquid produced from this, wort, is then concentrated by using heat or a vacuum procedure to evaporate water from the mixture. The concentrated wort is called malt extract

Beers made with malt extract will tend to ferment slower and finish at a higher gravity than corresponding all-grain beers. This is due to a variety of factors including the presence of unfermentable dextrins from the concentrating process, the lack of free nitrogen in extract malt needed for yeasts, and the potential for oxidization of the malt for malts stored for an extended period.

Benefits of Brewing with Malt Extract

1. Saving of Time
2. Extract saves space
3. Extract means efficiency
4. Extract means consistency
5. Extract encourages home brewing

In conclusion, the Brew in a Bag method is a great way to get into all grain brewing! You will end up saving money by extracting all of the sugars from the grain on your own, you will need to purchase the minimal amount of additional equipment, know that you are still brewing in a timely manner, and have a simple clean up at the end of the day!

Source: Wikipedia, great fermentation, home brewing association, beer smith



MAMTA BHARDWAJ

What is moderate consumption?

To get health benefits of wine one should consume wine in “moderate amount”.

But what is “moderate” wine consumption? How much wine one can drink in one sitting before the benefits turn into dangers depends on many factors. Like a person’s age, gender, size, body stature, and general health condition. As well as, whether it is being consumed with food or on empty stomach.

Generally women absorb alcohol more quickly than men because of their lower body water content and different levels of stomach enzyme. That’s why moderate consumption may be a lower amount for women than for men.

According to, “Dietary Guidelines for Americans 2010” published by the US department of agriculture. “If alcohol is consumed it should be consumed in moderation – up to one drink per day for women and two drinks for men.”

The National Health Service UK explains that men should not regularly drink more than 3 to 4 units of alcohol a day while women should not drink more than 2 to 3 units a day.

One unit is equal to 10ml or 8 gm of pure alcohol. A 250 ml glass of red wine with 12% alcohol contains 3 units of alcohol.

How to calculate alcohol units

Using units is the simpler way of representing drink’s alcohol content. Alcohol content is usually represented as ABV.

ABV is the measure of amount of pure alcohol as a percentage of the total volume of liquid in a drink.

You can find the ABV on the label of the bottle or can written as “vol” or “alcohol volume”.

You can calculate how many units there are in a drink by multiplying the total volume of drink in ml by its ABV in percentage and dividing the result by 1000

- $\text{Strength (ABV)} \times \text{volume(ml)} / 1000$
- For e.g. to calculate no of units in pint of red wine with ABV 13%

$$13 \times 375 / 1000 = 4.88 \text{ units}$$

So technically, this formula explains a lot. But I think everyone should understand one thing before opening the bottle of wine. Wine is for celebrating, to cherish the moment and not to get high. Cheers!

Drink responsibly.

Microbial contamination of ethanol fermentations



AJAY SHARMA

Manager - Technical (Alcohol Industry)

Microbial contamination is a pervasive problem in any ethanol fermentation system. These infections can at minimum affect the efficiency of the fermentation and at their worse lead to stuck fermentations causing plants to shut down for cleaning before beginning anew. These delays can result in costly loss of time as well as lead to an increased cost of the final product. Lactic acid bacteria (LAB) are the most common bacterial contaminants found in ethanol production facilities and have been linked to decreased ethanol production during fermentation. Lactobacillus sp. generally predominant as these bacteria are well adapted for survival under high ethanol, low pH and low oxygen conditions found during fermentation. It has been generally accepted that lactobacilli cause inhibition of Saccharomyces sp. and limit ethanol production through two basic methods; either production of lactic and acetic acids or through competition for nutrients. However, a number of researchers have demonstrated that these mechanisms may not completely account for the amount of loss observed and have suggested other means by which bacteria can inhibit yeast growth and ethanol production. While LAB are the primary contaminants of concern in industrial ethanol fermentations, wild yeast may also affect the productivity of these fermentations. Though many yeast species have the ability to thrive in a fermentation environment.

Inhibitory mechanisms of lactic acid bacteria

Currently, numerous theories to account for the interaction of yeast. Accumulation of both lactic and acetic acids is major inhibitory end-products. While these acids lower the pH of any fermentation, their true inhibitory effect is seen in the undissociated form of the acid, as it is capable of diffusing through the cell membrane. Once inside the cell, it can then dissociate, releasing H^+ ions that acidify the cytoplasm of the cell. There are numerous other compounds produced which will inhibit the ethanol production such as diacetyl, and fatty acids

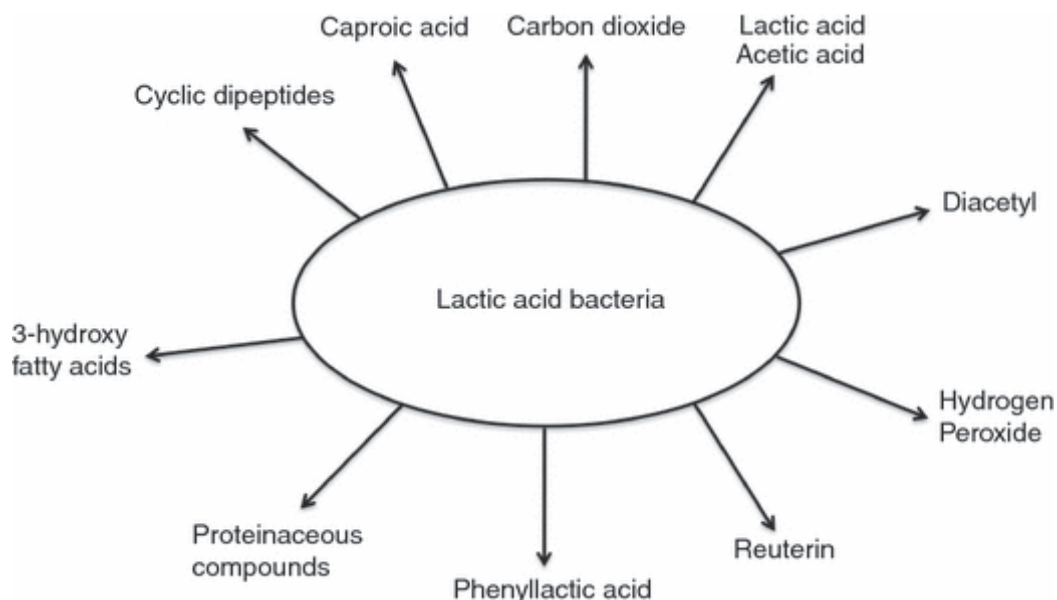


Figure 1

Summary of the main antifungal compounds produced by different lactic acid bacteria. Lactic and acetic acid are the main compounds produced that effect *Saccharomyces cerevisiae*.

Production losses because of wild yeasts

Wild yeast are a persistent problem in all types of fermentations, including biofuel. Contamination by wild yeast can cause losses in ethanol yield. A loss of even 1% ethanol production has a large financial impact. However, controlling wild yeast presents different challenges from controlling bacterial contamination. The best way to control wild yeast is through monitoring by molecular and microbiological techniques. Once a wild yeast contamination has been identified, the treatment is a complete change of the yeast population within the fermenter. This also adds an additional cost to the effects of wild yeast contamination

Reference-

- The role of nisin in fuel ethanol production with *Saccharomyces cerevisiae*
J. Peng, L. Zhang, Z.-H. Gu, Z.-Y. Ding, Modeling bacterial contamination of fuel ethanol fermentation

WINE REPORT



KANCHAN SINGH

Chapter Head - South Delhi, India

Apex Wine Club India

1 February 2022, Tuesday

All the wine growing regions outside of Europe are referred to as New World Wine regions. The important New World Wine regions are California, Washington, Oregon, Argentina, Chile, Australia, New Zealand, and South Africa.

Due to climate change, these New World Wine regions are shifting away from equator. They are moving further north in the Northern Hemisphere and further south in the Southern Hemisphere, where climatic changes have created an environment which is more conducive to viticulture.



BrewTimesTM



Balaji Enzyme and Chemical Pvt Ltd

No. 106/107, A5/1, Parasnath Complex, Owali Gaon, Dapoda Road,
Bhiwandi - 421302 | +91-72-08124000
E-mail : info@becc.org.in | Web. : www.becc.org.in