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SUGARCANE SYRUP PRESERVATION

Next big thing for Distilling Industry

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MD's Desk

Munish Madaan
MANAGING DIRECTOR

Hello Friends,

In today's dynamic world, change is a constant companion, and adaptability is key. As we delve into another issue of Catalysts Connect, I am excited to share insights into the incredible developments across the globe, with a particular focus on India's Ethanol program and the burgeoning number of new plants, especially Grain to Ethanol facilities, that are on the horizon.

In the year 2023, India continues its remarkable stride toward a sustainable energy future. We are witnessing an extraordinary achievement, maintaining an average annual national ethanol blend rate of 11.5 percent, representing a substantial 13 percent increase over the previous year. April 2023 marked a significant milestone when India's average monthly blending rate exceeded 11 percent.

At the heart of this transformation is India's Ethanol Blended Petrol (EBP) program, which has evolved considerably in the last five years. This program has led to substantial savings, including an equivalent of $289 million or INR 2.3 billion in foreign exchange and a remarkable reduction of over 2.7 million metric tons (MMT) in greenhouse gas emissions. Such achievements illustrate India's commitment to environmental sustainability and energy security.

The E-20 national target set for 2025 is a testament to our resolve to enhance domestic biofuel production, encompassing 1st, 2nd, and 3rd generation biofuels. As we strive to attain E-20 by ESY 2024/2025, the government of India is encouraging sugar mills and stand-alone distilleries to optimize their resources, including surplus sugar and grains from FCI, for ethanol production within the EBP framework. Efficient molasses and syrup preservation will significantly contribute to India's ethanol economy.

In addition to these endeavours, India's 2023 G20 presidency is marked by the "Global Biofuel Alliance," designed to foster international cooperation in promoting sustainable biofuels, especially in the transportation sector. This initiative includes technical knowledge transfer and assessing the global biofuel market.

India's journey to becoming a sugarcane surplus producer is a significant milestone. It ensures a consistent supply of feedstock and a stable pricing mechanism. However, as sugarcane production fluctuates, there's a shift towards ethanol, impacting sugar exports. The Indian government is actively exploring strategies to increase corn yields for ethanol production.

The Catalysts Group is committed to supporting India's Ethanol program, enhancing production and efficiency. Despite global uncertainties, our commitment to sustainability and growth remains steadfast. India's progress in the Ethanol program showcases our potential and inspires the world. As we navigate changing landscapes, we remain optimistic about the global economy's resilience, with India as a beacon of hope.

Warm regards,

Munish Madaan

Sugarcane Syrup Preservation

A Combinatorial Approach

Anil Kumar Rai
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Introduction

India is the 4th largest producer of ethanol after United States of America (USA), China, and Brazil having more than 300 distilleries with a production capacity of about 3.2 billion liters mainly by fermentation of sugarcane molasses. Out of the total available ethanol, about 45% is used for potable liquor, about 40% is used as industrial solvent in chemical industry, for blending in fuel and for other applications. There is a continuous growth in demand for ethanol in India due to growth in industrial applications and its use as blending agent in fuel. However, the production capacities are lagging with respect to the market demand for the ethanol and the amount of ethanol currently being produced in India is not sufficient to meet domestic demand. The ongoing efforts to reduce the fuel import burden on the country, the Central government's decision to increase the blending percentage of alcohol in petrol is encouraging the ethanol producers to increase their capacities and to explore alternate feedstock for ethanol fermentation. This has enabled sugar mills to produce ethanol by diverting cane juice/Syrup towards ethanol production and availability of ethanol for the Ethanol Blended Petrol (EBP) program. The support from government to provide higher compensation price for ethanol produced from sugar juice or syrup and B molasses would aid in reducing excess sugar stocks and impacting the sugar industry capacity to pay arrears to sugarcane farmers. All sugar mills/ distilleries are planning to take benefit of the scheme by participating in supply ethanol for the Ethanol Blended Petrol (EBP) program.

India and Brazil are the largest producers of sugarcane in the world primarily to produce sugar. Molasses is the key by product of sugar industry and is one of the main feedstocks for ethanol production, however in future sugarcane juice and syrup will also have a significant share as a feedstock for ethanol fermentation that may include primary/secondary/mixed/clear juice and syrup which is concentrated juice with total dissolved solid content more than 50 Brix. Clarified sugarcane juice, from the milling section, is concentrated to 60 brix in the falling film evaporation section to convert juice into syrup (Clark, 2013).

Operating the distillery throughout the year is a challenge without the storage of raw material for off-season, though cane juice can be used during season, it is very difficult to maintain its sugar content as well as keep it free from microbial contamination. However, the cane syrup could be stored and utilized as a raw material for off-season consumption. Owing to the rising demand for renewable bioenergy, there is a need for a sustainable solution to preserve sugarcane syrup for ethanol production. India, being a country committed to use of renewable energy under EBP20 program, has brought out an extensive plan for encouraging the production of

bioethanol. Therefore, distillery industry in India has ample amount of growth opportunities to contribute in EBP program by preserving the excess sugarcane Syrup during crushing season and use the same to produce ethanol during off-season.

Challenges in syrup preservations

The solubility of sucrose changes with varying temperature and at low temperatures the sucrose might crystallize in syrup (Serna-Saldivaret al., 2008). With the changing environmental conditions, the sucrose in syrup tends to breakdown into monomers, which are more susceptible for microbial degradation (Thompson, 2009). The neutral/ near neutral pH of the syrup is also a favorable condition for the microbial flora that enhances the microbial growth and syrup degradation (Vanderzant, 1992). Providing the right environment is necessary for syrup stability by maintaining pH and temperature conditions (Kapuret al.1978, Kunitakeet al., 2014). The pH is an indicator for microbial degradation and is also evident from formation of by-products such as Gluconic acid, Lactic acid, and Acetic acid (Madan et al., 1997, Rawat, 2015). The syrup stored without taking proper precautions may also decrease the fermentability of the syrup and hamper the ethanol production process.

Numerous preservation methods being investigated by researchers for the sugarcane syrup consists of chemical, thermal, and non-thermal methods that includes usage of enzymes prior to storage (Anejaet al., 2014, Kaavya, et al., 2019, Killerbyet al., 2022). Enzymes are also dosed in the storage tank at regular intervals for achieving extended shelf life of cane syrup. Simultaneously, the stored syrup will be cooled by recirculation with a provision of inert gas blanketing in the storage tank head space to avoid contamination when the syrup comes in to contact with air.

Cane Syrup Preservation Lab scale studies

The lab scale studies were conducted at Catalysts Biotechnologies Research and Development center by sourcing the syrup from sugar industry having Brix of 76.04% and TRS 68.35%. The syrup was treated with Enzysyrup Protect Advance (ESPA), a proprietary blend of antimicrobial enzymes that prevents the osmotolerant bacteria and other microbial flora, at 20 ppm of dosage without inversion and preserved for 90days at lab scale (5Kg). During this tenure, considerable reduction in TRS, Brix with crystalized sugar at the bottom of the flask was observed (Table 1).

Table 1: Changes in syrup characteristics during 90 days syrup preservation trial at lab scale (5Kg) using ESPA without syrup inversion

Sample		pH	Brix %	POL %		Purity %		TRS %	
Initial		6.11	72.76	62.24		85.54		67.95	
Setup Id	TYMC (Cfu/gm)	TVC (Cfu/gm)	TLBC (Cfu/gm)	FS (HPLC) %w/w	Sucrose %w/v	Fructose %w/v	Lactic Acid %w/v	Glycerol %w/v	Acetic Acid %w/w
Control	< 10	6.4 x 10^3	60	67.74	63.946	0.59	0.18	BDL	0.75
Test 1	< 10	4.0 x 10^3	30	66.66	63.003	0.51	0.157	0.1	0.074
Test 2	< 10	4.0 x 10^3	40	67.36	63.628	0.549	0.171	0.132	0.083

The sedimentation of crystals leads to non-homogeneity of the syrup and challenges during the fermentation. The microbial analysis of the preserved samples showed control of the microbial growth up to some extent (Table 2).

Table 2: Microbial and HPLC sample analysis after 90 days of syrup preservation at lab scale (5Kg) using ESPA without syrup inversion

Sample name	TYMC (Cfu/gm)	TVC (Cfu/gm)	TLBC (Cfu/gm)	FS (HPLC) %w/w	Lactic Acid %w/v	Glycerol %w/v	Acetic Acid %w/v	EtOH %v/v
Control	12000	1500	960	58.80	0.206	1.208	BDL	2.649
Test 1	400	840	640	64.06	0.224	0.399	0.085	1.431
Test 2	11500	2900	370	64.25	0.251	0.24	0.08	1.194

This clearly indicates that addition of preservative alone is not sufficient to preserve the cane syrup with good fermentability. The observations indicate total sugar of the treated syrup (TRS%+Crystalize sugar %) was stable during the trial period whereas the total sugar of control samples was reduced by 8%. The data is tabulated in Table 3 and the slight variations of the analysis can be attributed to the evaporation and fine crystallization remain un-sedimented.

Table 3: TRS fall due to crystallization leading to non-homogenous mixture after 90 days of syrup preservation at lab scale (5Kg) using ESPA without syrup inversion

90 Days Sample	TRS %W/W	Crystals 0.4micron	Ethanol %V/V	Effective Sugar%	Microbial Analysis	Sugar/TRS /Depletion
Initial	67.95					
Control	59.77	0.023%	2.649	63.69%	N/A	8.33%
Test 01	64.20	0.074%	1.431	66.38%	Controlled	3.80%
Test 02	64.20	0.356%	1.194	66.32%	Controlled	3.80%

The TRS trend of syrup preservation without inversion is depicted in Figure 1.

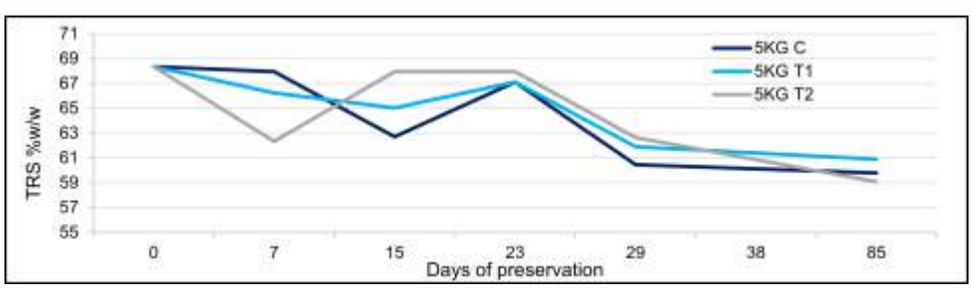

Figure 1: Trends of TRS during Syrup Preservation for 90 days using ESPA without syrup inversion

Catalysts Combinatorial Approach to preserve Cane Syrup

Based on the lab scale results Catalysts has developed a unique, innovative patented technology for syrup storage with the help of proprietary enzyme formulations using combinatorial approach that provide cost effective tailor-made solution to the industry. The syrup preservation approach developed by Catalysts Biotechnologies includes enzymatic treatment of sugar syrup followed by antimicrobial treatment during storage. The preservation process starts by diverting the syrup of > 65 Brix with TRS > 58%w/w from the vacuum evaporation pan to a storage vessel. During the diversion process the syrup is treated to have the right environment for the enzyme formulation

(EnzyInvert P Conc., 2-3 ppm) to work via providing the necessary co-factors, desired pH and temperature conditions The storage vessel can be equipped with temperature control system using via recirculation pump and a dosing pump. The controlled inversion process makes the syrup stable and can be preserved at ambient temperatures without degradation and crystallization for up to 6-9 months. To enhance the shelf life of the syrup, ESPA will be dosed at 15-20 ppm weekly/fortnightly based on the environmental conditions of the plant. The broad overview of the preservation process is depicted in Figure 2.

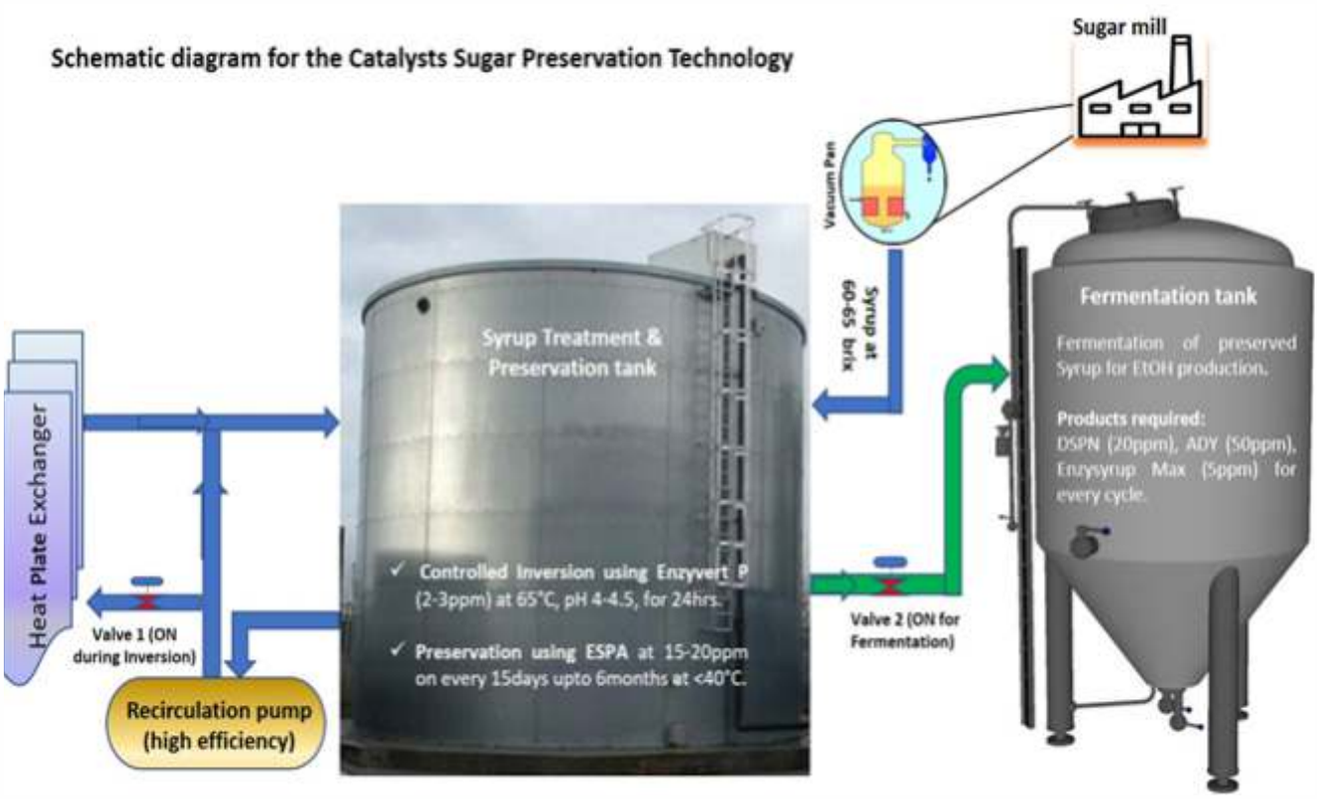

Figure 2: Schematic Diagram for the Treatment of Syrup using Catalysts' Combinatorial Technology

Pilot Scale (35KL) Study of Catalysts Syrup Preservation Technology

The pilot-scale preservation study was conducted with 35,000 L syrup having 64% Brix and TRS of 59.29%. The treatment was completed in 24 hours and the syrup was stored for 142 days with fortnightly addition of preservative enzymes.

Table 4: Physical parameters of Preserved Syrup for 142 days using Catalysts' Combinatorial technology

Date	Brix	Pol%	Purity	pH	TRS	EtOH
25-Apr-2022	68.6	57	83.08	6.2	59.29	NA
Treatment of syrup at 65 degree for 24 Hrs, 3ppm EnzyvertP at pH 4.5						
26-Apr-2022	66.87	36.7	55	4.43	58.94	NA
14-Sep-2022	64	<3	NA	4.03	58.25	2.2%v/v
Equivalent TRS =TRS% + Ethanol (%v/v)/0.644/Sp gravity = 60.92%w/w						

The observations of the trial are depicted in Table 4, which shows stable values of the TRS and Brix and a one log reduction in microbial load compared to initial microbial count (Table 5).

Table 5: Microbial Analysis of Preserved Syrup for 142 days using Catalysts' Combinatorial Technology

Analysis Type	Particulars	TYMC Cfu/gm	TVC Cfu/gm	TLBC Cfu/gm
Microbial Analysis	Initial	<10	6480	40
	After Treatment	<10	970	20
	142 Days sample	<10	700	30

After 142 days of storage the syrup was checked for fermentability. The fermentation study was conducted with Catalysts ADY (50ppm), DSPN Pro (20ppm) and Enzysyrup max (5ppm). The fermentation study results are shown in Table 6 with a good fermentation efficiency (FE) of 92-93%.

Table 6: Fermentation parameters at 1KL scale for Preserved Syrup (142 days) with Catalysts Combinatorial technology

Syrup quantity	Fermenter Volume	RT	RS harvest	VA wash Harvest	FE%	Net EtOH
30 MT	104000 L	28 hr	2.00 % w/v	394 ppm	93%	10.81% v/v

The TRS trend of syrup sample is depicted in Figure 3.

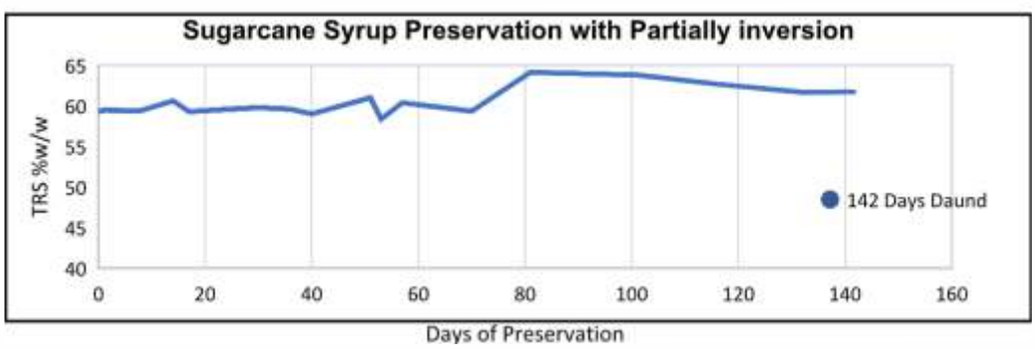

Figure 3: TRS trend of preserved syrup for 142 days, treated using combinatorial Technology

Discussion

To support the ethanol blending program by Govt. of India, several sugar industries are coming up with distillery division to have flexibility of sugar and ethanol production as per market demand. In addition to this, the ethanol produced from sugarcane is considered as a green fuel and there is a huge market demand for the same. To meet the market demand and to support sustainability availability of syrup throughout the year is a major challenge. The research community is constantly working on addressing these challenges. This unique combinatorial approach developed by Catalysts Biotechnologies Pvt. Ltd. is going to be a game changer in this segment for prolonged storage of sugarcane syrup that enables sugar industries to store syrup during off season up to 6-9 months to continuously.

Advantages of Catalysts Syrup Preservation technology

1.The process is cost effective and requires minimal infrastructure.

2.Controlled inversion process addresses the crystallization during storage.

3.Reduced microbial activity due to the antimicrobial enzyme ESPA.

4.The ease of handling syrup during storage and fermentation due to reduction in viscosity.

5.Enhanced fermentability with reduced retention time at high gravity fermentation

6.Depolymerization of complex sugars like Dextran & starch in the syrup that supports yeast metabolism for achieving better FE.

Acknowledgment

We thank our Managing director for his encouragement and providing Infrastructure. Our special thanks to Wave Industries, Dhanaura, Daund Sugar Factory, Daund, for providing raw materials. We also thank Aniket, Joole, Prerna, Kuldeep, Hari Mate, Sandeep, and Sathya Sundar for their support during experiments.

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Unveiling the Role of Starch

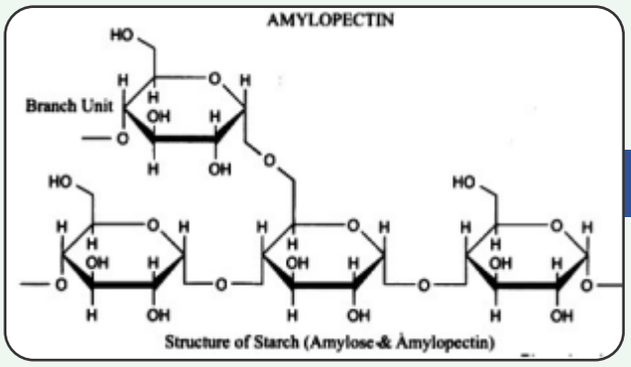
Key Insights into its Significance in Sugarcane Juice Syrup Fermentation

Shubham Garg
R&D

Starch, one of the most abundant and versatile carbohydrates on the planet, often goes unnoticed despite playing a crucial role in various aspects of our daily lives. It serves as a key source of energy for plants, and, in turn, for us as consumers.

Starch: The Basics

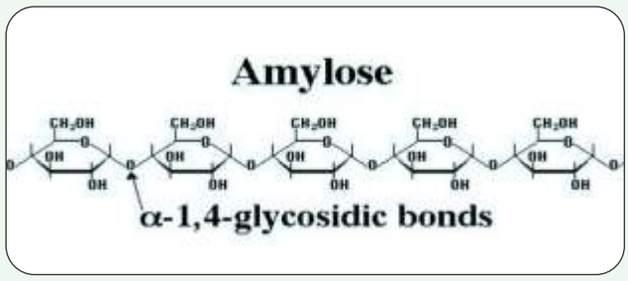
At its core, starch is a complex carbohydrate made up of long chains of glucose molecules linked together. It is primarily found in plant-based foods, with common sources including grains like wheat, corn, rice, sugarcane cassava. Starch acts as the primary storage form of energy in plants.



Structure of Starch

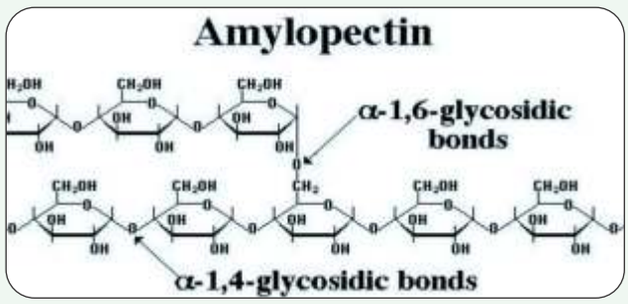
Amylose

Starch has a complex structure consisting of two major components: amylose and amylopectin. Amylose is a linear chain of glucose molecules connected by alpha (α)-1,4-glycosidic bonds. The linear structure gives amylose its characteristic helical shape, and it can form semi-crystalline regions within the starch granule.



Amylopectin

Amylopectin, on the other hand, is highly branched, with frequent α-1,6-glycosidic bonds that link glucose units. This branching imparts a distinctively different structure compared to amylose. The branching in amylopectin makes it more soluble and results in a lower tendency to form crystalline structures. Consequently, amylopectin is responsible for the gelling and thickening properties of starch.



Properties of Starch

Starch exhibits a variety of properties that make it indispensable in a range of applications:

1. Thickening and Gelling: Starch is renowned for its thickening and gelling capabilities. It has the ability to absorb water and swell, creating a thick, viscous consistency. This property is widely used in culinary applications, from gravies to puddings.

2. Texture Modification: In the food industry, starch is a go-to ingredient for modifying the texture of various products. It can add creaminess to ice cream, crispness to battered fried foods, and chewiness to candies.

3. Binding: Starch acts as a binding agent in a multitude of food products, helping to hold ingredients together. From meatballs to sausages, starch contributes to the desired texture and structure.

4. Stabilization: Starch is employed to stabilize emulsions in products like salad dressings, preventing the separation of oil and water.

5. Retrogradation: After gelatinization, when a starch paste cools, retrogradation occurs. This is the process in which amylose molecules, in particular, re-associate and recrystallize.

6. Hydration: Starch granules have a strong affinity for water. When starch granules are mixed with water, they swell and absorb water, forming a viscous paste. The extent of hydration and viscosity depends on factors such as temperature and the type of starch used.

Conquering the Starch Conundrum in Sugarcane Juice Syrup Fermentation

Sugarcane juice syrup fermentation is a vital process that yields a range of valuable products, including ethanol and other bio-based compounds. Despite its many advantages, this process is not without its challenges. One persistent issue is the presence of starch in sugarcane juice, which can significantly hamper the fermentation process. In this article, we will explore the problem of starch in sugarcane juice syrup fermentation and discuss strategies to overcome it.

Understanding the Starch Challenge

When sugarcane juice syrup is used as a feedstock for fermentation, the presence of starch can pose several challenges:

1.Slower Fermentation: Starch is not as easily fermentable as simpler sugars like sucrose or glucose. Its conversion into fermentable sugars takes time and can slow down the overall fermentation process.

2.Reduced Ethanol Yield: The longer fermentation times required for starch conversion can lead to a decrease in ethanol yield. This is a significant concern for industries focused on bioethanol production.

3.Resource Allocation: During the conversion of starch into fermentable sugars, microorganisms may allocate a significant portion of their resources to produce the necessary enzymes. This diverts resources from ethanol production and affects overall process efficiency.

4.Risk of Contamination: Extended fermentation times increase the risk of contamination, which can further hinder the quality and yield of the final product.

5.Competition for Enzymes: In the presence of starch, the enzymes needed to break down starch into fermentable sugars must compete for resources with other enzymes involved in converting sugars like sucrose and fructose into alcohol. This can slow down the breakdown of starch and the overall fermentation process.

6.Incomplete Fermentation: If the concentration of starch in the sugarcane juice syrup is significant, it can lead to incomplete fermentation. Yeast may preferentially consume the simpler sugars first, leaving behind unfermented starch. This results in lower alcohol yields and potentially a sweeter or starchy taste in the final product.

Overcoming the Starch Challenge

Breaking down starch in sugarcane juice is crucial for efficient fermentation and the production of various sugarcane-derived products. Fortunately, there are several effective solutions to break down starch in sugarcane juice:

1. Enzymatic Treatment: Enzymes are highly effective in breaking down starch into fermentable sugars. Amylase enzymes, in particular, can be added to sugarcane juice to catalyze the conversion of starch into simpler sugars like glucose and maltose. This method is commonly used in industries producing ethanol and other bio-based products. As per research paper **Sugarcane starch: quantitative determination and characterization** by (*Joelise de Alencar FIGUEIRA1*, Priscila Hoffmann CARVALHO1, Hélia Harumi SATO1; ISSN 0101-2061 ; 1 Laboratory of Food Biochemistry, Department of Food Science, School of Food Engineering, University of Campinas – UNICAMP, Rua Monteiro Lobato, 80, CP 6121, CEP 13083-862, Campinas, SP, Brazil)* few points are listed below:

- The pullulanase is an enzyme that hydrolyzes specifically the α-1,6 glycosidic bonds of starch and its by-products that contain at least two glucose units in the lateral branched chains
- The α-amylase from Bacillus subtilis hydrolyzes the α-1, 4 glycosidic bonds of the starch reducing its viscosity.
- Iso amylase from Flavobacterium sp. preferably hydrolyzes amylopectin α-1,6 glycosidic bonds that involve long linear chains
- Glucoamylase, also known as amyloglucosidadase, hydrolyses the α-1,4, α-1,6 and α-1,3 glycosidic bonds of starch and its by-products liberating glucose units
- Glucoamylase of Aspergillus niger and Rhizopus sp. can hydrolyse gelatinized starch.

2. Heat Treatment: Applying heat to sugarcane juice is another option. Heat can help break down the starch molecules and make them more accessible for fermentation. However, it's essential to strike a balance as excessive heat can also denature the enzymes and microorganisms involved in fermentation.

3. Acid Hydrolysis: Acid hydrolysis involves adding acid (typically sulphuric acid or hydrochloric acid) to the sugarcane juice. This method cleaves the starch molecules into fermentable sugars. Care should be taken when using acid to ensure proper neutralization and pH adjustment to prevent damage to microorganisms.

4. Cooking: Traditional methods often involve cooking sugarcane juice before fermentation. This heat treatment not only breaks down starch but also helps sterilize the juice and improve its clarity.

5. Microbial Starch Hydrolysis: Certain microorganisms, like some strains of yeast and bacteria, possess enzymes that can break down starch. Selecting these microorganisms for fermentation can help alleviate the starch issue naturally.

6. Genetic Modification: In some cases, researchers have developed genetically modified sugarcane varieties with reduced starch content. These sugarcane varieties have a higher ratio of sucrose to starch, which makes them more suitable for efficient fermentation.

7. Combination Methods: Often, a combination of methods is used to ensure thorough starch breakdown. For example, heat treatment can be followed by enzymatic treatment to maximize starch conversion.

8. Quality Control: Implementing strict quality control measures is crucial to monitor and adjust the starch content. Regular testing and analysis can help identify the presence of starch and guide the choice of the most appropriate method for its breakdown.

The choice of method should consider the specific requirements of the fermentation process and the end product. It's also essential to maintain optimal conditions, such as temperature and pH, throughout the process to ensure efficient starch conversion. Additionally, adherence to safety and environmental regulations is crucial, especially when using chemicals like acids.

Conclusion

Starch content in sugarcane juice presents a notable challenge in the fermentation process, affecting both the yield and efficiency of the final product. Recognizing the impact of starch on fermentation and implementing appropriate strategies is crucial. By employing techniques such as enzymatic treatment, pre-processing, microorganism selection, and quality control, producers can effectively mitigate the adverse effects of starch in sugarcane juice fermentation. Enzymatic treatment being the cost effective technique for industrial purposes is to be incorporated in the process to ensure a more efficient and higher-yield production of ethanol and other valuable sugarcane-derived products, benefiting industries and consumers alike. At Catalyst we provide you **ENZYLASE** an in-house designed and developed product which works on higher temperature and hydrolyses starch giving you higher ethanol yield in your syrup fermentation.

Shall we stop using ENZYDEX® and ENZYLASE® in milling..

while doing ethanol fermentation from syrup?

Anil Kumar Rai
R&D

There is a myth in the process that if there is no sugar recovery to be done from syrup, there is no need to add any enzymes to prevent from making polysaccharides such as Starch and Dextran, commonly known polysaccharides in industries.

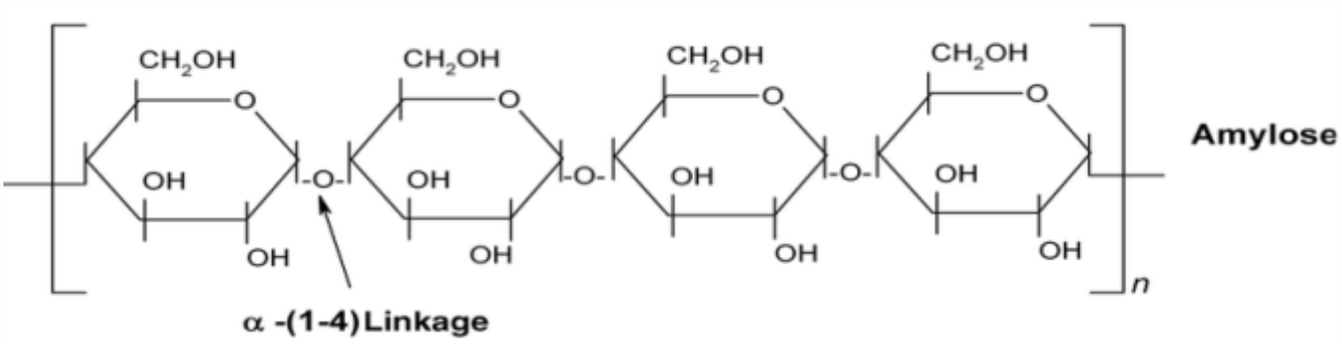
Background

When syrup is getting contaminated with microbes like Leuconostoc mesenteroides and Streptococcus mutans, these are converting residual sugar into polysaccharides during juice to syrup making process, and neutral pH is favourable for them for this activity. Once these byproducts are formed, they are carried forward in the system through syrup or molasses as unfermentable sugar, and unutilized till end and be the part of BOD in the effluents or spent wash.

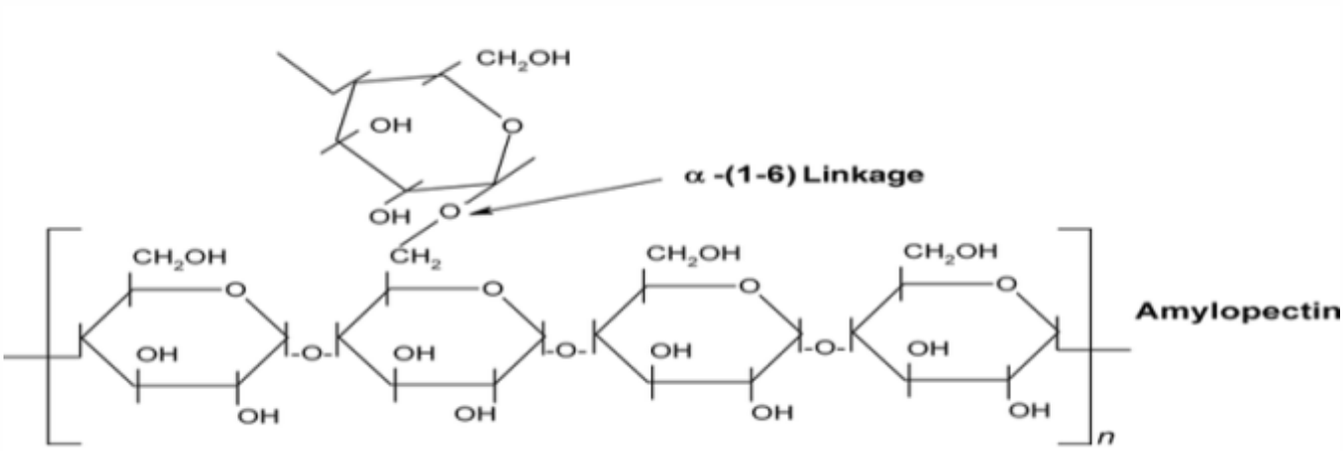
Introduction

Starch is found in plants and serves as a major energy storage molecule. It consists of two main components: amylose and amylopectin. Starch molecules can contain thousands of glucose units linked together, forming a complex, semi-crystalline structure.

Amylose is a linear chain of glucose molecules linked together by α(1 4) glycosidic bonds.



Amylopectin is a branched polymer of glucose, with both α(1 4) and α(1 6) glycosidic linkages



Dextran is a polysaccharide produced by certain strains of bacteria, particularly lactic acid bacteria. It is not commonly found in plants like starch. It is composed of glucose units linked together by α(1 6) glycosidic bonds. These linkages create a highly branched structure. It can have a range of molecular weights, and the degree of branching can also vary. Therefore, solubility is less.

The concentration of dextran and starch in sugar cane juice can have significant impacts on its processing and quality.

In general, there are some common guidelines and acceptable limits:

Polysaccharides	For Sugar Production	For Ethanol Production
Starch	>0.1-0.2%w/w	Less soluble, low content is preferred, >1000ppm in wash
Dextran	>0.01-0.02%w/w	More solubility, low content is preferred >2500ppm in wash
Problems	can interfere with sucrose crystallization and reduce sugar yield.	Can interfare with high gravity fermentation and ethanol yield

Their presence in sugar cane juice can have various impacts on the quality and processing of the juice. Following are the ways can affect sugar cane juice:

1. Viscosity: increase the viscosity of sugar cane juice as their concentration rises. This can make the juice thicker and more difficult to process.

2. Filtration: High concentrations of can clog filtration systems. This can lead to decreased efficiency and increased maintenance costs.

3. Sucrose Extraction: In the sugar extraction process, interfere with the crystallization of sucrose, can reduce the yield of sucrose and overall recovery.

4. Microbial Growth: High Starch and Dextran level in syrup indicate undesirable growth of microbes and byproduct in juice/syrup.

To manage and control the impact of dextran and starch in sugar cane juice processing, various methods can be employed:

Enzymatic Treatment: Enzymes like Enzylase® and Enzydex® can be used to break down starch and dextran, respectively, into simpler sugars, which are easier to process.

Heat Treatment: Heat can help to reduce the viscosity of juice by breaking down some of the polysaccharides. However, this should be done at lower pH 6.0 - 6.5 with enzymes at moderate temperature. (Mix Juice to syrup process)

Regular monitoring of the dextran and starch concentrations is essential to ensure that the juice/syrup meets the desired quality standards.

Solutions

ENZYDEX® It is a Dextranase enzyme formulation that catalyses the hydrolysis of dextran, a complex branched polysaccharide composed of glucose molecules linked together through α(1 6) glycosidic bonds. Dextranase breaks down dextran into simpler sugars, primarily **maltose and glucose**, by cleaving these α(1 6) linkages.

ENZYLASE® It is a amylases enzyme formulation, Amylases are a group of enzymes that catalyse the hydrolysis of starch, which is a complex carbohydrate made up of **glucose** molecules linked together by glycosidic bonds.

Impact on Distillery and Ethanol Recovery

The starch and Dextran are not of any use in their native form during fermentation by yeast, they can supress the fermentation by giving stress and enhancing fermentation time, but these enzymes (5 ppm dosage in juice/wash volume) can help it to break into smaller sugar which are assimilable by yeast. This can result into higher yield recovery, lower BOD of spent wash and therefore less burden on ETP section of distilleries.

Interesting Facts

1. We can make 0.1%v/v ethanol from them 2000ppm starch and dextran. So, if we control the formation of these polysaccharide we are achieving this value of ethanol as yield and recovery in distillery.

2. With Catalysts Syrup Preservation technology®-this effect was observed during treatment and recovery of ethanol during fermentation, lowering of starch and dextran was observed during treatment and preservation while partially inverting the syrup for preservation.

Mastering the Art of Management Information Systems

Transforming Data into Strategic Decisions

Monish Goyal
Planning & MIS

Introduction: The Data-Driven Revolution

In an era marked by the relentless march of technology, we find ourselves awash in data. From global corporations to small businesses, from healthcare to agriculture, the flood of information is both a challenge and an opportunity. Harnessing the potential of this data requires the right tools, strategies, and approaches. This article embarks on a journey through the world of Management Information Systems (MIS) as a key instrument in unlocking the power of data for enhanced decision-making and efficiency.

In today's data-driven world, the effective utilization of Management Information Systems (MIS) stands as a cornerstone of organizational success. MIS serves as the bridge between raw data and strategic decisions, enabling businesses to navigate complex challenges and seize emerging opportunities. This article delves into the profound role of MIS in organizational management, dissecting its multifaceted functions, and highlighting the transformative impacts it can have on any organization.

In the digital age, the ability to harness data and convert it into actionable insights is paramount. MIS, a comprehensive system designed to facilitate this process, acts as a strategic compass for decision-makers. It collects, processes, and presents data to support a myriad of organizational functions, including data storage, analysis, and dissemination.

The Essential Roles of MIS

At the heart of MIS lies its multifaceted functions. These functions enable organizations to perform tasks efficiently and effectively, transforming raw data into actionable insights. In today's complex business landscape, these roles are indispensable:

Role	Description
Data Collection and Storage	Collects data from various sources and stores it in an organized manner for easy retrieval.
Data Processing	Transforms collected data into meaningful information through cleansing, aggregation, and calculation.
Information Retrieval	Offers efficient access to data and reports for managers and decision-makers.

Data Analysis and Reporting	Provides tools for data analysis, generating reports, charts, and graphs.
Decision Support	Aids decision-making with analytical tools and models for forecasting and scenario planning.
Strategic Planning	Supports long-term strategic planning by offering historical data and future projections.
Resource Allocation	Assists in effective allocation of resources, from budgeting to staffing.
Performance Monitoring	Monitors the performance of departments, projects, and individuals.
Communication and Collaboration	Encourages information sharing and collaboration within the organization.
Data Security and Compliance	Ensures data security and compliance with relevant regulations.
Efficiency and Productivity	Streamlines processes, reducing manual tasks and increasing overall efficiency.
Customer Relationship Management	Manages customer interactions, sales leads, and improves customer service.
Inventory and Supply Chain Management	Optimizes inventory and supply chain operations in manufacturing and distribution.
Human Resource Management	Assists with HR tasks such as employee records, payroll, recruitment, and performance evaluation.

The Impact of Missing MIS

The absence of a well-structured Management Information System (MIS) can have a profound impact on an organization's operations. It leads to a lack of timely and accurate data, hindering effective decision-making. Without MIS, businesses may struggle to track performance, analyze trends, or plan for the future. This often results in missed opportunities and inefficiencies that can affect productivity and profitability. Additionally, the absence of a comprehensive MIS can lead to increased manual work, which is time-consuming and prone to errors. In essence, the impact of missing MIS is felt across various aspects of an organization, from strategic planning to day-to-day operations, making it a critical component of modern business management.

A journey through the organization's operations without the aid of a well-implemented MIS system reveals a spectrum of challenges:

Impact	Description
Inefficient Decision-Making	Lack of timely and relevant information hampers decision-making.
Data Disorganization	Scattered data results in inefficiencies, errors, and data duplication.
Reduced Productivity	Employees spend more time on manual tasks, reducing productivity.
Inaccurate Reporting	Lack of centralized MIS can lead to errors in critical reports and financial statements.
Lack of Visibility	Management lacks a comprehensive view of organizational performance.
Ineffective Resource Allocation	Suboptimal allocation of resources can result in wasted resources or insufficient support.
Missed Opportunities	A lack of data-driven insights can cause missed growth and innovation opportunities.

Conclusion: The Power of Data and MIS

As organizations navigate the digital landscape, the imperative to embrace data-driven decision-making becomes more apparent than ever. Implementing an effective MIS system streamlines operations, enhances data accuracy, and empowers decision-makers to drive growth and competitiveness. The impact of not having an MIS system in place will differ depending on the unique circumstances of each organization, but the overarching message is clear: the absence of MIS can lead to inefficiencies, missed opportunities, and a potential growth ceiling.

In conclusion, the true art of effective MIS isn't limited to data processing; it extends to using data as a catalyst for informed and strategic decision-making. In this age of data, MIS is your gateway to optimizing performance, unlocking efficiencies, and seizing opportunities. As organizations, irrespective of their size and sector, continue to grapple with a deluge of data, the role of MIS stands as a guiding light to navigate this digital realm.

Fermentable & Un-fermentable Sugars in Molasses

Bhoopendra Bhardwaj
R&D

Molasses a very common raw material for ethanol production. It have two type of sugar Fermentable sugar & Un-fermentable sugar.

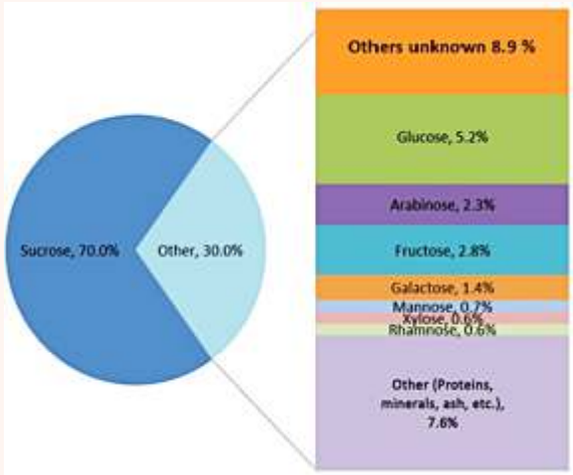
Fermentable sugar which can be utilised by yeast & other microorganism easily for their growth & for ethanol production. It should be Sucrose, Glucose & Fructose. During fermentation this type of sugar utilised by the yeast for ethanol production & by the microorganism for by product formation. These sugars are broken down into ethanol and carbon dioxide during fermentation process.

Another is Un-fermentable sugars, which cannot be easily utilised by yeast or other microorganisms during fermentation. Some sugar molecules are more complex or have complex chemical structures that make them resistant to fermentation. These Un-fermentable sugars remain in the final wash after fermentation.

Un-fermentable sugars in molasses can include a variety of sugar compounds, and the exact composition can vary depending on the source and processing of the molasses. Some of the common Un-fermentable sugars and compounds found in molasses include: Raffinose, Galactose, Arabinose, Mannose, Xylose, Rhamnose, Stachyose, Polysaccharides, Millard reaction products, Caramelized sugar etc.

The conversion of Un-fermentable sugars into fermentable sugars in molasses or other sugar-containing substrates typically involves enzymatic processes. One of the key enzymes used in this context is known as “invertase”.

Invertase is an enzyme that hydrolysis the sucrose (a disaccharide) into monosaccharides (glucose, and fructose), which can easily utilized by the yeast.



In addition to invertase, other enzymes may also be employed to break down more complex Un-fermentable sugars into simpler, fermentable forms in different contexts. For example, enzymes like alpha-amylase and glucoamylase can be used to convert starches into fermentable sugars, and beta-glucanase can break down complex polysaccharides into simpler sugars.

The choice of enzyme is depend on the process & composition of raw material. It could also vary according to the final product. Enzymatic conversion of Un-fermentable sugars into fermentable ones is a common practice in various industries, including brewing, distilling, and biofuel production.

The presence of 1% Un-fermentable sugar during fermentation can have several effects, depending on the context and the specific type of Un-fermentable sugar involved. Here are some potential effects:

Alcohol Content: Since Un-fermentable sugars cannot be converted into alcohol by yeast, their presence will result in a slightly lower alcohol content in the final product compared to a similar fermentation without Un-fermentable sugars.

Residual Sugars: The presence of Un-fermentable sugars can lead to higher residual sugar levels in the final wash/product. So after certain recycle it will impact on fermentation process.

Yeast Health: While 1% Un-fermentable sugar is a relatively small amount, extremely high levels of Un-fermentable sugars in a fermentation can stress yeast cells and impact yeast health and fermentation efficiency. However, at this low level, yeast health is unlikely to be significantly affected.

In some other fermentation like brewery & malt process it will also impact on flavour & test of final product.

The F/N ratio, which stands for the **"Fermentable to Non-Fermentable Ratio,"** plays a typical role in fermentation processes, including the production of alcohol, biofuels, and industrial fermentation applications. This ratio helps determine the balance of fermentable and non-fermentable components in a substrate.

To calculate the F/N ratio, you need to know the amounts of fermentable sugars and non-fermentable components in the molasses. Fermentable sugars typically include glucose, fructose, and sometimes sucrose, which can be readily metabolized by yeast or other microorganisms during fermentation. Non-fermentable components contains Un-fermentable sugars, complex carbohydrates, and other substances that cannot be metabolized during fermentation.

The formula for calculating the F/N ratio is:
F/N Ratio = (Total Fermentable Sugars) / (Total Non-Fermentable Components)

You can measure the total fermentable sugars and non-fermentable components through laboratory analysis or use known values provided by the manufacturer or supplier of the molasses.

The ideal F/N ratio can vary depending on the specific fermentation process. The F/N ratio is a crucial parameter for process optimization and quality control in fermentation industries.

From Ancient Times to Modern Plates

Millets - The Nutri Cereals

Mrityunjay Kumar Verma
R&D

From ancient times to modern plates, Millets are dubbed as "Nutri-cereals" because they are rich in vitamins, minerals, fiber, and other essential nutrients. Millets are a group of small-seeded grasses that have been cultivated for thousands of years as staple crops in various parts of the world. Millets are known for their resilience and ability to grow in diverse agro-climatic conditions, including regions with low rainfall and poor soil quality.The United Nations General Assembly at its 75th session in March 2021 declared "2023" as the International Year of Millets (IYM 2023).

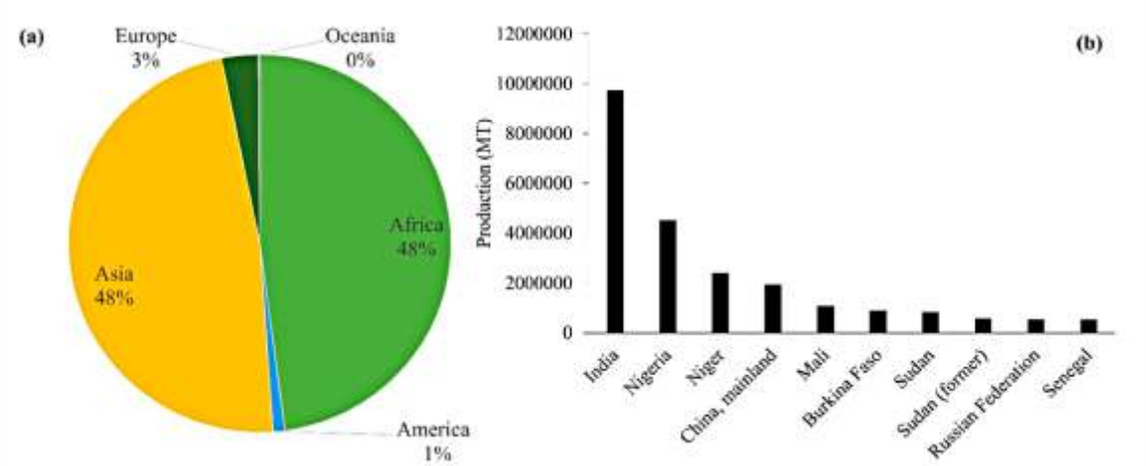


Figure 1. (a) Global millet production. (b) The world's top 10 millet producers. India, African countries and China dominate the production scale. (*Production units are in Metric Tons (MT)). (Data: FAOSTAT, 2016, accessed from http://www.fao.org/faostat/en/#data/QC/visualize).

Common types of millets include

Types	Origin	Functions	Minerals
Foxtail millet	China	Animal studies show colorectal cancer protection. Reduces cholesterol and prevents diabetes in glucose-intolerant people. Prevents mouse acute ethanol-induced liver injury.	Protein- 11.50–12.3, Fat-2.38–4.3, Dieatry Fiber- 2.5-8.5,Carbohydrate-60.9–75.2, Energy- 331 Kcal, P-290 mg, K-250 mg

Finger millet	East Central Africa (Uganda)	In diabetic rats, it reduces tissue damage and promotes wound healing. Reduces plasma triglycerides in hyperlipidemic rats, thereby preventing cardiovascular disease.	Protein-7.3, Fat- 1.3, Dietary Fiber-3.6,Carbohydrate-72.0, Energy- NA, P-283 mg, K-NA
Proso millet	Central and eastern Asia	Gluten-free and prevents celiac disease. Its low glycemic index reduces type 2 diabetes risk..	Protein-12.5, Fat- 1.1, Dietary Fiber-2.2, Carbohydrate-70.4, Energy- NA, P-206 mg, Ca-14
Pearl millet	Tropical West Africa (Sahel)	Gluten-free foods prevent celiac disease. It boosts immunity to prevent Shigella-induced pathogenicity in mice.	Protein-11.6-11.8, Fat-4.8- 5.0, Dietary Fiber- 11.3,Carbohydrate- 67.0-67.5,Energy- 361-363, P-296mg,K- 307
Kodo millet	Mainly in India also in west Africa	It decreases the glycemic index, prevents diabetes, and possesses antioxidant effects in female humans.	Protein- 9.8, Fat-1.3,DietaryFiber-2.47,Carbohydrate- 65.9–66.6,Energy-309, P-188mg,K-144 mg
Little millet	South east Asia	Because of the presence of polyphenols, it protects against current metabolic illnesses.	Protein-8.7, Fat- 5.3, Dietary Fiber-8.6, Carbohydrate-75.7, Energy- NA, P-220 mg, Ca-17
Banyard millet	Japan & India	Apoptosis in HT-29 human colon cancer cells inhibits carcinogenesis. Its phenolic content reduces protein glycation and glycoxidation, which contribute to diabetes.	Protein- 6.2, Fat-2.2,DietaryFiber-1.98,Carbohydrate- 65.5, Energy- 307, P-280 mg, K- Nil

Types and Mineral contents of different types of Millets ref:-10.9734/AFSJ/2020/v14i230124

Since millets are grown in almost all parts of the world in one or the other form. It's importance has grown because of it's gluten free, low glycemic index, fiber and other nutrient content compared to high glycaemic index of rice, wheat and other cereals currently in use, makes it a good contender for industrial application.

Current trends

Sustainability: Millets are known for their low water and input requirements compared to major staple crops like rice and wheat. They are drought-tolerant and can thrive in less fertile soil. As sustainable and environmentally friendly agriculture practices gain importance, millets are being promoted as a crop that can contribute to sustainable food production.

Food Security: In regions with food security challenges, such as parts of Africa and Asia, millets have long been a staple food due to their ability to grow in adverse conditions. The industry perspective recognizes millets as an important crop for improving food security and reducing reliance on more resource-intensive crops.

Market Growth: The millet industry has witnessed growth in recent years as consumer demand for healthier and more diverse food options has increased. This growth is reflected in the production of millet-based products such as millet flour, breakfast cereals, snacks, and even millet-based beverages. The market for these products is expanding, and companies are investing in millet processing and product development.

Export Opportunities: Some countries have recognized the export potential of millet-based products. Millets can be exported as grains, flour, or processed products to regions where there is a growing interest in incorporating

millets into their diets. This presents an opportunity for economic growth in millet-producing regions.

Research and Development: Industry players, including food manufacturers and agricultural organizations, are investing in research and development to create new millet-based products and improve processing techniques. This includes efforts to develop millet-based ready-to-eat meals, snacks, and value-added products to cater to changing consumer preferences.

Government Support: In many countries, governments are providing support and incentives to promote millet cultivation and consumption. This support can include subsidies, research funding, and initiatives to raise awareness about the benefits of millets.

Challenges: Despite the positive outlook, the millet industry also faces challenges. These include limited awareness among consumers, lack of infrastructure for millet processing, and the need for improved marketing strategies to promote millet-based products effectively.

Catalysts as a solution provider

We at Catalysts are proud in saying that we have provided solution to some of our customers. We have also helped customer successfully transition from barley, wheat, rice and other cereals based products to millet based product. Below are some of the industry application catalysts can help with in the upcoming future.

• LOW DE extract/product

Growing awareness regarding diabetes & Nutrition there is a demand to reduce simple sugars as much as possible from almost all product while keeping the taste and other nutrient profile similar. We have achieved as low as 17% DE in extract from 100% millet in our lab trials and the same can be replicated at plant level. Since millet contains a higher percentage of amylopectin (80%) and that too in a complex with proteins and other compounds, It is hard to achieve saccharification with low DP1 & DP2 without using suitable enzymes, PH and temperature profile along with the optimum rest given to the same.

- Higher protein content in the extract from millet

Since millet has protein content around (7-11%) and is cheaper considering other protein sources it is only natural to consider it as a replacement. We have successfully optimized the process to achieve higher protein content while keeping all parameter as required by the customer.

- In future we can replicate adjuncts in the brewing industry with millet to improve flavour and nutritional value in beer.

- Can be considered as a replacement of rice and sugar in the bio-ethanol industry.

- Malto-dextrin industry using millet in their products to improve the profile as well as a cost saving measure.

In conclusion, the industry perspective on millets is increasingly positive, driven by their nutritional value, sustainability, and potential for addressing food security and health concerns. As consumer demand for healthy and diverse food options continues to grow, millets are likely to play an important role in the future of the food industry and we at catalyst should drive the same in the market with our expertise.

Navigating Your Professional Development Journey

Strategies for Success

Aarati Ram
CRM

Introduction

Professional development is an ongoing, lifelong process that individuals undertake to enhance their skills, knowledge, and abilities in their chosen career paths. It plays a crucial role in personal growth, career advancement, and adaptability to a rapidly evolving job market. In this article, we will explore the significance of professional development, key strategies for its successful pursuit, and how it benefits both individuals and organizations.

1. The Importance of Professional Development

In the fast-paced landscape of today's work environment, characterized by rapid changes in industries and technologies, the importance of continuous learning and skill development cannot be overstated. To stay competitive and adaptable, professionals must embrace adaptation as a constant companion. Equally significant is the role professional development plays in career advancement. By acquiring new skills and knowledge, individual's open doors to a world of new job opportunities, promotions, and the promise of increased earning potential. However, the benefits extend beyond career progression; they seep into the realm of personal satisfaction. Expanding one's skillset and knowledge base is a recipe for enhanced job satisfaction, as it equips individuals to confidently tackle tasks and challenges, reducing stress and boosting morale. Beyond the professional sphere, the journey of self-improvement inherent in professional development fosters personal growth, encompassing improved communication, effective time management, and burgeoning leadership abilities

2. Strategies for Successful Professional Development

Successful professional development is a well-structured journey, beginning with the imperative step of setting clear goals. These objectives define the skills and knowledge you seek to acquire and the benefits they offer your career. Specific, measurable, and time-bound goals provide clarity, serving as guiding beacons. Once your goals are established, creating a development plan becomes paramount. This roadmap outlines the steps required to

achieve your aspirations and should encompass a mix of courses, certifications, workshops, and other pertinent activities. Education and training are vital; formal education, online courses, workshops, or seminars should be considered, with many flexible learning options available to accommodate busy schedules. Furthermore, professional growth benefits immensely from mentorship and networking. Engaging with experienced professionals offers guidance, insights, and opportunities, while networking keeps you informed about industry trends. Self-learning, reading, experimentation, and embracing new technologies play a vital role in your journey. To stay informed about the ever-evolving industry landscape, it's essential to regularly monitor developments, subscribe to newsletters, follow thought leaders on social media, and attend conferences or webinars. Lastly, continual evaluation of your progress and the embrace of constructive feedback from peers and superiors are invaluable tools for growth, ensuring you stay on the right track and identify areas for improvement.

3. Benefits for Individuals

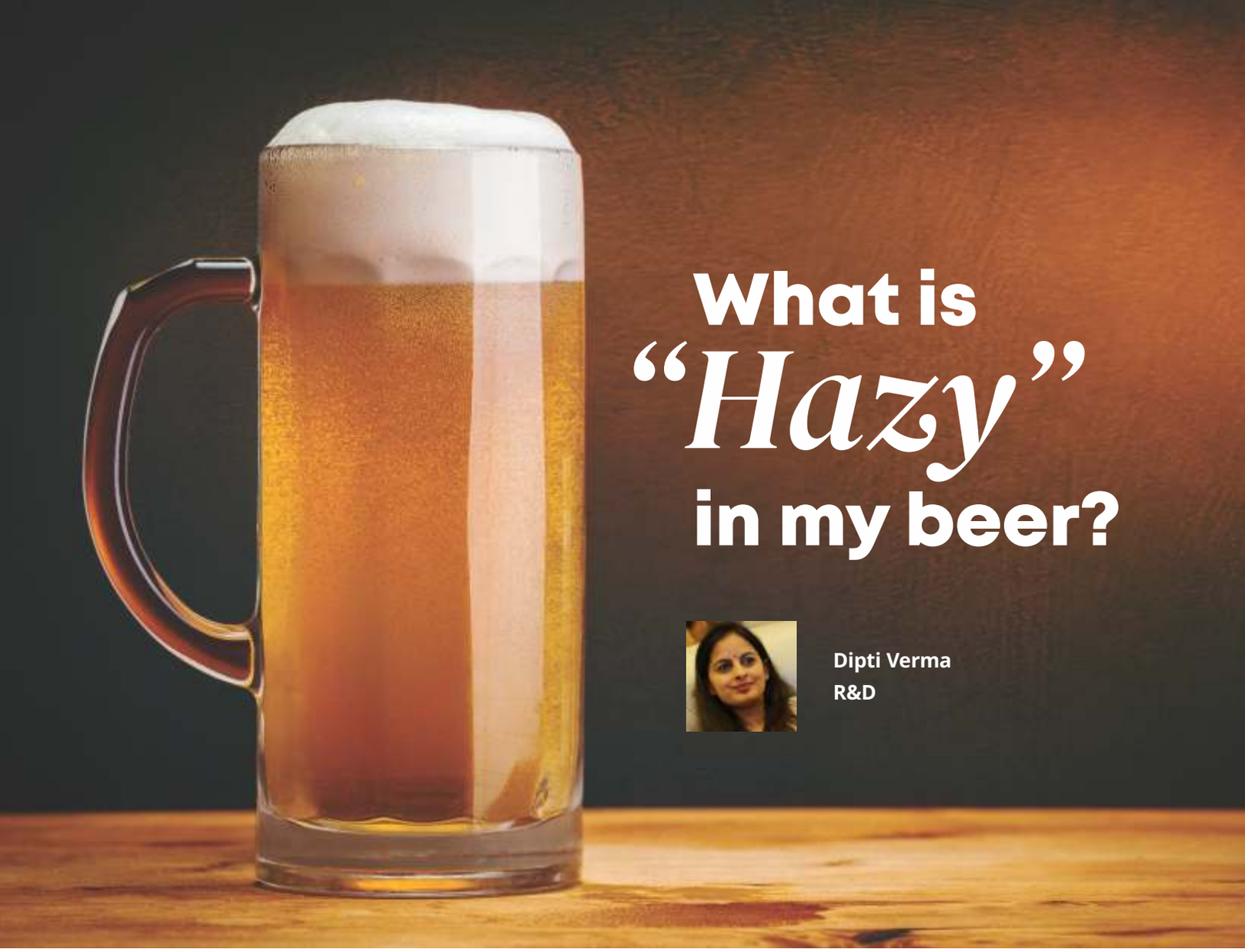
Professional development is a powerful catalyst for career advancement, often opening doors to promotions, increased responsibilities, and the promise of higher earning potential. As your skills and knowledge expand, a noticeable transformation occurs in your job satisfaction, with tasks becoming more engaging and fulfilling. This surge in competence not only positively impacts your professional life but also nurtures personal growth. Increased confidence accompanies mastery of new skills and knowledge, boosting self-esteem and self-assuredness. Ultimately, the journey of professional development is a holistic one, improving your overall quality of life, both in your career and in your personal pursuits. It not only propels you forward in your profession but also enriches your sense of fulfilment and well-being.

4. Benefits for Organizations

Investing in employees' professional development has a profound impact on organizations. First and foremost, it fosters talent retention, as companies that prioritize their workforce's growth tend to keep their top talent engaged and committed over the long term. Furthermore, this commitment to professional development reaps rewards in the form of improved performance, with skilled and motivated employees contributing to enhanced overall company performance. Such a workforce is also more inclined towards innovation, constantly bringing fresh ideas and creative solutions to the table. Moreover, it enhances an organization's adaptability, as employees who continually learn and evolve are better equipped to navigate and respond effectively to the ever-changing business landscape, ensuring the company's long-term success and resilience.

Conclusion

Professional development is a lifelong journey that offers numerous benefits for both individuals and organizations. By setting clear goals, creating a development plan, investing in education and training, seeking mentorship, and staying informed, you can take charge of your career growth and personal development. Embrace professional development as a continuous process, and it will empower you to thrive in a constantly evolving professional world.



What is *"Hazy"* in my beer?

Dipti Verma
R&D

One of the most traditional and popular alcoholic beverages in the world is beer. This type of colloid solution has a weak stability and a complicated composition. Beer haze generation is a major quality issue that mainly impacts the beer's flavour and shelf life. Particles of bigger or colloidal size that are suspended and insoluble, which may be detected visually or with instruments, are the cause of hazes.

The two main categories of Beer Haze are biological and non-biological.

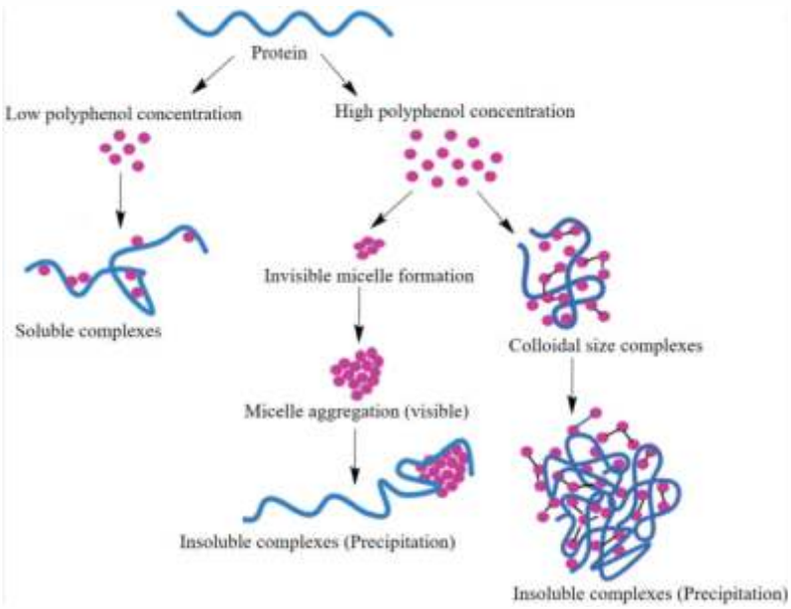
Biological Haze: Bacteria, mould, and wild yeast are the sources of biological haze.

Non-Biological Haze: There are two more classifications for it.
1. Chill Haze
2. Permanent Haze.

The development of protein-polyphenol complexes bound by weak hydrogen bonds is the cause of chill haze. The chill haze appears when the beer is cold, at 0˚C, and disappears when the temperature rises to 20˚C. Chill Haze's particle sizes vary from 0.1 to 1µm.

Another is permanent Haze, in which the intermediate precursor is the Chill Haze particle. When the Chill haze complex oxidized, formed strong covalent bonds, and transformed into large particles, a permanent haze is created. Permanent haze has particles that range in size from 1 to 10 µm. At 20˚C, permanent haze is maintained.

In addition to protein-polyphenol complexes, glucans, inorganic debris, and calcium oxalate are other elements contributing to the haze. Barley contains β-glucans, which are structural components in the cell and are polysaccharides of D-glucose monomers joined by β-glycosidic linkages (β-(1-3) and β-(1-6)). After the barley is malted, mashed, and boiled, the β-glucan is fermented and eventually added to the final beer. Filtration issues are known to arise from the β-glucan's tendency to enhance viscosity. According to Speers et al, turbidity increases after filtering when β-glucan with a size of 300 k Da is present.



Reference: Phenolic–Protein interaction: Food production, Processing & nutrition

Calcium oxalate can also result in haze. Calcium and oxalic acid combine to make calcium oxalate. Barley already contains oxalic acid, and the water provides calcium. The amount of oxalic acid varies on the crop harvest, whereas the brewing water contributes the majority of the calcium. Beer has a poor solubility product for calcium oxalate, which causes it to precipitate as crystals. These crystals can take the shape of prisms, rosettes, octahedrons, or amorphous forms.

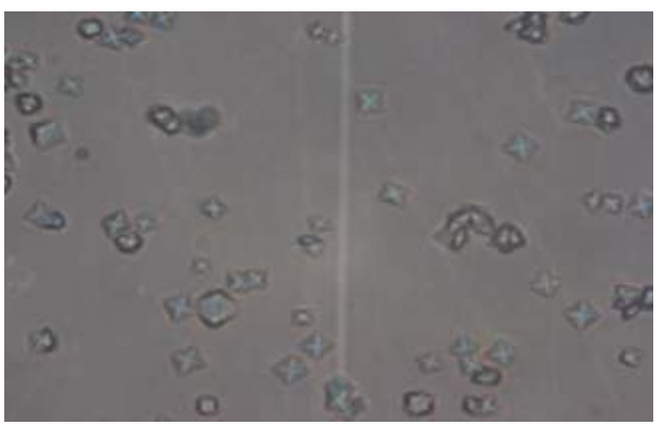


Figure: Microscopic Picture of calcium-oxalate observed in beer Sample

Here, "inorganic matter" refers to particles that do not come from organic sources like water, barley, hops, or yeast. Dirt particles are frequently inorganic components; they are there as a result of inadequate cleaning and filter assistance. These materials include dust particles, label remnants, filtering aids, etc. Beer may exhibit haze due to filter and stabilization aids if particles manage to get past the filters and trap-filters.

The haze on the beer is the first visual clue as to its quality. Knowing the real cause of beer haze is therefore essential. Beer haze particles' constituent parts are readily determinable, and technological aspects of haze generation throughout the brewing process can be monitored in real time. Most of the time, it is possible to pinpoint the elements that make up haze as well as its origin by using some tools and techniques.

Reference:

Yin Wang and Lingzhen Ye, Haze in Beer: Its Formation and Alleviating Strategies, from a Protein–Polyphenol Complex Angle, Foods 3114,10,2021.
Elisabeth Steiner, Thomas Becker and Martina Gastl: Turbidity and Haze Formation in Beer – Insights and Overview, J. Inst. Brew. 116(4), 360–368, 2010.

Iceberg of Ignorance

Problem Awareness in Indian B2B Companies

Awadhesh Nath Tiwari
Marketing & Corp. Comm.

> ***"An organization's ability to learn, and translate that learning into action rapidly, is the ultimate competitive advantage." – Jack Welch***

Introduction

The workplace is akin to an iceberg, where problems lurk beneath the surface, hidden from view. This iceberg of ignorance is a universal phenomenon, but it's particularly profound in the context of Indian B2B companies. We delve into this enigma, exploring why executives are exposed to a mere 4% of the problems while staff confront the full 100%. Let's embark on this journey to reveal the hidden depths of the workplace iceberg.

The Iceberg of Ignorance Unveiled

Understanding the Model:

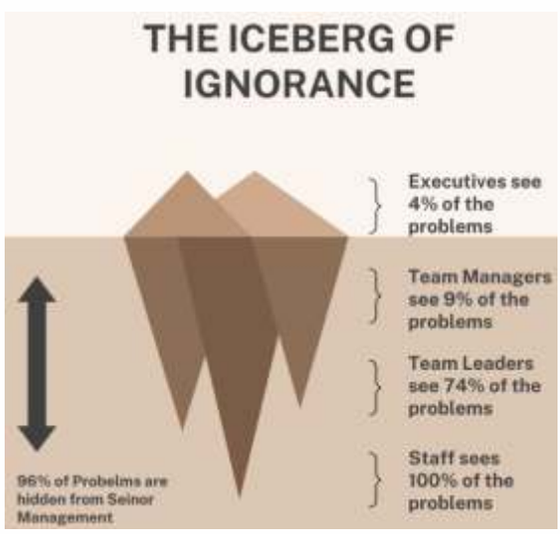
The Iceberg of Ignorance is a concept that originated from a study by Sidney Yoshida in the 1980s. It illustrates the diminishing awareness of problems as they move up the organizational hierarchy.

The Paradox Explained:

At the base of the iceberg, where the staff resides, problems are in plain sight.

The employees, being closest to the operations, have a firsthand understanding of the issues.

However, as we ascend the iceberg toward the executive level, awareness dwindles. By the time we reach the tip, executives are aware of only a fraction, around 4%, of the actual problems.



The Paradox of Problem Awareness

Root Causes:

Why does this paradox exist? Several factors contribute. Executives are often shielded from daily operational matters. Information is filtered, and only a select few problems reach their desks. Additionally, senior management can be out of touch with the reality on the ground.

Consequences:

This lack of awareness among executives has consequences. Decisions may be based on partial information. Opportunities for improvement and innovation remain hidden. As a result, the organization's growth may plateau.

A Harvard Business Review study revealed that only 20% of surveyed employees felt that their managers understood the challenges they face in their daily work.

Unmasking the Iceberg in Indian B2B Companies

The Indian Context:

In Indian B2B companies, this paradox is even more pronounced. The hierarchical structure is often deeply entrenched. A culture of deference to authority can stifle open communication. As a result, problems stay submerged.

Silent Challenges:

Many Indian staff members are aware of issues but hesitate to communicate them to superiors due to cultural norms. The "speak when spoken to" mentality prevails, further concealing the iceberg's depths.

Research Data:

A survey conducted by an **Indian management association found that 65% of employees felt uncomfortable speaking up about problems to their superiors**. The fear of reprisals and concerns about cultural norms regarding hierarchy were cited as the primary reasons.

Bridging the Awareness Gap

1.Promoting Open Communication: To address the iceberg of ignorance, companies should actively encourage open communication. Employees at all levels should feel empowered to voice concerns, ideas, and solutions without fear of retribution.

2.Active Listening: Leaders must embrace active listening. When employees speak, their voices should not just be heard but truly listened to. Their insights can uncover submerged problems and opportunities.

3.Empowerment through Data: Utilizing data and analytics can help in unveiling hidden issues. Technology can be a tool for problem revelation. Regular data-driven reports can keep executives informed about the actual challenges.

In any organization, there exists an inverse relationship between the flow of information and the concentration of decision-making power. While HR departments can play a pivotal role in bridging these gaps, relying solely on HR is not sufficient. Therefore, a fundamental rule for an executive's success is to embody humility, maintain strong connections, and embrace feedback.

Curiously, executives are often compensated for their decision-making abilities, yet they frequently face constraints due to the prevailing power structures.

Few rules which an effective leader follows in a successful organization are:

Rule No.	Description	Impact on Team
1	Establish self-initiated networks.	Avoid influence of power structures.
2	Suspend judgment, validate information.	Ensure decisions are based on validated data.
3	Delegate with specific criteria.	Clarify decision-making process and roles.
4	Facilitate more, take fewer decisions.	Foster a culture of decision-making.
5	Ask fundamental questions.	Promote critical thinking and understanding.

The Path Forward: Fostering Transparency

Transparency in Decision-Making: Companies should strive to make decision-making processes more transparent. The more executives understand the challenges, the better they can make informed, strategic decisions.

Visibility and Accountability: Create a culture of visibility and accountability. When problems come to light, there should be a clear path to addressing them. Teams should be held accountable for resolving issues.

Conclusion: Shaping a Transparent Future

In the world of Indian B2B companies, the iceberg of ignorance is a reality that needs to be acknowledged and conquered. As long as problems remain submerged, an organization's growth potential remains untapped. Navigating this iceberg requires a shift in culture, one that values transparency, communication, and the wisdom that can be harnessed from every level of the organization. By doing so, we can ensure that all challenges are addressed, and all opportunities are seized.

Cultivating Trust in the Workplace

A Psycho-Sociological Perspective

Yograj Kaushal
CRM

Trust is the bedrock upon which successful workplaces are built. It is the invisible force that empowers collaboration, nurtures open communication, and propels organizations toward achievement. When trust is woven into the fabric of a workplace, employees are more inclined to work together harmoniously, take strategic risks, and remain dedicated to their organization. In this comprehensive exploration of building trust in the workplace, we delve into the psychology and sociology of trust, uncovering strategies and insights for creating thriving, trustworthy work environments.

The Psychology of Trust

Trust in Leadership: Leading by example is an imperative starting point. Trust trickles from the top-down. Employees gauge trustworthiness by observing the integrity, transparency, and ethical behaviour of their

leaders. When leaders exhibit unwavering integrity, employees naturally follow suit, fostering a culture of trust.

Open Communication: Encouraging open and honest communication lies at the core of trust-building. To establish a trust-rich environment, employees must feel secure in sharing their thoughts, concerns, and innovative ideas without apprehension. Leaders who regularly update their teams on company progress and developments create a foundation of trust through transparency.

Active Listening: In the quest to build trust, one must exhibit genuine interest in employees' opinions and concerns. Active listening not only encourages open dialogue but also conveys respect and appreciation, laying the groundwork for meaningful connections.

Acknowledging Mistakes: Mistakes are a part of the human experience. Acknowledging one's errors and taking responsibility for them is not a sign of weakness but rather a testament to transparency and humility. This openness in admitting fallibility cultivates trust.

The Sociological Aspects of Trust

Empowering Employees: Micromanagement corrodes trust. To foster trust, leaders must empower their employees to make decisions within their roles and grant them the autonomy to take ownership of their work. Trust is the currency of empowerment.

Fostering Inclusivity: A diverse workplace that embraces different perspectives and values inclusivity is more likely to be one in which trust thrives. Valuing and respecting diverse voices is the essence of a culture of trust and collaboration.

Providing Development Opportunities: Investing in employees' growth and development demonstrates a commitment to their long-term success. This investment is instrumental in building trust by conveying genuine intentions.

Recognition and Appreciation: Recognizing and appreciating employees' contributions regularly is like depositing trust into an emotional bank account. These appreciative gestures build trust and elevate morale, creating a more positive work environment.

A Blueprint for Building Trust

Upholding Confidentiality: Confidentiality is sacred. Respecting the privacy and confidentiality of sensitive information, whether concerning employees, clients, or the organization, is imperative. Any breach of confidentiality can rapidly erode trust.

Setting Clear Expectations: Transparency in roles, responsibilities, and organizational goals is an antidote to ambiguity. A shared understanding of expectations is the linchpin of trust-building.

Cultivating a Trustworthy Work Environment

Ongoing Commitment: Building trust is a journey, not a destination. It requires continuous commitment and effort from every member of the organization. Trust is the communal responsibility of the workplace.

The Trust Multiplier Effect: When trust is deeply rooted in workplace culture, it becomes a force multiplier. It enhances productivity, encourages innovation, and cultivates a positive and engaging work atmosphere. Trust acts as the adhesive that bonds teams and organizations together.

A Glimpse into Trust in the Workplace

In a 2019 workplace survey, employees were asked about the importance of trust in their workplace. Here's a snapshot of their responses:

Trust Aspect	Importance Ranking (Out of 10)
Trust in Leadership	9.2
Open Communication	8.7
Empowerment	8.5
Active Listening	8.9
Acknowledging Mistakes	8.3
Inclusivity	9.0
Development Opportunities	8.6
Recognition and Appreciation	9.1
Confidentiality	9.2
Clear Expectations	8.8

Conclusion: The Currency of Trust

Trust is not an abstract concept; it is the currency of healthy, thriving workplaces. It is nurtured by psychological principles of integrity, communication, and humility, as well as sociological principles of empowerment, inclusivity, and appreciation. Building trust is an ongoing effort that pays exponential dividends. It is the foundation upon which successful organizations are constructed, fostering innovation, unity, and a resounding sense of purpose.

In the wise words of Peter Drucker, "The most important thing in communication is hearing what isn't said." Similarly, the most critical aspect of a successful workplace is trust — what is felt in every interaction and unspoken but deeply understood.

Employee Engagement

NEW *Joiners*

Akash Rastogi
Technical Solutions
01-Jul-23

Vishal
R&D
04-Jul-23

Abhijeet Singh
BD
17-Jul-23

Manoj Kumar
Supply Chain
02-Aug-23

M Bhaskar
Technical Solutions
16-Aug-23

Amandeep
QMS
04-Sep-23

Team *Celebrations / Trainings*

New QC Lab in the R&D unit, Sahibabad, Uttar Pradesh

Team *Celebrations / Trainings*



Training for Leadership, Business Development, and Customer Solutions teams, Delhi – September 2023














Company Offsite Trip, Chail, Himachal Pradesh – September 2023

Seminar & Conferences


UPDA's International Conference, Lucknow, Uttar Pradesh – July 2023



Philsutech Annual Convention, Cebu City, Philippines – August 2023



1st Catalysts Technical Workshop, Belagavi, Karnataka – August 2023


CII Sugartech, Lucknow, Uttar Pradesh – September 2023


STAI's 81st Annual Convention & International Sugar Expo, Trivandrum, Kerela – September 2023

Brews & Spirits and Fermentis Academy, Bengaluru, Karnataka – September 2023

India Sugar & Bioenergy Conference, Delhi – September 2023

SISSTA's 52nd Annual Convention, Chennai, Tamil Nadu – September 2023

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