BrewTimes™

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BALAJI ENZYME & CHEMICAL PVT LTD

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Introducing BrewTimes :

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

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

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

About Our Company :

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

HOP CREATION No. 1

CREATIVE PRODUCTS

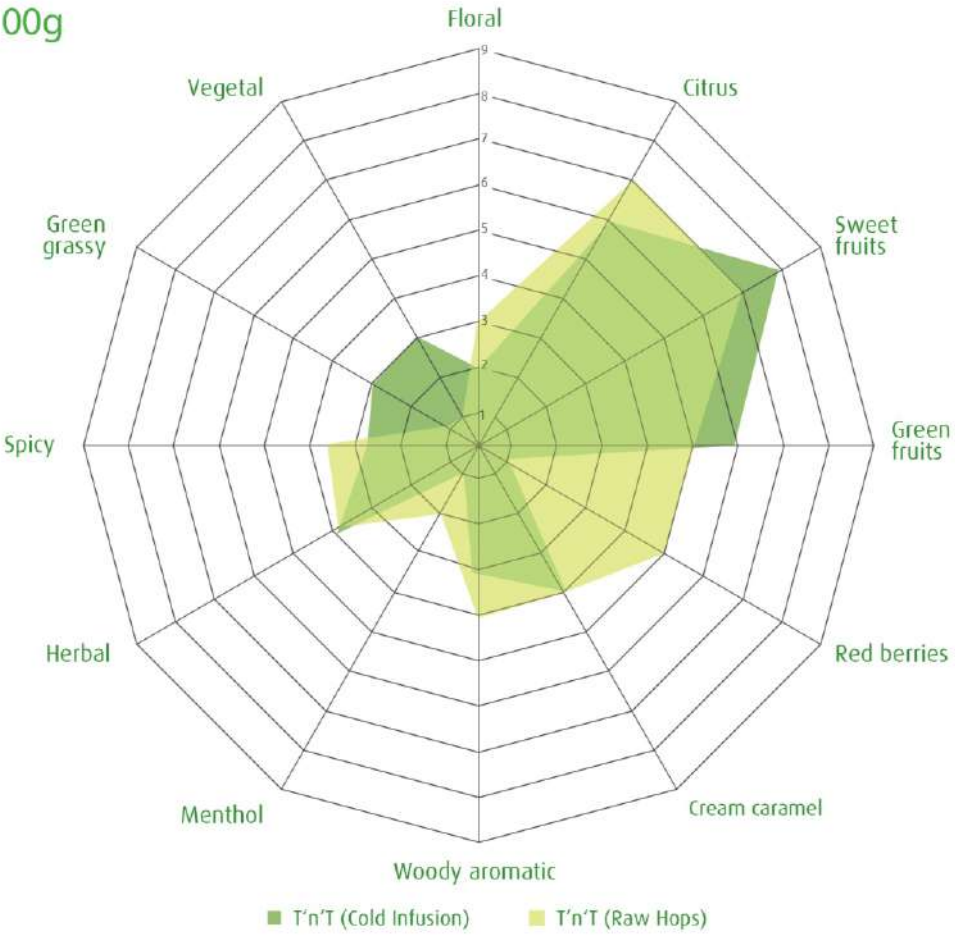
T 'N' T

This exclusive BARTH-HAAS GROUP Hop Creation provides an explosive aroma and taste character to your beer.

Crop 2017

α-content: 12,0 - 13,0 %

Oil content: 1,3 - 1,5 ml/100g



http://www.barthhaasgroup.com/en/varieties-and-products
brewingsolutions@johbarth.de

BARTH-HAAS GROUP

HOP CREATION No. 2

CREATIVE PRODUCTS

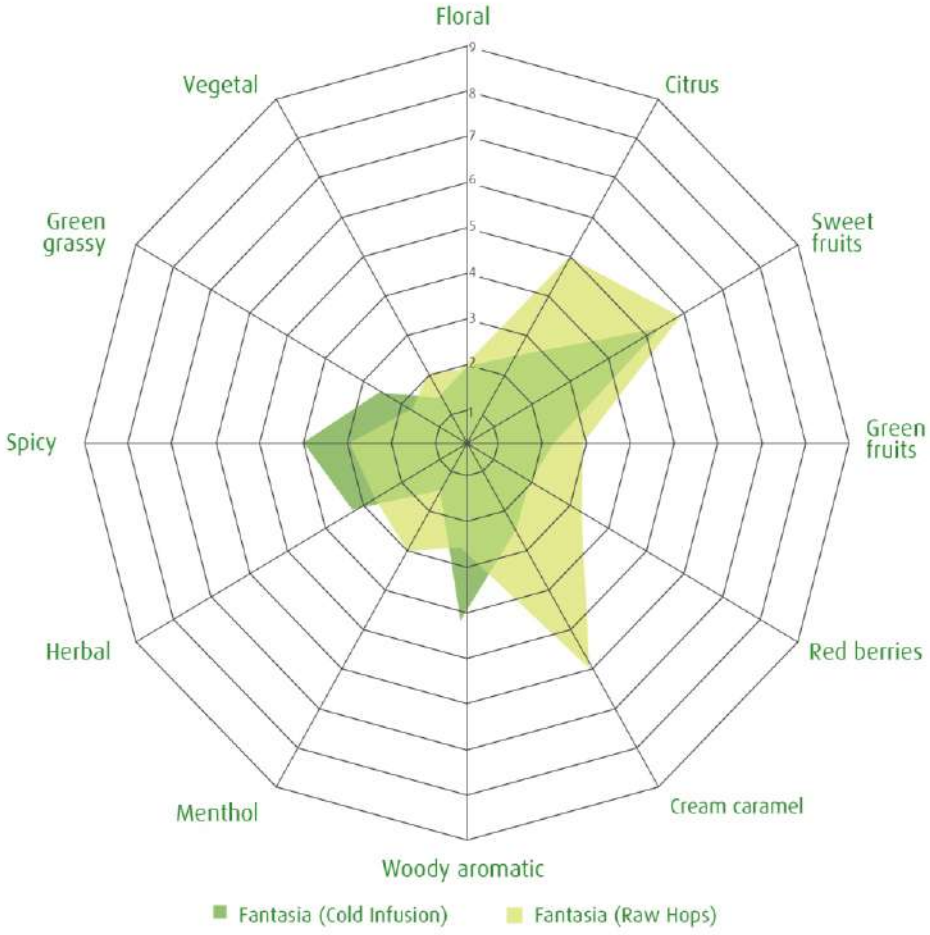
Fantasia

This unique BARTH-HAAS GROUP Hop Creation provides a silky touch of cream and caramel to your beer.

Crop 2017

α-content: 4,5 - 6,5 %

Oil content: 1,0 - 1,5 ml/100g



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HOP CREATION No. 3

CREATIVE PRODUCTS

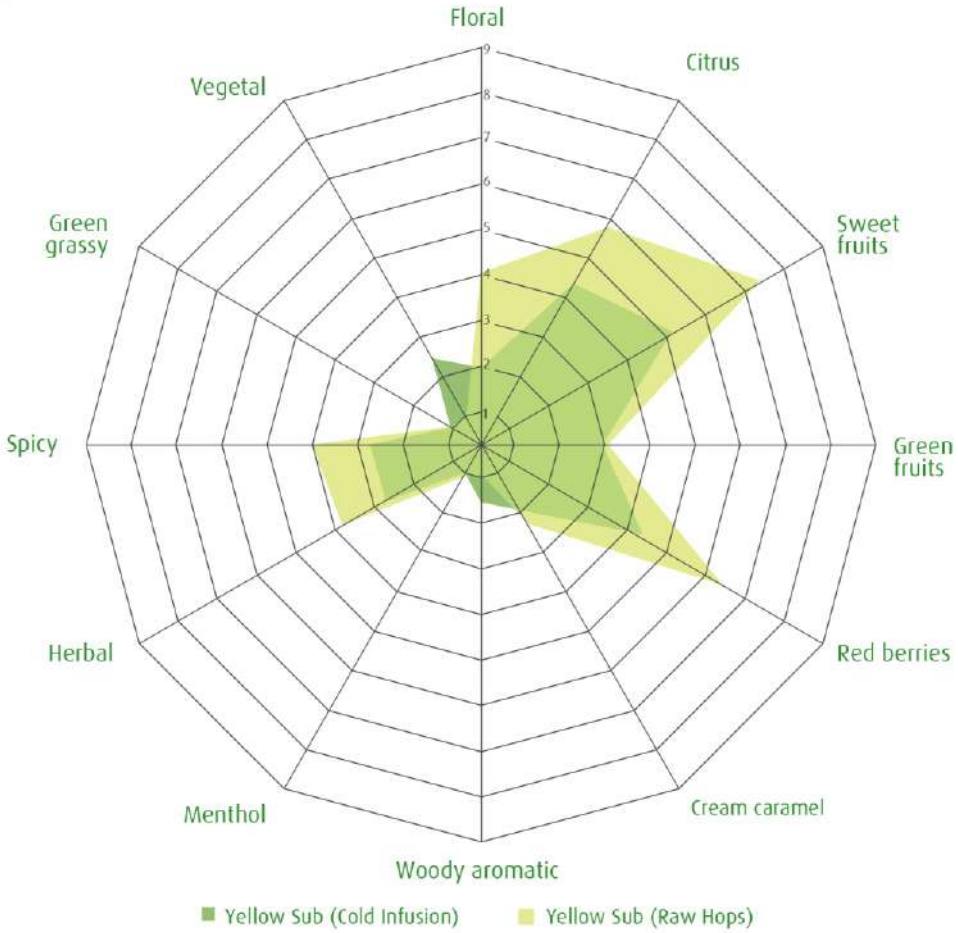
YELLOW Sub

This exclusive BARTH-HAAS GROUP Hop Creation turns a fine and excellent hop aroma into a sweet, fruity Flamenco of apricot and orange, with a hint of blackberries, which makes your beer irresistible.

Crop 2017

α-content: 6,0 - 7,5 %

Oil content: 1,0 - 1,5 ml/100g



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HOP CREATION No. 4

CREATIVE PRODUCTS

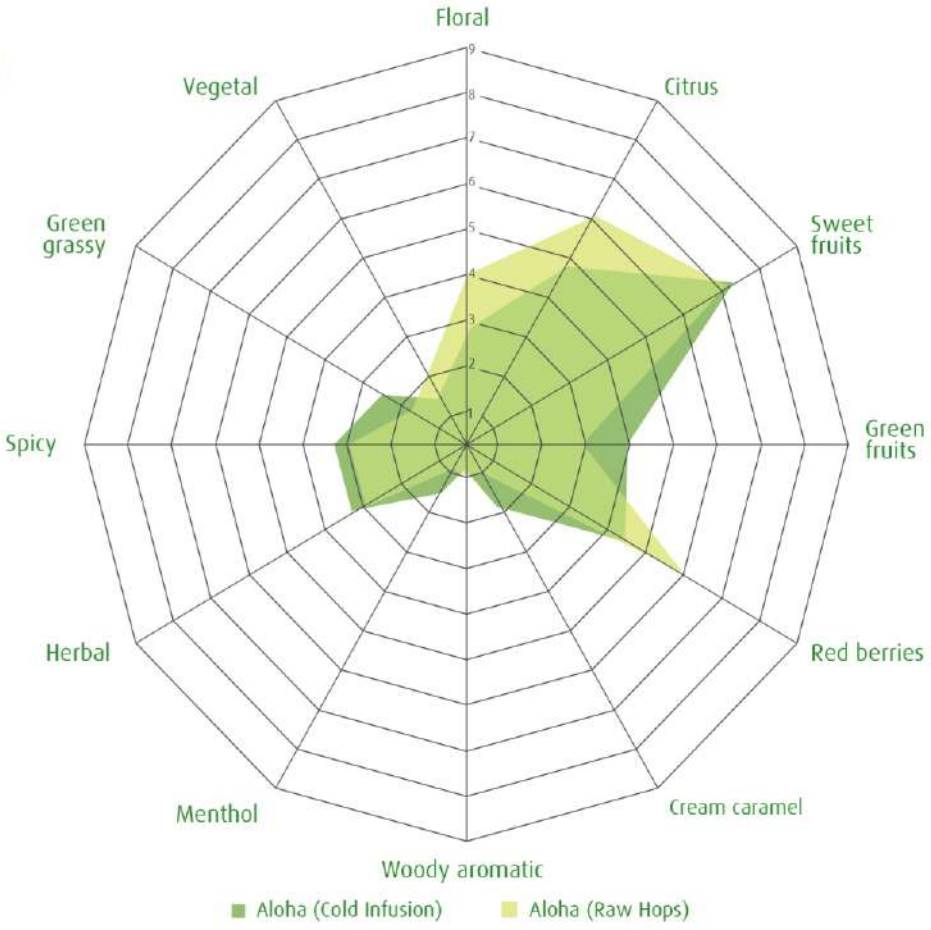
ALOHA

This unique BARTH-HAAS GROUP Hop Creation gives your beer an exotic boost with a flavour coming directly from Hawaii.

Crop 2017

α-content: 8,8 - 10,0 %

Oil content: 1,5 - 2,0 ml/100g



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BARTH-HAAS GROUP

SANITATION AND PEST CONTROL IN BREWERY

BIJAY BAHADUR

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Introduction

The modern brewery faces microbiological and pest-related challenges. Microbial issues, including stray microorganisms, and infestations by insects, rodents, and birds are common concerns. Just as we wouldn't eat from a dirty, cracked plate due to the potential bacteria growth in its crevices, similar principles apply to pest control. Maintaining cleanliness and repairing facilities are essential for eliminating pests' sources of food and shelter. Hence, sanitation and pest control must be integrated.

Breweries, due to their warm, moist environment and grain ingredients, are attractive to pests. To reduce this allure, we must identify changes that can be implemented. Ensuring well-sealed structures and physical barriers becomes crucial in preventing pest access. Later, we'll delve deeper into these aspects. However, initially, let's explore the types of pests that could potentially infiltrate a brewery.

Types of Pests Encountered

Pests can be categorized based on their entry points or potential harborages within the facility. Identifying the infestation source facilitates more effective control measures.

Some insects like ants, crickets, and earwigs primarily inhabit the exterior but occasionally infiltrate to cause issues. Flies, on the other hand, are drawn to the facility and might breed indoors. Certain beetles, like the red flour beetle, accompany grains or malt into the plant. Silverfish might arrive with packaging materials, while cockroaches enter via floor drains or live within them. Termites, exploiting floor cracks, can infiltrate and persist throughout the facility without continuous control. In the case of rodents, external entry is common, while birds roost, rest, or forage in proximity to the brewery.

Integration of Sanitation and Pest Control Methods

Although most companies will be dealing with existing facilities, it is important to discuss some factors that would enter into selecting a site for a new plant.

Location and Environment

In selecting a new facility site, several factors, apart from practical ones like transportation access, water quality and quantity, and labor availability, warrant consideration. Proximity to populated areas, for instance, might lead to issues such as odor complaints and increased traffic. Moreover, as concerns over fumigant gases rise, facility fumigation can become more challenging, particularly near densely inhabited regions, potentially harboring various pests that could be attracted to the plant.

It's vital to acknowledge that a completely pest-free location isn't feasible. Hence, the focus should be on choosing a site where pest issues are easier to pinpoint and control. If the primary concern is flying insects, strategies like reducing entrances and employing physical barriers can be prioritized.

Landscaping to Minimize Attracting Insects

Landscaping should improve plant image and product appeal, but slight changes can greatly impact pest control. Avoid fruit and nut trees as they attract honeybees that might pose stinging issues for workers. Bees could target sugar lines or can crushing zones. Fallen rotting fruit lures flies and birds, while nuts draw rodents.

Structural Design to Exclude Pests

Designing to exclude pests starts with recognizing their attraction factors within a brewery:

- Shelter from harsh weather: Pests seek warmth in winter and coolness in summer, with rain further driving them indoors.
- Food odors lure hungry pests.
- Access to moisture: Pests often lack water sources outdoors.
- Light allure: White doorway lights attract pests; sodium vapor lights are less appealing. Mounting lights 10 m (30 ft) from entrances and directing illumination inward improves the situation.

Perimeter Design

Wall fans, with their "self-closing louvers," provide false confidence as the louvers don't seal tightly enough to stop insect entry. Fans can also be turned off occasionally, causing pest infestations during weekends or holidays when inactive.

Doorways are essential, but doors shouldn't remain open. Design doors for easy closure to effectively keep pests out.

Metal roll-down doors, when properly installed, work well for frequent use. Yet, additional barrier brushes are often needed. Standard steel doors work for pedestrians but may have hollow sections allowing mice to access doorframes.

Air blast fans over doorways can assist, but proper installation and regular checks are vital.

Roof openings are commonly overlooked as insect entry points. Unscreened vents and stacks near leaks and rain puddles can be problematic. Don't underestimate stored product insects' ability to fly from nearby sources to brewery roof vents. Smooth roofs near dust collectors aid cleaning.

Trash and Waste Disposal

Trash compactors serve as both convenient trash disposal spots and feeding grounds for pests. Due to their low placement, cleaning beneath them is a challenge, exacerbated by the lack of nearby drains. Elevating compactors on concrete skids can help and should be matched with a raised area for disposal pickup. The area surrounding should feature smooth concrete, not dirt or asphalt, with a sloped path to a sufficient sewer drain.

Dumpsters are often positioned conveniently near entrances, unfortunately placing pest-attractive spots beside frequently open doors. To intercept flying insects, both areas require electric fly-catching devices.

Open dumpsters near buildings invite pests. All trash cans, ideally with self-closing or snug lids, should be lined with plastic bags, promoting daily disposal and cleaning. Regular cleaning routines are vital to ensure proper disposal of appealing items. Plant outdoor dining and smoking spaces should be distant from entrances leading to critical areas.

Modern breweries don't necessitate openable windows. The minimal light and air they provide aren't worth the risk of insect infiltration. Glass blocks can offer desired illumination, but any glass entails breakage and potential contamination hazards.

How to Locate Possible Points of Contamination?

The modern concept of quality assurance involves a hazard analysis of the potential for contamination at each critical point. Critical points are where contamination may occur if steps are not taken. A trained inspector should do a complete Hazard Analysis Critical Control Point (HACCP) survey.

Equipment Design

a) Grain and Malt Area

Upon malt or grain arrival, quality should be rechecked for contamination. Even clean rice, corn grits, or malt can get tainted during unloading.

Large modern breweries use pneumatic systems and transfer hoses for unloading. Left uncapped on the ground, transfer hoses have allowed insects and rodents to infiltrate and be carried with the grain. This history of contamination has led to massive product disposal. Gravity unloading from railcars to a floor dump is less sanitary; dirt and insects near the dump might be included. Contamination risk from stored product insects persists through milling and weighing.

Silos can harbor insect infestations, potentially transferring to new stock without regular cleaning and fumigation. Cleaning grain and adjunct systems is challenging due to inaccessible equipment. Though spot fumigation addresses hidden areas, equipment redesign enabling inspection and thorough cleaning will become necessary.

b) Brewhouse

Mash and wort areas, mainly face cockroach and fly issues. Wood, a roach resting spot, should be avoided; instead, opt for clean, ceramic surfaces. Well-maintained ceramic walls and floors deter problems here.

Cockroaches exploit sewer systems, hiding during "fogging" and re-emerging once insecticide disperses. They prefer darkness and avoid large spaces.

Around kettles, loose tiles and missing grout create breeding grounds for phorid flies, drain flies, and cockroaches. When feasible, inspect with pyrethrin aerosol and seal appropriately, as it's an ongoing task.

c) Filling Area

The filler area is critical, as it is the last step before packaging. Equipment not in use poses notable insect challenges. Such equipment warrants monthly priority inspection for cleanliness.

Contamination risks abound in the filling area. Ill-sealed crown cap boxes can gather dust and insects. Crowns lack adequate cleaning systems. Adding an air wash to the crown line's entry is feasible. However, sealing crown boxes initially is key.

Usually covered, the filling line shields from above but not flying insects, like fruit flies, especially during pauses. Preventing flying insects before they reach this zone is crucial.

Packaging and outside areas should have at least two closed doorways. Monitoring with insect traps is vital. Detecting numerous insects in this area signifies issues elsewhere that demand attention.

Insect Control Methods

No brewery in the world that did not occasionally have an insect problem. There are a variety of insect control methods and a good pest control program will choose the options that are safest to the product, the employees, and the environment, and integrate these into one master plan. Among the options are:

Use of a fumigant gas:

- Fumigate ingredients before they arrive at the plant
- Fumigate ingredients in bins or silos
- Fumigate equipment
- Fumigate packaging materials
- Fumigate an entire plant or sections of the plant

- Space spraying of large areas with non-residual insecticides
- Limited area treatment with non-residual aerosols
- Baits for ant or cockroach control
- Void treatments with insecticidal dusts
- Crack and crevice treatment with residual insecticides
- Spot treatment with residual insecticides
- Outside bait treatments for flies and other insects
- Nonchemical treatments such as extreme heat or cold

Use of Fumigant Gases

Fumigant gases are commonly used in breweries to control insects, both before ingredients arrive and within the brewing process. Ingredients like rice, corn grits, and barley are often fumigated before delivery. Ensuring pest-free ingredients becomes more crucial as certain control methods within the brewery become limited. Currently, phosphine products are the preferred fumigants for grains.

Within the brewery, silos are fumigated upon emptying to eliminate insects that may be present on the silo surfaces or at the bottom. Careful execution is required to protect workers nearby during the multi day fumigation process. The application of phosphine products in this area usually demands three or more days for effectiveness.

Infestations can occur in hard-to-thoroughly-clean equipment between overall plant fumigations. Targeting equipment alone is possible using magnesium phosphide, a task that demands specialized crews.

Some breweries fumigate their entire brewhouse multiple times a year to minimize infestation risks. However, this practice can contaminate adjacent cellars if proper precautions are not taken. Eliminating gas from cold areas proves challenging and poses health hazards. For this type of fumigation, methyl bromide is typically employed, requiring around 24 hours of exposure and 12–24 hours of aeration. Given the anticipated decline in methyl bromide availability, alternative solutions will be necessary.

Types of Fumigants Used

Methyl bromide has been used extensively for many years because of its many advantages:

- Little or no residue problem
- Good kill of all life stages of insects including the egg stage
- Short exposure time of 24 hrs plus 12–24 hrs for aeration
- Does not harm electrical equipment
- No significant insect resistance known

Regrettably, due to its alleged ozone layer depletion, methyl bromide is internationally prohibited. None of the current fumigants match all its qualities, and no new substitute has arisen with the same benefits. All alternatives, including various fumigants, must be thoroughly explored.

Sulfuryl fluoride is under examination as a potential replacement for methyl bromide in food processing facilities. It entails a 24-hour exposure period and is managed similarly. Residue concerns are minimal, and corrosion risks are low except near open flames. While not as effective as methyl bromide against eggs, it matches up in eliminating other life stages.

Carbon dioxide, alone or combined with heat, can control insects, but demands lengthier exposure than methyl bromide. Its application might suit certain bin treatments, yet not for brewhouse fumigation due to inadequate sealing capabilities for the requisite 60%+ carbon dioxide concentration.

Safety for employees remains paramount in any brewhouse or building fumigation. Even silo fumigation procedures must safeguard workers in close proximity to the silos.

Space Treatments (Fogging)

Space treatments use tiny aerosolized insecticide particles, often as small as 5–25 µm, which can linger in a room for hours. These particles effectively eliminate various exposed insects, including small flying ones like fruit flies and even large cockroaches.

Distinct from fumigation, space spraying deploys liquid insecticides that can't penetrate as deeply. Fumigants, as single molecules, can permeate cartons, boxes, and concrete walls, while sprays can move between cartons and boxes only.

Dichlorvos (DDVP) proves most potent for space treatments. Previously mixed with methyl chloroform for optimal dispersion, new formulations use carbon dioxide as an aerosol propellant, showing promising outcomes. Formerly used oil-based diluents have presented odor and other issues since the unavailability of the former diluent.

Baits

Baits, an ancient concept, have evolved into the preferred choice for ant and cockroach control, with liquid, granular, and gel forms. Unlike fumigants or fogging, baits pose minimal personnel hazards and contamination risks. Though labor-intensive initially, they prove highly effective over a year.

For cockroach control, injecting gel or similar formulas into hiding spots provides months-long control. Baits excel for various ants, requiring multiple types due to dietary preferences. Outside, granular baits are valuable, particularly for fly control around dumpsters and similar spots, attracting and eliminating flies in the area. However, care should be taken not to attract more flies indoors.

Granular insecticides work outdoors too, repelling migrating insects. These are applied using fertilizer spreaders along the plant's perimeter. Caution is advised on paved surfaces to prevent bird consumption, which has led to bird deaths.

Residual Sprays

Stored grain insects, challenging pests in breweries, lack effective baits. Cleaning and sanitation are

crucial to their control. A layer of organic dust can lead to numerous insects, rendering even the best pesticides ineffective. Optimal sanitation allows residual sprays on floors or walls to efficiently eliminate stored grain insects, lasting over a week. Enhanced efficacy results from targeting narrow cracks favored by these insects, such as equipment-fastening points. Sealing treated cracks afterward reduces yearly labor needs.

Residual Dust

Dust formulations surpass sprays. Compatibility of insecticide with the dust surface grants extended residual life. In breweries, dust treats voids like wall voids effectively, coating them thoroughly. Unlike wet sprays, dust's floating nature prevents repellency. Modern dust forms resist moisture and small electric dusters supplement hand dusters. Dusting must avoid drifting for contamination concerns.

Heat or Cold Treatments

At 57–65°C for 24 hrs, lethal temperatures spread widely in a building, cost-competitive with standard fumigation. However, brewery designs lack heat resistance, affecting cellars often connected to brewhouses.

Cold storage of delicate ingredients like malt samples and hops controls pests and preserves quality. Though non-lethal, cellar temperatures impede insect development.

Insect Monitoring Methods

Flashlight inspections are vital but can be enhanced with additional tools. Synthetic pheromones, mimicking insect attractants, boost results when combined with sticky traps. Effective for early detection and monitoring progress, they excel with Indian meal moths, cigarette beetles, warehouse beetles, and Trogoderma species. Placement in grain storage areas is recommended.

However, some environments hinder pheromone traps, like those for red flour beetles, confused flour beetles, and saw-toothed grain beetles. Glue boards, strategically placed, monitor cockroaches and insects hidden from view. Coupled with accurate records, they reveal 80% of issues in less than 20% of space, guiding targeted treatment.

Electric fly grids, a long-used tool, offer insight into infestations by analyzing catches. Different species suggest drain problems or migration, guiding plant sealing. Vacuum samples uncover insects missed by other methods, while retained ingredient samples reveal delayed egg hatches.

Employee pest sighting reports, when accurately noted, are excellent for locating infestations. Detailed recordings specifying observer, pests, location, date, and time, with follow-up actions and inspections, aid efficient treatment.

Safety

Breweries prioritize employee health amid societal pesticide concerns. Executive commitment is

crucial, ensuring precautions like proper aeration after fumigations or space treatments. Deciding between fumigation and repairs requires monitoring and records, not fixed schedules.

Characterizing exposures across various conditions at each facility helps establish guidelines for workers. Silo treatment inside breweries demands no risk of fumigant exposure, often challenging due to prolonged gas presence. Using gases with shorter exposure times should be considered.

Space spraying hazards exist. DDVP requires SCBA, head covering, and body suit. Pyrethrin sprays' potential allergic reactions are less significant than avoiding employee exposure. Notification, placards, and locks are essential to prevent exposure.

While careful crack treatments generally pose no risks, trace pesticide amounts might appear due to volatilization and migration. Labels and manufacturer contact offer safe application guidance. Pre exposure medical exams, blood cholinesterase tests, and respirator certifications ensure safety.

Protecting workers and prioritizing safety remain paramount.

Perimeter Rodent Control

Careful scrutiny of incoming products is essential under Good Manufacturing Practices regulations, largely preventing pest entry with products. However, external sources remain the main entry point for rodents. Their adept climbing skills are notable. If downspouts lack screening, rodents exploit them to access roofs, while scaling walls or leaping from trees and structures is also common.

Excluding rodents is paramount. Monthly assessments of doorways are advised, ensuring no gaps for rodent entry. A guideline: if a pencil fits beneath, a mouse can enter; if your thumb fits, even a rat can. Mice slip through 4mm holes.

The gravel strip encircling the building and paved areas are crucial for control. Due to poor eyesight, rodents follow walls for entry. Fearful without tall weeds, they enter shelters, including bait stations. Dual defense is optimal. Bait stations near the wall and along the perimeter fence are recommended.

Calculating bait station numbers along the fence hinges on experience and records. Suspected nearby sources warrant more stations. While granular baits suit house mice, roof rats prefer fruit or meat. Roof rats access buildings differently, leaping meters or using wires.

"Tamper-resistant" bait stations are vital, mandated by EPA. Locks secure these costly, though not foolproof, stations. Fastening is critical where children or non-target animals could access them. Inspect and clean bait stations bi-monthly, replacing bait monthly for efficacy.

Multiple catch traps inside and out require protection. Glue boards in traps or stations evade fastening rules but still need safeguarding. Toxic baits stronger than anticoagulants are rarely necessary. Maintained programs obviate indoor toxic bait use. Perimeter inspections, especially near drainage ditches, are prudent. Additional bait stations or targeted treatments could be employed. Fumigation certification is requisite for phostoxin tablet usage. Regular trap checks and proactive measures are key to avoiding rodent control failures. Refer to Table 1 for reasons behind potential failures.

Table 1: Some Reasons Why Rodent Control Programs May Fail

Plant environment

- Poor sanitation results in excessive rodent populations
- Weeds provide shelter and food
- Trash and stored equipment provide shelter
- Spills along railroad tracks provide food
- Poor drainage provides water

Outside bait stations

- Not in the travel path of rodents that are entering plant
- No bait or insufficient bait for rodent population
- Old dirty bait that is no longer attractive
- Bait station poorly designed and is not an attractive shelter
- Stored materials and trash provide better shelter
- Bait station so hot or so cold that rodent does not enter
- Rodent resistant to bait used

Rodent proofing

- Some openings not closed
- Openings not sealed with correct materials
- Doors left open during the day
- Rodent proofing at ground level only
- Rodent proofing at doors but not around pipes and other entrances

Inspection of incoming ingredients

- Little or no inspection at the time of arrival
- Open truck not inspected until unloading starts (rodent may have left)
- Shrink wrapped material assumed to be clean — receives no inspection
- "Chimney-packed" pallets not checked in center
- No backlight used even on products preferred by rodents

Multiple catch traps

- Animal (rat) too large for trap and no other traps used
- Trap damaged and not inspected. It cannot catch mice
- Trap wound too tight to catch small mice
- Trap too far from wall to be effective
- Trap left too long in one spot and rodents avoid it
- Trap not cleaned and has bad odor

Baited snap traps

- Poor choice of bait. Undesirable food for rodents
- Bait not tied on. Easily pulled off without triggering trap
- Trigger of trap not against wall
- Trap warped and wobbles when rodent touches, scaring rodent
- Trap sprung by vibration of plant before rodent gets there
- Trap not left out long enough to overcome fear of new objects
- Trap not tied down and is dragged off to where rodent can get free
- Trap stored with insecticides and is repellent to rodent
- Prebaiting not done on "smart old rat"
- Trigger angle too high or too low

Glue boards

- Poor placement in relation to rodent pathways from shelter to food
- Glue layer too thin for size of rodent
- Glue has a layer of dirt, making it ineffective
- Placed in a moist area where rodents wet feet may make board fail
- Board not fastened and is dragged to where rodent can pull it off

Inspection program

- Plant inspections infrequent
- Inspections only made of inside areas
- Inspections made by untrained person
- Inspector unwilling to get dirty during inspections
- Inspector thinks in terms of chemical control only

Regulations Affecting Pest Control

Pesticide regulations in India are governed by various government bodies such as agriculture, health, and environmental agencies. Additional regulations from entities like OSHA and FDA must also be adhered to.

State-specific guidelines vary, but pesticide application must align with label instructions, using EPA registered materials exclusively.

"Restricted use pesticides," including fumigants, mandate application by a certified applicator who has passed a state competence exam. Recertification through testing or specialized training is periodic. Fumigants demand certified handling.

For brewery operations, certifications spanning pest, termite, fumigation, bird, and lawn control might be necessary. Contractors' certification cards should be on record when engaged. Brewery staff,

especially the brew master, should ideally hold certifications for program management and legal understanding.

Record Keeping

Breweries must maintain records of restricted pesticide applications for at least 10 years. These records should be kept by both the brewery and the hired pest control agency, distinct from pest sighting or sanitation reports to maintain privacy.

Pesticide use reports should include:

- Pesticide name and registration number
- Amount used
- Application location
- Target pest
- Application method
- Application date

Beyond legal requirements, effective pest control demands organized records. Written schedules detailing tasks and timing are essential. Changes need pre-approval, often from the brew master. Rodent catch records assess program success and guide adjustments. Computerized systems are available.
Sanitation-related maintenance requests need separate logging and timely completion.

Construction or remodeling can introduce new pests or reveal hidden issues. The person in charge of pest control must be informed for assessment and potential extra measures. Faulty remodeling may create new entry points, often through wall voids from shoddy repairs involving pipes or wiring.

Outside Contractors versus In-House Pest Control

In the brewing industry, external pest control contractors with food plant experience are common. Exceptions may include those with entomology degrees. As certified individuals become harder to replace, reliance on contractors could increase.

Certain pest control firms recognize this shift and train specialized personnel across the country for demanding food plant pest control. Residential-focused firms lack the expertise or legal knowledge for brewery accounts.

Benefits of qualified contractors:

- Certified staff
- Access to advanced equipment
- Up-to-date training and techniques
- Off-site pesticide storage
- Separate insurance and liability

- No internal politics
- Expertise in specialized areas like commodity fumigation

Unqualified companies can lead to issues:

- High technician turnover causes unfamiliarity with plant and safety protocols
- Commission-based workers may rush larger accounts
- Inadequate training in pest control, especially brewery-specific knowledge
- Technician reports to boss, not brew master
- Concealing infestation extent to appear effective
- Infrequent visits diminish technical staff value

Effective pest control begins with detailed specifications, often written by brewery staff and sometimes aided by consultants. The risk of product contamination remains, with the brewery bearing heavier consequences. Hiring contractors doesn't absolve the brewery of responsibility; records must confirm work completion. Quarterly reviews between pest control and brewery staff foster communication and problem prevention.

Evaluating Pest Control Results

Assessing pest control outcomes varies. While minimal complaints might suggest success, regular checks are vital. Weekly in-house checks of key spots and monthly full plant inspections are advised. Integrating pheromone and glue board trap records enhances reports.

Contract inspections can be done in-house or by external agencies, requiring clear expectations and safety rules communication. Major reports should reach top management, with weekly summaries at minimum.

Inspection program failures stem from:

- Infrequent plant checks
- Limited indoor inspections
- Untrained inspectors
- Reluctance to get hands dirty
- Overreliance on chemical solutions

Summary

Pest control for insects and rodents is evolving and will continue to do so. Understanding underlying principles aids adaptation.

For insects living outside and sporadically entering, sanitation and distance from vegetation are key. Residual insecticides are used but inspection with glue boards is preferable.

Flying insects like flies require sanitation; space sprays like synergized pyrethrins are useful. Managing small flies prevents spider issues.

Insects entering with packaging will see non-pesticidal solutions like plastic or low-starch slip-sheets rise, minimizing reliance on fumigation.

Roaches, ants, termites will shift to bait-based control, focusing on less contamination and cost. Rodent control will largely revolve around building sealing.

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2. *Handbook of Brewing, Edited by Hans Michael Eblinger*
3. *Brewing Microbiology (Second Edition), F. G. Priest & I. Campbell*
4. *Brewing – A Practical Approach, Bijay Bahadur, 2016*
5. *Handbook of Brewing, Edited by Fergus G. Priest & Graham G. Stewart*

APEX WINE CLUB INDIA
Estd. 2018

5th Anniversary

1st Announcement

Let's celebrate with joy

Sat.23rd Sept'23

11:30 am to 03:30 pm

on Brunch at Sahara Star, Mumbai.

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Non Members....2,800

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Non Members....3,000

After 16th Sept
Members....3,000
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THE IMPORTANCE OF SODIUM BENTONITE GRANULES: A VERSATILE SOLUTION FOR VARIOUS INDUSTRIES

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Introduction

Sodium bentonite granules, derived from the natural clay mineral known as bentonite, hold significant importance in various industries due to their unique properties. This article explores the versatile applications of sodium bentonite granules and their contributions to geotechnical engineering, environmental remediation, agriculture, and beyond. By delving into the characteristics and benefits of sodium bentonite granules, we can gain a comprehensive understanding of their importance and widespread usage.

Sodium bentonite granules are small particles or pellets made from sodium bentonite clay. Bentonite is a type of clay that is formed from the weathering of volcanic ash. It has a high content of montmorillonite, a mineral known for its swelling and absorbing properties.

Sodium bentonite granules are commonly used in various industries and applications. One of the main uses is in geotechnical engineering and construction, where it is used as a sealing and waterproofing agent. The granules can be mixed with soil to create an impermeable barrier, preventing the flow of water or other fluids through the soil.

In addition to its geotechnical applications, sodium bentonite granules are used in environmental remediation projects to seal ponds, landfills, and other containment areas. They can also be found in industries such as agriculture, where they are used in soil amendments to improve moisture retention and nutrient availability.

Overall, sodium bentonite granules are versatile and effective materials that offer excellent sealing and absorbing properties, making them valuable in various industries and applications.

1. Geotechnical Engineering Applications

1.1 Sealing and Waterproofing: Sodium bentonite granules possess exceptional swelling and sealing capabilities, making them a preferred choice for creating impermeable barriers in construction projects. Their ability to absorb water and expand helps to prevent seepage and leakage through soil, providing an effective solution for dams, canals, and underground structures.

1.2 Landfill Liners and Caps: Sodium bentonite granules serve as essential components in landfill liners and caps. By incorporating these granules into the soil, a robust barrier is created to contain hazardous waste and prevent its migration into the surrounding environment.

1.3 Tunneling and Boring: The swelling and cohesive properties of sodium bentonite granules make them suitable for tunneling and boring operations. By stabilizing the soil and preventing collapse, these granules ensure the safety and efficiency of underground excavation projects.

2. Environmental Remediation

2.1 Pond and Lagoon Sealing: Sodium bentonite granules act as effective sealing agents for ponds and lagoons, particularly in areas with high water table levels. They create a watertight seal, preventing the infiltration of pollutants into groundwater resources and promoting environmental conservation.

2.2 Soil and Groundwater Contamination Remediation: In environmental cleanup projects, sodium bentonite granules can be used to contain and control the spread of contaminants. By forming barriers around contaminated areas, these granules limit the migration of pollutants and facilitate effective remediation processes.

2.3 Oil Spill Cleanup: Sodium bentonite granules, when applied to oil spills, have the ability to encapsulate and absorb oil. This aids in the containment and removal of oil from water bodies, minimizing ecological damage and facilitating the restoration of affected ecosystems.

3. Agricultural Applications

3.1 Soil Amendment and Moisture Retention: Sodium bentonite granules can enhance soil quality by improving its water-holding capacity and moisture retention. This proves beneficial in arid regions, where water scarcity is a challenge, and aids in sustaining healthy plant growth and crop yields.

3.2 Nutrient Availability and Plant Health: The high cation exchange capacity (CEC) of sodium bentonite granules promotes better nutrient availability for plants, improving their overall health and vitality. These granules can be used as carriers for fertilizers and micronutrients, ensuring their efficient delivery to plant roots.

3.3 Erosion Control: When mixed with soil, sodium bentonite granules act as an erosion control measure by stabilizing the soil structure. They reduce water runoff, soil erosion, and sedimentation, thereby preventing land degradation and protecting valuable agricultural land.

Conclusion

Sodium bentonite granules play a vital role in diverse industries, offering a multitude of benefits and applications. Their sealing, absorbing, and stabilizing properties make them indispensable in geotechnical engineering, environmental remediation, and agriculture. As a sustainable and environmentally friendly material, sodium bentonite granules continue to find innovative uses and contribute to the development of efficient solutions for numerous challenges faced by industries worldwide. By harnessing the potential of sodium bentonite granules, we can advance in areas such as construction, conservation, and agriculture, leading to a more sustainable and resilient future.

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BEER QUALITY CONTROL AND PREVENTION

Craft beer brewhouses and large-scale breweries alike must rely on rapid and accurate spoilage organism detection to avoid beer contamination. Due to the nature of the microorganisms, beer contaminants can easily go undetected by traditional microbiology detection.

Not only does beer contamination yield off-flavour, acids, excessive carbonation and undesirable aromas, beer spoilage leads to time waste and capital loss. Even worse, microbial contamination may result in recalls and brand fallout.

As part of a brewhouse's quality management program, it is key for brewers to identify contamination sources and prevent microorganisms access within the brewery.

Therefore, the entire production timeline - from raw-material oversight to brewery inspection - must be monitored with meticulous measure. For example, raw materials added to the hot side of the brewery can be contaminated, despite the sterilization step of the kettle. Meanwhile, the brew plant itself can harbour contamination on vessels, piping, cooling systems, measuring instruments, on the floor, and even in the air. Testing must be consistent as part of the quality control protocol to ensure product quality along the brewing process.

COMMON CONTAMINANTS IN BEER

Bacteria

Generally, bacteria do not survive in beer, however certain species - including Lactobacillus and Pediococcus, often referred to as lactic acid bacteria (LAB) - can. They are by far the most encountered beer spoilers and considered to be responsible for 60% to 90% of contaminations.

Wild Yeast

Wild yeast (i.e. Brettanomyces/Dekkera) is problematic because it lives in beer by resisting high alcohol levels, even with limited oxygen and low pH environments. Brewers from around the world consider the wild yeast Saccharomyces var. diastaticus to be the most problematic. Saccharomyces var. diastaticus causes “gushing” due to the unwanted fermentation. The source of the contamination can be from the brewer’s yeast itself or from within the brewery once established.

DETECTION OF BEER SPOILAGE

Speed, sensitivity, and specificity each play a role in determining the best beer spoiler detection method for your brewery. Today, brewers can choose between traditional culture-based microbiology or Polymerase Chain Reaction (PCR) Analysis.

Traditional microbiology detection involves a trained technician to collect samples without cross contamination, understand the culture media, and interpret the results as applicable to the brewer’s quality control application. Pros are cost, simplicity, manipulation and accessibility; however, cons present longer time lines (two to four days for bacteria and five to ten days for yeasts), trained staff, microbiology lab equipment and false negatives.On the other hand, the PCR test method provides same-day detection and identification of beer spoilers. This modern technique identifies a specific segment of the target microorganism’s DNA, then amplifies this DNA trace to detect its presence

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A COMPREHENSIVE REVIEW ON FILTER AIDS AND ITS APPLICATIONS

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ABSTRCT

Filter aids is a salicaceous inert material for separation of liquid and particulate matters. In general filter aids are obtained from mining where diatomaceous earth and perlite are dominantly used as filter aids for industrial applications. The filter aid has important properties of its rigidness, chemically inertness, insoluble, porous, high permeability, and remove finest particles at high rate. Due to its good stability, less impurities, it is on high demand for separation of high purity products of food, beverages and pharmaceutical industries.

Keywords: Filter aid, Application; Diatomaceous earth, Separation, Filtration

INTRODUCTION

Filter aid is an inert material containing solid particles for improved filtration efficiency by a porous, permeable membrane that retains solid particles and control the liquid flow. Filter aid usage has two objectives: 1) for layering and protecting the basic medium called precoat and 2) for flow rate improvement by decreasing the cake compressibility and increasing the cake permeability called admix or body feed (Eagle-Pitcher Minerals, Inc., 1988). Figure 1 showing the mechanism of filtration with and without filter aid of precoat and admix ways.

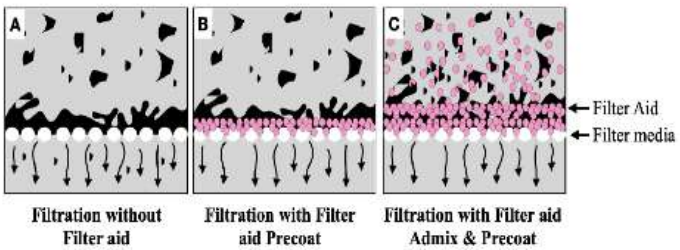

Figure 1: Filtration mechanism with and without filter aid

Filter aids are categorized as diatomaceous earth (DE), perlite, cellulose and others. However, DE and Perlite filters aids are most useful and commonly used for optimum throughput and maximum liquid clarity. DE is the diatomaceous skeleton recovered by mining operation from seabed and further processed to make different grades of filter aid. Filter aid is having different particle size and smaller the particle size responsible for removal of smaller particulate matter but at lower filtration rate (Bächle et al. 2021). Thus, finer grade is for high clarity filtration. Few crystalline type DE are also available but those are doubtful as carcinogen via inhalation route. Perlite is a mineral based but other form of filter aid recovered from natural glossy and volcanic rock which further processed for crushing, heating and explosive expansion to 10 times of its original volume.

Both DE and perlite are silica-based minerals and some other filter aid materials are available in are asbestos, cellulose, agricultural fibres, saw dust, rice hull ash, paper fibres etc. Cellulose can be used for filtration system that cannot tolerate silica. However, the filtration efficiency of cellulose is not good as DE or perlite but post filtration process of cellulose may have better cake integrity and it can be incinerated easily. Calcined rice hull ash and fibers from used newspapers are relatively new filter aids used for wastewater sludge dewatering.

What is diatomaceous earth

DE is a massive deposit of diatomite lay asleep beneath the Earth's surface until awakened to play a role as an instrument of modern industry. This deposit is so vast that it has been described by some as inexhaustible. The diatoms are unicellular form of life with cell wall, frustules and the accumulation of fossilized frustules of diatomite and this is the raw material for development of different grades of filter aid where calcination is the important step. The schematic representation of manufacturing of filter aid is shown in Figure 2. The most dominant diatomaceous species found are at Okayama Stephanodiscus, Akita Coscinodiscus, Oita and China Cyclotella. Balaji Enzyme and Chemical Pvt Ltd (BECPL) Mumbai, India is marketing pink and white diatomite deposits of Radiolite® filter aids and its specifications are resented in Table 1.

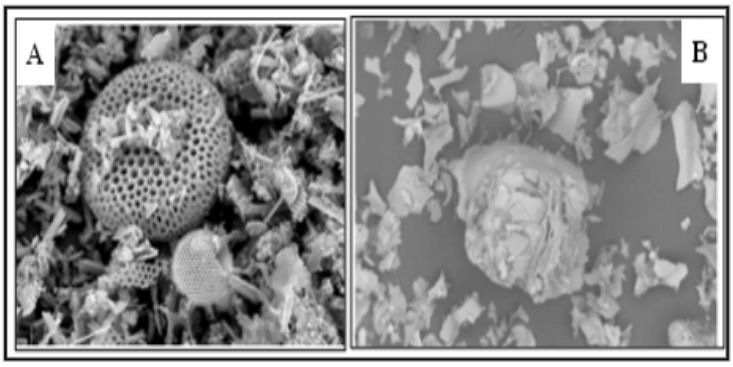

Figure 2: Typical Filter Aids (A-Diatomaceous earth, BPerlite)

Table 1: BECPL's Filter aids

Parameters	RADIOLITE® 200 or 300 (Pink)	RADIOLITE® 600 or 900 (White)
Description	Calcinated dolomite filter aid	Flux calcinated dolomite filter aid
Color	Pink	White
Specific gravity	2.2	2.2
Moisture	<3%	<3%
pH	7	10
Permeability	0.12-0.23 Darcies	1.6-3.5 Darcies
Mesh passing +150 mesh	<5%	<5-10%
Particle size distribution		
>40	16.3-17.1 µ	31.1-34.4 µ
40-20	34.3-34.9 µ	32.7-33.8 µ
20-10	24.2-24.4 µ	18.9-19.7 µ
10-5	14-14.1 µ	7-9.6 µ
5-2	7.7-8.2 µ	3.5-5.7 µ
<2	2-2.8 µ	1.5-2.2 µ
Median particle size	20.3-21.8 µ	27-30.2 µ
Major Chemical analysis		
SiO_2	>92%	>90%
Al_2O_3	4-4.2%	3.2-3.5%

Equipment Compatibility

Usage of filter aid in following equipment for liquid clarification for various industrial applications.

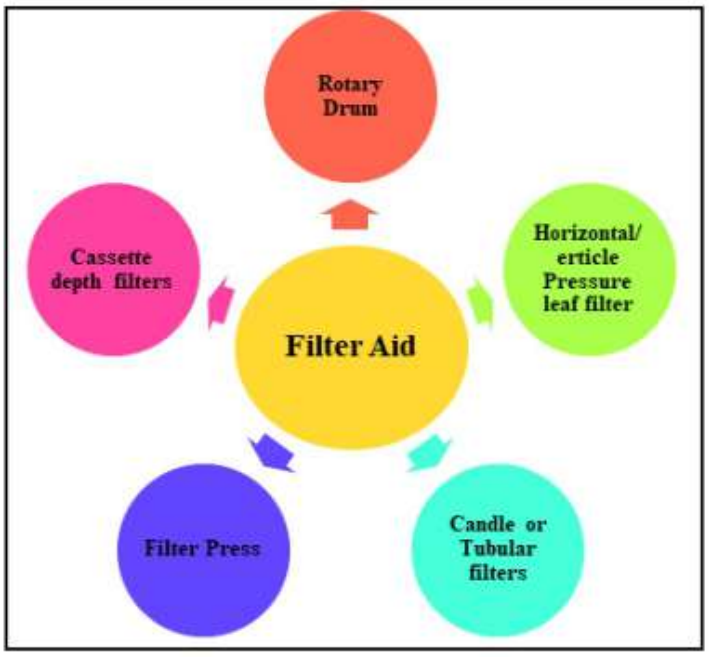

Figure 3: Equipment working compatibility of filter aid

The Table 2 showing the sector wise application of silicabased filter aids. Applications of filter aids depends upon the types of filtration process and sometime on end product performance or logical advantages.

Fiter Aid Workability

Filtration system consist of filter, filter feed pump, filtration tank containing filter aid for precoating and admixing pump for continuous addition of filter aid. A typical dolomite-based filtration system is schematically drawn in Figure 4. The filter aid can be continuously added as either slurry or by dry feeding. Slurry feeding is generally done with diaphragm pumps or plunger. For batch process, the filter aid can be added directly to the batch as admix. In operation of a filtration system, the filter is first precoated by circulating a mixture of filter aid and clear or filtered liquid from the precoat tank through the filter and circulate back to precoat tank and continued until all the filter aid is deposited on the filter septum. The body feed injection system is then started and filter is changed over, with minimum fluctuations in pressure, from precoating of filtering.

Precoating: This is the first step of filter aid on the filter septum. The main purpose of precoat is to prevent the clogging of spectum by impurities, to clarity liquid immediately and to facilitate cleaning of spectum at the end of the cycle.

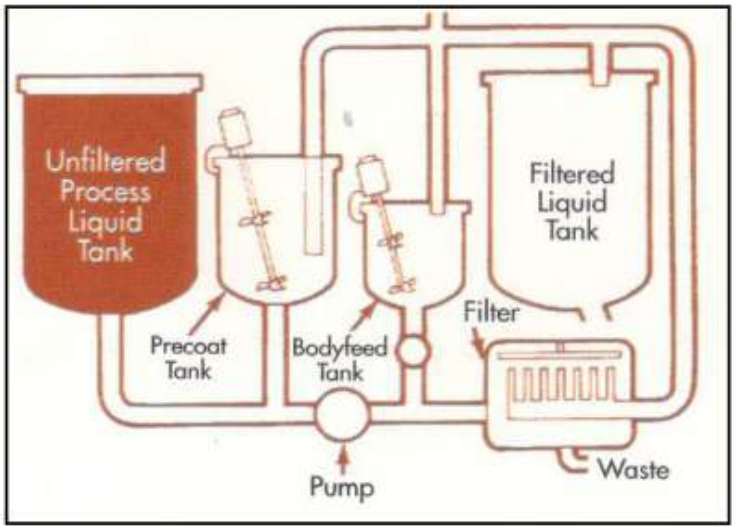

Figure 4: Filter aid-based filtration plant (Silicon Product (P) Ltd.

Dosing: Generally, 5-10 Kg filter aid/ 100 ft^2 of filter area is used. For poor filtration or new filter, high amount filter aid may be used. For perfect distribution, almost 4.5 Kg filter aid/ 100/ ft^2 of filter area is necessary which form precoat of almost 1.6 mm thickness. Where the precoat slurry concentration is dependent on the ratio of filter area to the liquid volume of the filter and piping and the precoat pumping rate is depended on the viscosity of liquid. Try to avoid the fast flow rate, as it causes erosion of precoat in the filter. For water, it is 5-7 L/ ft^2 of filter area/ minute, or 40-80 L/m^2 of filter area/ minute. For viscous liquids, the rate will be low 20 L/m^2/hour. So, a general rule for precoating is to precoat at that rate which gives a differential pressure of approximately 2 lbs/ In^2 (13.8 kilopascals).

Troubleshooting: Precoating filtrate should clear up in 2-5 minutes and continue precoating until the liquid in the filter shell is relatively clear. This process usually takes place in 10-15 minutes. Sometimes the clarity of filtrate could be caused by:

1) precoat erosion by high a circulation rate;
2) blinding of filter septum;
3) insufficient precoat at top of leaves by very little circulation;
4) tears in septum;
5) old screens with worn and/or separated wires;
6) leaks between septum and rum of leaf;
7) worn gaskets between leaf discharge nipple and discharge manifold;
8) wrinkles in septum; and
9) negative pressure on discharge manifold causing flashing inside the leaf.

Filter Aid Applications

Filter aid has wide applications in food, beverages, drinking water, pharmaceutical, chemical, paint, coating industries as well as environmental sectors. Filter aids are diatomaceous (pink and white) and perlite based but the white types of diatomaceous earth-based filter aid had enormous applications almost in all sectors. Some of the sector wise applications are listed in Table 2.

Table 2: Sector wise application of different filter aids

Application	Sector	RADIOLITE® 200 or 300 (Pink)	RADIOLITE® 600 or 900 (White)	PERLITE
Food & Beverages	Alcohol/ Whiskey	X		
	Beers	X		
	Oils	X	X	
	Vinegar	X	X	
	Honey		X	
	Alginate		X	X
	Sugar/ Starch		X	X
	Sweeteners		X	X
	Wines	X	X	X
	Juices	X	X	X
	Syrups	X	X	X
Drinking water	Drinking water		X	
Pharmaceutical	Enzymes		X	X
	Antibiotics		X	X
	Gelatin	X	X	
	Blood fractionation	X	X	
	Fermentation	X	X	X
Industrial	Biodiesel	X	X	
	Greases			X
	Solvents		X	
	Lube Oil		X	X
	Aluminum cold rolling oil	X	X	
	Aluminum hot rolling oil	X	X	
	Corn gluten		X	
	Gold/ silver mining		X	
	Molasses	X	X	
Chemical	Inorganic chemicals		X	
	Organic chemicals	X	X	X
	Resins		X	
	Polymers		X	X
	Brine		X	
	Adhesives		X	

Application	Sector	RADIOLITE® 200 or 300 (Pink)	RADIOLITE® 600 or 900 (White)	PERLITE
	Fertilizers		X	
	Amines		X	
	Caustic		X	
	Citric acid		X	
	Dry cleaning solvents		X	
	Liquid sulfur			X
Paint & Coating	Waxes		X	
	Oils		X	
	Varnish		X	
	Gums		X	
	Shellac		X	
Environment	Stormwater		X	X
	Wastewater		X	X
	Swimming pool		X	X
	Media filter drains		X	X

Merits of Filter Aid

1. Improve permeability and porosity in filter cake
2. Improve filtrate (liquid) clarity
3. Help for contaminant removal
4. Prevent filter medium binding
5. Higher efficiency filtration

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76TH INDEPENDENCE DAY CELEBRATION BY BECPL TEAM









WHAT IS BLUE WINE AND HOW DOES IT GET ITS COLOUR

VASHNAVI WAKHRE

In the world of wine, the traditional red, white, and rosé options have long dominated the shelves. However, a recent newcomer is turning heads and sparking curiosity - blue wine. Yes, you read that right. Blue wine has emerged as a trendy alternative, captivating enthusiasts with its vibrant colour and unique taste. Read on to know more about this trending wine on the market.

The creation of blue wine dates back to 2016 when a group of Spanish entrepreneurs decided to experiment with breaking the wine colour norms. They sought to create an unconventional beverage that would attract younger generations and challenge the traditional image of wine.

If you are wondering about the grape variety used for this wine, then you will be surprised to know that it uses the base of white grapes. The traditional ageing process is bypassed, and the grapes undergo a special maceration technique. This technique consists of combining the grape juice with a plant-based pigment extracted from the skin of a red grape called anthocyanin, which is responsible for the blue colour in many fruits and flowers and can also be found naturally in grape skins. The use of anthocyanin is the key to achieving the vibrant blue hue of the wine. By adding carefully measured amounts of the pigment during the maceration process, the wine takes on a distinctive blue appearance. Also, you will be surprised to know that no artificial colourings or additives are used for this wine and the blue colour is entirely derived from natural sources.

Apart from making it visually captivating, anthocyanin has a minimal impact on the wine's taste. It predominantly retains the original flavours and profile of the white grapes, resulting in a refreshing and light beverage.

Blue wine has gained traction, especially among millennials and wine enthusiasts looking for novelty. Its striking appearance has made it a popular choice for serving at parties or events, providing a talking point that most traditional wines cannot offer. Not just that, but due to its fruitier character, blue wine is often compared to white wine or a fruity cocktail.

Blue wine has not been free from criticism. Traditionalists argue that it compromises the essence and heritage of winemaking, considering it a mere marketing gimmick or a fad. Others question the naturalness of adding anthocyanin as it doesn't naturally occur in white grapes. Despite the debate, blue wine has managed to attract a growing consumer base. Its success has even led to the creation of variations such as sparkling blue wine or blue wine cocktails, expanding its appeal in the market.

While it may not be everyone's glass of wine, blue wine undoubtedly stands out from the rest with its electric blue hue, offering a playful twist on a traditional drink. So, the next time you're feeling venturesome or want to surprise your guests, consider serving up a bottle of blue wine. It might just add that touch of vibrancy and intrigue to your evening, making every sip an unforgettable experience.

Source: https://timesofindia.indiatimes.com/life-style/food-news/what-is-blue-wineand-how-does-it-get-its-colour/photostory/102111964.cm

Celebrating Beer Culture Worldwide: Unforgettable Beer Festivals

Rohit Chauhan

Introduction

Beer festivals aren't just events; they're the experiences that blend tradition, innovation, and the joy of coming together. Let's journey through some of the globe's most iconic beer festivals, where history, unique offerings, and cultural connections all flow together.

Oktoberfest: Munich's Legendary Bash

Imagine a festival that began with a royal wedding back in 1810 and has since become the ultimate beer extravaganza – that's Oktoberfest! Held in Munich, Germany, this fest spans over two weeks, offering massive beer tents from Munich's top breweries. People raise their steins filled with classic Bavarian lagers, enjoying lively music, traditional dances, and delicious pretzels and sausages. With a staggering 7 million liters of beer consumed, Oktoberfest is truly a monumental celebration of beer and community.

Great American Beer Festival: A Cheers to Creativity

Now, let's head across the pond to the Great American Beer Festival (GABF) in the United States. Imagine a place where over 4,000 beers from nearly 800 breweries come together under one roof – that's GABF! Held in Denver, Colorado, since 1982, this festival celebrates the ingenuity of American craft brewers. From experimental ales to aged wonders, attendees get to explore a treasure trove of flavors. But it's not just about sipping; GABF also hosts seminars on brewing techniques, making it a learning adventure for both brewers and beer enthusiasts.

Bira 91's The Great Indian Octoberfest: India's Craft Beer Celebration

Now, let's take a detour to India's emerging craft beer scene and discover Bira 91's The Great Indian Octoberfest. As India embraces the craft beer movement, this festival captures the excitement of local innovation and celebration. Held in cities like Bangalore and Mumbai, it's a fusion of local and international craft brews, live music, and an array of delicious cuisines. This festival tells the story of India's evolving beer culture, enticing both seasoned beer lovers and curious newcomers.

More Than Just Beer: Cultural Connections and Unity

These festivals go beyond beer; they weave cultural stories. Oktoberfest honors Bavarian traditions and welcomes visitors from around the world with open arms. The Great American Beer Festival reflects America's diverse brewing spirit, celebrating creativity and uniqueness. In India, The Great Indian Octoberfest mirrors the rise of a fresh beer culture, blending local tastes with global influences.

A Toast to Togetherness

What's truly magical about these festivals is the connection they create. People from different walks of life come together to celebrate their shared love for beer. Conversations flow as easily as the brews, friendships are kindled over a common pint, and people from different corners of the world find common ground in clinking glasses.

In Conclusion

Beer festivals are more than just events; they're celebrations of beer's universal appeal. From Munich's Oktoberfest to Denver's GABF and India's The Great Indian Octoberfest, these festivals showcase the heart and soul of beer culture. So whether you're raising a stein in Munich, enjoying a pint in Denver, or savoring craft brews in India, remember that each festival is an opportunity to join a global toast to the amazing world of beer. Cheers, prost, and bottoms up!

HOW TO READ A WINE LABEL

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Are you like most wine drinker who buys a wine by grape variety? If "Yes" then I'm sure buying a wine can be a daunting task for you. The variety of grapes used to prepare a wine is mentioned on the wine label but there are many other information which are available along with some basic details. But the more details available on label, the more it seems difficult for a buyer to understand.

How to read a wine label all that information on a wine label is there for a reason here's how to decipher it you will need a wine and some basic wine knowledge. A well-designed label should serve the purpose of giving enough information about a wine's origin, style, and quality.

Here is a step-by-step guide to reading a wine label:

1. Producer: the name or maker of the wine.

- Informs you who is producing the wine
- Look for details about the winery such as its name, location, and information.

2. Country or region of origin:

- Indicates a wine region.
- Where the grape was grown and the wine was produced.

3. Grape verities:

- Variety refers to what grape and grapes were to make the wine.
- Identify the specific grape variety the wine is made from. This can tell you about the wine's flavor and style.

4. Vintage:

- Tells you the age of the bottle of wine.
- Provides insight into the quality of the grapes harvested during a particular year.

5. Alcohol by volume (ABV):

- This tell you the level of alcohol in the wine.
- It's a legal requirement to have ABV on a wine bottle.
- Many higher-alcohol wine are made from riper grape.

NATURAL GROWING ENVIRONMENT OF A VINE PLANT

PRIYANSHI SHARMA

Vine plant needs the following 4 things to complete the annual vineyard cycle:

- **Heat**
- **Sunlight**
- **Water**
- **Nutrients**

The amount and the timing of these key resources within the growth cycle are important if the wine is to produce and ripen grapes suitable for making wine. The natural resources available to a particular vineyards or even a particular vine depend on the growing environment.

Temperature and sunlight

Heat and light are important for vine growth and grape formation and ripening. **Solar radiation** is the main source of both heat and sunlight.

The effects of temperature

• Temperature has a huge influence on vine growth or grape ripening in all stages of the vine growth cycle.

• In winter , cold temperatures causes dormancy. Temperature above 10 degree Celsius stimulate budburst , the optimum temperature for successful vine growth cycle is 18 to 33 degree Celsius.

• Temperature also has an influence on many aspects of grape ripening.

• Sugar accumulation in the grapes is generally faster at warm temperatures due to both optimum rates of photosynthesis producing sugars and because increased grape transpiration promotes the movement of sugar into the grape.

• Generally riper aroma/flavours are associated with grapes grown in warmer climates whereas cool conditions may cause the herbaceous aromas.

• Different grape varieties have different needs and sensitivities regarding temperature.

The effect of sunlight

• The vine needs sunlight for photosynthesis which is needed for vine growth and early grape growth and ripening.

• Grape exposure to sunshine has a number of effects , including enhancing the development of colour pigments in black grapes and reducing levels of bacteria that cause herbaceous aromas.

• Sunlight also helps in the shading of fruits which is usually beneficial.

Winds

• Winds and breezes can have a warming or cooling influence in many vine regions.

• Winds and breezes reduce the occurrence of humid , stagnant air .

Effects of soil

• Soil can also have an effect on vine plant.

• Soil that drains freely, for example sandy or stony soils warm up more quickly in the spring than damp soils. Rising soil temperature encourages budburst and shoot growth.

• Stony soils , especially if the underlying soil is slightly damp are also very effective in absorbing heat.

Water

• The vine Needs water to survive . adequate water availability is vital for healthy vine growth and grape ripening.

• Generally, the vine needs a minimum of 500mm of rainfall per year in cool climates and atleast 750mm in warm regions.

• Water also acts a solvent for nutrients in the soil which is important for their uptake by the vine.

• Rainfall is the natural source of water for the vine plant and therefore the amount and timing of rainfall each year is an important factor in producing high quality grape .

Nutrients

Nutrients are important for healthy vine growth and can have an influence on yield and grape composition.

The most important nutrients are as follows:

- **Nitrogen**
- **Potassium**
- **Phosphorus**

Other useful nutrients are calcium , magnesium, sulphur, manganese, boron, copper, iron and zinc.

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CONRURRENT EVENTS

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Starch: Production, Properties, and Diverse Applications

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Introduction

Starch is a vital carbohydrate that plays an integral role in our daily lives. It serves as a primary source of energy for humans and is widely utilized in various industries due to its unique properties. Derived from plant sources, starch has been a significant part of human history for centuries, finding its way into an array of products across different sectors. This article delves into the production, properties, and diverse applications of starch.

Starch Production

Starch is primarily extracted from plant sources, most commonly from cereals like corn, wheat, and rice, as well as from tubers such as potatoes and cassava. The production process involves several stages:

Harvesting: Crops like corn or potatoes are harvested, and the starch-rich parts are separated from the rest of the plant.

Cleaning and Washing: The harvested parts are cleaned to remove dirt and impurities. They are then washed to eliminate residual soil and contaminants.

Size Reduction: The cleaned crops are ground or grated to break down their cellular structure, releasing starch granules.

Separation of Starch: The mixture is then subjected to a process of separation, which might involve using water to separate the starch from other components like fibers and proteins.

Purification: The extracted starch slurry is further refined to remove any remaining impurities through processes like centrifugation and sedimentation.

Drying: The purified starch is dried to reduce its moisture content, resulting in a fine powder or granules ready for various applications.

Properties of Starch

Starch exhibits several unique properties that make it versatile in numerous applications:

Gelatinization: Starch granules can absorb water and swell, leading to gelatinization where the

starch paste thickens upon heating. This property is essential in cooking and food processing.

Viscosity: Starch pastes can vary in viscosity, offering thickening and binding capabilities in foods and industrial products. Modified starches can be tailored for specific viscosity requirement.

Film forming: Starch can form flexible and biodegradable films which find use in packaging materials and coating for various products.

Diverse Applications

Starch's versatility extends to a wide range of applications across various industries:

Food Industry: Starch is a staple in the food industry, serving as a thickening agent in soups, sauces, and gravies. It's used to improve texture and stability in products like baked goods and dairy items.

Textile Industry: Starch is employed in sizing solutions, which coat yarns to enhance their smoothness and facilitate weaving. It provides stiffness to fabrics during processing.

Paper Industry: In the paper manufacturing process, starch is used in the paper surface treatment and as a binder in coatings. It enhances paper strength and smoothness.

Pharmaceuticals: Starch acts as a binder in tablet formulations, ensuring that ingredients hold together during compression. It's also used in the production of capsules.

Adhesives: Starch-based adhesives are utilized in industries such as packaging, bookbinding, and wallpaper. They are eco-friendly alternatives to petroleum-based adhesives.in industries such as packaging, bookbinding, and wallpaper. They are eco-friendly alternatives to petroleum-based adhesives.

Biodegradable Plastics: Modified starches are used to produce bio plastics, providing an eco-friendly alternative to conventional plastics.

Personal Care Products: Starch can be found in cosmetics and personal care items like talcum powder and dry shampoos, offering absorbent and mattifying properties.

Conclusion

Starch, derived from plant sources through a meticulous extraction process, showcases a remarkable range of properties that enable its application in numerous industries. From enhancing the texture of our favourite foods to contributing to sustainable packaging solutions, starch's versatility continues to make it an indispensable ingredient in our modern world. Its journey from crop to final product is a testament to the synergy between nature and human innovation.

KANCHAN SINGH

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1 July 2023, Saturday

In a recent development, Sula has decided to temporarily pause its expansion in Nasik, instead, the company has shifted its focus towards vineyards outside Bengaluru.

It is important to note that Bengaluru has experienced a remarkable 75 per cent surge in visitors compared to the previous year, which makes it the next destination for Sula's expansion plans.

Sula Vineyards Limited is a publicly listed company which was incorporated on 26 February 2003 in Mumbai, Maharashtra. Sula has introduced grape varieties such as Chenin blanc Sauvignnon blanc, Riesling, and Zinfandel to India, which have made a considerable impact on wine consumption in India.

Besides, Sula also focuses on wine tourism in India, and has been actively expanding its hospitality sector. In the past six months, Sula has added approximately 50 per cent more hotel rooms in Nasik.

With an ambition for growth, Sula has set an internal target of INR 100 crore in wine tourism revenue this year, and an overall revenue of around INR 600 crore. The outlook for the company's growth targets is positive, as. it recorded the highest number of individual tastings, which were more than 4,700.

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