Invitation

Please join us for the **33rd VH Yeast Conference** & **100th anniversary of the VH Berlin 2022**. After two years of COVID-19 impacts and online meetings only, we are glad to provide you again with lectures and presentations, in person & online - on current topics in the fields of markets & quality methods, applied yeast research and process innovations in yeast production.

The celebration of the **100th anniversary of the VH Berlin 2022** luckily coincides with the declaration of **"Baker's yeast as the microrganism of the year 2022"** by the association of general and applied microbiologists (VAAM), which is participating with two lecturers.

This year's focus is on **"yeast as a protein source for food/daily diet"**, with regards to the political settings, climate relevance as well as technical solutions. The topics will also be part of a round table discussion. During the VH Berlin convivial evening, you are invited to taste alternative (meat) protein products vs. the BBQ. We look forward to a lively exchange and networking event.

M. Eng. Sc. Antoine Chagnon, President of VH Berlin
Dr.-Ing. Michael Quantz, General manager of VH Berlin

Conference day I, all times in CEST = UTC +2h

Monday, September 12rd 2022

10:00 a.m. Conference opening and welcome

President A. Chagnon

Lallemand Inc. (CAN)

10:15 a.m. 100th anniversary of the VH Berlin: The Founding of the Research Institute for Baker's Yeast in 1922 and the Significance of Collaborative Applied Research

Nancy Bodden

Ruhr-Universität Bochum (GER)

In 1922, the German yeast factories founded the Research Institute for Baker's Yeast (Versuchsanstalt der Hefeindustrie) under the umbrella of the renowned Institute of the Fermentation Industry (Institut für Gärungsgewerbe) in Berlin, which already maintained the research and teaching institutes of six other industrial associations (spirit manufacturers, brewers, starch manufacturers, grain distillers, vinegar manufacturers and potato dryers).

The lecture first examines the motives of the German yeast factories for founding a joint experimental station and examines the first research strategies and scientific findings from the 1920s. The second part of the lecture deals with the larger context, namely the development of cooperative industrial research in Germany since the end of the 19th century, pointing in particular to the "pioneering role" of the Institut für Gärungsgewerbe. To this end, the two experimental institutes for the brewers and starch manufacturers (founded in 1882 and 1883) are presented as examples (founding motives, research strategies).

Finally, the question is clarified to what extent the Institut für Gärungsgewerbe was a model for the further development of cooperative industrial research.

Markets

10:45 a.m. Nutrition and Climate Change – The impact of different protein sources

Friedrich-Karl Luecke

Fulda University of Applied Sciences (GER)

The agro-food system makes a substantial contribution to the emission of greenhouse gases (GHG, calculated as CO_2 equivalents) and to the global warming. The extent of this contribution depends on the system boundaries set. If only the emissions from agricultural activities are considered, the percentage is about 8-9% for Germany; if upstream and downstream processes and CO_2 emissions due to land use and land use change (LULUC) are included, the percentage rises to about 19%, and if emissions from "virtually imported" agricultural areas are added, the estimate is about 25%. Globally, this percentage is even higher.

The majority of GHG emissions from the agro-food system originates from the livestock sector, in particular, methane from ruminants, and N_2O from cropping forage plants. Hence, there is a wide consensus that we need to reduce the intake of animal proteins (especially red meat, to a lesser extent dairy products and eggs) in our diet considerably, in favour of other protein sources (see e.g. the EAT-Lancet study by Willett et al., Lancet 393, 447ff, 2019).

$CO2_{eq}$-footprints were estimated for various proteins. However, this data is based on certain assumptions and system boundaries. For example, the benefits of sustainable animal husbandry on bioavailability of nutrients for humans, recycling of plant nutrients (and saving of mineral fertilizers) and on carbon sequestration in soils (especially in grasslands) should be taken into account. Production of proteins by fermentation makes sense if non-edible parts of crop plants and by-products of processing are used without resource-intensive pre-processing and downstream processing. The production of yeast from molasses is a positive example.

On the basis of these considerations, this presentation will discuss the $CO2_{eq}$-footprints of various proteins, with focus on plants and fermentation products.

11:15 a.m. Developing plant-based meat alternatives – opportunities of yeast products

Mari-Liis Tammik

Tallinn University of Technology (EST)

Rapid growth of plant-based meat products is occurring in both retail and food service sectors. Yet, meat alternatives currently available on the market often have poor sensory properties, nutritional profile and are mostly produced from soy protein and wheat gluten, which are also common allergens.

Recently, various new plant protein concentrates and isolates have reached commercialization, thus suitability of these raw materials for meat alternatives was studied. Proteins from cereals and legumes provide the necessary consistency and fibrous-like texture but have distinctive off-flavours and aromas. Inactive yeast products are widely used in the food industry, as they contain peptides, free amino acids, and other compounds, which help to increase sensory attributes like meatiness and roastiness. Also, non-textured plant proteins are used in the product formulation, as these can improve texture properties like juicyness and cohesiveness. Yeast proteins could be potential alternatives to offer additional functionality as well.

In our project, funded by the Good Food Institute, different commercial plant proteins were studied to understand their suitability in meat analogue applications. The study demonstrated also that the addition of inactive yeast products into the final recipe had a positive effect on sensory profile of prototype products.

Markets

11:40 a.m. InnovProtein EU and the EU yeast sector

Diane Doré

Cofalec (FRA)

With a population of 7 billion people constantly increasing, and expected to reach 9 billion in 2050, the limits of food production must constantly be pushed back. In this context, the FAO considers that one billion people in the world suffer from protein deficiency. With more than 20% of global greenhouse gas (GHG) emissions coming from agriculture, more than half of which are due to livestock production, there is an urgent need for sustainable, affordable and nutritious alternative protein options.

The yeast sector can become an important contributor to the supply of such alternative proteins and represents an opportunity to create new forms of sustainable food.

The yeast sector can indeed contribute in many ways to the supply of alternative proteins in relation to its high-quality protein content (more than 50%), its fermentative powers to ferment plant bases or as living microorganisms, producing metabolites of interest of which proteins within their biological mini factories that constitute their living cells.

In addition to the potential to reduce the carbon footprint, and lower the environmental impact, the supply of proteins via the yeast sector also allows for a significant reduction in land use compared to traditional proteins.

However, the EU yeast sector is not enough identified by European policy makers and by consumers on these issues. The Bioeconomy Report release in July 2022 confirmed this finding as it did not even mention the name of fermentation and yeast once.

This is why COFALEC wanted to join forces with the EU insect and algae sector to launch the Innov Protein EU Alliance last December. This Alliance brings together IPIFF (insects) and EABA (algae) as representative of these new alternative protein sources. These innovative proteins sources constitute reliable and high value solutions for tackling EU and global challenges and reduce the EU dependency on critical feed materials in line with the Farm to Fork Strategy.

11:50 a.m. Brief Coffee Break

Markets

12:00 p.m. Round table – "Yeast protein, an alternative protein for alimentation?"

The round table participants are:

Diane Dore – Cofalec, Paris (FRA)
The industry view (-> Lecture on EABA/COFALEC/IPIFF initiative 12/2021)

Kevin Verstrepen – KU, Leuven (BEL)
The applied yeast research: (-> Lecture on (edible) yeast cell factory potential):

Mari-Liis Tammik – TFTAK/Tallinn Tech University (EST)
The applied food research (-> Lecture on important characteristics of raw materials for meat alternatives)

Hermann Broll – BfR Federal Institute for Risk assessment (GER)
(-> EFSA / national bodies work flow on the risk assessment of novel foods).

Moderator: Ildar Nisamedtinov – Lallemand Europe, Tallinn (EST)

12:30 p.m. Conference Lunch Break

Analytics and Quality

01:45 p.m. Horizontal gene transfer, hybrids, heterosis – hell what?

Jürgen Wendland

Hochschule Geisenheim University (GER)

Yeast has been used in alcoholic beverage production and baking for several thousand years. It may have been mankind's first domesticated species. The relevance of yeast in these two fields has been broadened and *S. cerevisiae* has become the work horse in bioethanol production, biotechnology and bio-based economy in general. This makes *Saccharomyces cerevisiae* one of the most successful and abundant organisms on earth. It is generally assumed that the yeast that drives and dominates fermentations is a pure-bred *Saccharomyces cerevisiae* strain. However large-scale comparative genomics studies in recent years have shown that there are different clades of yeasts used in the baking industry, the ale and lager beer, cider and winemaking fermentations. Within these different clades specific domestication events took place that resulted in the selection of improved strains. These domestication events involved hybrid formation in lager and wine yeasts and the cross-utilization of beer yeasts in the baking industry with subsequent specific selection in the baking environment. Yeast hybrids may show hybrid vigor (heterosis) surpassing their parental strains in their performance and may thus represent advantageous production strains. Additionally, Horizontal Gene Transfer led to the introgression (gene flow) of favorable genes from non-*Saccharomyces* species into the *S. cerevisiae* genome.

Here, I will show some examples of the improvements of yeasts in man-made niches by natural selection without genetic modification. An outlook is provided on the potential of genetic engineering to further enhance production strains.

02:15 p.m. Biothermofluiddynamical aspects of extrusion-based production of meat analogues

Cornelia Rauh

Technical University Berlin (GER)

Extrusion-based production of meat analogues is mainly based on cooking extrusion or high-moisture extrusion, respectively. During cooking extrusion foam like structures are generated, and during high-moisture extrusion fiber like structures are formed. The generation of these structures highly determines the quality and texture attributes of meat analogues and depend on the process conditions and the ingredients in the extrusion process. The formation of foam like structures results out of simultaneous evaporation and solidification effects at the die exit. The formation of fiber like structures results out of physico-chemical and biothermofluiddynamical aspects, i.e. flow induced mechanical and thermal processes, especially in the cooling die.

The lecture focusses on the mathematical-numerical and experimental characterisation of cooking and high-moisture extrusion to produce meat analogues. In the field of high-moisture extrusion an analysis of flow and temperature fields is shown, especially in the cooling die where the structure formation takes place. The main challenge of the analysis and optimisation of the process is the exact determination of rheological properties of the protein matrix. The structure formation is correlated with the flow and temperature fields. In the field of cooking extrusion the effect of dietary fibers, e.g. by added oil seed press cakes, is investigated with respect to the foam generation and microstructure developing at the die outlet.

02:45 p.m. Coffee Break

Analytics and Quality

03:00 p.m. Process optimisation in the field of wheat dough processing using real-time recording of quality-relevant characteristics in raw materials, intermediates and final products

Andre Blome

OWL University of Applied Sciences and Arts (GER)

In the bakery products industry, which is still strongly characterised by craftsmanship, there is increasing pressure on prices and innovation. At the same time, end consumers and politicians are demanding consistently high product quality and the careful use of resources, which calls for comprehensive automation of production.

To achieve this, important parameters and target values, first and foremost those of product quality, must be identified, continuously monitored and harmonised with each other. Available objective assessment methods are time-consuming, do not lead to the desired results and do not necessarily reflect the conditions in production, partly because they are carried out offline.

The aim of the project is to come closer to a more robust overall process in wheat dough preparation up to sample products by continuous and novel analyses of raw material and intermediate product properties as well as process parameters. The basis is a small-scale pilot plant for the production of pizza bases, which is equipped with extensive sensor technology for real-time recording of quality parameters of raw materials, intermediate and end products. The data thus obtained will be used for objective evaluation of quality-relevant parameters in wheat dough preparation and processing.

In this way, the foundation is to be laid for (autonomous) process optimisation with regard to end product quality and resource efficiency using approaches from the field of Industry 4.0.

03:30 p.m. Yeast as a significant ingredient in meat alternative products: Company *More Foods* demonstrates commercial viability

Leonardo Marcovitz, Florian Wild

More Foods (ISR)

More Foods is focused on understanding how to use yeast as a significant protein source in order to make final textured meat alternative products. In our presentation at the 1st VHOYC in 2020, we gave an overview of meat alternative processing and discussed some of the requirements of a protein source. This time we give some more insight on how we use yeast to create fibrous structures with a meat-like bite and how we face challenges to enable yeast to become a major ingredient in the meat alternative industry.

More Foods is already in the Israeli market selling to notable customers like Apple, Samsung, Facebook catering and others. The company is now initiating expansion in Europe.

03:45 p.m. YeastForce – know your dough

Holger Müller

BlueSens gas sensor GmbH (GER)

Three years after its market launch, *YeastForce* is establishing itself primarily in the field of activity measurements of yeasts and raising power in doughs of any kind.

The original area of application is constantly expanding to include other fields in the field of food production. In our short presentation, we will once again present the key data of the device, show the commissioning, as well as the possibilities that you have as a user with *YeastForce Monitor*.
Experience live at the booth a motive force measurement under real conditions.

Visits & Convivial evening

04:15 p.m. Bus transfer to *Futurium Berlin*

04:45 p.m. Visit *Futurium Berlin*

https://futurium.de/en

06:30 p.m. Convivial evening at *Zollpackhof Berlin* –
with "alt (meat) protein vs. BBQ" tasting session

In addition to a dinner event with many networking opportunities to enjoy, we will also have a tasting session where the audience will be able to compare alternative meat from alternative proteins with actual BBQ meat.

https://www.zollpackhof.de/en/

10:30/11:00 p.m. Last transfer back to the hotel / End of conference Day 1

Conference day II, all times in CEST = UTC +2h

Tuesday, September 13, 2022

Applied research

09:00 a.m. Exploring the potential of different *Saccharomyces cerevisiae* strains for use as cell factories

Kevin Verstrepen

KU Leuven (BEL)

Synthetic biology combines rational engineering design principles with insight into biological circuits and advances in molecular biology to design and express *de novo* DNA sequences that result in novel biological functions. Microbes are often used as a host (or “chassis”) for the new genetic circuits because the cells are easy to manipulate and because the natural diversity in microbes offers the potential to employ a broad range of different designs and to manufacture a wide range of products. The possible applications of synthetic biology range from basic biology (studying how genomes function) to translation in medicine, pharmaceutics, biofuels and sustainable chemistry. While it is a relatively new interdisciplinary scientific field, synthetic biology is regarded as a game-changing technology with the potential to disrupt various scientific and economic activities (report of the EU Science Advisory Council; https://bit.ly/2Ln1P8C). The strategic promise of synthetic biology has resulted in massive support from agencies like the WHO, the Gates Foundation and the American Academy of Science. Moreover, over the past years, several new companies that specifically use synthetic biology have been founded.

Yeast cells, and in particular *Saccharomyces cerevisiae*, have extensively exploited as chassis strains for synthetic biology. Some of the earliest commercial applications includes the production of insulin by Novo Nordisk in 1987. Since then, and particularly over the past 10 years, the use of yeast as a cell factory for the production of various proteins, enzymes, lipids and other complex biomolecules, including for example artemisinin, cannabinoids and various aroma compounds, has increased rapidly.

In this talk, we briefly explain the basic principles and applications of synthetic biology in *Saccharomyces*. We then cover some novel approaches and applications that have been developed in our team, and demonstrate the promise of using non-conventional *S. cerevisiae* strains as well as other yeast species as chassis strains for more efficient production of various compounds.

09:30 a.m. The breeding and application of high-protein *Saccharomyces cerevisiae* strain

Sun Yafang

Angel Yeast Co., Ltd. (PRC)

By 2050, the world population is expected to grow to 9 billions, and the contradiction between food availability and population growth will continue to be obvious. In the next 30 years, a huge "protein gap" will be formed between the globally available protein and the expected demand. It is estimated that the protein gap will be 250 million tons by 2050. The global demand for alternative proteins is surging, and the total size of the alternative protein market will grow at a double-digit rate every year. Microbial protein is one of the most advantageous ways to meet the growing global demand for protein, and the market size is expected to reach 2.6 billion US dollars by 2023.

With the rapid growth of the global alternative protein market, the alternative protein cultivated by microbial fermentation is growing rapidly with the advantages of less resource consumption, high efficiency, environmental sustainability, comprehensive nutrition and so on. Yeast protein, as a typical representative of alternative protein, with high bio-value, green, safe and sustainable advantages, has potential ability and development space that can not be ignored.

Saccharomyces cerevisiae is rich in protein and has been widely used in food processing for a long time because of its flavor and safety. Yeast protein is rich in nutrition, with high content of essential amino acids and high digestion and utilization rate, which can meet the nutritional needs of human body. Moreover, the production process is mature and the manufacturing efficiency is high, which is suitable for large-scale manufacturing, and the water demand and cultivated land area are significantly reduced. Adapting to a wide range of people, it has no beany smell, and can bring rich meat flavor and improve flavor.

Our research team carried out yeast genetic breeding work to screen *Saccharomyces cerevisiae* strains with high protein and high biomass, improve the production intensity of yeast protein, analyze the nutritional function of yeast protein and study the modification of yeast protein, improve the processing performance of yeast protein, to meet the needs of plant-based meat processing and other application fields. Yeast protein has been widely used in dairy products, protein drinks, fruit juices, biscuits, cakes and other common foods and functional foods such as dietary supplements, protein powder, energy bars, meal substitutes and so on.

10:00 a.m. Event driven modeling for the accurate identification of metabolic switches in fed-batch culture of *S. cerevisiae*

Adnan Jouned

Technical University Vienna (AUS)

Mechanistic model-based methods are indispensable tools for characterization, monitoring and control in biopharmaceutical industry. However, the complexity of mechanistic models is restricted by the availability of process analytics. As a result, biological reactions are often lumped and only central metabolic pathways and extracellular analytics are considered. Moreover, due to process dynamics during typical batch and fed-batch cultivations, intracellular phenomena can often not be neglected. Typical examples are the Pasteur effect, Crabtree effect, and diauxic growth. A solution to this is to formulate discontinuous (piecewise) growth models and to incorporate metabolic switches expressed as logical operations.

This contribution discusses the application of a piecewise kinetic growth model in the context of an industrial relevant case study. Targeted *Saccharomyces cerevisiae* lab scale experiments were conducted with different glucose and ethanol fluxes to trigger switches between metabolic pathways. We propose to use an event driven method to accurately identify the location and sequence of these switches, and the duration of active metabolic pathways during the time course of an experiment. It turns out that, compared with a standard implementation without active event location, the proposed approach leads to more accurate identification of switches and model parameters and thus, to more accurate model predictions.

Poster session / presentations from the industry

10:30 a.m. **COFALEC TC: Yeast specification 2022, DIN SPEC 91473:2022-08**

Thorsten Pietsch

Ohly GmbH (GER)

Zinc yeast for nutritional purposes: current challenges and future perspectives

Claudia Keil, Martin Senz

Technical University Berlin (GER),
Versuchs- und Lehranstalt für Brauerei (GER)

van Mourik Yeast & Packagaging:
Yeast Downstream Equipment & Automation

see documents provided in the conference folder

van Mourik Yeast & Packaging (NED)

Schill+Seilacher:
Struktol® Defoamers, Emulsifiers & Process aids

see documents provided in the conference folder

Schill & Seilacher GmbH (GER)

10:45 p.m. Coffee Break

Process development

11:00 a.m. **Engineering of Baker's Yeast for Utilization of Glycerol as Substrate: Why is this Attractive for Future Bioeconomy?**

Elke Nevoigt

Jacobs University (GER)

Apart from its great importance in food and beverage production, baker's yeast *Saccharomyces cerevisiae* became a thoroughly studied eukaryotic model organism. In addition, it has several attractive traits which have also made it a popular workhorse in industrial biotechnology. Recently, the organism has been selected as the Microbe of the Year 2022 by the „Vereinigung für Allgemeine und Angewandte Mikrobiologie" (VAAM) reflecting its huge importance in fundamental and applied science.

A major reason for its popularity is the ease by which this organism can be genetically engineered to establish tailor-made metabolic pathways. This has also allowed to successfully overcome a major bottleneck of *S. cerevisiae*: its narrow natural carbon substrate spectrum limited to hexose sugars. To illustrate this, the presentation will focus on the achievements that we made in our group with regard to engineer baker's yeast for the utilization and fermentation of glycerol. Glycerol is an attractive carbon source for several reasons, particularly due to its high degree of reduction. Currently, glycerol is mainly generated during biodiesel production, but might also become a central carbon source for future bioeconomy if synthezised from carbon dioxide. Many wild-type strains of *S. cerevisiae* cannot grow at all if glycerol is the sole source of carbon in synthetic media. Within the last decade, we have been able to generate a strain that is able to grow under these conditions with a maximum specific growth rate of nearly $0.3 h^{-1}$. To showcase the value of this strain, two applications will be presented: i) the fermentative production of succinic acid from glycerol and carbon dioxide, and ii) the utilization of glycerol as a co-substrate for the metabolization of D-galacturonic acid, a monomer present in pectin-containing plant biomass.

Process development

11:30 a.m. Process performance of cultivations with the oleaginous yeast *Yarrowia lipolytica* across scales

Jasmina Cziommer

Technical University Berlin (GER)

Scale-down (SD) has been well established for mimicking large-scale processes in the lab scale. SD-reactors are either comprised of one or several compartments of stirred tank or plug-flow reactors in different combinations. Although widely applied to study the impact of different conditions, a systematic investigation of the comparability of the various SD-designs has not been performed yet.

The here applied (oleaginous) yeast *Yarrowia lipolytica* is a promising host for the exploitation of high-value lipids, which hold great potential for the application in food industry. As this yeast is generally recognized as safe, it is seen as a valuable organism for the application in food additives and in biotechnologically produced fish feed, which require polyunsaturated fatty acid (PUFA)-rich single cell oils.

In order to apply *Y. lipolytica* as feed component, a successful scale up of the cultivation process has to be conducted. Therefore, firstly, a conceptual study concerning the comparability of scale-down designs and secondly, a scale up to industrial production of 50 m³ is demonstrated. Afterwards, the most suitable scale-down design to reproduce the performance of the industrial scale was identified.

To relate both, the scale-up and scale-down, the cellular stress response to fluctuating dissolved oxygen supply with respect to growth, long-chain fatty acid, amino acid and main carbon metabolite synthesis, as well as macromorphology on the single-cell level was observed. It is demonstrated that especially the consumption of specific amino acids from complex media components and the incorporation into proteins is affected by gradient formation. Furthermore, the relation of the population heterogeneity to process performance parameters was investigated. Process analytical technologies, such as in situ light microscopy, were used to facilitate the capture of macromorphological heterogeneity as a result of gradient formation. The results were related to the prevalent stress conditions and also compared to *at line* flow cytometry.

The workflow that was finally obtained provides a suitable tool for comparing scale-down reactor design and evaluate their suitability to reproduce the large scale in case of oleaginous yeasts and probably other microbial cultures.

12:00 p.m. Developing and scaling up the process on yeast lipid production based on lignocellulosic hydrolysates

Petri-Jaan Lahtvee

Tallinn University of Technology (EST)

Non-conventional yeast *Rhodutorula toruloides* has many advantages in front of traditional model organisms when desired to be used as a microbial cell factory for converting various waste and industrial by-products into value added compounds like food ingredients.

R. toruloides can naturally consume a variety of carbon sources, have high stress tolerance towards fluctuations in environmental conditions and toxic compounds, and is naturally producing a number of valuable food ingredients, including lipids (up to 70% of their biomass) and carotenoids. However, to make this strain more efficient and allow the production of value-added nutrients, the strain's metabolism must be well understood and efficient tools for its metabolic engineering must be developed.

In order to do so, we have sequenced the strain, evolved it to tolerate high concentration of industrial hydrolysates, developed advanced metabolic modeling tools alongside with the development of a synthetic biology toolbox for the yeast to allow an efficient engineering of the strain. Within this framework, we have learned peculiarities of co-factor balancing and energy metabolism of this oleaginous yeast. In this presentation, we exemplify how the advanced modelling of *R. toruloides* have helped us to improve its uptake of hemicellulosic carbon sources and increase the efficiency of converting them into natural and unnatural carotenoids, and how these processes have been scaled closer to the level of industrial production.

Process development

12:30 p.m. Carbon-neutral production of yeast oil for the cosmetic and food industry

Max Webers

COLIPI GmbH (GER)

Global population is projected to grow from 8 billion to 10 billion by 2050. The global demand for vegetable oil surpassed 210 million metric tons in 2021 and is projected to grow by another 33 million metric tons by 2030 with a 68% share being used for food applications. Global warming is said to negatively impact oil crop yields by up to -30% for some regions including working horses such as palm oil . To counteract decreasing yields, intensification of oil crop seed farming and expanding crop land by converting and deforestation of e.g. rain forests must not be an option. This may cause a long-term vegetable oil demand surpassing supply with all its severe consequences. Bioeconomy with single cell oils (SCO) and single cell proteins (SCP) produced by oleaginous yeasts may become an alternative pathway. Yet per se it is not a more sustainable option to classic vegetable oil production. The metabolism of yeast is a rather inefficient converter of carbon sources, releasing vast amounts as biogenic CO_2 and aerobic processes are dependent on energy intensive aeration and agitation. Further, industrial yeast plants are depending on carbon sources such as molasses from sugar beet and sugarcane, crops needing farmland increasing deforestation.

COLIPI GmbH develops and industrializes carbon neutral yeast processes for SCO and SCP production from industrial side streams like molasses moving to other side streams in midterm with the objective of feeding the world while protecting the climate. Retrofitting existing yeast factories and unlocking new business with respective partners is part of this project.

To achieve this we work with *Rhodosporidium toruloides* (*Yarrowia lipolytica* and *Trichosporon oleaginosus* are an option). To decarbonize the yeast process we run an integrated parallel process with hydrogen-oxidizing bacteria (HOB) that fix biogenic CO_2.

In this talk we will give an up-to-date overview about the emerging bioeconomy around yeast for the production of SCO and SCP with applications such as vegan meat or dairy replacements. We share insights to challenges of its commercialization and last but not least introduce the concept of decarbonizing yeast processes with HOB to make them a truly more sustainable and alternative SCO and SCP production pathway.

01:00 p.m. Feedback & Farewell

President A. Chagnon

Lallemand Inc. (CAN)

01:15 p.m. Conference Lunch

02:30 p.m. End of conference