Global Insights

The Fi Europe Startup Challenge 2024

Championing ingredient innovation

Startup Challenge 2024


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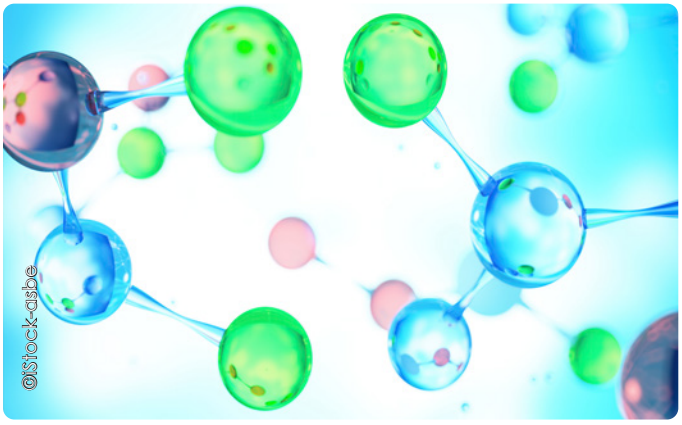
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The Startup Challenge: Advancing ingredient innovation since 2016

Since its beginnings in 2016, the **Fi Europe Startup Challenge** has been offering a unique platform to showcase startups' ingredient innovations and amplify their message to an audience of potential partners and investors at Fi Europe, the annual global meeting of thousands of decision-makers in the food ingredient industry.

Startups active for five years or less can apply to as many of the categories that are relevant to them, free of charge.

The winning startups can also choose from one of three high-value prizes:

- A fully equipped exhibitor stand at Fi Europe for the following year, as well as a Premium Profile on the Ingredients Network website, which attracts almost 900,000 unique visitors each year.
- A digital marketing package for Ingredients Network and Fi Global Insights to promote their online presence throughout 2025.
- Mentorship and support from one of our jury members. This could include one-to-one coaching sessions; the opportunity for potential pilot work; or access to corporate collaborations and accelerator programmes.

Why apply?

Every startup selected as a finalist will be interviewed for an article that will be published on the Fi Global Insights website, which has 260,000 unique visitors annually and over 25,000 newsletter subscribers, further increasing visibility.

Click here
to apply for the 2024 Startup Challenge in Frankfurt

The 2024 categories:

Fi Startup Challenge 2024

CATEGORY:

Most Innovative Food or Beverage Ingredient

This category covers ingredients or additives that improve taste, texture, appearance and/or nutritional value.

Fi Startup Challenge 2024

CATEGORY:

Most Innovative Plant-based or Alternative Ingredient

This category covers innovations related to food and beverage ingredients or additives specifically from a plant-based or alternative, non-animal source.

Fi Startup Challenge 2024

CATEGORY:

Most Innovative Foodtech Solution

This category covers innovations related to food processing or bioprocessing technologies, solutions or services that have the potential to positively impact the food and beverage industry.

Fi Startup Challenge 2024

CATEGORY:

Most Innovative Service or Digital Solution Supporting the Food and Beverage Industry

This category covers innovations that support improvements in ingredients sourcing and production, food safety and quality, traceability, transparency, smart packaging, and/or supply chain management.

In addition, a special jury's choice award will be awarded to one of the finalists.

(Please note that startups cannot apply to this category)

Fi Startup Challenge 2024

CATEGORY:

Most Innovative Sustainable Solution

Jury's choice award

This special prize will be awarded to the startup with the most sustainable innovation. All startup finalists across all categories can be considered for this award, with the winners being decided by the expert jury. The startup's overall sustainability efforts will be considered.

Fostering disruptive innovations for a sustainable food system

Startups are defining and designing the innovative food ingredients of tomorrow, but often lack the scale and funds to bring their solutions to market. Connecting with the right partners is therefore a fundamental part of any startup's journey, and the **Fi Europe Startup Challenge** is the ideal place to do so.

The Startup Challenge was the brainchild of nutrition consultant and food industry expert Sandra Einerhand, who worked with the team at **Fi Europe** to make it a reality.

Since then, Einerhand has watched the Startup Challenge grow and evolve. "The Challenge offers a front-row seat to witness the cutting-edge ideas and creativity that are shaping the future of the food industry," she said. "It's inspiring to see the passion, ingenuity, and dedication of entrepreneurs who are pushing the boundaries of what's possible. The opportunity to interact with such talented individuals and contribute to the growth of innovative solutions that address key industry challenges is truly rewarding and invigorating."

The Challenge is also unique in the high-level exposure it offers startups. Thanks to the fact that it is co-located with Fi Europe, one of the biggest ingredient trade shows that brings together R&D scientists, food technologists, product developers, and senior management every year, participating startups can benefit from highly lucrative interactions.

According to Albrecht Wolfmeyer, a Startup Challenge judge and director of the ProVeg Incubator, the competition offered many benefits. "It's an expert sounding board, a stage to gain visibility, and a great opportunity to increase their networks," he said.

Fi Europe 2024 in numbers

1,500 +
exhibiting companies

25,000
total attendance

135 +
Countries represented

Why take part in the Startup Challenge 2024? Testimonials from last year's winners

The Startup Challenge has played a pivotal role in accelerating the businesses of many startups - as previous participants in the Challenge testify.

Monica Bhatia, co-founder and co-CEO of Equii

Did you make interesting/useful business connections by attending Fi Europe & pitching in the Challenge?

"Yes, I got to know a few different VCs from all over Europe who are keen about foodtech and with whom we have followed-up after the event. I also met with business leaders from some large bakery companies who would find our innovation useful to their portfolio. "Last but not the least, it was very encouraging to visit all the different innovation partners who were attending or exhibiting at the Fi Europe event, and to know first-hand where the focus on European companies is with foodtech. I saw a lot more companies leveraging deep science to study and deliver nutrition-focused opportunities in Europe than I see in the US. I was fortunate to share the stage with some of these companies during the award ceremony as well and will be looking forward to their progress over the years, as I am personally a nutrition nerd as well!"

What were the benefits for you of participating in the Fi Europe Startup Challenge?

"The Fi Startup Challenge was a unique opportunity to introduce Equii into European food ecosystems as well as the food innovation community simultaneously. As Europe's largest food industry show, it was great to be recognised for our innovation and use this honour as a platform for Equii to discuss partnerships with EU-based businesses and funds."

Would you recommend other food ingredient startups to apply to the Challenge?

"One hundred percent! The pitch competition is designed to create visibility for startups in Europe and abroad. The award itself is very prestigious, we consider it as one of the best recognitions we have received at Equii.

"I also found the experience very helpful. The competition is structured so as to encourage the founders to pitch their company in various long and short formats, and as I went through it, I realised that was great practice for me. It helped me improve my messaging tremendously, which is always a useful skill for any founder."

David Ciudad Rodriguez, CEO and co-founder at Deep Detection

What were the benefits for you of participating in the Fi Europe Startup Challenge?

"Participating in an event like this is always positive: companies, potential clients, and investors get to know you, and the brand is reinforced. Additionally, as last year's winners, we had the opportunity to have a work session with a recognised VC in the food sector."

Did you make useful business connections by attending Fi Europe and pitching in the Challenge?

"We had contacts with investors and companies interested in learning about the technology. In our case, [it was] just a few months before we closed an investment round, so contact with new investors is aimed at the future investment round to accelerate growth at the end of 2025."

Would you recommend other food ingredient startups to apply to the Challenge?

"Of course! Deep Detection is an industrial hardware company aimed at improving the quality and safety of food products, so we were a bit unique in this sense because almost all the other participants were companies with new products or new food processes. But I believe that companies creating new food products, ingredients, and technological solutions have a unique framework in this Challenge."

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Pitch perfect: 10 tips to wow the panel of judges

As every entrepreneur knows, pitching before investors or potential clients is an important and inescapable part of the startup world – and a well-delivered pitch can be decisive in determining a startup's trajectory.

The panel of Startup Challenge judges is composed of food ingredient experts, VCs, and industry analysts. This year it includes Eline Boot, head of partnerships at Foodbytes by Rabobank; Itziar Ortega, senior vice president of global operations at Eatable Adventures; and Thomas van den Boezem, principal at PeakBridge.

We asked one of the judges, Sandra Einerhand, for her top tips to prepare a stand-out application and then wow the panel of judges when pitching on the day.

1. **Clearly identify the problem your ingredient, product, or service solves** and explain how it offers a better solution for consumers compared with existing options.

2. **Highlight the unique selling points of your product relative to your main competitors** and be honest about them, as your customers will be discerning and they value transparency.

3. **Demonstrate that your product is addressing a real consumer need.** Provide data on market trends, target audience, and potential growth.

4. **Craft a compelling story that resonates with your audience,** your customer, and the consumer. Share the inspiration behind your product.

5. **Describe your business model.** This will help the judges to understand how your startup plans to generate revenue, sustain operations, and achieve growth. A clear and viable business model demonstrates that you have a well-thought-out strategy for turning your innovative idea into a successful business.

6. **Understand the criteria that the panel of judges will focus on.** This may slightly differ depending on the category that the startup is pitching in but it is always clearly communicated by the organisers.

7. For those startups that target the health and wellness market: **showcase any health benefits your ingredient/product/service offers.** Provide scientific backing including human intervention studies in the target population on your product to substantiate the benefits. Presenting generic data only on ingredients (of competition) is less credible.

8. **Provide safety and regulation compliance data.** Ensure that your product meets all relevant safety and regulatory standards. Mention any certifications you have received.

9. On a more personal note: **be authentic, passionate, honest, and transparent.**

10. **Don't forget the deadline!** Send your application before 30 August 2024.

Click here
to apply for the 2024 Startup Challenge in Frankfurt

Reflections from the Startup Challenge 2023

Watch this interview with the judges!


Startup Innovation
Challenge 2023


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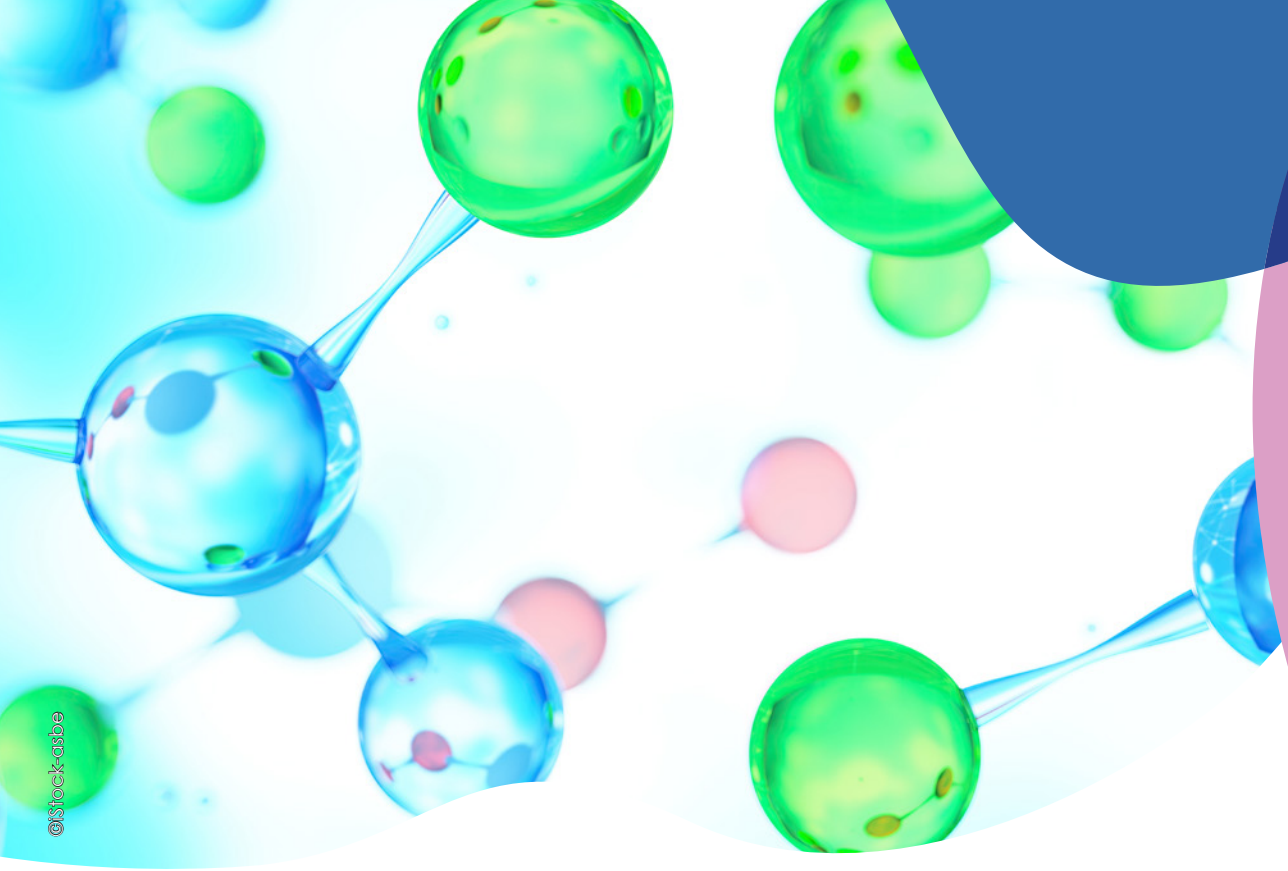

Find out more about the 2023 winners

Arkeon: Producing essential amino acids from waste gases

Austrian startup Arkeon uses archaea – a group of micro-organisms similar to but distinct from bacteria – to produce essential amino acids via a proprietary, patent-pending gas fermentation process, producing sustainable ingredients.

Archaea - a group of micro-organisms similar to but distinct from bacteria – are central to Arkeon's revolutionary approach to producing sustainable ingredients. Colonies of archaea are fed industrial waste gases, and amino acids are produced through a proprietary patent-pending gas fermentation process.

"These microbes feed on carbon dioxide, along with hydrogen," explains Arkeon co-founder Michael Mitsakos. "From these feedstocks, the archaea excrete amino acids through a membrane, which end up in a salty solution. We are then able to separate the amino acids from the salts."

Producing amino acids essential to human health

Through this ground-breaking process, Arkeon is able to produce the 20 amino acids essential to human health – essentially from industrial waste gases. The potential benefits of this are significant, from reducing the amount of CO2 emitted into the atmosphere to creating local ingredient supply chains.

For this innovation, Arkeon received the Most Innovative Plant-Based or Alternative Ingredient award at the Fi Europe Startup Challenge. “This award has given us recognition and visibility,” says Mitsakos. “It is important that people in the food industry, as well as consumers, are aware that solutions to tackling the climate crisis are being worked on.”

Mitsakos also believes that while elements of the startup’s technology are complex, the story behind the company is easy to grasp. “This award can help to mainstream our message,” he says. “We are taking science and technology out of the lab and into the world, and I think this is very important.”

From the lab to the market

From the beginning, the founders of Arkeon wanted to positively impact the world. Mitsakos and his colleagues focused on the food industry, in part because they recognised the huge carbon footprint that the sector has.

“If you look at how food ingredients are made, they tend to be tied to land, plants, and animals,” he says. “There are always these three components. We wanted to think outside the box, and we landed on a process of producing amino acids from microbes. This means that you can bypass agriculture, and instead of using agricultural inputs, use waste gases.”

Arkeon identified pioneering researchers and scientists to work with to turn this concept into a reality. The aim was to take their findings out of academia and into the real world, where they can make a difference.

Commercial awareness and scientific know-how

Mitsakos sees two sides to the business. The first addresses the challenges facing CO2-emitting industries, such as steel and cement. By installing their technology at the source of pollution, Arkeon’s proposition turns CO2 emissions from a problem into a potential new revenue stream. Heavy industry is incentivised to become part of the solution to creating a more sustainable and circular future.

“On the other side, we are a B2B ingredient provider,” says Mitsakos. “The amino acids we produce are ideal for the food and beverage sector, as well for personal care and any other industries that use amino acids. We can produce all 20 amino acids essential to human health.”

The startup is currently looking for CO2-emitting companies interested in partnering up, as well as scaling up the technology. A facility in Vienna is operational and producing amino acids at pilot scale.

“Producing at commercial scale will take time and investment,” says Mitsakos. “We need partners that believe in what we are doing, and these are the discussions we are currently having.”

There is also growing interest from the food sector, in part because most amino acids are currently procured from unsustainable sources. There is a recognised need for greater supply chain transparency and security, and a general acceptance that the food sector must become more sustainable at every step.

“Over the next two years, we will be building a demo facility, which will basically be a fully-equipped small-scale plant that is capable to produce amino acids for food and beverage applications,” says Mitsakos. “This will help to further show what science and technology can achieve. I’m proud that we have created a company that is both commercially and scientifically minded. This is a powerful combination.”

NIUM: Assessing the impact of ingredients on the gut microbiome

The startup NIUM is developing advanced tools and models to better understand the links between food, the microbiome, and overall well-being to help brands formulate more nutritious products.

NIUM has developed an in vitro model that enables manufacturers and food specialists to test how ingredients, foods, nutrition products, and drugs might impact metabolism and the gut microbiome. The technology emulates the physiological conditions of the gut by leveraging microfluidics, and features a sophisticated suite of analytical software.

“The key advantage of our approach is our ability to conduct scalable testing of nutritional products,” explains NIUM co-founder Alberto Noronha. “This represents a groundbreaking advancement, particularly for companies engaged in the testing or screening of new products.”

Another key point is that as NIUM’s testing initiatives progress, the software models will evolve. This, says Noronha, creates a mutually reinforcing cycle that enhances the robustness and utility of the platform for customers.

“The continuous refinement of our software contributes to a positive feedback loop,” he says. “This will amplify the overall effectiveness of our platform, and ensure sustained value for those using our technology.”

For this innovation, NIUM was given the Most Innovative Processing Technology or Technology Platform Award at the Fi Europe Startup Challenge.

“Participating in the Startup Challenge gives us the opportunity to collect valuable feedback and enhance our visibility for attracting new customers,” says Noronha.

“The competition proved to be an invaluable experience, and receiving the award was the cherry on top. This recognition serves as another positive signal that we are indeed moving in the right direction.”

Pioneering technologies to understand the gut microbiome

The idea for NIUM began during Noronha's doctoral studies at the University of Luxembourg. His research focused on better understanding gut microbiome data and its implications for health and disease.

"While the influence of food on the composition of the microbiome was acknowledged, there was a noticeable gap in efforts to construct more refined models that could precisely elucidate the dynamic impact of different foods on this complex community of microorganisms," he says.

As the NIUM concept evolved, the overarching objective remained: to pioneer technologies aimed at comprehensively understanding how dietary choices can intricately shape health outcomes through their influence on the gut-microbiome. Noronha and his colleagues wanted to delve into the development of advanced tools and models capable of decoding the nuanced interplay between food, the microbiome, and overall well-being.

"Navigating the challenges of securing initial customers, acquiring financing, and effectively communicating our vision was an early journey for us," says Noronha. "Subsequently, we recognised the imperative of developing our in-vitro platform and establishing our independent laboratory, which we are currently addressing. This evolution marks a strategic pivot towards enhancing our capabilities and solidifying our presence in the industry."

On the road to commercialisation

After receiving positive feedback for its vision and ambition, the business has been able to move towards commercialisation. The first commercial projects to use the platform have been finalised, and more customers are lining up.

"The learning curve has been steep," says Noronha. "Participating at events like Fi Europe has helped us to stay up-to-date on current trends, to foster new partnerships, and attract potential customers. But above all, we thoroughly enjoyed connecting with and getting to know other startups. Witnessing the abundance of talent operating at the forefront of innovation in the food sector across diverse categories has truly enriched our experience."

Noronha and his colleagues are looking forward to 2024 and say they are are on track to establish their dedicated laboratory facility. "This strategic move is essential for scaling our technologies and solidifying NIUM's prominence as a key player in the food R&D sector," he says. "The laboratory will serve as a cornerstone in advancing our research capabilities and contributing significantly to the innovation landscape."

Deep Detection: Ensuring food quality with AI-powered, photon-counting X-ray inspection

Product recalls are not only expensive; they can cause long-lasting reputational damage. To address this, one startup has developed an AI-powered, photon-counting X-ray camera for production line inspection machines.

Deep Detection has developed PhotonAi - a photon-counting, multi-energy x-ray camera designed for food inspection. The innovation is designed to detect foreign bodies, defects, and flaws at a higher resolution and with greater energy efficiency than is currently possible.

“We wanted to improve industrial inspection to achieve safer and better-quality products,” explains Deep Detection co-founder and CEO David Ciudad.

“The food sector wants to produce safe food products, but one persistent problem has been the detection of foreign bodies such as plastics, bones, and glass. While manufacturers are willing to invest in solutions that can help ensure the quality reputation of their brand, systems today have been far from adequate.”

Ciudad and his colleagues thought they could help to address this challenge. They designed PhotonAi to deliver high-speed, high-volume throughput, and to deliver a very high Probability of Detection (POD) rate. The technology is also designed to be integrated into existing processing lines at a minimal cost.

“Our clients are manufacturers of X-ray inspection machines, who then sell these machines to food companies,” explains Ciudad. “They want to be able to design innovative solutions that ensure the quality and safety of the products. And in the end, food manufacturers want to eliminate recalls, which cost money and damage brand reputation.”

For this breakthrough, Deep Detection was awarded the Most Innovative Processing Technology or Technology Platform prize at Fi Europe's Startup Challenge. "We are very focused on the food sector, and improving the inspection of products," says Ciudad. "Regarding the award, we are pleased to have received this recognition, as it shows that our vision can add value to the industry."

Fitting into automated production processes

Deep Detection was launched in July 2020, in the midst of the Covid-19 pandemic. "At that time everything was difficult," Ciudad recalls. "We were finishing the first R&D prototype, and since we couldn't leave the house, development was stopped for a long time."

Nonetheless, Ciudad and his colleagues persevered. The past two years have been spent refining the technology to develop quality cameras that fit seamlessly into automated production processes. "One of the things that sets us apart is the development of AI models to improve the probability of detection and identification of materials," says Ciudad. "We think that we have a unique value proposition for the food sector."

Adding value to the food sector

The startup is currently in the pre-commercial phase, and a number of clients are carrying out pilot tests with industrial prototypes.

"The response has been excellent," says Ciudad. "We have many clients now interested in trialling the technology, to see what it is capable of. Now the ball is in our court, and we are working on delivering more commercial cameras over the coming months. It will be a very entertaining 2024!"

The key aim now is to become established as a manufacturer of X-ray inspection cameras, with a rigorous and quality production process. The business intends to continue working closely with clients, to fully exploit the possibilities of the first camera model, PhontoAi DS. Feedback received will be taken into account in the development of the second model that is currently being developed.

"Our ambition is to lead industrial inspection with photon counting technologies powered by AI," says Ciudad. "There are actually very few industrial hardware startups, and really very few focused on the food sector. We believe that it is a global sector with many opportunities, and we want to continue working to be able to add value to food companies."


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Equii: Creating high-protein staple foods through bioinformatics and fermentation

By combining bioinformatics, fermentation, and cutting-edge processing, EQUII is turning flour from primarily a source of carbohydrates into a complete protein powerhouse for healthy staples such as bread and pasta.

A great deal of innovation in the protein space is focused at present on sustainability. Achieving nutrition, taste, and affordability at the same time however is not always that straightforward. The startup, EQUII, has sought to address this, by turning flour from a mere carb source into a complete protein powerhouse.

“Our products don’t have any ingredients that are not typically used in the bakery or pasta industry, nor do they carry GMOs,” explains Monica Bhatia, co-founder and CEO, EQUII. “This making them extremely easy to integrate into existing lines.”

Cutting edge processing innovation

EQUII’s technology has three major innovation areas. The first element is a bioinformatics algorithm, capable of reading whole genomes and predicting the nutritional quality of the entire proteome. “This step allows us to scan thousands of microbes found in foods, especially fermented foods and discover the ones that can make complete proteins when fermented,” says Bhatia.

The second step is fermentation. With the microbes from step one, grain starches are fermented to produce complete proteins at low-cost. The final downstream processing step isolates proteins post-fermentation. “We are able to study and tailor the water binding properties of our protein during the downstream steps,” explains Bhatia. “This allows EQUII protein to get the right texture and taste during final recipe formulation.”

These mixes have been validated at conventional, large-scale industrial facilities for bread, bakery, and pasta. EQUII’s success was recognised at this year’s Fi Europe, when the company won the Most Innovative Food or Beverage Ingredient award at the **Fi Europe Startup Challenge**. “This award is so meaningful to us,” says Bhatia. “It provides us with strong validation, as we discuss our innovation with partners in Europe and around the world.”

Sustainable protein, healthy nutrition, and great taste

The inspiration for EQUII came from the realisation that following a nutritionally balanced diet is not always easy. Life can be hectic, and many people simply don't have the bandwidth to think about every aspect of their meals. In addition, healthy food choices don't always taste great.

"I started EQUII to make nutrition on our plate a default, by creating staple foods that are high in protein, low in carbs, and have great taste and texture," Bhatia explains. "The market for plant-based proteins has been growing leaps and bounds, but most innovation over last 10 years has focused on mimicking meat."

Bhatia recognised that staple foods are as much a part of our plates as meat. She saw a major opportunity to improve food systems through high protein staples enriched with plant-based protein. "The idea was to address the need for sustainable protein and healthy nutrition, and meet consumer preferences in one product," she says.

A key challenge at EQUII's beginning was accessing the resources needed to achieve proof of concept, without requiring significant investment. "Our goal was not only to create a protein, but to go the extra mile and demonstrate that our protein can create a product like bread with similar taste and texture as normal bread," says Bhatia. "This required specific skillsets, equipment and R&D tools."

To achieve this, EQUII partnered with institutions like the California Wheat Commission, which lent the startup equipment, tools, and knowledge.

Building a resilient and sustainable food economy

EQUII has since built up a strong customer base of product manufacturers. The company is also currently in talks with several major B2B players in the field of staples.

"The amount of innovation in our field is growing at unprecedented rate," says Bhatia. "This gives me confidence that we will see a much more resilient and sustainable food economy in the years to come. I saw many innovative ingredients in the plant-based space displayed at Fi Europe that can provide great solutions to solving the major challenges around taste, texture and cost for the consumer."

"I met with and talked to some companies in the space of flavourings, preservatives and fibre solutions that I had not seen before, and was just amazed by how good the products were."

Moving forward, EQUII plans to focus both on commercialising its flagship products – EQUII Baking blend, EQUII Complete protein bread and EQUII Complete protein pasta – and continuing on the path of improving yeast strains and fermentation processes to create ingredients ready for massive adoption.

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WNWN: Looking beyond cocoa beans to recreate the flavour of chocolate

WNWN is pioneering ethical and sustainable alternatives to chocolate. A key ingredient in this start-up's success has been a winning combination of fermentation techniques with a passion for – and knowledge of – flavours.

This London-based company is at the cutting edge of developing plant-based, low-carbon ingredients that taste just like chocolate. WNWN is founded on the belief that innovation can deliver solutions that address important societal issues – and still taste great.

"We love chocolate," says co-founder Johnny Drain. "But when you start digging into how chocolate is made, you find that two thirds of cocoa is produced in the Ivory Coast and Ghana - two small countries in West Africa – and that this production is linked to child labour and deforestation. Cocoa production also has a huge carbon footprint."

Drain and his co-founder Ahrum Pak believed that alternative solutions to cocoa were possible – so they set up a company to make this a reality. Their solution was to take locally sourced, sustainable and abundant ingredients like cereals and legumes, and apply fermentation technology.

Finding shared compounds in universal flavours

"Our solution also involves some good old classic flavour work," says Drain. "We have hired chocolatiers and trained chefs and trust our culinary instincts. If you look hard enough in nature, you can find flavours in chocolate that exist elsewhere."

Drain points out that this makes perfect sense. A chocolate bar might be advertised as having notes of cherry or coffee, without containing any of these ingredients. "There are shared compounds in these universal flavours," he says. "Flavour is out there – you just have to corral it into the right shape and form."

For this work, WNWN was awarded the Most Innovative Sustainable Solution at Fi Europe's Startup Challenge. "There are so many highs and lows in launching a start-up, so it was really important for the whole team to get this external validation," says Drain. "It was also great to be in the same room as these major ingredient companies and suppliers – we want to be amongst them in ten or 15 years."

Bringing worlds together

Another reason for the business's success has been the complementarity of the co-founders. "We are from different worlds," says Drain. "Ahrum has an MBA and was working in consultancy. She was getting a bit fed up, especially during Covid, and recognised that her real passion was for sustainability."

Drain has a background in fermentation and food tech. After completing a PhD in material science, he spent a number of years working for high-end restaurants, creating new ingredients and training staff in fermentation.

"I'd also been sitting on this idea of making something that tastes like chocolate," he said. "One inspiration in fact was boiling potatoes. The streaming pan smelled a little like chocolate, and I wondered how this could be captured."

A mutual friend brought the pair together, and the business was launched shortly after. WNWN began life in a tiny basement in a former east London pub and has since expanded to a staff of around 18 people.

"We have begun to release products onto the market, mostly in limited drops, and were in fact the first company in the world to sell a cocoa-free chocolate in 2022," says Drain. "I'm very proud of that. We are increasingly selling our product to bars and bakeries and looking to expand."

Providing sustainable alternatives to cocoa

The process of scaling up the business is very much underway. "We are now in a position to sell hundreds of kilos of our product, and are busy building sales pipelines," says Drain. "Our aim is a create suite of ingredients that work for all chocolate applications."

Chocolate is just the start. Many other ingredients, such as coffee and vanilla, are also grown and sourced in unethical and unsustainable ways. The same supply chain pressures and environmental impacts related to cocoa are also evident with these ingredients.

"These products are not identical, but there is a thread of flavour profiles that runs through them," says Drain. "We believe that our fermentation platform can unpick these flavour profiles."

The ultimate goal, says Drain, is not to replace cocoa. Instead, he sees WNWN as a means of offering the food industry a more sustainable alternative, of educating consumers about sustainability, and applying pressure to result in real change that benefits farmers and communities on the ground.

"We feel that industry is interested in what we are doing," says Drain. "There is certainly awareness about the need for sustainable solutions, and we think people are open and curious."

Planet A Foods: Using plant-based fermentation to recreate the flavour of chocolate

Through proprietary technology that naturally ferments oats and sunflower seeds, Planet A Foods is able to recreate the flavours and fats in chocolate – a milestone in the development of sustainable, cocoa-free alternatives, it says.

The company's product, ChoViva, is produced using an innovative and patented manufacturing process. As Antonia Schreiber, head of business development and partnerships at Planet A Foods, explains, the methods used are close to traditional chocolate making.

"Oats and sunflower seeds undergo a similar treatment to cocoa beans, from the proprietary fermentation-like method we use to gentle roasting," she says. "We then ground the seeds in several steps, to get a highly aromatic concentrate. After that, we mix the concentrate with other ingredients and conche everything."

The end result, says Schreiber, is a creamy, tender, and velvety mass that looks and tastes like chocolate, and has the same manufacturing properties. This is achieved while using local crops that are harvested in a more sustainable and people-friendly way than crops such as cocoa.

For this breakthrough, Planet A Foods was one of two winners of the Most Innovative Sustainable Solution award at the recent Fi Europe Startup Challenge.

"We were very honoured to be nominated, and to win the award this year," says Schreiber. "This has given us a lot of recognition and we are proud seeing that we can actually contribute to a current challenge that the industry is facing. We are hoping that we can help the industry to move forward in a more sustainable way."

A love of chocolate – and a desire to make a difference

Planet A Foods was founded in 2021 by siblings Sara and Max Marquart. Through combining Sara's experience in biotech and knowledge of flavours with Max's work as a material scientist and entrepreneur, the pair saw an opportunity to combine their expertise and love of chocolate with a desire to make a positive difference.

Planet A Foods saw the production of cocoa as highly problematic. Forests are often cleared to make way for cocoa, and such monoculture farming can kill biodiversity and degenerate the soil. Massive amounts of water are needed to produce cocoa, and farmers - with no choice but to grow cocoa – are often kept in grinding poverty.

"This is what drove us to develop our ChoViva innovation," says Schrieber. "We wanted to offer ChoViva as an alternative to chocolate - with the same taste but more ethical and with much less CO2 emissions."


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Protecting both the planet and people

The business faced a number of challenges in turning this aspiration into a reality. Major issues included building up a production facility from scratch, finding people with the necessary skills, establishing the process and delivering ChoViva at a commercially viable scale.

"Our partners supported us along the way," says Schrieber. "However, some people didn't take us very seriously. Right now though, with rising cocoa prices, industry is definitely taking us more seriously. It is increasingly clear that an alternative to cocoa is needed."

The company currently consists of food technologists, marketers, and supply chain experts. "We all want to reduce our carbon footprint, while still consuming the delicious things in life," says Schrieber. "We all believe in protecting our planet, and the people that create the foods we love."

New ideas in sustainable production and consumption

Planet A Foods is currently helping well-known brands and partners to replace cocoa and chocolate with ChoViva in their products. "New private label as well as branded products will be launched in Germany, Austrian and Switzerland in 2024, and we are talking to partners about expanding to more countries," says Schrieber.

"FI Europe was an amazing event for us, as it enabled us to get feedback on our product, learn about the industry, and understand current challenges and trends. Additionally, it was great talking to so many people. The event enabled us to establish a network, and to raise awareness of our ingredient brand ChoViva."

This commitment to protecting the planet through cutting CO2 emissions, sustainability utilising local ingredients and treating farmers with dignity remains the central mission of the business.
"The world needs new ideas in how we sustainably deal with food, whether it's about production or consumption," says Schreiber. "The idea behind ChoViva is to motivate people with joy, and to help us make a difference. On our shared journey, even the tiniest step counts."

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Fi Global Insights: Spotlight on startup innovation in the food and ingredient industry

The Fi Global Insights weekly newsletter covers food ingredient news and analysis all year long, including the best of startup innovation. Here is our pick of three articles showcasing startups making waves thanks to their disruptive ingredients, products, and tech-driven solutions.

Using 'deep plant intelligence' to create next-generation dairy alternatives

Using data science and artificial intelligence (AI) is the key to unlocking the latent potential that exists in the plant kingdom, says Oliver Zahn, astrophysicist and founder of plant-based dairy startup, Climax Foods.

There is no escaping the fact that animal agriculture is bad for the environment and that the food production system is going to sustain a growing global population.

Global analysis has shown that while meat and dairy provide just 18% of calories and 37% of protein, they use 83% of farmland and produce 60% of agriculture's emissions. In short, it is inefficient and unsustainable.

The food industry is all too aware of this, and is ploughing huge resources into the development of plant-based foods and technologies that have the potential to reduce reliance on animal agriculture.

However, predictions of meat and dairy alternatives displacing demand for animal products haven't quite materialised.

Oliver Zahn, founder of California startup Climax Foods, believes this is because so far, the alternatives are "pretty lacklustre".

"Usually, they don't taste like animal products. They don't have the same texture, they don't have the same functional characteristics when you heat them, and they don't have the same nutritional value," he said.

Broadly speaking, two strategies are dominating advancement in this space: using trial and error approximation to develop products that closely resemble their animal-derived counterparts and using precision fermentation to grow cultured meat or dairy.

The problem with 'band-aid' products

The problem with the former approach, according to Zahn, is that in trying to recreate the functionality of the animal product, companies usually end up with what he refers to as a "band-aid" product.

"They end up piling band-aids on top of one another. They might add flavours, then gums, and in the end, they still don't manage to recreate the actual functionality," he said.
He gave the example of casein, a dairy ingredient whose breakdown functionality is difficult to replicate.

"If you try to recreate the melt and stretch functionality of casein through a mix of ingredients that aren't animal-derived protein, you will never end up with the same outcome. It may melt but it won't melt in the same way," he said.

Is identical a must?

Turning his focus onto cultured meat and dairy, Zahn questioned the assumption on which this approach is based, namely that the products created have to be biologically and chemically identical to their conventional equivalent.

"The notion that you have to recreate the animal product identically is an interesting route to explore, but ultimately the only thing that matters is that it behaves in the same way. It does not matter whether the protein from which 'melt and stretch' is derived has the sequence of casein in it. A human will not look under the microscope. No human cares. No human will ever care," he said.

So how should the food industry be approaching the development of foods that can replace those produced by land-based agriculture?

Another formulation strategy is 'deep plant intelligence'

According to Zahn, a better way is leveraging the largest resource of edible protein, lipids, and biodiversity on earth, namely the plant kingdom. This was the premise on which Zahn founded Climax Foods three years ago.

"The plant kingdom is so overwhelmingly large and complex that no company to date has dared to explore what we in data science call the 'global optimum' of what you can accomplish in terms of recreating any desirable food functionality," he said. "Climax Foods is a data science company leveraging deep plant intelligence to unlock food products that are tastier, healthier and more sustainable."

He said the key to unlocking this potential is to harness the intelligence of both humans and machines.

"There is a limit to what humans can imagine. There is also a limit to what machines and AI can imagine. The beauty of our model comes from the symbiosis of the two forms of intelligence," he said.

He added: "And this is what we're learning every month in our lab: how we can harness the intelligence of humans and machines simultaneously to speed up the product development process and answer the question of how we can replace animal products in a zero-compromise way more quickly."

Capturing the human interaction with food through machine analytics

The starting point for this was to collect data on what makes cheese and other animal products behave the way they do in order to provide its AI-driven platform with a set of labels from which to learn.

"In supervised learning, you have a bunch of outcomes that are predicted by a bunch of inputs. So, you need a comprehensive set of labels and features to be able to recreate these outcomes," he explained.

With no existing data available, the company developed a comprehensive set of assays that characterised the human interaction with food – in other words, how humans perceive compounds that affect key functional attributes like flavour, texture, melt and stretch.

Essentially, this enabled it to create an AI-powered sensory panel, a far more cost effective and efficient solution for testing prototypes than using a human panel.

Rapid ingredient screening

It has also provided the basis for rapidly screening thousands of ingredients and comparing the outcomes to its targets and animal equivalents. Machine learning enables it to converge faster to fewer failed experiments.

“We optimise focusing on functional efficacy, ingredient source, scalability and de-risked dependency on any one source ingredient,” explained Zahn.

Through this platform, the company is able to understand how proteins behave in response to physical and chemical modifications, and can optimise them to achieve certain characteristics. For example, it can make a plant-derived milk matrix that it claims is the first protein matrix to stretch and melt like casein, and has developed a plant-based fat that combines the desirable properties of margarine and butter.

Case study: Plant-based mozzarella

Zahn said that high throughput ingredient selection and proprietary protein modifications coupled with fat optimisation have enabled the company to achieve the specific melt and stretch properties of mozzarella cheese.

“We screened and modified thousands of ingredients in a data-driven way to find the ideal expression of functional properties. Then, with lipid databases and modelling, we created a plant fat mixture that emulated milk fat. We combined the fat and protein into a mozzarella prototype and used AI to optimise for different protein and fat combinations, delivering the best mozzarella fast,” he said.

As well as developing mozzarella, the company has used its platform to develop brie and blue cheeses.

Dairy or plant-based starter cultures?

One of the first questions it needed to answer when making cheese was whether it could use traditional dairy cultures even though it was moving away from lactose to plant-based sugars.

“We got quite excited about the prospect of developing new strains but actually found that the best way was to make a functional milk substrate that could use traditional dairy cheesemaking strains so that you can turn it into any cheese in exactly the same way,” said Zahn.

“Originally, we didn’t know whether the strains would prefer lactose over plant-based sugars. It turns out they don’t. They like plant sugars better, and sometimes they like them too much, so you need to slow them down a little,” he said.

This does have its benefits, though, as it means cheesemakers can speed up the ageing process - one of the biggest bottlenecks in cheese production.

On a milk replacement mission

Climax Foods is starting in plant-based cheeses, but its bigger mission is to develop a turnkey dehydrated replacement that replicates the functionality of animal milk, with the ultimate aim of comprehensively replacing dairy milk.

“If we can make a functional milk substrate that can be fermented, aged, and processed in the same way as milk, that would be very cool,” said Zahn.

From flavours to fats: Tapping into the world of fungi innovation

The fungi kingdom can provide a wealth of healthy, sustainable ingredients from meat alternatives made with mycelium biomass to precision fermentation-derived colours, flavours, lipids, and more.

The sheer diversity of ingredients and materials that come from the fungi kingdom highlights its potential to be used as a tool for sustainable change in the field of food and beyond.

For millennia, people have eaten fungi in the form of mushrooms, the fresh fruiting body of the fungus. However, in recent years research and development (R&D) has revealed the versatility of fungi across industries: fungi are a source of active ingredients for pharmaceutical drugs, while mycelium biomass can be used to create alternatives to meat, leather, plastic packaging, and even construction materials.

Fungal strains can also be used as host organisms in precision fermentation, producing high-value ingredients such as steviol glycosides, dairy proteins, or omega-3 fatty acids in a low-impact way without requiring the resources of traditional forms.

Fermentation creates minimally processed products

One of the benefits of using mycelium as a base for meat alternatives is that fermentation is a relatively gentle production process compared to, say, extrusion or Couette shear cell technology that are used on plant proteins like pea or soy.

“We can reduce the complexity of what we have right now in the plant industry,” said Anne-Catherine Hutz, co-founder and vice president of product at mycelium startup Infinite Roots, formerly known as Mushlabs. “[With] extrusion, for example, we [use] a lot of energy and high temperatures that go on the protein, so we lose a lot of nutrients in the process.”

Mycelium manufacturers can also alter the taste, texture, and nutritional value of the biomass by tweaking the fermentation parameters or changing the feedstock on which the mycelium is grown. This means that fewer processing steps or additives are required downstream – and with a growing backlash against ultra-processed foods and their perceived unhealthiness, this could be a compelling argument for consumers looking for clean label meat alternatives.

According to Isabella Iglesias Musachio, founder and CEO of Bosque Foods, a Berlin-based startup making whole cut meat alternatives using mycelium, this is Bosque Foods' "biggest unique selling point."

"We grow [the mycelium] with, inherently, this incredible texture and a solid structure [...] so by the time we harvest our mycelium, we are actually dealing with a product that is almost as close to the end product as you can get. That's why we are able to create products that are very clean label, minimally processed, and without a ton of DFPs [dietary fibre polysaccharides]," said Iglesias Musachio.

Mycelium can provide protein, fibre, lipids, and micronutrients

Mycelium is often called mycoprotein, and the original mycelium brand, Quorn, often refers to its ingredient as such. However, this term is not perfect, said Hutz, because it only calls out the protein content of the mycelium biomass, ignoring other important macronutrients, such as fibre.

"...we need to be careful that we are not telling consumers something wrong because if we use biomass as a whole, it's not just protein," said Hutz. "At Infinite Roots, we are looking into the benefits of the fibre part, which also give a lot of benefits."

She said it was important to communicate the health benefits of mycelium's fibre content – particularly in Europe where most people meet and even exceed the recommended intake for protein but tend to be deficient in fibre.

Mycelium can contain other nutrients of interest as well. Iglesias Musachio said Bosque Foods' mycelium contains important micronutrients such as vitamin D12, a precursor to B12, while Emilia Nordlund, research manager at Finnish research organisation VTT, said VTT was looking at developing strains that contain other macronutrients such as fats and lipids.

"Lipids can mimic the meat juiciness or texture that is important for meat alternatives [...] and can bring in not only the flavour and sensory qualities but also the nutritional qualities," said Nordlund.

The benefits of using fungi as a precision fermentation 'workhorse'

Another field in which fungi are used to create food ingredients is precision fermentation. Fungi is used as a "workhorse" to produce an ingredient of interest, which could be a protein, plant lipid, flavour, colour, or bioactive molecule.

Nordlund said: "It's really broad how you can imagine using different fungal strains – depending of course on the strain."

Finnish precision fermentation startup Onego Bio, for instance, spun off from a VTT research project, is now looking to commercialise its ovalbumin, the major component of egg white protein, that is made in a factory without the use of hens.

In the precision fermentation space, fungi offer certain advantages over other organisms (yeast, bacteria, or microalgae) that can also be used as the "workhorse", according to Nordlund. VTT works with Trichoderma, which secretes the molecule of interest within the culture media but outside the cells and biomass. Bacteria, on the other hand, almost always produce the target molecule intra-cellularly, which means more downstream processing is needed to isolate and remove it from the final ingredient, Nordlund explained.

Fast scale-up and routes-to-market

Fungal proteins, including mycelium, also offer something that other foodtech-derived proteins, such as cell-cultured meat products, do not have: a much faster scale-up and route-to-market.

"I think that [...] fungal products and processes really can play a big role especially when we compare [them] to cultured meat or other solutions that are really long-term in development," Nordlund said. "With fungi, we can really scale up fast, get the regulations, show the safety, and really build the processes."

Going forward, however, she predicted that the future of sustainable product development would be hybrid rather than 100% fungi-based.

"We don't need to do only fungal-based foods and materials," Nordlund said. "I think there are a lot of opportunities combining [ingredients], and that can also be the fast track to the market – combining plant-based ingredients with fungal-based ingredients, either precision fermented or whole ones."

Fungal fibre: Upcycled mushroom extract is a natural shelf-life extender

By offering a clean-label, eco-friendly alternative to artificial preservatives, Chinova Bioworks says its mushroom fibre ingredient "disrupts the preservation category".

Mushrooms have spent a long time in the shade, overlooked and underutilised by the food industry. However, in the past few years, there has been growing recognition of their health benefits and potential as a nutritional and sustainable food source.

One innovator at the cutting edge of the "mushroom movement" is Canadian biotech company Chinova Bioworks. It has extracted a naturally occurring chitosan fibre from upcycled white button mushrooms to create Chiber – a clean-label preservative that is said to improve the quality, freshness, and shelf life of a variety of food and beverage products.

"Chiber provides broad-spectrum protection and is effective at inhibiting bacteria, yeast, and mould – ensuring food safety. It can meet the highest standards of natural preservation without compromising the flavour profile, texture, or appearance of any food or beverage product," Natasha Dhayagude, CEO and co-founder of Chinova Bioworks, told Fi Global Insights.

Harnessing mushroom science

Since 2016, Chinova Bioworks has been on a mission to upcycle mushrooms in a way that can add value to the food supply chain.

"My co-founder, Dave Brown, and I met in 2016 and we found a common interest in the science of mushrooms," she explained. "Being at the forefront of mushroom innovation, we went back to the basics in using nature to protect food.

"We took it one step further by realising the potential of a fibre extracted from the most commonly produced white button mushroom and its impact on improving the freshness, quality, and shelf life of food and beverages naturally."

Chitosan: A natural spoilage disruptor

The basis for Chiber is chitosan, a naturally occurring fibre. Its effectiveness as a preservative stems from its ability to disrupt the membranes of spoilage organisms.

"When in acidic conditions, Chiber is a positively charged (cationic) polysaccharide. The cationic areas of the chitosan molecule will interact with the negatively charged components of the microorganism's cell wall, such as peptidoglycan or proteins. This interaction will inhibit the survival of the microorganism, making Chiber an effective antimicrobial ingredient for coverage against all types of spoilage causing yeasts, moulds, and bacteria," said Dhayagude, explaining the mechanism responsible for Chiber's functionality.

Clean-label extraction

Chinova Bioworks extracts the chitosan from mushrooms via a patented process that involves drying and grinding the mushroom stems, and using heat and water to purify the fibre from the stems.
This proprietary "green chemistry" process yields a clean-label ingredient that can be listed as "white button mushroom extract", "mushroom fibre extract", "mushroom extract", or "natural flavour". Chiber is also the only natural and clean-label antimicrobial ingredient to have been approved under Whole Foods Market's ingredient qualification programme.

Saving mushroom stems from landfill

As well as meeting demands for label transparency, Chiber also has an upcycling story that will resonate with conscious consumers.

Chinova Bioworks works with farmers to harvest the white button mushrooms that are typically wasted or recycled, and upcycles them into Chiber. Effectively, there is a double waste reduction benefit – first, when the mushroom stems are diverted from landfill; and second, when food waste is reduced through the creation of longer-lasting products.

"Chiber's value proposition utilises discarded biomass that previously took up landfill space and now serves as a natural functional ingredient sold in liquid form to food and beverage brands," said Dhayagude.

Dairy and non-alcoholic beverages are two categories where Chinova Bioworks sees potential for its mushroom extract.

Data from dairy analysis

Chinova Bioworks has partnered with food developer Mattson and the Cal Poly San Luis Obispo Dairy Science Program to conduct a dairy analysis of yoghurt and cream cheese, testing Chiber's effectiveness in comparison with other natural and artificial preservatives.

"The results were amazing for both the yoghurt and the cream cheese at extending the shelf life and maintaining the taste and flavour of the samples. This study substantiates Chiber's effectiveness in the dairy sector for producers wanting a sustainable and natural preservative," said Dhayagude.

An alternative to alcohol

Dhayagude added that the beverage category is also a prominent focus area for the company, especially non-alcoholic beers, wines, and cocktails.

"That segment has gained popularity over the last few years and is expected to show continued growth. Brewers are especially interested in finding a natural preservative to replace the alcohol that was used as a safeguard against harmful microorganisms," she said.

She continued: "The flavour profiles of beer are very complex, and finding a natural antimicrobial is complicated as some can change the taste of the beer. However, brewers are finding that Chiber is easy to use, prevents the growth of harmful microorganisms, and doesn't affect the sensory profile of their beers."

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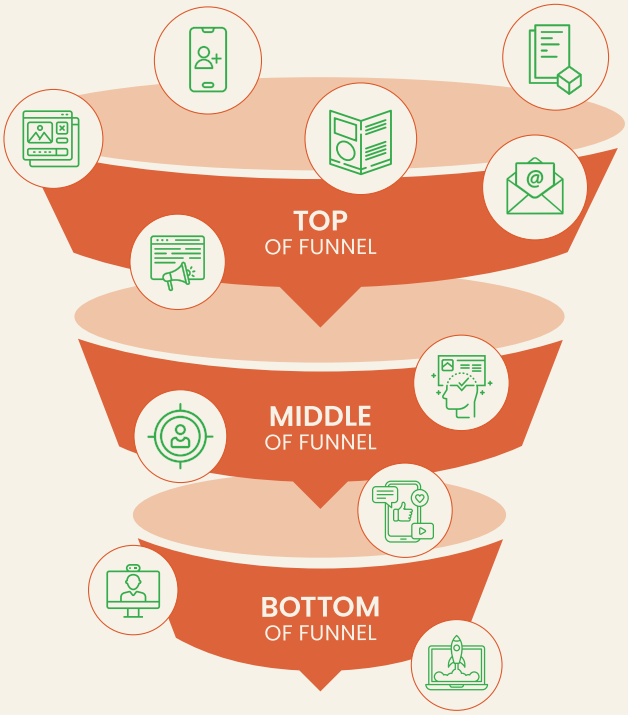

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