

The Food Systems Innovation Challenge:

Empowering Students to Transform Food Systems

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WUR Student Challenges

NFP Netherlands Food Partnership



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We thank our partners and sponsors for their generous contributions. Their support has been invaluable in making the Food Systems Innovation Challenge an unforgettable and inspiring initiative, empowering the young pioneers of change in our food system and contributing to innovations for a sustainable future.

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Introduction

The Food Systems Innovation Challenge: Empowering Students to Transform Food Systems

The challenges facing our global food systems—climate change, biodiversity loss, and food insecurity—require bold and innovative solutions. The Food Systems Innovation Challenge was created to empower students to take on these issues by designing practical, context-specific innovations that drive local food system transformation.

Hosted by Wageningen University & Research and the Netherlands Food Partnership, this challenge provides young innovators with the opportunity, mentorship, and resources to turn their ideas into real impact. Over six months, 18 student teams from nine countries developed feasible and scalable solutions tailored to their communities, focusing on sustainability, nutrition, and social inclusion.

More than just a competition, this challenge is a platform for young changemakers to shape the future of food. We hope their stories inspire you as much as they inspire us!

2024 Impact in numbers:

9 Universities from 4 continents participated

275 students registered with their project idea, with 70 teams.

18 Student teams (75 students) selected for the challenge and received project seed money

5 Teams (18 students) were selected to continue in the Youth Food Lab incubation program

About the challenge

Wageningen University & Research (WUR) and the Netherlands Food Partnership (NFP) proudly hosted the 2024 Food Systems Innovation Challenge - an exciting initiative aimed at shaping the future of sustainable food systems.

Imagine having the chance to turn your innovative ideas into impactful ventures that transform your community. The Food Systems Innovation Challenge offers exactly that opportunity. More than a competition, it is a platform for nurturing creativity, fostering entrepreneurship, and empowering young individuals to drive meaningful change.

This global competition strives to cultivate youth engagement by involving students in decision-making processes on critical issues such as climate change, biodiversity, and local food system transformation. Selected teams from nine countries - Kenya, Nigeria, Ethiopia, Ghana, Uganda, Brazil, Suriname, Nepal, and the Netherlands - received mentorship and funding to design and implement food system innovations within their communities.

Each team focused on one of three key domains: **Ecological Sustainability, Nutrition and Healthy Diets**, and **Social Inclusion**, contributing to their country's national priorities for sustainable food systems. Over six months (April to September 2024), 18 student groups implemented their plans, with each team receiving up to €2,500 for their projects.

A panel of expert jury members evaluated the projects based on their feasibility, sustainability, scalability, and potential impact, ensuring that the most promising ideas receive further support.

What is the Food Systems Innovation Challenge?

Today's global agriculture faces many challenges, especially feeding our growing population while simultaneously preserving our ecosystems and natural resources worldwide. Climate change is affecting the way we grow food. Integrated and innovative approaches from a wide range of disciplines are needed to ensure healthy, equal, and sustainable food systems in the future.



What is a Food System?

A food system is a complex web that includes all the stages involved in the production, processing, distribution, consumption, and disposal of food. It is the combination of all the factors that are important for food security (WUR) and it starts with agricultural activities such as crop production, fishing, and livestock raising, and extends to include processes such as harvesting, storage, transportation, and promotion. Within this framework, multiple stakeholders such as farmers, suppliers, distributors, retailers, and consumers interact to bring food from the field to the table.



Why a challenge on local food systems?

This student challenge is all about food systems. Focusing on localized challenges allows for the development of innovative, context-specific solutions that can address the unique socio-economic and environmental needs of different regions. By resolving food system issues at the local level, we not only work towards decreasing the environmental impacts of food production but also promote sustainability and food security.

Partner universities

What makes this challenge particularly exciting is the global collaboration that brings together nine different universities, all working towards a common goal. These universities include:

- Anton de Kom Universiteit, Suriname
- Esalq-USP, Brazil
- Kathmandu University, Nepal
- Lukenya University, Kenya
- Makerere University, Uganda
- University of Abuja, Nigeria
- University of Ghana, Ghana
- Wageningen University & Research, The Netherlands
- Wollo University, Ethiopia

Students from these above-listed universities were allowed to submit a concept note detailing their innovative food system solution. From those submitted, each university chose two teams to continue to the finals.

Mentoring

This is one of the most valued elements of our Food systems Innovation challenge. During the challenge, the selected teams were appointed an experienced mentor from an influential partner company or organization who would provide personal guidance so that the team could lift their project to the next level. They could consult experts from the partner network to further develop their concepts.



Grand Finale Event

The Grand Finale on 30 September 2024 formed the culmination of the Food Systems Innovation Challenge; From each of the 18 selected teams, one representative was invited to attend the Grand Finale event in Wageningen. The Grand Finale event was a multiple-day program where the representatives were taken on excursions to visit stakeholders in the Netherlands. It's also the moment when the teams presented their inspirational food systems innovation vision and the pathway towards it. During this event, winners were announced and six months of hard work was celebrated. A stimulating and exciting event for building connections and obtaining a wealth of inspiration! Also, the five winning teams received award money and will enroll in Youth Food Lab 2025; an incubation programme by WUR, World Food Forum/FAO and IAAS (International Association students in Agriculture and related Sciences.

Fruitastic 5 Wins the Food Systems Innovation Challenge with a Vision to Combat Food Waste in Uganda

Text: Rebeka Bilik

The 2024 Food Systems Innovation Challenge concluded with Fruitastic 5 from Uganda winning the top prize of €5,500 for their creative approach to reducing food waste. The team developed a method to transform overripe jackfruits into nutritious snacks, extending the fruit's shelf life while promoting healthy eating and boosting economic benefits for local farmers and vendors.

The challenge brought together 18 student teams from nine countries, including Suriname, Brazil, Nepal, Kenya, Uganda, Nigeria, Ghana, the Netherlands, and Ethiopia. Over the course of six months, the teams worked on feasible, scalable, and impactful innovations aimed at transforming local food systems to meet national pathways to sustainable food systems, linked to the UN Food Systems Summit.

Finalists and Winning Innovations

Each team was tasked with designing and implementing a project that addressed a food systems innovation in their local context. In the end, Fruitastic 5 stood out for their practical approach to tackling food waste and empowering local communities.

In second place, the Eco Grub team from Nepal presented a solution to convert organic waste into affordable, protein-rich feed for poultry, pig farming, and fisheries using Black Soldier Fly (BSF) larvae, addressing high feed costs and reducing environmental impact.

AgroEssential from Brazil secured third place for their research into using essential oils from citrus and Spiked pepper to naturally control pests and diseases in horticultural plants, promoting sustainable food cultivation.

The Audience Award went to Sugar Shakers from Nigeria, who developed date syrup as a safe, quality alternative to refined sugar while promoting its health benefits and exploring its use in sweets and chocolates.
The Top 5 Finalists also included:
- Green Scholars - Ethiopia
- Success Tribe - Uganda

Youth Food Lab Incubator Launch

During the award ceremony, partners officially launched the Youth Food Lab Incubator. The incubator will provide winning teams with mentorship, resources, and knowledge-sharing opportunities to further develop their projects.



The launch was led by Sjoukje Heimovaara (Wageningen University & Research), Kazuki Kitaoka (World Food Forum), and Sagar Paudel (International Association of students in Agricultural and related Sciences).

Reflecting on the significance of the incubator, Sjoukje Heimovaara noted, "Partnerships like the Youth Food Lab are vital for empowering the next generation of innovators. By fostering youth-led innovation, we can build sustainable food systems that will benefit communities globally." She also highlighted that the new physical hub of the Youth Food Lab at Wageningen University & Research would serve as a platform for local and international students to access entrepreneurial training and support.

Partners and Collaboration

The Food Systems Innovation Challenge was organized by Wageningen University & Research in collaboration with the Netherlands Food Partnership and supported by partners like the International Association of Students in Agricultural Sciences, World Food Forum, and the Youth Food Lab. Together, they provided students with resources, policy engagement, and financial backing to advance sustainable food system innovations.



Youth Food Lab

Future Beyond the Challenge: The Youth Food Lab

The Food Systems Innovation Challenge 2024 was not just a competition but a launchpad for transformative ideas and initiatives. For the top five teams - **Fruitastic 5** and **Success Tribe** from Uganda, **Eco Grub** from Nepal, **AgroEssential** from Brazil and **Green Scholars** from Ethiopia - the journey did not end here. Their groundbreaking projects have earned them a coveted spot in the **Youth Food Lab Incubator**, a program designed to propel their innovations to the next level.

The **Youth Food Lab** is an incubator program (by WUR, World Food Forum and IAAS) that empowers young changemakers to transform the future of food systems. It bridges the gap between visionary ideas and real-world impact, offering participants tailored mentorship, hands-on workshops, and access to an expansive network of experts and partners. This program is not only a continuation of the work initiated during the challenge but also an opportunity for teams to scale their projects and refine their solutions.

By joining the Youth Food Lab, these top teams will gain unparalleled visibility on the global stage, including the prestigious **World Food Forum** flagship event in October. Through this platform, they will connect with industry leaders, policymakers, and other innovators, broadening the scope of their initiatives and amplifying their potential for impact.

As Sjoukje Heimovaara of Wageningen University & Research highlighted during the Grand Finale, "Partnerships like the Youth Food Lab are vital for empowering the next generation of innovators. By fostering youth-led innovation, we can build sustainable food systems that will benefit communities globally." This sentiment underscores the essence of the Youth Food Lab: nurturing young leaders to drive meaningful change in their local and global food systems.

For Fruitastic 5, Eco Grub, AgroEssential, Success Tribe and Green Scholars the challenge was just the beginning. With the support of the Youth Food Lab, these teams are now poised to transform their ideas into sustainable, scalable solutions, inspiring others to reimagine the possibilities of a resilient and equitable food future.

The jury members

Aline Mugisho
Head of Youth Agripeneurship at the International Institute of Tropical Agriculture

Aline Mugisho is a dynamic leader and the Executive Manager of the Innovative Youth in Agriculture Project (I-Youth). With a wealth of experience in youth empowerment, gender, and migration studies, she brings a global perspective shaped by her work with international organizations like the European Youth Education Centre (EJBW) in Germany and USAID-funded programs. Aline is also pursuing her doctoral studies at the Willy Brandt School of Public Policy, University of Erfurt.

Her academic background includes a Master's in Forced Migration Studies from the University of Witwatersrand and a Bachelor's in Journalism and Communication. Aline has contributed to significant research projects on migration, social cohesion, and governance and has worked extensively in the sub-Saharan and Great Lakes regions of Africa as a journalist, researcher, and activist. Recognized for her work in conflict resolution, education, and community development, Aline continues to advocate for youth and gender inclusion in agriculture and beyond.



Dhanush Dinesh
Clim-Eat

With over a decade of experience across the private sector, NGOs, and international organizations including CGIAR and the UN, Dhanush has worked in countries such as China, India, the Netherlands, Thailand, and the UK. His focus is on fostering a just transition to resilient, low-emission food systems in low- and middle-income countries through innovation, research, and collaboration.

In 2021, he founded Clim-Eat, a unique "think-and-do tank" addressing critical global food systems challenges. As the Executive Director and Chief Climate Catalyst, he leads a diverse team in delivering policy advice, groundbreaking research, and capacity-building initiatives. Equipped with a PhD in Environmental Governance and an impressive portfolio of science-policy engagement publications, he is dedicated to turning knowledge into action to create sustainable, climate-resilient food systems.



Jacobine Mannak
Dsm-firmenich

Jacobine is a seasoned Sustainability Director, and forward-thinking leader committed to creating meaningful societal impact through business innovation and strategic partnerships. Renowned for her optimism, results-driven approach, and focus on the human element, she excels in driving transformative change.

Jacobine's expertise lies in embedding sustainability across all business functions, enabling companies to adapt to market, investor, and NGO expectations while thriving in a competitive landscape. Passionate about food system transformation, she focuses on advancing healthy and sustainable diets, promoting regenerative agriculture, supporting sustainable protein sources, tackling food loss and waste, enhancing livelihoods, and improving food labeling.



Kazuki Kitaoka
World Food Forum

Kazuki brings extensive expertise in diplomacy, international affairs, and UN operations, with a focus on UN reform, economic and social development, environmental sustainability, and responsible investment. A passionate advocate for youth empowerment, he works to advance sustainable policies in food, agriculture, and industrial development while fostering aid effectiveness and corporate social responsibility.

Kazuki's extensive public management experience at the UN spans strategic planning, political outreach, corporate results reporting, and public-private partnerships. Skilled in managing large, interdisciplinary teams and coordinating multilateral conferences, he also excels in digital communications, programme marketing, and professional development for young employees. With a track record of delivering impactful results, he is a visionary leader driving global progress across sectors.





Maaike Groot
East-West Seed

Maaike is the Manager of Public Affairs at East-West Seed, a global leader in tropical vegetable seed production. With a focus on supporting smallholder farmers, she advocates for providing them with better tools and resources to enhance food security and contribute to feeding a growing global population. Maaike actively participates in industry dialogues, such as the World Seed Congress, and is featured in discussions on sustainable agriculture, including the role of seeds in addressing future food challenges. Her work highlights the critical intersection of agriculture, sustainability, and public policy.



Carolijn Gommans
IDH

With over 25 years of experience, Carolijn is a finance professional who has successfully combined investments and grant mechanisms to drive inclusive and sustainable economic growth. Her expertise includes leading and implementing climate and inclusive finance projects for international donors, governments, banks, and major non-profit organizations, often leveraging digital financial services to enhance impact.

Known for her proactive and innovative approach, Carolijn excels at creating solutions that align with the needs of diverse stakeholders. She is an analytical and open-minded leader, who brings exceptional skills in research, capacity building, and project management, along with a proven ability to coordinate multidisciplinary and multicultural teams effectively.



Success Tribe
Makerere University - Uganda

Success Tribe, a team from Makerere University, is tackling tomato waste and improving livelihoods at Busega market through sustainable initiatives. Partnering with local farmers and vendors since April 2024, the team launched Jest Foods, a ketchup production project that addresses processing inefficiencies, quality control, and storage challenges. Feasibility studies revealed issues like inadequate infrastructure and irrigation inefficiencies, prompting renovations to the market facility and training programs to equip vendors with modern processing techniques. These efforts resulted in the production of high-quality products such as tomato paste, sauces, and jams, despite equipment limitations.

The initiative has transformed over 3.2 tons of tomatoes into valuable products, reducing waste and providing steady income for 35 families. Enhanced product quality and packaging have improved market competitiveness, with participation in exhibitions broadening market reach and networks. Infrastructure upgrades, such as repainting walls and installing shelves, have improved working conditions, while financial empowerment initiatives, like savings and loan services, have fostered economic stability for vendors. Success Tribe's efforts have reduced operational costs, diversified revenue streams, and positioned Jest Foods and the market group for growth and certification opportunities.

Despite significant progress, challenges remain, including limited equipment, manual production methods, and certification barriers that restrict access to larger markets. However, the project demonstrates the transformative potential of youth-led innovation in addressing community challenges. The team has gained valuable skills in project management, business operations, and networking, setting the stage for scalability and replication in other markets. By balancing social impact with business goals, Success Tribe is creating a sustainable, equitable food system and paving the way for continued entrepreneurial success in Uganda.





Team members:
Esther Nakimuli
Jackline Catherine Bawaye
George Walusaga
Innocent Magezi



Fruitastic 5
Makerere University - Uganda

Summary of Activities

Success Tribe engaged in a series of activities from April to September 2024 as part of the Food Systems Innovation Challenge, aimed at reducing jackfruit waste and creating a sustainable snack product. The team conducted extensive problem research, revealing significant post-harvest losses of overripe jackfruit that contribute to municipal waste and environmental harm. Early efforts included fruit leather production trials, sensory evaluations, and exhibiting products at events to refine recipes and gather feedback. The team also participated in capacity-building workshops on project planning, business strategy, and communication, which helped them create a structured work plan, secure equipment, and begin full-scale production at Makerere University's Food Technology Business Incubation Center.

To raise awareness and expand market reach, the team actively engaged with the public through social media, exhibitions, and media appearances, such as a feature on NTV Uganda's "Money and Markets." They attended innovation and business workshops, gaining essential entrepreneurial skills, and pitched their product at key events like the Ayute Challenge and MoTIV market. Funding received in June enabled the purchase of necessary production tools, including dehydrators and packaging materials, facilitating the launch of their brand, *Fruitie* Boost. The team's work not only highlighted the product's potential but also built valuable connections with institutions, experts, and potential funders, laying a foundation for future growth.

Achievements and Challenges

Key achievements included developing a complete product recipe, acquiring essential equipment, and receiving business training to transform their project into a viable venture. The brand *Fruitie* Boost gained support from institutions like Makerere University, MoTIV, and Unipod and provided a market for jackfruit vendors by utilizing overripe fruit. The team also showcased their product at high-profile events, gaining visibility and critical feedback from experts and customers. However, challenges persisted, such as obtaining meaningful vendor feedback, finding optimal packaging solutions, and conducting nutritional analysis due to high costs of required chemicals. Despite these hurdles, the initiative made significant strides in reducing food waste while fostering sustainability and entrepreneurship.



Team members:
Tayebwa Mushana Joseph
Naluwooza Sheillah Faith
Nawar Sabah Kitiibwa
Kwagala Joshua
Nakindi Zarkiah Radha



Miraculous Mycelia

Anton de Kom University of Suriname

Suriname produces approximately 265,000 tons of rice annually, generating significant bio-waste, including around 53,000 tons of rice husk, about 20% of the harvest's mass. Aiming to repurpose this bio-waste, a project explored its use as a growth medium for cultivating edible mushrooms and as an organic fertilizer. The substrate for mushroom cultivation was prepared by mixing rice husk, rice bran, gypsum, and water in a specific ratio, sterilized to prevent contamination, and inoculated with grain spawn. This process was carried out in Paramaribo, while the spawning and fruiting stages were monitored in a greenhouse in Saramacca to facilitate community engagement and better management.

Three mushroom species, *Pleurotus djamor, Pleurotus citrinopileatus*, and *Lentinus tigrinus*, were cultivated using 144 substrate bags, each weighing 2.5 kg. During June to August, environmental conditions such as temperature (24–37°C), humidity (50–90%), and CO2 levels were monitored. While the *L. tigrinus* strain showed early spawning and pinhead formation, no significant fruiting was observed across all strains, likely due to factors such as nutrient imbalance, incompatibility with rice husk substrates, and compromised spawn quality. The high silica content in rice husks and the aging of imported grain spawn were identified as key challenges, suggesting a need for locally sourced spawn to improve outcomes.

Despite the lack of successful fruiting, the project tested the spent substrate's potential as an organic fertilizer. Preliminary results indicated positive effects on plant health compared to synthetic fertilizers and no-fertilizer controls, demonstrating less harm and better plant structure. This dual-use approach highlights the potential to reduce bio-waste while contributing to sustainable agriculture, though further refinement in mushroom cultivation and fertilizer testing is necessary for optimal results.

Team members:
Isaiah Saiman
John Vermeer
Chioma Schurman



EntoPro

Anton de Kom University of Suriname

Between April and September, the EntoPro project in Suriname focused on addressing the challenges faced by local poultry farmers due to soaring feed prices, which have increased by 500% from 2020 to 2024. The project aims to recycle market waste and agricultural byproducts into valuable resources such as compost, liquid fertilizer, and nutrient-rich protein meal, using Black Soldier Fly Larvae (BSFL). This innovative approach supports a circular economy by reducing organic waste sent to landfills, lowering feed costs, and promoting environmental sustainability. By introducing BSFL as an alternative animal feed and fertilizer source, EntoPro seeks to empower farmers with knowledge and skills to adopt BSFL farming as a sustainable business model.

Despite its potential, the project faced several challenges, including adverse weather conditions that disrupted operations, infestations from ants and other insects, and difficulties in achieving consistent BSFL size and reproduction. Efforts to cultivate Black Soldier Fly (BSF) in captivity were unsuccessful, leading to insufficient BSFL prepupae for large-scale chicken feed production. These obstacles highlight the need for improved site conditions, pest management strategies, and more efficient cultivation techniques to realize the full potential of BSFL in poultry farming and waste recycling.

The EntoPro project aligns with at least four Sustainable Development Goals (SDGs) by fostering environmental sustainability, promoting economic growth through innovative agricultural practices, and supporting food security. By addressing key challenges in poultry farming and waste management, the initiative offers a model for sustainable development, empowering farmers and reducing environmental impact while contributing to a more resilient agricultural sector in Suriname.



Team members:
Mukhlis Karsodjojo
Ivy Sontowinggolo
Michaël van Leesten
Shaguill Linger
Kirti Baboelal
Hammed Jimoh

PermaVoltaics

Wageningen University & Research - The Netherlands

The PermaVoltaics project is an innovative initiative aimed at transforming food systems through a combination of regenerative agriculture, ecosystem management, and renewable energy solutions. By integrating Agri-PV systems (semi-transparent photovoltaic modules) into landscapes, the project seeks to create biodiverse food forests and accelerate ecosystem restoration while supplying standalone energy hubs to rural communities. The organization employs a steward-ownership model, ensuring its mission remains at the core while enabling investments from local energy consumers. This model supports sustainable development by combining improved growing conditions with energy access, empowering local farmers and businesses with resources like electric water pumps.

The project involved extensive stakeholder engagement and field research to align its efforts with local needs. After consultations with Dutch organizations such as RVO, LNV, and TNO, the team traveled to Kenya to explore their beachhead market. Meetings with entities like the Kenya Climate Innovation Centre, KALRO, and local universities provided valuable insights into funding, partnerships, and local norms. Surveys of 200 rural community members and discussions with local leaders revealed widespread enthusiasm for the initiative, with community members offering land for project development. This groundwork laid the foundation for pilot projects and research collaborations to test the model's feasibility.

Despite significant progress, PermaVoltaics encountered challenges related to communication, cultural differences, and establishing its legal and organizational framework. Online collaboration difficulties and cultural disparities required the team to adapt and establish a unified working approach. The transition to a steward-owned entity presented complexities in legal documentation and non-conventional funding mechanisms, given the absence of traditional venture capital exit strategies. Nevertheless, participation in innovation programs and continued network expansion are helping the team overcome these hurdles, paving the way for a sustainable and community-driven approach to food and energy systems.



Team members:
Pascal Spijker
Cindy Octaviana
Fatima Farrash Khiabani
Haggai Muruka
Rakava Alex Martin

Agroboros
Wageningen University & Research - The Netherlands

Agroboros tackles three pressing global food system challenges: an aging agricultural workforce, unsustainable practices, and the economic struggles of smallholder farmers. Its mission is to educate children aged 3–10 about food systems and agroecology through immersive, hands-on experiences in farms, schools, and public spaces. The program also supports primary school teachers with training and provides smallholder farmers with economic opportunities through participation. By combining education, ecological principles, and community engagement, Agroboros envisions fostering a generation more attuned to sustainable food systems while alleviating farmers' economic pressures.

The pilot phase was launched in Nantes, France, chosen for its conducive socio-cultural environment and strong local networks. The team conducted stakeholder consultations with caregivers, educators, and farmers to identify their needs, which informed the development of a comprehensive curriculum. Agroboros' activities blend principles from Montessori education, agroecology, and systems thinking to create experiences that nurture ecological awareness, emotional intelligence, and collaborative skills. Pilot themes included seed cycles, beneficial insects, and imaginative farm-based storytelling, with partnerships established with urban and rural farms, nonprofits, and schools in the region.

Initial implementation showcased promising results, with positive feedback from participants and strong community interest. However, scheduling challenges and limited outreach reduced attendance at some events, underscoring the need for earlier planning. The initiative plans to refine its program over two years, expanding partnerships, securing government accreditations, and piloting projects in urban farms and schools. Future goals include creating a replicable framework available in multiple languages and offering teacher training programs, ensuring broader reach and long-term sustainability for Agroboros' vision of transforming education and agriculture.



Team members:
Estève Hélias
Daniela Orduz Ramos
Guillem Olle Majo
Sarah Scheid

SugarShakers
University of Abuja - Nigeria

The **Sugar Shakers Team** from the University of Abuja developed an innovative project focused on producing date syrup as a sustainable alternative to refined sugar. By implementing the **Hazard Analysis and Critical Control Points (HACCP)** system, the team aimed to ensure the safe and high-quality production of this natural sweetener while addressing critical issues like ecological sustainability, health-conscious consumption, and food security. This approach promotes planting date palms, which require less water than sugarcane and contribute to reducing land degradation. The project aligns with growing consumer demand for healthier sweetener options and addresses broader concerns such as nutrition, food safety, and environmental impact.

The project was implemented in five key phases between April and September 2024. Initial activities included assembling a HACCP team and conducting market research, which revealed the uniqueness of the product in the local market. Production began in June, adhering strictly to HACCP guidelines, resulting in the first batches of date syrup. In July, safety verification and laboratory analyses identified three optimal date varieties (Dan Agadaz, Zabiya, and Dan Mali) with low sucrose levels. Challenges such as financial constraints, delays in securing laboratory access, and reliance on plastic packaging highlighted areas for future refinement. Despite these limitations, the team achieved significant milestones, including successful pilot production and quality testing.

Community engagement in August was a crucial aspect, raising awareness of date palms' ecological and health benefits and promoting the use of date syrup over refined sugar. These efforts emphasized its potential to combat health issues like obesity and tooth decay while fostering food and water security. The project's conclusion demonstrated the viability of this innovative food system, positioning date syrup as a sustainable and healthier sweetener option that aligns with Nigeria's food security goals and ecological priorities. Future efforts could address unresolved challenges to enhance production and broaden its impact.







Team members:
Gbadebo Abdullahi
Raheem Ganiyu
Peter Ameh
Ololade Royanat
Bello Opeyemi

Sesame Nutrigenius

University of Abuja - Nigeria

The Sesame Pasta project was initiated after being selected as a finalist for the **Food System Innovation Challenge (FSIC) 2024,** with a goal of addressing nutritional and social inclusion challenges. The team focused on creating pasta enriched with sesame seeds (Sesamum indicum) to cater to diabetic individuals and those with special dietary needs while also being suitable for the general population. This innovation aimed to enhance the food system's sustainability by using sesame, a drought-resistant crop, and promoting health-conscious food alternatives. Through collaboration with mentors and participation in workshops, the team developed a unique curly-twist-shaped sesame pasta, emphasizing hygiene and precision during production.

Key achievements included the successful production of sesame pasta, verified through lab analyses and palatability tests, which confirmed its high fiber content and essential nutrients beneficial for growth and metabolism. The team conducted market research, revealing a lack of similar products in the market, confirming their innovation's uniqueness. Efforts in community outreach raised awareness about sesame's health benefits and ecological advantages, promoting its adoption. The product was deemed scalable, feasible, and affordable, with long-term potential to meet rising demand without compromising quality. Its ecological sustainability is a standout feature, given sesame's low water requirements, contributing to water conservation and climate resilience.

Challenges included time constraints that delayed some critical analyses, such as acute toxicity tests and shelf-life studies. Additionally, scaling up production remains a focus area for future exploration. Despite these hurdles, the project demonstrated strong potential as an inclusive, health-promoting, and sustainable food innovation. By addressing market gaps and environmental concerns, the team's sesame pasta offers an innovative contribution to both local and global food systems.



Team members:
Abubakar Barwa
Megan Lolomari Kurere
Juliana Daudu
Oluwakemisola Olayinka Ogunlade
Ismail Afolabi Oyewole





YamNovators
Kathmandu University - Nepal

The Yam Product Development project aimed to address the underutilization of yam in Nepal, particularly within the Chepang community, by creating value-added products like chips, pickles, and flour. Yams, a rich source of nutrients, are a staple for the Chepang people, who face significant challenges such as poverty, isolation, and food insecurity. Despite past initiatives to promote yam cultivation, a lack of market demand limited the economic benefits for these growers. This project sought to diversify yam products, enhance their market appeal, and create economic opportunities, ultimately transforming yam from a subsistence crop to a viable source of income. Activities included experimenting with preservation methods, optimizing product development, conducting consumer taste tests, and engaging in community workshops to share techniques and nutritional insights.

Key achievements included transforming yam into marketable products that generated positive market responses and sales during farmers' market trials, confirming the feasibility of homemade yam-based foods as alternatives to commercial products. Nutritional analyses of the two local yam species, *halo* and *tokaine*, were shared with the community, highlighting their health benefits. The project fostered a mindset shift within the Chepang community, who began to view yam as an income opportunity rather than merely a subsistence crop. Workshops empowered farmers with knowledge about processing techniques and market feedback, inspiring confidence and interest in scaling up production.

Challenges encountered included remote and difficult terrain to access the Chepang community, a limited yam harvest window, and issues like oxidative browning during processing. Despite these obstacles, the project demonstrated the potential of yam as a versatile, nutritious, and economically beneficial crop. The initiative showcased the impact of product innovation and market engagement in enhancing the livelihoods of marginalized communities while promoting healthier, locally sourced food options.

Team members:
Binod Prasad Bhatta
Gorakh Nath Pandey
Akshita Shrestha
Shreya Pathak
Lalit BC





EcoGrub
Kathmandu University - Nepal

EcoGrub is a sustainable poultry farming initiative that focuses on utilizing Black Soldier Fly (BSF) larvae as an affordable and eco-friendly protein supplement in poultry feed. By converting organic waste into high-protein larvae, EcoGrub aims to reduce the cost of traditional poultry feed, making poultry farming more profitable and environmentally sustainable. The project demonstrates the potential of BSF as a viable protein source while also addressing waste management and promoting more sustainable agricultural practices.

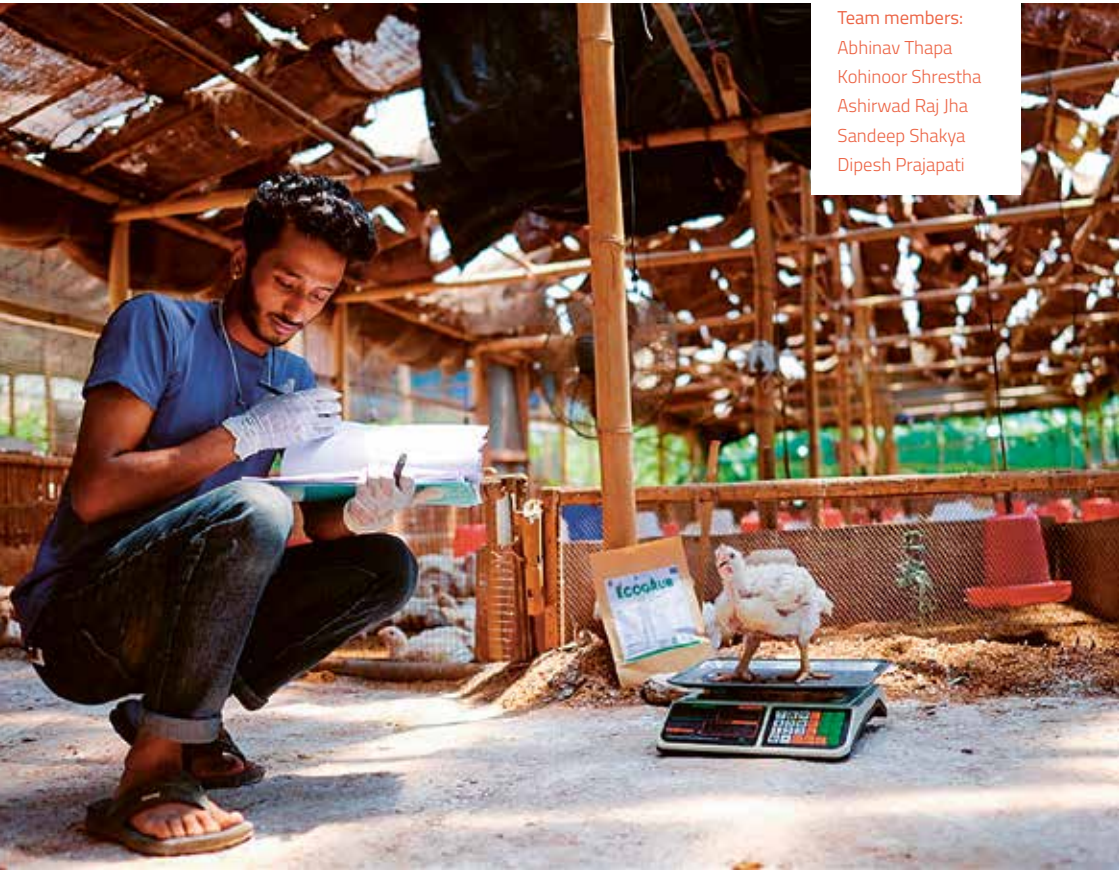
The team carried out various activities, including selecting a site for production, installing a mini-farm for BSF production, and collaborating with local vegetable and meat shops for biodegradable waste collection. They also partnered with poultry farms to test the BSF-based feed. The production process involved buying pre-pupa, breeding BSF adults, and harvesting their eggs to produce larvae. After processing, dried larvae were analyzed for essential nutrients such as lysine, methionine, and calcium, and used in formulating poultry feed. The effectiveness of the feed was tested by comparing the growth of chickens fed EcoGrub feed with those fed traditional feed.

EcoGrub achieved several milestones, such as producing high-quality BSF larvae with notable amino acid content and collaborating with local government to raise awareness about the project. The project garnered attention from media outlets and sparked interest among local poultry farmers, with several farms testing the feed and reporting faster growth in their poultry. The workshop organized by EcoGrub further facilitated discussions on the benefits of BSF as an alternative protein source, leading to an increased willingness among farmers to adopt the product.

The impacts of EcoGrub's work include the provision of high-quality protein, the bio-conversion of organic waste into valuable poultry feed and natural fertilizer (frass), and the conservation of water resources compared to traditional feed sources. The project also contributed to local education and awareness about sustainable farming practices and promoted social inclusion by encouraging participation from a diverse range of farmers. Despite challenges like pests, temperature control, and handling BSF eggs, the initiative successfully highlighted the benefits of BSF in poultry farming and set the foundation for further growth and adoption in the community.







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Dryland Agriculture Innovators

Lukenya University - Kenya

The Dryland Agriculture Innovators team aims to promote resilience in arid and semi-arid regions by addressing challenges faced by farmers in these areas. Recognizing the hardships caused by unreliable rainfall, climate change, and limited water resources, the team focuses on improving food security, economic opportunities, and soil health. With family farms constituting 99% of farming households, the team aims to improve agricultural productivity in these regions through sustainable methods that conserve water and protect soil health. Their innovation, the basin method, is designed to harvest and conserve water from minimal rainfall while promoting healthier soil for crop growth.

The basin method involves creating small basins (50cm by 30cm by 15cm) on farmland, where crops are grown and water is collected. These basins allow for better water percolation, reducing runoff and promoting soil aeration. They are strategically placed to prevent soil erosion, with alternating basins improving the overall effectiveness of the system. This innovation aims to improve farming practices in arid regions, ensuring that farmers can produce crops more efficiently and sustainably, even with limited water resources. The method is simple, easy to implement, and has the potential to significantly improve food production and reduce food insecurity in these areas.

The project involved several key activities, including seedbed preparation, site selection at Lukenya University farm, and the transplantation of collard seedlings into the basins. The team closely monitored the crops by watering them twice a week initially, and then once a week as they matured. A control experiment using traditional farming methods was also conducted for comparison. Throughout the process, the team conducted regular scouting to track progress and address challenges. After 29 days, the team harvested the collard leaves, and the results of the project were shared with the community to promote the adoption of sustainable farming practices.

The project achieved significant milestones, including water conservation, reduced weeding, and improved soil health. The basins allowed for more efficient water use and minimized the need for weeding, while also reducing soil disturbance, thus conserving water. The method proved simple and effective, with community members, especially women farmers, showing great interest in adopting it. However, the team faced challenges such as water scarcity, pest infestations, wildlife damage, and human interference, which occasionally disrupted the project. Despite these issues, the project demonstrated the potential of sustainable farming practices to improve resilience in dryland areas and help mitigate food insecurity.

LUKENYA UNIVERSITY

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Agro Sackpla
Lukenya University - Kenya

AGRO SACKPLA is an innovative urban farming method designed to enhance food security and generate income by repurposing sacks and recycled water bottles. This approach involves planting leafy vegetables in vertical sack farms filled with manure, soil, and a central layer of pebbles, allowing for a higher density of plants compared to traditional horizontal farming. The method helps conserve space, making it ideal for urban areas where arable land is limited. The project was carried out from April to August 2024, with a focus on growing crops like amaranthus, spinach, and collards.

The project involved several key activities, starting with the preparation of nursery beds for different crops, followed by the installation of sack farms. Twenty-five sack farms with a central layer of pebbles were set up, along with five sack farms without pebbles for comparison. Each sack could hold up to 20 seedlings, resulting in a total of 500 plants. After transplanting the seedlings into the sacks, the crops were carefully monitored, watered with recycled water bottles, and treated with organic pest control methods. The harvest, which took place in August 2024, resulted in an average yield of 8 kg per sack for those with pebbles, compared to a lower yield in the sacks without.

The project achieved several notable successes, including income generation through the sale of surplus produce, which was sold to local grocery shops in nearby towns. It also contributed to enhanced nutritional intake by providing access to a variety of leafy vegetables, helping address micronutrient deficiencies. The project also promoted efficient water use through the innovative watering system and helped reduce plastic waste by utilizing recycled bottles. Despite challenges such as water shortages, pests, and clogging of some sacks, the team is working to address these issues in future phases of planting to further optimize the AGRO SACKPLA method.



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Rescue Juice Squad: Cashew Apple Revivalists

University of Ghana

The cashew sub-sector in Ghana plays a vital role in the country's economy, contributing significantly to job creation, food production, and income generation. Ghana is one of the top producers of raw cashew nuts (RCNs) in Africa, with approximately 300,000 farmers engaged in cashew cultivation. Despite the growing importance of cashew in the economy, the by-products, particularly cashew apples, remain largely underutilized. Around 30% of cashew apples go to waste annually, contributing to food loss, revenue loss, and environmental pollution. The limited knowledge on processing techniques and lack of capital for investment are key barriers to the effective use of cashew apples, which could be transformed into valuable products to address food insecurity.

The primary aim of the project is to promote the consumption of cashew apple juice in Ghana, which provides a potential solution to the issues surrounding food waste and food insecurity. The project has specific objectives, including producing and promoting cashew apple juice, training individuals (especially women) in juice preparation, and providing entrepreneurship training for value chain actors. In the course of the project, the team engaged in capacity building through various trainings organized by the University of Wageningen, which enhanced their skills in business planning, project execution, and marketing strategies.

The project was implemented in the Bono East Region of Ghana, following several engagements with key stakeholders in the cashew value chain, including farmers, business advisory centers, and local organizations. The team successfully harvested ripe cashew apples, processed them into juice through a series of steps, and packaged the juice for storage and sale. This process not only added value to the cashew apples but also contributed to creating sustainable, locally produced food options that could be sold to communities, enhancing the local economy.

The project's impact was wide-ranging, contributing to Ghana's food systems transformation pathways in several areas. It promoted food transformation by introducing a low-cost, nutritious beverage that could reduce the reliance on unhealthy, processed foods. Additionally, the project developed postharvest technology based on indigenous knowledge, improving food storage and safety. The production of cashew apple juice also addressed food consumption issues by offering a healthy and affordable product, promoting awareness about nutrition, and supporting cottage industries for fruit processing.

Beyond its economic and nutritional contributions, the project also focused on ecological sustainability, social inclusion, and food security. By reducing agricultural waste

and utilizing cashew apples efficiently, the project minimized environmental harm and supported sustainable farming practices. It also created new opportunities for marginalized groups, particularly women, who were involved in the processing and marketing of the juice. Furthermore, the project contributed to food security by diversifying food sources, reducing post-harvest losses, and improving access to essential nutrients, ultimately enhancing long-term food stability in rural communities.



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DINERA
University of Ghana

DINERA (Do It Now Eat Right Always) is an innovative project that leverages artificial intelligence (AI), blockchain, and community-based strategies to address global food safety and security issues. Its central platform focuses on analyzing food sources, enhancing food preservation, and improving food safety from production to consumption. By utilizing cutting-edge technologies, DINERA aims to reduce postharvest losses, promote sustainable packaging, and reduce hunger. The platform also seeks to improve food safety, particularly in urban and street food settings, by ensuring better traceability and transparency within the food supply chain.

The initiative aligns with global goals such as Zero Hunger and Good Health and Well-being, and supports national food systems pathways in Ghana. The project is particularly focused on ensuring food security and enhancing food safety in Ghana, working in collaboration with stakeholders like the Food and Drug Authority (FDA) and the University of Ghana's Department of Agricultural Economics and Agribusiness. With AI analyzing food safety data and blockchain ensuring the traceability of food products, the platform seeks to provide reliable information on safe food sources and vending locations, beginning in Accra and extending to other areas in Ghana.

Throughout its development, DINERA has made significant progress, including launching a beta version of its platform, publishing articles to raise awareness, and forming key partnerships with government and academic institutions. Despite challenges in data collection for AI model development, the integration of blockchain technology in rural areas, and the complexity of fostering collaborations across sectors, DINERA has continued to adapt and innovate. The team is focused on deploying the platform on the University of Ghana campus and later expanding to the streets of Accra, gathering real-time user feedback to ensure the platform effectively meets local needs and contributes to food safety and security in the region.

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The Green Scholars

Wollo University - Ethiopia

The project in Dessie City, Ethiopia, aims to address the challenges of malnutrition and educational shortcomings among children and adolescents. Many young people in the region suffer from undernutrition, with high rates of stunting, underweight, and wasting, while also facing educational challenges such as a high dropout rate and a theoretical learning approach. Furthermore, the lack of knowledge about proper food preparation leads to nutrient loss in vegetables due to prolonged cooking at high temperatures. To combat these issues, the project promotes the establishment of organic school gardens at Tigle Fire primary and Hotie secondary schools, with the goal of expanding to households across the city. The initiative intends to improve access to nutritious food, raise awareness about agriculture, and promote healthier eating habits.

The project's implementation involved several key phases, beginning with preparation, where stakeholders such as local authorities, schools, and universities were engaged. After selecting suitable locations for the gardens, both vertical and horizontal organic gardens were established. These gardens featured a variety of vegetables and cereals, and were built using locally available materials, promoting waste management and sustainability. Alongside the gardening efforts, training and awareness campaigns were conducted, including educational sessions on the nutritional value of organic gardening and the importance of dietary diversity. The project also used creative methods like theatrical performances to engage the community and promote the benefits of healthy eating and gardening.

In addition to its nutritional and educational goals, the project made contributions to Ethiopia's food systems pathways. It addressed food security by providing safe, affordable, and nutritious food, promoted sustainable consumption by increasing dietary diversity, and supported nature-positive production practices through organic farming methods. The project also aimed to foster economic resilience by encouraging localized food systems and creating new market opportunities. Challenges such as bureaucratic delays, budget constraints, and workload issues were encountered but were mitigated through ongoing discussions and solutions. The project is expected to have lasting impacts on the health, education, and economic well-being of the community, with plans for further expansion and sustainability through continued stakeholder involvement.



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KOCHAGRI

Wollo University - Ethiopia

The Solar-Powered Multipurpose Agricultural Intelligent Field Robot is a project developed by Wollo University students to address the challenges faced by small-scale farmers in Ethiopia. The robot is designed to automate essential farming tasks such as plowing, seeding, pesticide application, and soil analysis, using solar energy for sustainability. The project integrates machine learning for precision agriculture, allowing the robot to adapt to different soil conditions, adjust seeding depth, and monitor water levels for irrigation. The goal is to improve agricultural productivity, sustainability, and precision while reducing the environmental impact of traditional farming methods.

The development of the robot began in April 2024, starting with the design phase and progressing to prototyping by May. Initial challenges included sourcing advanced sensors for tasks like soil detection and adaptive navigation, as the local market did not carry the required materials. Despite these difficulties, the team used locally available alternatives to test the system. By June, they integrated machine learning algorithms to optimize field operations, and by July and August, they began field testing the robot. While the robot performed well under optimal conditions, issues with GPS accuracy and sensor reliability in remote areas presented challenges that required ongoing refinement.

By mid-August 2024, the team successfully developed a working prototype that can perform key agricultural tasks powered entirely by solar energy. This robot introduces precision agriculture to small-scale farmers by optimizing resource usage, which can lead to higher yields and reduced environmental impact. The project has the potential to empower rural farmers by automating labor-intensive tasks, lowering reliance on costly fuel and electricity, and improving livelihoods. Despite facing challenges such as sourcing advanced components, financial constraints, and balancing academic responsibilities, the team plans to enhance the robot's capabilities and collaborate with agricultural cooperatives and the Ministry of Agriculture to bring the technology to market in the future.


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Women Feeding Cities

Esalq/USP - Brazil

The "Women Feeding Cities" project, launched in April 2024, aimed to empower women through urban agriculture by teaching them farming, financial management, and social entrepreneurship. The project began with administrative processes, including establishing partnerships with municipal departments and selecting land for the garden. In May, the first meetings were held with participants, and tools, seedlings, and land preparation activities were carried out. Agricultural training began as planting commenced. Over the following months, the project expanded its activities to include additional training on food insecurity, gender inequality, and financial management, culminating in harvesting and selling vegetables by September. Alongside these activities, a "Women, strength, beauty and life" campaign was launched to empower women beyond traditional roles.

The project has yielded significant achievements, with over 95% of the participants reporting increased self-confidence and independence from abusive relationships. Many women have achieved financial autonomy by generating income from the sale of vegetables, aided by training in financial and administrative management. The project also contributed to food security by providing fresh, nutritious produce, reducing dependence on processed foods, and improving overall health. Additionally, the project strengthened community ties, with women gaining respect and participating in decision-making processes. The project's success attracted attention from local authorities and other cities, showcasing urban agriculture as a viable solution to food insecurity and unemployment.

Despite its successes, the project faced several challenges. Financial constraints were a major issue, limiting the ability to scale the project as desired. The team had to prioritize expenditures and make cost-saving adjustments. Additionally, some interpersonal conflicts arose among participants due to their difficult backgrounds, but these were addressed through the project's methodology, which fostered collaboration and created a safe space. The large scale of the project also led to work overload, requiring the recruitment of more women to help with management. The project's recognition and growth were fueled by its strong social media presence, connecting with a wide network of supporters, potential partners, and individuals interested in urban farming.

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AgroEssentials
Esalq/USP - Brazil

The project aimed to address global hunger and poverty by enhancing food production and nutrition through innovative, sustainable methods. It focused on using essential oils, specifically D-limonene from citrus peels and Monkey Pepper oil from the Amazon, to naturally increase carotenoid and chlorophyll levels in plants. These oils, known for their pest control properties, were selected to improve plant nutritional value while offering an eco-friendly alternative to harmful chemical pesticides. The project targeted smallholder farmers in Acre and Amazonas, Brazil, aiming to improve global nutrition and promote local economic development by cultivating native plants and enhancing rural livelihoods.

The project tested the effects of D-limonene and Monkey Pepper oil on two plant species: biquinho pepper and sour begonia. Both plants were subjected to various concentrations of the essential oils, with results indicating increased chlorophyll content in both species and a significant rise in carotenoid levels in begonias. The experiment, conducted in controlled conditions with fertigation and weekly oil applications, demonstrated the potential of these oils to improve plant health, enhance nutritional profiles, and provide a natural pest control solution. Although the cold temperatures hindered fruit production in the biquinho pepper plants, the results from begonias confirmed the oils' beneficial effects on plant nutrition and pest management.

The project achieved several key impacts, including enhanced plant nutrition through increased carotenoids and chlorophyll, contributing to better human health. The essential oils also served as effective, low-toxicity pest control agents, promoting sustainable farming practices. However, the project faced challenges such as climatic constraints, which prevented fruit production in the pepper plants, limiting some aspects of the study. Despite this, the results suggest that essential oils, particularly Monkey Pepper oil, offer a promising approach for improving food quality and supporting sustainable agriculture. Future research should explore broader applications of these oils to optimize agricultural practices and expand their benefits in diverse settings.



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The role of the partner universities is crucial in inspiring the next generation of changemakers dedicated to transforming food systems. We appreciate your commitment and look forward to working together to ensure the continued success of this initiative.

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The organizers of the 2024 Food Systems Innovation Challenge

WUR Student Challenges

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