

KIRDI NEWSLETTER

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**KENYA INDUSTRIAL RESEARCH
& DEVELOPMENT INSTITUTE**

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MSME SUCCESS STORIES

1. Bloom to Bag: Harnessing water Hyacinth for sustainable planting
2. Clean cooking: Reducing emissions with KIRDI's Gastov innovation
3. Keddie Botanics: Cultivating Health and Sustainability Through Herbal Teas.
4. gDIH: Pioneering Kenya's Digital and Green Revolution.

ABOUT KIRDI

The Kenya Industrial Research and Development Institute (KIRDI), is a public research institute under the Ministry of Investments, Trade and Industry. The Institute was established in 1942, by the British colonial government, initially as a central laboratory at Kabete, Nairobi, to promote industrial development. This laboratory was administered by the Kenya Industrial Management Board (KIMBO).

KIRDI's mandate is to undertake research, development and innovation in industrial and allied technologies and disseminate research findings to support industrial development.





Bio-plastic potting bags made from water hyacinth

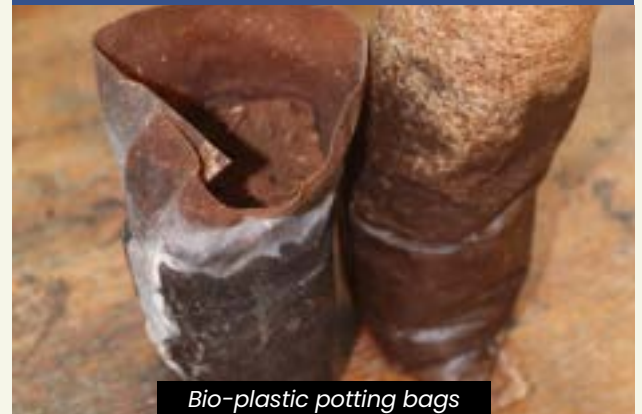
“With the support and guidance of KIRDI researchers, my idea has flourished. Access to modern machinery and equipment has streamlined the production process, significantly reducing production costs by 50%”, he said. Collaborating closely with KIRDI, Joseph ensures that the bio-plastic potting bags meet the highest standards of quality and effectiveness.

KIRDI is the ultimate destination for startups seeking to expand their horizons and connect with like-minded entrepreneurs. Here, one has the opportunity to share and exchange valuable insights that will take their business to the next level.

1. BLOOM TO BAG HARNESSING WATER HYACINTH FOR SUSTAINABLE PLANTING

Joseph Nguthiru, a Civil Engineering graduate in Water and Environment from Egerton University (2022), is a shining example of the innovative spirit fostered at the Kenya Industrial Research and Development Institute (KIRDI). As one of our Micro, Small, and Medium Enterprises (MSMEs) incubatee, Joseph envisioned the HyaPak project—a venture aimed at producing bio-plastic potting bags from water hyacinth, turning an environmental nuisance into a sustainable solution.

He embarked on this remarkable journey, beginning with a simple trip to Lake Naivasha. Stuck for nearly five hours at the lake due to the notorious water hyacinth, his encounter with this invasive plant sparked the groundbreaking idea of turning it into bio-plastic potting bags.



Bio-plastic potting bags



Samples of bio-plastic potting bags with plants

“Transforming challenges into opportunities, innovation knows no bounds when driven by a passion for sustainability and a commitment to positive change.”

2. CLEAN COOKING: REDUCING EMISSIONS WITH KIRDI'S GASTOVE INNOVATION

KIRDI's Environmental Sustainability and Climate Change Research Centre (ESCC-RC) has been working towards developing innovative solutions to address environmental issues and promote sustainable development. One such solution is the Gastov technology, which has been developed for clean cookstoves.

The Gastov technology involves a unique process of burning wood in a limited air supply to produce charcoal that can be further used as cooking fuel. This process makes it highly efficient in terms of wood consumption, saving around four to five times the amount of wood or biomass consumed by traditional open-fire cooking methods.

Driven by the desire to reduce harmful emissions like carbon monoxide, it was developed with guidance from the Environmental Protection Agency (EPA) and adheres to ISO and WHO standards.

The Gastov comes in four models—206, 212, 310, and 412—each designed for specific fuel capacities and climate conditions. Its flexibility sets it apart; it can be adapted to different energy sources, including wood, briquettes, and even sugar cane waste. The stove's natural draft design ensures efficient performance with low connectivity requirements.

Compared to other stoves, it excels in efficiency and emission reduction, thus making it a valuable tool in combating climate change.

KIRDI's Gastov technology stands out as an example of innovation in the quest for sustainable development and environmental conservation.



From left to right: the four models of Gastov; 412, 310, 206, and 212 respectively



Keddie Botanics Organic Tea

Keddie Botanics' herbal teas are crafted from unique blends to maximize health benefits, appealing to health-conscious consumers.

"We are committed to championing a healthier, more natural lifestyle, aligning with Sustainable Development Goals 1, 2, 3, and 12; Poverty Reduction, Sustainable Agriculture, Good Health, and Well-being, and Responsible Consumption and Production respectively," she says.



Keddie Botanics Organic Tea blended with cinnamon

3. KEDDIE BOTANICS: CULTIVATING HEALTH AND SUSTAINABILITY THROUGH HERBAL TEAS

Keddy Grace, owner of Keddie Botanics, is one of KIRDIs MSMEs incubated at the Food Technology Research Centre (FT-RC), and a Chemistry graduate from the Catholic University of Eastern Africa.

Keddie has managed to put up an agro-processing company that specializes in herbal teas. "Our core product currently is Organic Guava Tea and blended Organic Guava Tea with Cinnamon, both natural and free from preservatives or additives. These teas offer a healthy alternative to caffeinated beverages."

Keddie says starting up the business was quite challenging due to a lack of processing equipment and technical skills, but coming to KIRDI was a game changer for her as she received quality training, capacity building, access to machinery to enable pre and post-production, and the assurance of her product meeting the quality standards and regulatory requirements for processing.

Her business sources its raw materials locally, supporting local agriculture and reducing transportation emissions. This allows them to ensure the freshness and quality of their ingredients while fostering community growth.



Keddie Botanics Guava Tea products

"Through perseverance and innovation, we can turn challenges into opportunities, creating a positive impact on health, communities, and the environment."

4. GDIH: PIONEERING KENYA'S DIGITAL AND GREEN REVOLUTION

The Kenya Green and Digital Innovation Hub (gDIH) is partnering with KIRDI to envision a one-stop shop that will contribute to the digital transformation of Kenyan enterprises while promoting sustainable development, circular economy, environmental protection, and tackling climate change. As a key partner, KIRDI has utilized its modern maturity assessment tools to evaluate the viability and readiness of various technologies before investment.

KIRDI's core contributions have been in testing, piloting, and demonstration. These facilities have provided invaluable opportunities to test new technologies in real-world settings, identifying potential challenges and developing effective solutions.



KIRDI staff planting trees at Konza City, Machakos County

KIRDI has been instrumental in knowledge sharing and technology transfer. Through workshops, seminars, and collaboration with other institutions, KIRDI has facilitated the dissemination of knowledge and the transfer of technology, ensuring that the benefits of the gDIH project reach a wide audience.

In addition to its technical contributions, KIRDI has also played a key role in regulatory compliance. By ensuring that all technologies meet the necessary standards, KIRDI has helped to create a conducive environment for investment and growth in the digital innovation sector.



TEST BEFORE INVEST

1. Maturity assessment tools
2. Testing, piloting and demonstration facilities and services
3. Knowledge sharing and technology transfer.
4. Regulatory compliance.



KIRDI staff in a gDIH meeting at Konza City

"Together, through innovation and collaboration, we can build a sustainable future, where technology serves as a catalyst for positive change and environmental stewardship."

5. GUT HEALTH: YOU GET THE GUT YOU DESERVE

In the words of Paul O'Toole, "the gut is like a canary in the coal mine", it is like a bioreactor within us, whose composition is shaped by diet, disease, antibiotic use, and our lifestyle. It plays a critical role in protecting us against disease and supporting general wellbeing, yet what I love most about it is its ability to be manipulated to improve health outcomes.

Despite modern-day consumers' awareness of their diet, many foods on the shelves are ultra-processed, with complex ingredient lists that are difficult to decipher. Moreover, we often overlook the importance of the organ where digestion occurs. As Giulia Enders puts it, it's like trying to understand the magic show while being hesitant about the magician due to his appearance.

The gut, about 40 times the size of our skin, houses trillions of bacteria, viruses, fungi, immune cells, and various hormones, collectively known as the microbiome. We are born without these microbes, and they colonize our guts after birth. Around 70% of our immune system resides in our gut, and there's a possibility that our genetic makeup could be 99% microbial, and it is unique to everyone, similar to a fingerprint.

Contrary to popular belief, it's not just the brain that controls bodily functions; there's a bidirectional communication between the brain and gut through neural pathways. In stressful situations, for example, this connection prompts the gut to conserve energy, often leading to manifestations like nervous vomiting or diarrhea. This highlights the gut's advisory role to the brain, owing to its sensory prominence.

While microbial research often focuses on pathogenic entities, a vast majority (95%) of bacteria coexisting with us are either benign or beneficial. They play a crucial role in gut health, weight management, immune modulation, and mental well-being. Therefore, gut cleansing should be a delicate balance of beneficial and potentially harmful microbes to maintain a robust gut and a vigilant immune system.

Various factors, including environmental influences, medication intake, birth methods, lifestyle, and diet, shape the gut microbiota. Among these, dietary choices have a significant impact, with fiber-rich foods serving as optimal fuel for gut bacteria. The composition of the gut microbiota can change in just 24 hours based on dietary intake.

Dietary patterns significantly impact microbial diversity, with minimally processed, polyphenol-rich foods fostering bacterial abundance, while high-fat,



sugary foods correlate with diminished diversity. Supplementing with probiotics, found abundantly in fermented foods like yogurt, sauerkraut, and kombucha, and even the traditional ones like *mursik* and *amabere amaruranu* (from the Kalenjin and Abagusii tribes in Kenya) augments microbial diversity and function.

The future is looking to have targeted approaches to our microbiome, to prevent most problems before they start. Faecal Microbiota Transplantation is the first FDA approved therapy involving the gut microbiome. It is emerging as a promising intervention for recalcitrant infections like *Clostridium difficile* infection (CDI) showing a remarkable efficacy of up to 90% restoration of microbial equilibrium and ameliorating symptoms. Studies are now underway for other conditions like (MRSA) Methicillin Resistant *Staphylococcus Aureus* and Autism Spectrum Disorder (ASD). Moreover, pioneering research endeavours, such as Dr. Khalil Ramadi's development of electric pills delivering "bionudges" to the gut, illuminate innovative strategies to modulate gut physiology, akin to the effects of sugar on our systems.

When it comes to gut health, understanding the interplay between diet, lifestyle, and microbial ecology showing a huge potential for transformative interventions. From dietary choices that fuel microbial diversity to cutting-edge innovations like electric pills and faecal microbiota transplantation, the narrative of gut health is one of empowerment—a testament to our ability to harness the microbiome for optimal health outcomes. We need not only unlock the mysteries of the gut but also redefine the boundaries of preventive and therapeutic healthcare practices. The good news is we have the power to fire up our microbiome and we can trust our gut to keep us safe!

**By Ms. Okiko Getrude,
Senior Research Scientist.**

PICTORIALS

FOOD TECH & AGRO-PROCESSING



LEATHER & TEXTILE



PICTORIALS

ENGINEERING (MECHANICAL & CHEMICAL)



ENERGY (ESCC-RC)



PICTORIALS

EVENTS



Kenya Loop Forum Expo 2024



Visit by Jacobs Ladder Africa



Celebrating International Womens Day



KIRDI Team with members of gDIH Consortium at KONZA



Tree planting at KONZA



KIRDI Team meeting with Growth Africa

Vision

Quality industrial research for
competitive and sustainable
industries

Core Values

Integrity – Sustainability – Team work
– Creativity – Customer focus



Mission

Provide innovative technologies for
industry through research and
dissemination of findings

Motto

Research – Innovate – Commercialize

Contact Us:

P.O BOX 30650–00100, NAIROBI, KENYA



**+254 20 23 88 216
+254 20 23 93 466**



kirdi.kenya



0724 214 092



@kirdi_kenya



www.kirdi.go.ke



kirdi kenya



directorgeneral@kirdi.go.ke



kirdi_kenya

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