

Japan leading the way in agro-innovation

Climate change, environmental degradation and population growth have presented unprecedented challenges for the global agriculture industry. With the world's population set to reach 9.3 billion by 2050, the UN says that food production must increase by 60% in that time. But to do so without destroying an already-fragile planet and its ecosystems, the productivity, efficiency, and sustainability of agricultural practices need to be rapidly improved. Leveraging their capabilities in manufacturing, technology and innovation, Japanese companies are poised to play an important role in addressing this monumental global challenge.

"As a countermeasure to the issues of a growing global population and shortage of food, we are providing and developing new technologies. Particularly in the areas of Asia and Africa, there will be a population boom and the shortage of food will be a major issue there, so these areas will certainly be the focus of our business," says Kazuhisa Matsumoto, President

of Satake Corporation, a leading manufacturer of grain processing systems. "Our R&D focus currently expands to pre-harvesting in order to fully optimize productivity and efficiency, as well as maximizing product quality. Providing such information to farmers is crucial to efficiently grow quality crops and to ensure maximum quality and yield and contribute to solving food issues globally."

The R&D of Kakuichi, meanwhile, has focused on the development of nanobubble technology that will help to solve environmental, soil, and water problems that agriculture will face on a global scale over the coming decades. "We would like to spread this technology around the world to solve the food crisis caused by population growth and environmental pollution as much as possible and to pass the future to the next generation in a good condition," states president Riu Tanaka. "Nanobubble technology is a hidden technology that goes beyond agriculture to solve environmental and social problems. That is why we

want to find a partner with whom we can expand all over the world."

A manufacturer of fermentation machinery for fermented food products such as soy sauce, miso, sake and shochu, Fujiwara, with more than 10% of its employees engaged in R&D, is conducting 12 different projects in the cross-culture biotechnology and engineering technology field as part of its 2050 Vision development plan. "One of our main themes is to develop a sustainable food supply system. In the process of food production, tons of by-products are produced and they almost always go to waste," explains president Keiko Fujiwara. "But we look at these by-products as valid food materials, and with our well-known solid-state fermentation technology using microbes, we are trying to develop these by-products into new materials, food, and feed ingredients that are highly functional and nutritious."

With its main business being machinery for forestry, CHIKUSUI CANYCOM is also supporting the green energy industry with its



Kazuhisa Matsumoto,
President, Satake Corporation

equipment for the growth of crops used for biofuels, such as corn. "Our sprinkler system produces more reliable crop yields than drip irrigation systems," says president Yoshimitsu Kaneyuki. "Of course, a sprinkler system sounds quite simple in nature, but obviously, that is followed up with a lot of types of machinery that compliments the entire process of corn harvesting."

By combining Japanese *monozukuri* with agro-innovation, Nippon firms will help to sow the seeds of the green agricultural revolution worldwide over the coming decades.

CANYCOM: the definition of reliability

From agriculture and forestry to construction, CANYCOM's high-quality products are getting the job done in a range of fields.



Japanese firm CANYCOM has built its reputation by creating high-quality products in the fields of brush cutting, agriculture, construction, and forestry inspired by its surroundings in Fukuoka prefecture.

Founded in 1948, the company has grown into an international firm with sales in over 50 countries while retaining a local feel. The development has been driven by CANYCOM's focus on quality, an example of which is

"Creating niche markets allows us to cross borders beyond Japan and increase export output to overseas markets."

Yoshimitsu Kaneyuki,
President,
CHIKUSUI CANYCOM, INC.



its radio-controlled brush cutter specialized in tilting. Deriving from Japan's mountainous terrain, the cutter specializes in functioning on steep slopes with 40-degree gradients, while the radio-controlled transmitter allows for a communication range of up to 100 meters for 20 hours.

The company's forestry products are centered around the mechanization of weeding and logging in afforestation, a novel approach with a focus on planting young trees. This fits

into CANYCOM's overall dedication to pushing the green revolution, especially in the field of biofuels. As company president Yoshimitsu Kaneyuki says: "Bio-fuels are becoming necessities around the world right now." CANYCOM is focusing on introducing its machinery



in areas where it can be used with biofuel crops, such as its drip irrigation systems which improves yield reliability for corn.



This is indicative of the Japanese firm's dedication to value-added products rather than mass production, as Mr. Kaneyuki explains: "Creating niche markets allows us to cross the boundaries beyond Japan and export increased output to overseas markets."

As this expansion develops, the company will continue to recruit from the local population – offering an innovative path into the agriculture sector — and use its surroundings to inspire products that take agriculture, construction, and forestry into the future.

CANYCOM
www.canycom.jp

Revolutionizing agriculture with nanobubble technology: Kakuichi's sustainability roadmap

Nanobubble technology originated in Japan, and Kakuichi is the most experienced Nippon company in introducing and validating nanobubble technology to the agricultural sector.

Agriculture has been a critical part of human civilization since its inception. However, a never-ending need for higher yields and greater productivity to fuel a fast growing global population has led to an alarming increase in soil degradation, as stated in a report by the U.N. Food and Agriculture Organization. This leaves us in a position where a pursuit of productivity is impacted by the degradation that it caused. Furthermore, even if farmers try to improve the soil after it is too late, it will take several decades to regenerate the soil's strength. Therefore, it is crucial to find sustainable solutions that can maintain and even improve the soil while increasing productivity.



Nanobubble generator

This is where Kakuichi, and current president Riu Tanaka, come in. The company has made significant strides in the field of nanobubbles in agriculture through its collaboration with universities and specialized institutions. This research has provided valuable knowledge and know-how that can contribute to solving environmental, soil, and water problems that agriculture will face on a global scale in the next half-century. Kakuichi believes that if the ratio of organic farming can be increased slightly above the current level, and productivity can be raised, deterioration can be slowed down significantly, a clear solution for sustainable agriculture.

The Nanobubble Generator is certainly one of Kakuichi's

"My ambition is to create a society where each one of us can shine."

Riu Tanaka, President,
KAKUICHI CO., LTD.



most innovative solutions to date. It generates nanobubbles containing gas that are added to the water, providing effects that cannot be obtained with conventional water. Additionally, Kakuichi's system allows for the gas to be changed as well as the concentration of gas to be adjusted according to the application, making them more effective than other companies' nanobubble technologies, which only break down the gasses in the water. The generator can be directly integrated into existing agricultural greenhouse piping, making it a cost-effective solution for farmers.



Patented nozzle

"By simply reducing the size of the bubbles, filling them with oxygen, and irrigating them, it is possible to suppress soil deterioration and improve agricultural productivity," Mr. Tanaka explains.

"Kakuichi oxygen nanobubbles increase the oxygen concentration in the soil, which then remain for a longer period of time, activating soil microorganisms and increasing the speed of absorption of organic fertilizers. This makes trees healthier by improving their rooting and absorption. As a result, trees become less susceptible to disease, which leads

to reduced labor costs associated with pest control."

In addition, it has been discovered that when oxygen nanobubble water is irrigated into black loam soil, aluminum becomes less ionized. Phosphoric acid in the soil is rapidly fixed with aluminum, making it difficult for plants to absorb it. Therefore, by suppressing fixation, the effective use of expensive fertilizers can be achieved. It has also been confirmed that by distributing tiny water particles throughout the soil, phosphoric acid fixed in the soil becomes more soluble, and there have been cases where fertilizers can be used more effectively.

Since 2016, Kakuichi has been introducing nanobubble generators to small-scale agricultural producers in Japan. "We first introduced the devices to 120 farmers, and 80% of them recognized the positive changes. The device was then improved based on user feedback, and the nanobubble generators were



Off-grid NB generation from solar panels

further disseminated to 1,200 agricultural producers nationwide," adds Mr. Tanaka.

"Sensors were installed in each field to collect a large amount of data, and the challenge was to implement AI



Knowledge sharing at Kakuichi site

to irrigate strawberries with nanobubbles. However, due to the many variables in agriculture, we have struggled to get the AI to learn. But through many failures and unexpected discoveries, we are evolving.

"Therefore, we delved deeper into the data of individual top-runner producers and collaborated with universities and specialized institutions to verify the data. As a result, we were able to accumulate more detailed data. When we shared this data with other farmers, we were able to obtain new information. We value the sharing of knowledge."

By creating this cycle, Kakuichi, together with farmers, has made great strides in the development of nanobubble technology in the agricultural sector, with the company having already obtained patents for its devices and efficacy in 13 countries.

"We have technology that may solve the world's food and environmental problems," says Mr. Tanaka. "That is why we want to spread this technology throughout the world. The era in which things sell just because a product is good is over. We believe that we must grow together with our partners and solve the world's problems by providing products together with services, information, and data."

KAKUICHI

www.kaku-ichi.co.jp/aqua/en

Agrochemicals for safe and secure food production

SDS Biotech is formulating a business plan for global expansion as the Japanese firm looks to help provide the world with food security through its innovative pesticides.



"Amid the limits on expanding farmland, it is essential to increase the productivity of existing agricultural land."

Toru Abe, President & Representative Director, SDS Biotech K.K.

Established in 1968, SDS Biotech K.K. is a research and development-oriented agrochemicals company focused on creating effective, safe, and eco-friendly products. Its active substances are widely used in various agricultural fields, supporting farming in Japan and overseas. Having merged with Idemitsu Kosan Agri-bio

Department in 2022, the company now aims to expand its overseas business with its unique products.

Benzobicyclon, a groundbreaking rice herbicide, is a prime example. It offers a unique weed control mechanism and is widely used for resistant weed management in paddy rice fields across many countries. SDS Biotech developed and commercialized benzobicyclon, gaining approval in Japan in 2001, followed by registrations in South Korea, the USA, China, Colombia, Turkey, and



Benzobicyclon-treated paddy in background

Uzbekistan. Efforts are underway to register it in the Southern EU and South America. Benzobicyclon customization continues, with the optimization of application methods



Feed containing CNSL ©ASAGIRI MAPLE FARM

including drone application, chemigation, and new formulation types. Recent research also revealed its ability to suppress the growth of problematic weeds, further driving demand.

By harnessing the power of cashew nut shell extract (CNSE), which is developed by Idemitsu, SDS Biotech now has a functional feed additive for livestock, with components that support rumen function by controlling certain microbes. Feeding CNSE



Avanza with active ingredient benzobicyclon ©GOWAN

material to livestock enhances milk production, reproductive rates, and body size in beef cattle, while suppressing methane production, a significant greenhouse gas. Testing is underway with plans to launch in various countries, with the aim of improving cattle productivity while reducing environmental impact.

By expanding overseas, SDS Biotech aims to attract new clients focusing on customization, localized application methods, and continuous optimization, ensuring tailored solutions for farmers and livestock producers worldwide. The company is dedicated to revolutionizing agriculture and becoming a global leader in sustainable farming practices.

As company president Toru Abe says, "I want us to contribute more on global issues."

SDS Biotech K.K.
www.sdsbio.co.jp/english

Preserving tradition, automating excellence

Yoshiizumi Industry Corporation provides cutting edge food preparation machinery that ensures Japanese top quality, and is looking forward to sharing it with the world.



"As we continue to pursue automation in the food industry, we want to contribute to the industrialization of the production of good food."

Keieki Sasaki, President, Yoshiizumi Industry Corporation

Founded in 1955, Yoshiizumi Industry Corporation has a unique approach to culinary production, and is committed to preserving Japan's food culture, combining tradition with advanced technology.

"For the last 20 years Japan has been known for mass production," says company president Keieki Sasaki. "However, since the bubble burst, we have handed that crown to other countries like China and Vietnam."



Salmon cut with YS-3100XD

The company recognizes the need to shift focus from volume to quality and the methodology of *washoku* focuses on manual cooking with automated methods using its technology, while also preserving Japan's food culture and craftsmanship.

"In Japan, they are able to cut the fish into precise weights and then prepare it in a way that brings

out its unique characteristics," the president explains, highlighting the diversity in the nation's cuisine. "We are trying to automate this using our machines."

Tradition is one thing, but digital technologies, including AI capabilities, have taken hold and is something that Mr. Sasaki is embracing.



YS-3100XD Screen

"It is easier to improve AI technology for the mass production automotive sector," he says, "but for the food industry we are developing in-house AI to, for example, identify the core



Yoshiizumi group photo of a vegetable, where machines can struggle."

With thoughts on the company's aspirations for expansion, the idea is to target countries with a higher income, where customers are willing to pay a premium for outstanding quality.

"We are eager to expand to the United States as soon as possible and deliver our delicious food there," says Mr. Sasaki. "Our goal is to become one of the top ten companies in the world, if not the best, developing better machines, naturally leading us to success in the global market."

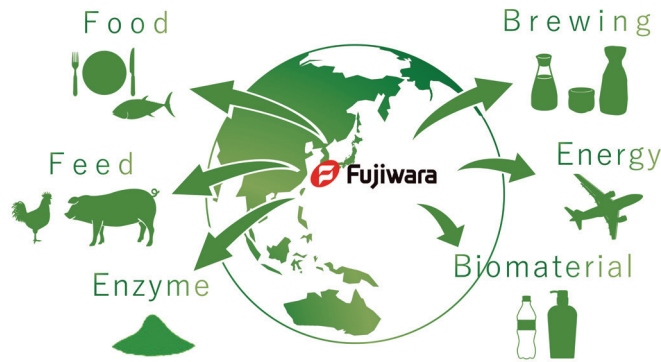
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Fujiwara Techno-Art: At the forefront of innovation in the microorganism industry

As a pioneer in solid-state fermentation technology, Fujiwara is looking forward to global partnerships to unleash the latent potential of microorganisms.

A company that this year celebrates its 90th anniversary, Fujiwara Techno-Art is a world-class manufacturer of the fermentation machinery behind fermented food products such as soy sauce, miso, sake and shochu. Now, as it looks to the future, the Japanese firm is out to take its leading-edge technology into new fields.

Fujiwara's equipment is crafted with a degree of expertise, and a commitment to quality, that sets it apart. "Compared to our competitors in Asia, our machines are more expensive – but our customers understand



"We want to foster a circular society for a sustainable, happier future."

Kana Fujiwara, Vice President (left), Keiko Fujiwara, President (right), Fujiwara Techno-Art Co., Ltd.



www.fujiwara-jp.com



Laboratory

our value," says President Keiko Fujiwara. "Our machines enable high productivity of consistently top-quality products, and we also provide careful follow-up services for a better long-term use of our machines. In the long term, our customers will come to realize that our machines fulfill low-cost production."

Key to the creation of fermented food products is the cultivation of microorganisms such as a fungus called koji mold.

For this purpose, Fujiwara has developed state-of-the-art koji processing equipment

that harnesses the company's expertise in a procedure known as solid-state fermentation. In Japan, this machinery has accrued an 80% market share.

"Our solid-state fermentation technology evenly cultivates large-scale fungus around solid materials such as rice, wheat and soybean, and optimizes the function of microbes," says Vice President Kana Fujiwara. "In mass production, highly advanced technologies are needed to control the environment to optimize microbes' performance. It was previously thought impossible, but we have created technology that enables large-scale, automated solid-state fermentation."

As part of the company's 'Vision 2050', Fujiwara aims to significantly broaden the application of its solid-state fermentation technology. "In 2018, we set out a vision maintaining the firm's focus on fermentation, but expanding its use to co-create a new 'microorganism industry' around the world," says Keiko

Fujiwara. "This is the name we have given to an industry that is widely spread across fields that maximize the potential of microbes and put it to highly valuable use." Fujiwara not only plans to expand into further food products, but is also targeting growth into areas such as animal feed, energy and biomaterials.

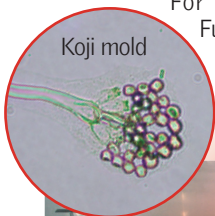
The company's vision also embraces the drive for a circular economy. "One of our main themes is to develop a sustainable food supply system," Kana Fujiwara explains. "In the process of food production, there are tons of by-products that are wasted. But with



Air flow type solid state fermenter for laboratory use

our solid-state fermentation technology, we can transform these by-products into new materials, food, and feed ingredients that are highly functional and nutritious."

As it looks to build a 'microorganism industry', Fujiwara is working to establish a domestic and international network of partnerships. "In contributing to a circular economy for a sustainable and happier future, we are also keen to collaborate with companies (around the world) that have high interest in global sustainability. To start with, we are working on raising awareness of our solid-state fermentation technology and expanding its applicable areas together with our partners."



Koji mold



The inside of a Koji making machine



Soy sauce



Sake



Miso



Shochu