

## SUSTENIR AGRICULTURE

# Sustenir sows the seeds of success

**Company ploughs efforts into high-tech methods of farming to maximise land-use and yield while reducing wastage.**

BY LISAYANI KRIWANGKO



**G**ROWING cold-weather crops such as strawberries and kale in Singapore might seem impossible to many, but that is exactly what Sustenir Agriculture is doing.

Since 2014, Sustenir has been using high-tech methods such as controlled environment agriculture (CEA), vertical farming, and hydroponics to grow a variety of non-native plants indoors.

For co-founder Benjamin Swan, this unlikely agricultural venture is far from frivolous. He sees it as an important environmental move: "It was really my opportunity to do the right thing, to fight the good fight, you know. This was something that needed to happen."

Sustenir is an urban farming company that uses controlled environment agriculture to grow non-native plants in Singapore. Seen here are regional sales manager Jack Moy (left) and co-founder Benjamin Swan. The company is also looking at using AI to monitor plant growth.

BT PHOTO: LEE JIA WEN

## CULTIVATING AN IDEA

The idea first came to Mr Swan when he read an article about vertical farming on his MRT ride home from work in 2012 – and felt that current methods were not efficient enough.

"The illustrations that I saw, they were wasting a lot of space. It may work in the United States where there is a lot of space, but in Singapore and Hong Kong, where land is scarce and rent is high, it just wouldn't work wasting space like that," he says.

That night, the then-engineer and project manager designed more compact versions.

Much of that early design work has translated to Sustenir's commercial farm in Admiralty today, which covers an area of 10,000 square feet (approximately 930 square metres).

While keeping his day-job, the budding indoor farmer spent his weekends and after-office hours connecting with academics and farmers from all over the world to learn more about this industry.

"I took bites from what everyone was doing, because everyone was doing things so differently, and from that I just formed my own hypothesis on how growing would happen."

With the knowledge gained, he focused on "growing impossible products at impossible places".

His first impossible place was the basement of a swimming facility in April 2013. There, he experimented with varying light wavelengths, nutrient solutions, carbon dioxide levels, and many other variables to find the optimum conditions for different species of plants to grow.

"I was growing kale by tricking the plant into thinking it was cold by chilling the water. It was there that I learnt the power of controlled environment. You just need to think outside the box."

After seeing the fruits of his labour, he decided to become a full-time farmer. The construction of Sustenir's facility in Admiralty started in October that year. Mr Swan wanted to use the budding technology of CEA to address the growing issue of environmental sustainability.

"If we keep going with farming the way it's being done right now, we're going to need farming land the size of Brazil by 2050 to feed the growing population. That means more deforestation, more pesticide runoff into rivers killing fish – it's not great."

"It's not to say that traditional farming is the devil, but we're saying that we need to fix it because it's not sustainable."

Through Sustenir's methods of vertical farming, land can be optimised to obtain more yield.

In an area of 54 square metres, Sustenir produces 1 tonne of kale or 3.2 tonnes of lettuce per month.

According to some reports, this can be 14 to 127

times more than the yield produced through traditional farming on the same area of land, depending on the climate.

Unlike traditional outdoor farming, vertical farming is not affected by seasonal changes. This allows for continuous production.

This form of farming also reduces water consumption, as the harvested crops do not need to be washed before they are consumed.

Sustenir keeps the plants clean by keeping external air pollutants out of the growing area and by having staff put on clean-room suits before they enter. This cleanliness is then maintained by packing the produce in airtight containers.

Producing non-native plants locally also reduces the ecological footprint from transport and food waste.

"Thirty-three per cent of produce is wasted in the logistics alone before it even gets to the merchants," says Mr Swan. "Then the merchants also have waste as well. It's what they call shrinkage."

Sustenir further reduces wastage by using all of its yield. Physically imperfect specimens are made into juice instead of being thrown away.

"Sometimes during the harvesting process, we could be a bit rough and the leaves are not perfect, so we don't sell those to retail," says general manager Jack Moy. "What we do is find a way to repurpose this, because they taste equally good and they have the same nutrition."

To support Singapore's self-sustainability – at least where greens are concerned – Sustenir does not grow local produce. Instead, the firm aims to grow imported veggies which are popular among residents.

"We put our customers at the heart of all our decisions," says Mr Swan.

For instance, after learning that many Singaporeans are fans of Japanese and Korean strawberries, Sustenir made that fruit its newest project.

Officially launched on June 20, 2018, the strawberries have enjoyed substantial demand – so much so that Sustenir plans to allocate more space in its farm for growing the fruit.

Unfortunately, not all its products were equally well-received.

Upon the launch of its kale, the Sustenir team gave out samples at Cold Storage stores, only to find that many locals do not enjoy the vegetable's tough texture and bitter taste.

Mr Swan then went back to the "grow room" – as the growing area is dubbed – and altered the environment to reduce these unpopular attributes of kale, resulting in a softer-leaf, less bitter product.

The team also visits farmers' markets to study customer preferences. This feedback is used to modify produce, for instance by cultivating sweeter

strawberries or milder arugula.

Mr Swan hopes to apply the same CEA methods to maximise the nutrients in plants and grow them for medicinal purposes, too.

Sustenir is also working on developing local grapes and wine.

#### LEVERAGING TECHNOLOGY

Apart from its own techniques, Sustenir taps external technologies for greater efficiency.

Through Spring Singapore – now Enterprise Singapore, after its merger with International Enterprise Singapore – Sustenir partnered PBA Systems to create robotic arms for seeding. One robotic arm does the work of three people.

Sustenir also works with educational institutions such as the National University of Singapore (NUS) and the Singapore Institute of Technology (SIT) to boost awareness of and interest in the industry.

After learning about vertical farming and CEA, students get the opportunity to develop projects and help the company in its green journey.

Says Mr Moy: "It's kind of like an internship. We even bring NUS (students) onto the business side where they can help with the marketing."

Ideas which the firm finds feasible will be commercialised, he adds. "So it's really cool for the students. They can be proud to share that they worked with Sustenir to create a new innovation that customers love."

In line with its zero-waste policy, Sustenir is working with SIT to find the most suitable way to turn physically imperfect kale into kale powder.

The company is currently exploring different ways of drying the vegetable – from spray drying to vacu-

um drying – to find one that retains the most nutritional value.

Another technology Sustenir is looking at is artificial intelligence, which can be used to monitor plant growth and detect problems so they can be nipped in the bud.

Says Mr Swan: "We're working with companies right now to work on our own in-house AI technology, to not only help us monitor and track plant growth, but to also help with the whole farming system. Everything from upstream with the resource materials to downstream with the ERP (enterprise resource planning) system." He declined to reveal the companies.

Sustenir also plans to create an online platform, Sustenir Life, to educate consumers on health, fitness, and vertical farming.

The company will work with health and fitness professionals, environmentalists and charities to share their stories and promote their causes on the blog-like platform.

All this is in the service of a larger, industry-level goal: changing the nature of outdoor farming, too.

"That's really the future of Sustenir," says Mr Swan. "It's to take technology and help outdoor farmers – through our centre of excellence in indoor farming – to apply smart technology into their farms, to optimise their farming programmes."

This is another reason Sustenir does not grow local produce. This ensures it does not compete with local farmers, instead complementing their existing products. Currently, Sustenir's cold-weather crops can be found at select Cold Storage outlets and online at Redmart. Sustenir also supplies food chains, restaurants and hotels such as SaladStop!, Les Amis and Shangri-La.

Mr Swan hopes to expand to other countries. "We're going to start with Asia-Pacific. In all heavily urbanised cities in Asia, we want to have Sustenir."

The company is building a 50,000 square foot facility in Hong Kong, and is working with local farmers in Indonesia and Malaysia to integrate smart technology – such as the robotic seeding arm – into their traditional methods.

Outdoor farmers can also tap Sustenir's research findings for optimal growth, for instance by varying the pH levels of water in response to changes in climate and temperature.

Ultimately, Mr Swan envisions Sustenir broadening its reach to the whole world: "It's time for change in agriculture."

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*- Sustenir co-founder Benjamin Swan*



## Growing a passion for plants

BEFORE Jaslin Koh joined Sustenir in 2015, she had no knowledge of agriculture. But after working with the firm's crops and learning more about vertical farming, she developed a passion for plants.

"At the time I needed a full-time job, and I saw online that Sustenir was hiring a process operator. I didn't even know exactly what that meant," says Ms Koh, 52, who only found out Sustenir was an agriculture company after she was hired.

She had held administrative jobs before becoming a homemaker upon the birth of her first child in 1993. Fifteen years later, she re-entered the labour market as a part-time seller in a school uniform supply company, where she worked for seven years.

"That's why I was a bit worried on my first day (at Sustenir). It's an entirely different environment from my previous office jobs."

Fortunately, adapting to the change proved to be less challenging than she had expected.

At the commercial farm in Admiralty, she received on-the-job training from her nursery manager. As a team, they also worked together to refine the growing process.

"When I first joined, we hadn't started anything yet, so we had to do some tests. I found it quite fun, and since then developed an interest for planting," she says.

Through many experiments, she discovered the best water pH level for seeding different plant species to obtain the highest rate of germination.

Along with her co-workers, she also observed the plants and worked out the varying doses of nutrients to optimise each species' growth.

And when Sustenir was experimenting with edible flowers, she was tasked with overseeing the new growth.

Apart from the hands-on work, she also attributes her enjoyment of her job to Sustenir's unconventional farming methods.

"I was so surprised to see that with the help of technology, we can grow plants indoors in such a clean place. It was something that attracted me a lot."

Most of all, she credits her desire to stay in the company to Mr Swan's leadership style.

"Ben never pressured me, he gave me a lot of space and freedom to experiment and learn. So whenever I come across a challenge, I just keep trying and trying."

Her perseverance did not go unnoticed. She is now head of the nursery and manages two assistants.

Her knowledge has blossomed in areas ranging from controlled environment agriculture – the catch-all term for the high-tech style of farming that Sustenir practises – to caring for non-native plants.

"I am happy with my job and thankful for the opportunity to learn so much."

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