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Polybee on lookout for investors to seed drone-powered pollination

The startup will run trials for its drones to pollinate crops grown in indoor farms, which are bee-free

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TOMATO farmers have long known that the wing beats of bumblebees trigger pollination in their crops and bump up yields.

But in indoor farms, where bumblebees aren't likely to be found, some operators take to holding vibrating wands or tuning forks against their flowers to replicate the thrum of the insects' wings, which beat at more than 130 times a second.

But pollinating flowers this way on a large scale is inefficient. Enter Singapore-based agritech startup Polybee, with its idea of getting autonomous drones to do the job.

While it is in no rush to raise a round, Polybee is on the lookout for future seed investors.

Its founder and chief executive Siddharth Jadhav said: "Our premise is to serve agritech sectors where the only option is pollination by hand… Pollination is the biggest bottleneck for the industry and the only way out is automation."

Now an associate scientist at the aero science group in Temasek Laboratories at the National University of Singapore (NUS), he has long been fascinated by nature-inspired drones and has studied the aerodynamics of flapping-wing machines, such as those modelled after hummingbirds.

Mr Jadhav started Polybee as a side project late last year, and set it up as a startup in March this year. Polybee now has two full-time engineers; Mr Jadhav will join full-time at the end of this year. The plan is to hire another four engineering and business development employees by mid-2020.

A year ago, Mr Jadhav joined the university's Lean Launchpad programme, which encourages researchers to explore commercial use cases for their work. This got him thinking about use cases for drones in urban farming.

"I was just getting familiar with vertical farming, which is of strategic importance, especially in land-scarce Singapore … A key issue in growing different crops is that a number of them need pollination.

"And then it occurred to me that if it's indoors, it doesn't sound like you'll be able to use bees."

He has contacted various vertical farming companies and found out that they pollinate their blooms in laborious fashion – by hand, because the lack of ultraviolet light indoors makes it tough for bees to find the markers for flowers' reproductive parts.

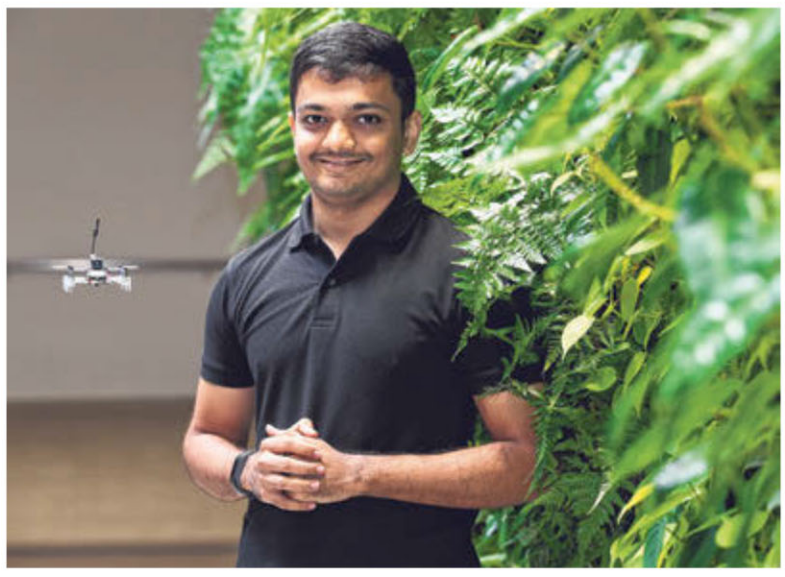
And indoors, dead bees pose a contamination risk.

A wide variety of crops needing pollination, and bees not being of any use indoors?

"That's when I knew that this is a great opportunity to build a solution at scale," he said.

Polybee is developing its own palm-sized drone that can create a "signature controlled air flow" pattern to vibrate the flowers at the right frequency so they release their pollen.

"When we set the airflow parameters, such as velocity, volume of air and duration, the airflow has turbulence in its current and this vibrates the flowers … Air-conditioning or fans don't have a signature air flow that will vibrate the flowers. It's the turbulence that gets the vibration done," Mr Jadhav said.



Polybee founder Siddharth Jadhav aims to reach out to vertical farms and hybrid seed companies. The sector now pollinates its crops by hand.
BT PHOTO: YEN MENG JIIN

Unlike hobbyist drones that are manually controlled, Polybee's machines will be designed to fly autonomously. The startup plans to install three-dimensional cameras with computer-vision algorithms in the surroundings to detect the position and orientation of the flowers and drones. The cameras send the data to the ground station software system, which maps out a flight path for the drones.

In addition to the drones, Polybee plans to provide its customers a software platform that can analyse data collected by the drones, such as the number of flowers pollinated.

Mr Jadhav dubs this end-to-end solution "Pollination-as-a-Service", which he hopes to sell to indoor farms and seed producers as a subscription package.

The efficacy of the drones is somewhat untested, but Polybee's small-scale trials thus far have yielded a fruit-set rate of 92 per cent. The figure represents the proportion of flowers that are successfully pollinated. (Greenhouse bee-pollinated fruit-set rates range between 90 and 95 per cent, said Mr Jadhav.)

Polybee is now looking out for venture firms and angel investors, especially those in agritech, to raise a seed round. But the startup is not in a rush to secure capital.

It has a 15-month runway, having secured S$810,000 in grants from an undisclosed organisation that funds startups and sustainability research, alongside the Lean Launchpad programme and the Technology Adoption Programme.

Polybee also has S$100,000 in pre-seed funding from the NUS Graduate Research Innovation Programme (NUS GRIP), a three-month accelerator for deep-tech startups.

Later this year, Polybee drones will be used in trials at a local vertical farm and a multinational hybrid seed company. It is also in talks with three vertical-farming firms and another hybrid seed production company based abroad for pilot trials, Mr Jadhav said.

The startup is set to focus on three self-pollinating crops for now: strawberries, tomatoes and bell peppers. Its target markets are those with established vertical-farming industries, such as Singapore, Japan and the US.

Phey Teck Moh, partner and co-founder at angel investment network AngelCentral, is Polybee's advisor under NUS GRIP.

He is confident that the startup will be able to attract investors.

"The idea is very powerful and the early traction was good enough … (that) the top vertical farm in the world and a leading seed company are keen to do trials with Polybee."

Asked if he plans to invest in Polybee, he replied: "When it advances its development to seek seed funding, I'll help them. At that time, if it meets my investment thesis, I will invest."

POLYBEE AT A GLANCE

- **HQ:** Singapore
- **Business:** Autonomous drones for pollinating and monitoring crops
- **Founder and CEO:** Siddharth Jadhav, associate scientist at the aeroscience group of Temasek Laboratories at NUS
- **Funding:** S$100,000 (pre-seed, 2019)
- **Backer:** NUS GRIP accelerator