

Tiny tomato plants could be breakthrough crop for precision breeding and vertical farming

New variety can produce up to 400% more fruit annually than conventional tomatoes using the same amount of growing space

LONDON, UNITED KINGDOM, November 4, 2024 /EINPresswire.com/ -- A precision-bred tomato variety that produces up to 400% more fruit over one year than conventional tomatoes could be a breakthrough crop for precision breeding in the UK — and a possible catalyst for a vertical farming boom.

Precision breeding company

[Phytoform Labs](#) has developed the

tomato, a miniaturised version of the elite variety Ailsa Craig, which can produce a kilogram of fruit from a plant one sixth of the typical size for tomatoes. The crop is tailored to the needs of vertical farms, where fresh produce is grown indoors under controlled conditions.

UK consumers eat around 500,000 tonnes of tomatoes each year and that number is rising . Just 70,000 tonnes are produced domestically, with most imported from the Mediterranean. There is a substantial opportunity for British growers to shorten the supply chain for this much-loved crop — however, practicalities can get in the way.

Until now, vertical farms have tended to focus on leafy greens, which are small and require very low maintenance.

Typical growing heights in vertical farms are around 15-25 inches (approx. 40-60cm), meaning tomato plants, which can exceed that size in a month before producing fruit, have been considered impractical.



Phytoform founders Nicolas Kral and Will Pelton have developed a tomato that could revolutionise vertical farming

Some dwarf tomato varieties are available and have been widely used as a model in scientific research, but the flavour of the fruit has generally been unappealing. Faced with the lack of options for growers, and with few breeders working with dwarf varieties, Phytoform Labs, based at Rothamsted Research in Hertfordshire, stepped up to the challenge.

“With dwarf varieties, almost every single trait is bad, except for the size. Instead, we decided to make elite varieties into dwarfs, starting with something good and going from there – that’s how we came up with this vertical farming tomato,” says Dr Antony Chapman, the company’s lead tomato genome engineer.

As well as being tasty, the new variety also offers business benefits. The plants can fit in three growth cycles a year, compared to conventional tomatoes that only have a single cycle, and growers can fit between 50 and 100 plants in a single square metre, enabling them to produce 150-300kg/m² – up to a 400% increase on conventional varieties.

Vertical farming company Harvest London, which has two farming facilities in Walthamstow and Leyton, has just completed the first phase of a pre-commercial trial using the variety. It has successfully grown hundreds of plants and is now working to optimise growing approaches.

“People want super tasty tomatoes, available all year round and not imported thousands of miles,” says Matt Chlebek, founder and chief agronomist of Harvest London.

“The exciting part of this is Phytoform is breeding something specific for vertical farming that addresses what consumers and growers want. The concept was proved beyond doubt when the first tomatoes grew, and we’re now working with Phytoform to understand what a successful plant looks like in this environment and using cutting edge technology to make them even better.”

A second trial is also nearing completion, working alongside Jones Food Company, the UK’s largest vertical farming operation, while several farms beyond the UK have shown interest in growing the tomato.



Phytoform

Phytoform Lab's logo



The precision-bred plants have miniaturised leaves and stems that fit in vertical farming systems, yet can produce four-times the fruit of conventional plants



Bringing in appealing new options that can help vertical farming become more diverse and competitive can only be a good thing for a greener and more secure food system in the UK and beyond”

Dr William Pelton, Phytoform

The [processes used by Phytoform](#) to develop the plants are an accelerated version of changes that could occur through natural mutations or traditional breeding. Its specialised culturing techniques can grow whole plants from single cells.

“Traditional breeding, where you crossbreed parent plants so that the resulting offspring has superior traits, does work, but it’s a very slow process,” says the company’s chief executive Dr William Pelton.

“Things are changing so fast now, both in terms of climate

change and human population growth, that I don’t think traditional breeding can keep up any longer. The technologies that can dramatically speed up this process are ready to be used and need to get out there.”

To date the speed of technology transfer in crop science has proved a barrier for start-ups in the sector, particularly in the UK and continental Europe.

Change is coming, with the UK’s Genetic Technology (Precision Breeding) Act being passed in 2023, but companies are still waiting for measures that will allow the commercial cultivation of precision-bred produce.

Scientists have been able to apply for licenses to grow precision-bred crops since 2022, with Phytoform Labs one of the most active companies in this area. But Dr Nicolas Kral, the company’s chief technology officer, says commercially viable crops such as Phytoform’s tomato, which is ready to be sold as soon as legislation allows, are vital to showing the practical impact of crop breeding developments.

“There’s little point in changing legislation if you don’t have the use cases for the technology,” he says. “It can’t simply be an academic interest. This product is real; you could be eating it next year, but without steps to enable commercial sales, this technology is just waiting in the wings.”

Vertical farming has the potential to increase food security, localise supply chains and reduce reliance on inputs such as pesticides, which can be harmful to ecosystems and are a significant concern for consumers. The new tomato, alongside other improved crops such as strawberries, could transform the financial viability of operations, sparking an expansion in high-tech local growing.

“Our consumer surveys clearly show that people want chemical free and more sustainable produce. Bringing in appealing new options that can help vertical farming become more diverse

and competitive can only be a good thing for a greener and more secure food system in the UK and beyond,” says Dr Pelton.

“We're hoping that this new product is going to almost be like a reset for vertical farming. Suddenly they have this small crop that transforms the business model from thin margins to decent profits. The growers we're working with are as excited as we are.”

Beyond the vertical farming tomato, Phytoform Labs has several other new varieties of crops in development, addressing key production and sustainability challenges.

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