

Australia: Could “sunglass” greenhouses raise horticultural productivity?

A Horticulture Innovation Australia-backed research project at Melbourne’s Swinburne University of Technology has the potential to change greenhouse production as we know it by using color-adjusting glass, solar panels and LED lights to improve the health of plants.

At www.freshfruitportal.com we catch up with lead researcher Baohua Jia, Associate Professor at Swinburne’s Centre for Micro-photonics, who says the big challenge with greenhouses today is the often high level of energy consumption.

“At this moment when people want to start their greenhouse they really need to consider how long it takes to pay off, so in our case we’re considering two technologies,” she says.

“The first one is based on semi-transparent glass – that means we can actually change the light coming into the greenhouse.

“The simplest case is in the summertime when there is a hot sun. We can try to really block the peak part to protect the plants from overheating.”

In winter this glass can also keep the warm air inside rather than having the plants exposed to the cool.

“That’s really the simplest case – we can also tune the ribbons to different colors coming through this glass to reach the vegetables.

“We also have solar panels, and not many people know that plants don’t need all the colors – in the solar spectrum there are at least seven colors, but for most of the plants they only need probably three or four colors.

“So for example, it could be red and blue or a combination of them to have the maximum productivity so the rest of the spectrum we can use to harness the electricity.”

By using this combination of adjusting colors and harnessing energy from certain color ribbons in the light spectrum, Jia says electricity is “basically coming from nothing” and can be used to cover energy consumption inside the greenhouse.

“Basically we incorporate nanomaterials into the solar cell and these nanomaterials have different responses to the different ribbons – by using them we can actually control the responses of the solar cell to the spectrum.”

She says the project is categorized into two phases – the first goes for half a year to study and evaluate different technologies in the market for their cost-effectiveness. The two types of glass to be trialed are solar glass (SG) and semi-transparent photovoltaic glass (STPVG).

“Through this analysis we’re going to tell people at what kind of scale and what kind of conditions you’re going to use this technology to be beneficial for you,” Jia says.

“If we find out this technology is really beneficial, then we’ll have our real trial in the greenhouse which we have available at our university.

“I feel this is really a promising technology,” she says.

Jia adds while the evaluation is still pending and she wants to wait for scientific fact to speak for itself before she jumps to conclusions, she is “very optimistic”.

“It doesn’t really add up too much to the existing cost, but you have lots of other beneficial aspects from the idea,” she says.

Another element to be explored is also whether the power generated from the solar panels could also power some LEDs within the greenhouse to continuously illuminate the plants and raise yields higher still.

“This is another way of enhancing the productivity, but of course this one waygone through the trial experiments but we have some references and some very preliminary results and experiments.

“This is basically thinking about new things and modern technology to manipulate the conditions of the growth, so we think the plants will be more manageable, including the growth process, the productivity, as well as the pest control.”

In a release, Hort Innovation chief executive John Lloyd said the technology, which was being investigated using vegetable levies and matched funds from the Australian Government, could be a game changer for industry.

“Industry tells us that it is finding glass-based protected cropping an attractive option as it allows the grower greater control over an environment within an enclosed area,” Lloyd said.

“However, what has been prohibitive to many growers are the energy costs. What this project aims to do is find a solution to some of those issues by looking into the development of a product which has the potential to bring cost savings and ultimately increase the viability of protected cropping.”

Source : <http://www.freshfruitportal.com/news/2016/09/06/australia-could-sunglass-greenhouses-raise-horticultural-productivity/>