

Press release for publication

Intelligent air-cleaning combats spoilage of fruit and vegetables

To speed up the ripening process of an avocado, you can store a tomato or banana next to it. This works, as tomatoes and bananas release a signal molecule called ethylene, which speeds up the ripening process of the avocado as well as other fruit and vegetables. Although this process can be useful in some contexts, it can, when left uncontrolled, start a chain reaction that can result in spoilage of entire containers or storages of fruit and vegetables.

Every year, fruit and vegetable waste from production, transport, storage and retail leads to a loss of more than 620,000 tons of produce amounting to more than DKK 3bn in Denmark alone. The build-up of ethylene in the air in confined spaces, where fruit, vegetables and flowers are stored, contributes significantly to food spoilage. Ethylene is a natural signalling molecule, which is released during the ripening of fresh produce, and even small concentrations of ethylene speed up the ripening process and lead to higher concentrations of ethylene, faster ripening etc. Therefore, a chain reaction leading to over-ripening is activated.

By actively reducing exposure to ethylene, a large amount of food spoilage could be avoided. A collaboration between Blue Ocean Robotics, Aalborg University, Develco Products, Danish Technological Institute, Gartneriet PKM, Alex Andersen Ølund, Aarstiderne and Dansk Supermarked has been established with the aim to develop a solution that enables efficient monitoring and control of ethylene levels during production, transport, storage and retail of fruit, vegetables and flowers. The developed solution will contribute to a significant reduction in fresh produce spoilage. The project is funded by the Innovation Fund Denmark.

The project will be based on state-of-the-art technologies within sensors, photocatalytic surfaces and UV-LEDs. Based on design parameters obtained from newly developed computer models capable of simulating flow properties as well as interactions between molecules and active surfaces, the surface and sensor elements will be further developed and combined into an air-monitoring and -cleaning unit.

Integrating the developed air-cleaning system with a network of modern ethylene sensors and other air quality sensors will enable improved monitoring and control of ethylene levels. In that way, spoilage originating from unwanted over-ripening due to ethylene can be avoided. Blue Ocean Robotics will be the main driver in the production of the air-cleaning unit, while Develco Products will be a driver in the development of the sensor control systems.

- *“The identification of an inexpensive sensor solution that can monitor ethylene will make it possible to use multiple sensors to map the ethylene levels in larger areas such as in containers or warehouses. Combining enhanced monitoring with a highly efficient air-cleaning solution (that can remove ethylene without some of the inherent downsides of solutions based on, e.g., ventilation or the use of ozone), will give a solution that can save resources and money in Danish companies that produce and handle fruit, vegetables and flowers”, says Jacob Ask Hansen, Senior Project Leader at Danish Technological Institute.*

By improving the monitoring and control of ethylene in the presence of fruit, vegetables and flowers, a significant amount of the current food waste could be avoided. Furthermore, 20% of the Danish export is comprised of foodstuff, and 20% of this foodstuff are products that are ethylene sensitive such as fruit, vegetables and flowers.

Therefore, the project can strengthen the ability of export businesses to deliver fresh products of highest quality. In addition, Danish technology-based companies such as Blue Ocean Robotic and Develco Products will obtain a significant advantage in the global competition by gaining access to solutions that are beyond state-of-the-art within sensors and air-cleaning solutions.

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Investment from Innovation Fund Denmark: DKK 10.7m

Total project sum: DKK 18.6m

Duration of the project: 3 years starting March 2016

Official project title: FRESH – Fresh produce through Reduction of Ethylene during Storage and Handling