

Using waste to grow food

In a corner of Eng Kong Cheng Soon community garden in Lorong Kismis stands an industrial-looking set-up that contrasts sharply with the thriving greens in the soil.

A fish tank, filled with black African tilapia, is connected to long grey pipes which have cut-out holes in them. The seedlings of leafy vegetables are planted in net pots placed in these holes. Their roots dangle in the pipes and absorb the nutrient-rich water flowing through.

Above the fish tank is a container filled with clay pellets. Edible plants grow here, watered by the fish tank too.

The entire set-up is shaded by a plastic canopy that lets sunlight in, but keeps rain out.

This hybrid aquaponics system has yielded about 6kg of vegetables, such as butterhead lettuce, spring onion and Chinese cabbage, in the last two months.

The bountiful harvest is the result of a final-year project by three engineering students at the National University of Singapore (NUS).

The students built the system from scraps they found in their school's workshops. It took a few months to design and construct the 251 sq ft system, which is about the size of a room in an HDB flat.



Associate professor Lee Kim Seng (front) and the students behind the project (from far left) – Mr Lim Zi Xiang, 35, Mr Kibria Shah, 31, and Ms Boo Jia Yan, 23. PHOTO: DIOS VINCOY JR FOR THE STRAITS TIMES

Aquaponics combines aquaculture, the raising of edible fish, with hydroponics, growing vegetables without soil.

There are three ways to set up an aquaponics system, though common elements include having a fish tank and a soil-free plant bed. Both fish and plants are cultivated in one system. The fish waste provides organic fertiliser for the plants and the plants filter the water for the fish.

The students kept these basic features and combined two aquaponics methods – media-filled beds and Nutrient Film Technique – into one system, allowing them to grow a greater variety of plants.

The media-filled containers are good for growing plants such as tomato, brinjal and chilli. These have long stems that are kept sturdy by the clay pellets.

Leafy vegetables, which have shorter stems and long roots, are better suited for the Nutrient Film

Technique – grown in net pots.

The fish can also be eaten once they are fully grown. The set-up is fully automated so they have to check in only once a week.

The students decided to work out of the community garden as they would be among seasoned gardeners. Ms Boo Jia Yan, 23, says: “There was a lot of experimentation and we had little knowledge of farming. Here, we were able to get advice about what could be improved.”

They have plans to fit in high-tech features such as solar panels, which can generate electricity to power the system and install a device that allows for remote monitoring.

The set-up has attracted interest from two home owners.

Associate professor Lee Kim Seng of NUS' mechanical engineering department, who supervised the project, hopes more people will take on urban farming. “It's a very easy set-up. Why not utilise the waste to grow something good?”