Covering system for orchards that reduce the use of pesticides, while producing solar energy

I. Michailidou[1], M.B. Pedersen[1], S.H. Boesen[1] and T. Spanos[2]

[1]DTU Design & Innovation, Technical University of Denmark
[2]DTU Physics & Nanotechnology, Technical University of Denmark

ABSTRACT

In fruit and berry production the biggest problem farmers face year after year is the attack of fungus diseases. Up to 95% of an apple production can be infected in a year by the scab disease. Conventional farmers use great amounts of pesticides to reduce this number, while organic farmers have no defense. A new research conducted by Marianne G. Bertelsen, senior researcher in the Department of Food Science at Aarhus University, shows that sheltering the apple trees from the rain can reduce the infection rate to near 0%. By sheltering the trees, the leaves are able to dry faster, preventing the scab from spreading. At the same time the implementation of large fields of solar panels for electricity production faces some ethical issues. Occupying land that could have been used for food production can result in rising food and land prices and can, in extreme situations, lead to famine in poor parts of the world. The idea of this product was to combine these two issues. By covering orchards with shelters containing solar panels, the farmers could reduce their use of pesticides, while producing solar energy.

To develop our product we first interviewed all the relevant stakeholders to understand their needs and the issues they faced. Multiple ideation, conceptualization and evaluation methods were employed to reach a shelter solution that was inexpensive and easily installable. In parallel, a business plan was formulated with the user in mind. In the end the final design was backed up by a mechanical analysis in SolidWorks and economical calculations.

Our product consists of a lightweight construction that may be mounted on the poles already in the orchards to support the trees. The covering surfaces are made from thick see-through plastic with stripes of semitransparent polymer solar panels that are both flexible and cheap. The product is compact in transportation, easy to install and it is estimated that farmers will earn revenue from our product after only 6 years. Overall, this product not only offers multiple benefits for the farmers, but can also be seen as a technological example setter, for the integration of food and energy production in an innovative and sustainable manner.

REFERENCES

Bertelsen, M. G. (2013) *Tag over æblerne: Er det vejen frem for usprøjtet æbledyrkning?* Retrieved January 26 2014, from http://pure.au.dk/portal/files/56801119/_bler_under_tag_Marianne_sept2013.pdf