Title: Looping the waste chain: From food waste to food

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Introduction:

Food waste is an extremely ponderous problem. A large quantity is generated annually in developed countries and is increasing year-on-year (Zhang et al., 2017). Much of the waste ends up in landfills or incinerated, and whilst the carbon contained within might be captured e.g. from landfill gas, the rest of the nutrients such as nitrogen and phosphorus is literally wasted. The manufacture of inorganic fertilizers to replace this produces significant amounts of greenhouse gas emissions and the use of bio-fertilizer can mitigate this tremendously (Lee, 2018).

Anaerobic digestion is currently in use to capture and re-use carbon from organic wastes in the form of biomethane while reducing the mass requiring disposal. The methane produced can be used for heat and power generation, replacing the use of fossil fuels. However, the digestate from the digestion process is often treated as a waste stream, even though it is rich in nutrients. The utilisation of this resource as a bio-fertilizer engenders some health concerns especially when used in agriculture to produce food. It has been postulated that pathogens of concern to human health might persist in digestate used to fertilise plants, and if insufficiently removed before consumption, could cause disease (Sahlstrom et al., 2008).

In order to close the food waste loop, nutrients from food waste should be reused to grow food again. To this end, digestate (from a food waste anaerobic digester) which has undergone various treatments to reduce pathogen load is tested in this study to grow the vegetable *xiaobaicai*. Different hygenic treatments were carried out on the digestate including controlled heat sanitation (Bendixen, 1994), autoclaving, and dewatering-filtration before

being used as a liquid fertilizer. The efficiency of the treated digestate to retain nutritional value is presented. A microbial analysis of the soil samples where the digestate is applied is also carried out.

References:

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