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Organic fertiliser: Circular economy for urban waste

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The import ban on chemical fertilisers and other agrochemicals is slowly starting to draw investments into alternative fertiliser systems.

There is an opportunity for Sri Lanka to use this policy window to create circular economies between agriculture and urban organic waste systems. These circular systems can help develop future organic alternatives in Sri Lanka. A circular approach can mitigate two major sustainable development challenges for Sri Lanka: Food insecurity and urban waste management.

The ban is not a recent shift. It stems from a longer historical agenda of a “toxin free nation” based on ‘wholesome agriculture. In 2016, Sri Lanka’s then President published an ambitious three-year agricultural plan to build a toxin-free nation. The plan was not translated into a national policy, but the recent ban seeks to advance this agenda.

The circular economy opportunities between agriculture and urban waste also have a history. There have been decades of focused research on the use of urban waste composting and co-composting and work to support farmer use of composting for agricultural production. Evidence from Sri Lankan research, the Government-supported Pilisaru project and complementary research from around the world provides insights



into value, opportunities and also challenges of organic waste value chains for agriculture production.

Solid green luminous night soil made from faecal sludge (human waste) at Dikowita Bio Gas Unit. (Photo by IWMI)

Over the past three years, a team comprising researchers from the Institute for Sustainable Futures at the University of Technology, Sydney, Australia (UTS-ISF), the International Water Management Institute (IWMI), Janathakshan (GTE) Ltd and the Sabaragamuwa University of Sri Lanka (SUSL) has been investigating opportunities for future circular economies in Sri Lanka. We, as part of this team, offer some emerging results and opportunities for future organic systems and food security outcomes, in light of the recent policy changes.

One challenge to a circular economy is creating the actual alternative to a chemical fertiliser. As normal waste compost is low in essential nutrients, there are promising opportunities to create a safe and nutrient rich organic soil ameliorant by co-composting municipal solid waste and septage. Co-composting is essential for 'wholesome agriculture'. It is important to stress that organic 'fertiliser' such as compost is excellent for soil health, structure and amelioration, but not as a nutrient source per se. For farmers to replace chemical fertiliser, an ordinary compost will have to be boosted, for example through co-composting with nutrient-rich septage, a technology which IWMI has tested over two decades in Africa and Asia.

In a Colombo district municipal council, recent research identified the potential supply and value of municipal waste, and added value by mixing dried faecal sludge with organic waste compost to improve its nutrient content and sale value. For example, a municipal council in the Colombo district collects waste which is 60% biodegradable. Yet only a small fraction (23%) of this waste is utilised for composting. Similarly, onsite, mainly residential sanitation systems are desludged by private operators and local councils. The value of this nutrient is lost as there is no processing infrastructure. Collected septage is discharged through pumping stations, transported through the sewerage network and discharged offshore, without further treatment. In a circular economy, this nutrient loss can be a valuable resource – which with adequate standards can help meet the fertiliser needs in agriculture.

Our research importantly identifies under-utilised supply of potential organic fertiliser. It also reveals that potential demand for compost derived from municipal solid waste (MSW) and septage outstrips the limited current supply – much of which is already being wasted.

Our study with farmers in peri-urban areas identifies that farmers are demanding compost derived from municipal waste, including safely treated septage. In a perception and demand survey of compost made from municipal solid waste, we found that farmer demand is high. About 70 percent of farmers interviewed in our research expressed interest in compost from municipal waste. However, the compost quality needs to be improved beyond current levels, and produced according to standards, free from contamination. Standards set in 2020 provide an important framework through which to grow a circular economy in organic waste.

Just over half of farmers (56 percent) we interviewed are willing to use compost that contains safely treated septage. Farmers gave similar reasons to why they would be willing to use compost made from MSW, but in addition noted that they are willing to use compost made with septage if it gives good results for plant growth and yield. We found farmers working with home gardens are willing to use compost, and they choose to use organic inputs to avoid the perceived health impacts of chemical fertilisers. We found vegetable farmers can be a new market for organic fertilisers, but they would prefer compost combined with urea. From the paddy farmers we spoke to, 70 percent showed interest in using compost. Paddy farmers most commonly preferred a pelletised form of compost when discussing the samples. However, they generally had mixed views on the benefits of each compost type. Therefore, determining the best compost products for this market requires further investigation.

Education is required to address current misunderstanding of compost. This education is not just required for farmers, but also retailers. Our research identified that most of the retailers were not aware of the origin of the ingredients of compost products they sell. Retailers are key to a circular economy for organic waste, and with this limited knowledge, it is difficult for them to act as catalysts for farmer use of organics.

Market segmentation of compost products is required. Values and needs differ between farmer groups. Our research identified that it is unlikely that a single compost product could meet the needs of all potential users. For example, vegetable farmers preferred high-quality compost made from MSW enhanced with faecal sludge and urea while home gardeners preferred high-quality compost made from MSW. Commercial pineapple and coconut plantations have different requirements compared to home gardeners.

Farmers are willing to pay for quality compost. In fact, farmers are willing to pay more than current minimum market price for improved quality compost. This demonstrates the potential value and opportunity of growing a circular economy in organics waste.

Increased involvement of different agencies involved in waste and agriculture management could help to promote compost use, including support on-farm trials or demonstrations, increasing the technical knowledge of extension officers and supporting standards development and certification. A circular economy needs to be supported and strengthened in all aspects of waste to organics for food production.

The development and expansion of organic waste value chains can trigger multiple benefits, by recovering the value of solid waste and septage resources. This can minimise the environmental burden of biodegradable solid waste and septage, improve services for citizens, create new economic opportunities and provide valuable agricultural inputs to farmers. An organics system powered by circular economy principles provides the potential to drive waste management solutions and strengthen food security outcomes.

Our proposal for creating circular economies between agriculture and urban waste systems developing future organic alternatives is informed by both current and previous decades of research. Our current research partnership is titled "From Urban Waste to Sustainable Value Chains: Linking Sanitation and Agriculture Through Innovative Partnerships". The research is funded under the Knowledge and

Linkages for an Inclusive Economy (KLIE) Grants Programme of the Australian Department of Foreign Affairs and Trade (DFAT). The research will be completed by the end of this year.

Sri Lanka is at a potentially transformative crossroads. While there are productivity and food security risks of the fertiliser ban, there are also opportunities to use this policy window to create novel policies and infrastructure that can link waste and agriculture. A circular economy of organic wastes can be an important investment of the future that benefits food producers and urban citizens in Sri Lanka.

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