

# Biological conversion of organic municipal solid waste to fuels and chemicals

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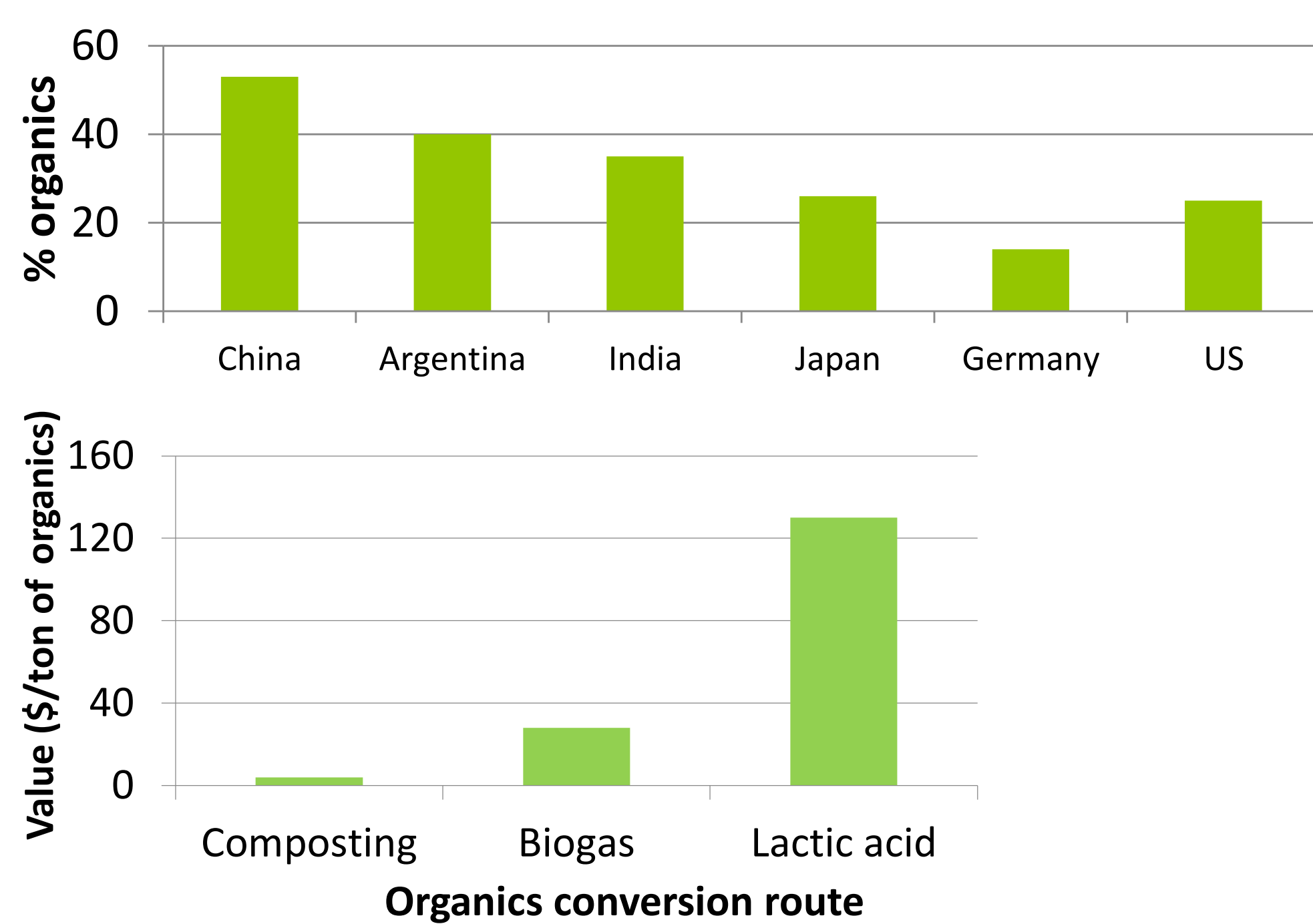
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## Opportunity

India's municipal solid waste (MSW) production is estimated to triple from 2012 to 2025<sup>1</sup>. Additionally, India presents a high percentage of organics in MSW streams.

Different green strategies have been proposed for MSW management, such as composting, biogas and lactic acid. Nonetheless, the lactic acid market is estimated to grow at a staggering CAGR of 20% until 2019<sup>2</sup>.



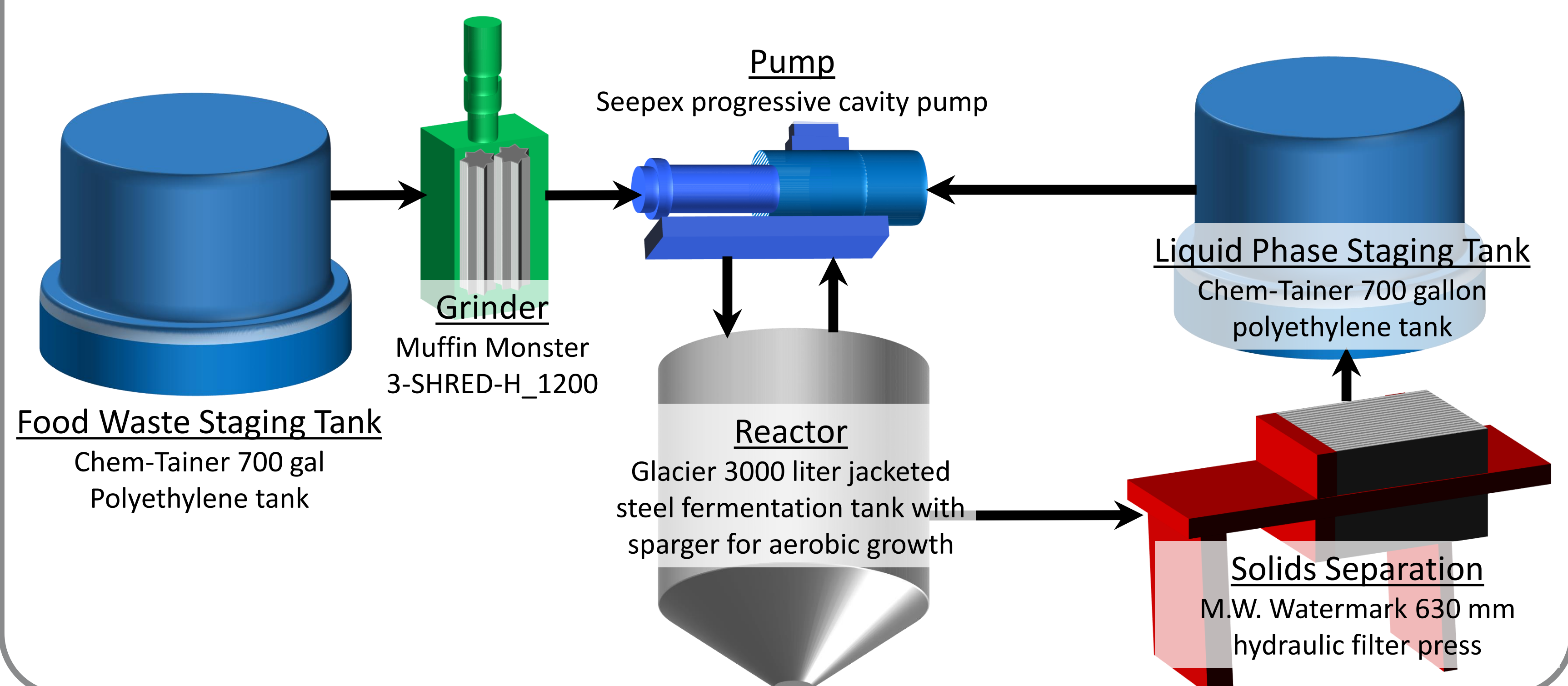
## Data/Results

We have been able to achieve yields greater than 100 g/l of lactic acid over the course of 5 days in 20 liter batches from food waste collected on the MIT campus.

Parameter	MIT Technology: Food Waste	Current Technology: Glucose
Feedstock (\$/ton of feedstock)	0	500
Final titer of lactic acid (g lactic acid/liter of reactor)	100	93.2
Overall productivity of process (g of lactic acid/liter of reactor/h)	1	> 0.8

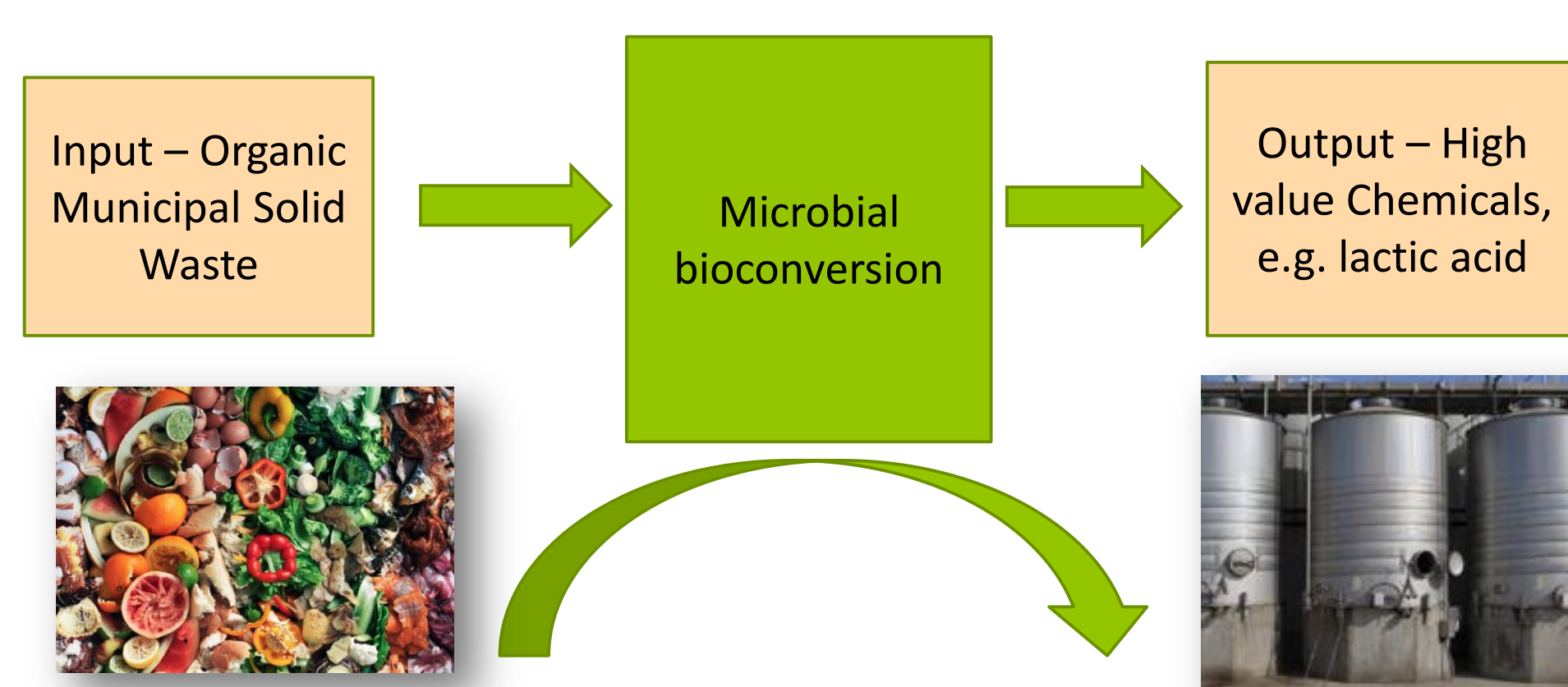
## Prototype

Below is the schematic of equipment to be used in the MIT demonstration facility. All equipment is sized to convert all of the food waste currently available (15 tons/month) to lactic acid.



## Proposed Solution

The aim of this project is to *convert food waste into high-value lactic acid*, using a novel microbial process developed at MIT. The process completely avoids the use of costly and unsustainable feedstock such as sugars. Our economic analysis for a typical lactic acid production facility shows that we could be processing 100 tons of organics per day to produce lactic acid at 30% lower cost than traditional lactic acid producers.



## Conclusions/Next Steps

Our group has developed a state-of-the-art biotechnology to produce lactic acid from food waste on a laboratorial scale, creating higher values than conventional technologies. The next goals include building a pilot plant at MIT which can process 100-500 kg per day of organics. The pilot would serve as the model for a larger plant at MIT and in India (1 ton per day).



## Acknowledgments

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## References

- [1] Hoornweg D., Bhada-Tata P., What A Waste: A Global Review of Solid Waste Management. Urban Development Series Knowledge Papers, The World Bank. March 2012, No. 15.
- [2] Markets and Markets, Lactic Acid Market by Application (Biodegradable Polymer, Food & Beverage, Personal Care & Pharmaceutical) & Polylactic Acid Market by Application (Packaging, Agriculture, Automobile, Electronics, Textile) & Geography - Global Trends & Forecasts to 2019.