Out of the Landfill and Into the Field: Suitability of Wastes as Agricultural Amendments

Rebecca J. Long[1*], Angela R. Possinger[2], José A. Amador[1], Rebecca N. Brown[1]
[1]University of Rhode Island, [2] Cornell University , *rlong86@hotmail.com

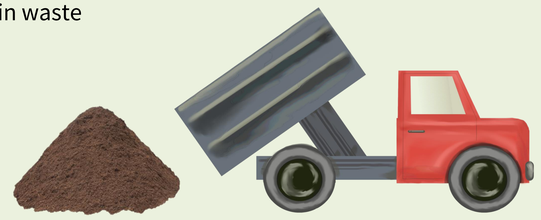
Background

Applying waste as an agricultural amendment can provide:

- A local source of **nutrients**, for plant growth, and **carbon**, to build soil organic matter
- Productive alternatives to landfills or incineration

However:

- Properties of waste amendments are **less consistent** than manufactured fertilizers
- Concerns about contributions of excess heavy metals or salinity
- Some wastes remain **unstudied** such as dehydrated food waste and gelatin waste

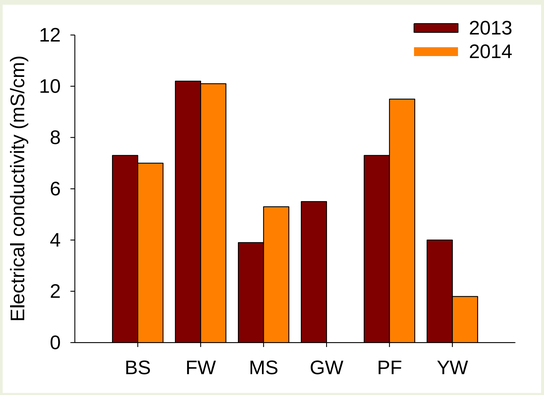


Waste Amendments

Wastes were obtained from sources in RI, NY, MA, and NH in 2013 and 2014 and tested to determine their suitability for use as agricultural amendments:

PF = Paper fiber sludge/chicken manure blend (7:1)
BS = Biosolids/yard waste co-compost
MS = Multi-source compost
YW = Yard waste compost
FW = Dehydrated restaurant food waste
GW = Gelatin manufacturing waste (2013 only)

Salinity

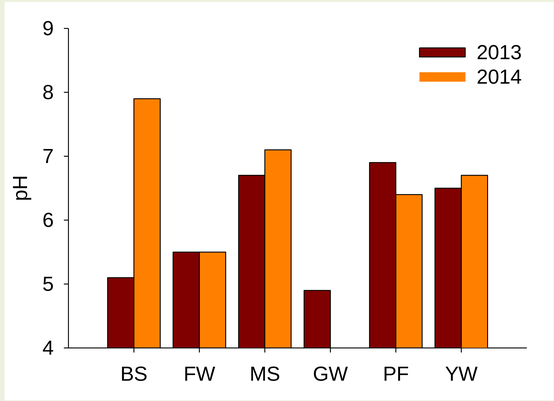


Amendment electrical conductivity was tested, as a measure of salinity, using a 1:2 waste to water ratio.

Takeaway: Waste electrical conductivity was **low** and fairly consistent year-to-year.

pH

Amendment pH was tested using a 1:6 waste to water ratio.



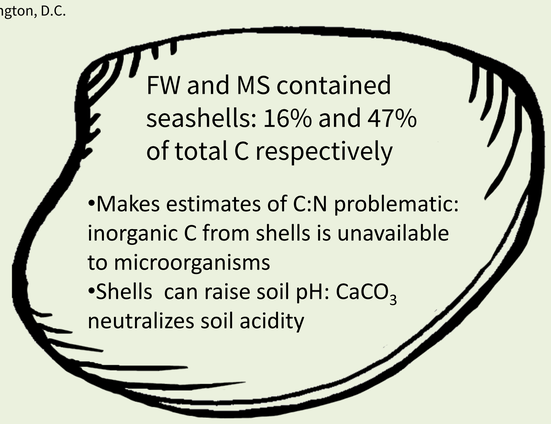
Takeaway: Because pH can affect availability of both nutrients and toxic elements, yearly testing is important for wastes with variable pH.

Heavy Metals

•Cd, Hg and Ni were below detection in all wastes
•Mo, Pb, Se, As, Zn, Cu and Cr were below EPA's limits for Exceptional Quality Biosolids[1], except As levels in 2014 YW

Takeaway: Short-term application (<25 years) of these wastes is unlikely to contribute problematic levels of heavy metals to the soil.

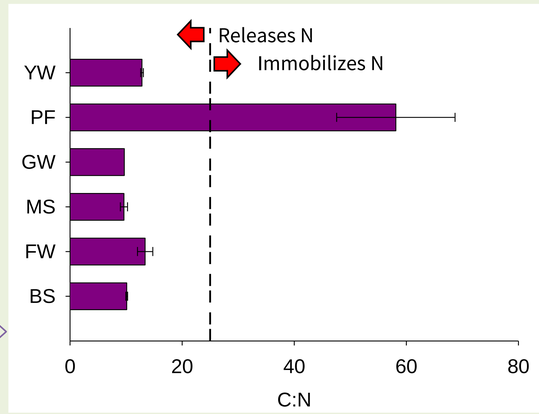
1. U.S. Environmental Protection Agency. 1994. A plain English guide to the EPA part 503 biosolids rule. U.S. Environmental Protection Agency, Washington, D.C.



C:N Ratio

Mean waste C:N ratios for 2013 and 2014 (+/- 1 std dev.)

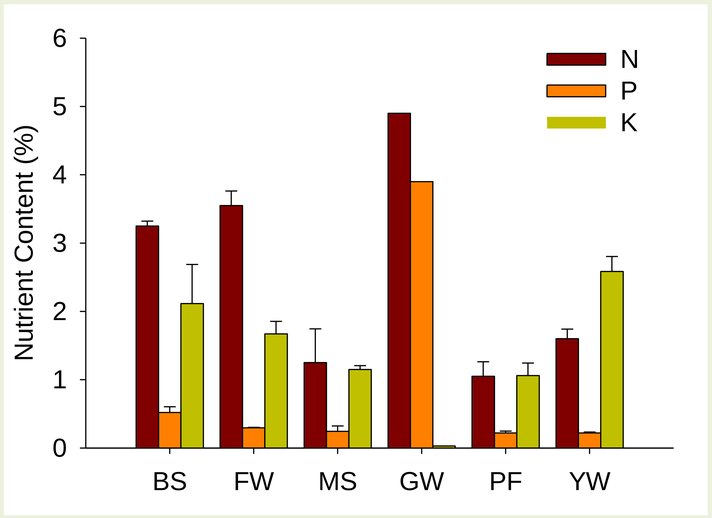
> 95% of N in wastes was in organic forms, and needs to be converted by microbes to be plant available



Takeaway: Most wastes had favorable C:N ratios for the release of plant-available N, with the exception of paper fiber, even after blending with chicken manure.

N, P, and K Content

Amendments were tested for total N, P, and K (dry wt. basis) in 2013 and 2014 (+/- 1 std dev.).



Takeaway: Nutrient content of wastes was generally low, although some contained >3% N (BS, FW, GW). Some N:P ratios (GW) could lead to over application of P if wastes were applied to meet crop N needs.

Conclusions

- **Regular testing** is important because of year-to-year variability, even from the same sources.
- These wastes did not contain problematic levels of **heavy metals** or **salinity.**
- Although **nutrient contents** were low to moderate, C:N ratios were generally favorable for providing plants with N.
- Some N:P ratios may lead to **excess P** application if applied to meet crop N needs.
- **Unique properties**, like seashells, can potentially affect N release and soil pH.

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