Gravimetric Water Content of Biosolids

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Why?

Biosolids are nutrient-rich waste products from facilities such as water treatment plants. When applied to plants, biosolids can provide nitrogen, phosphorus, calcium, magnesium, potassium, sulfur, and micronutrients that benefit plant growth. Because biosolids are rich in organic matter, they are also potentially useful as amendments to soils that have been depleted in organic matter. One basic piece of information is the water content of these biosolids. The effectiveness of biosolids can be reduced if the gravimetric water content is too high. High gravimetric water content can mean lower nutrients available to plants, leading to nutrient deficiencies. If the high gravimetric water content is present when testing biosolids, the water in the biosolid can be tested in nutrient analysis instead of the soil. This can result in incorrect analyses and lead to inefficient management practices.

Procedure?

The gravimetric water content of the biosolids was measured. To measure water content from 16 sources, three replicates of each biosolid were measured as close to 2 g as possible. The biosolids were then dried at 105° for 48 hours. The samples are weighed before and after the drying, and the moisture content is then calculated by the weight difference. It was challenging to perform the gravimetric water content analysis such that the analytical error associated with the three replicate measurements was kept within 2 percent of the mean value.

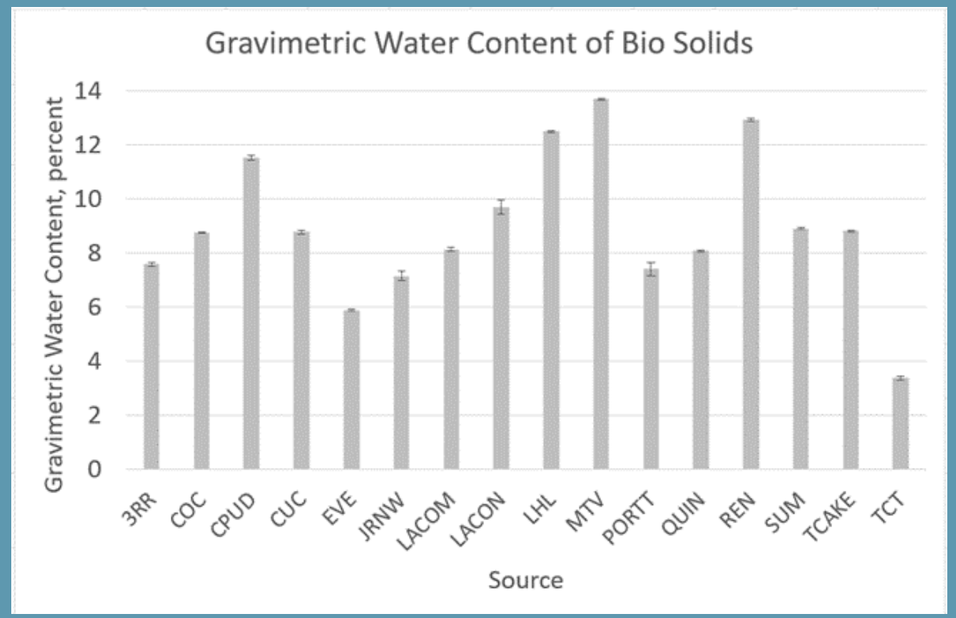

Figure 1: The average gravimetric water content of the biosolids sorted by source (standard error is plus or minus one).

Abbreviation	Source
TCT	Tacoma Classic Tagro
QUIN	Quincy Lagoon
LHL	Lake haven Lakota
LACON	Laconner Cake
SUM	Sumner Cake
CUC	Cheney Compost
EVE	Everett
3RR	3 Rivers Regional
PORTT	Port Townsend
LACOM	Laconner Compost
MTV	Mt. Vernon
JRNW	JRINMAN
TCAKE	Tacoma Cake
COC	City of Chelan
CPUD	Chelan PUD
REN	Renton

Figure 2: The table above displays the abbreviations paired with the names of the sources.

Results?

The gravimetric water content was stable within groups of biosolids and varied significantly between the various biosolids tested. Tacoma Classic Tagro had the lowest gravimetric water content of the biosolids at 3.4% (Figure 1). Mt. Vernon had the highest gravimetric water content at 13.7%, followed by Renton (13.0%), Lake Haven Lakota (12.5%), and Chelan PUD (11.5%) (Figure 1). The majority of the biosolids had a water content of at least 7 percent.

Implications?

Concerns with the Chelan PUD, Lake Haven Lakota, Mt. Vernon, and Renton biosolids are their high gravimetric water content (Figure 1). With the applications of these biosolids, less expected nutrients and excess water may be applied. A threshold of 7 percent of gravimetric water content was established for this analysis. Fourteen of the sixteen biosolids tested in this analysis were found to have at least 7 percent gravimetric water content (Figure 1). When testing biosolids for active carbon or nutrients, the biosolids should be dried before testing to ensure soil is tested and the water is not tested. The Tacoma classic tagro biosolid has the potential to be an effective fertilizer due to its extremely low gravimetric water content (figure 1). Further testing would be necessary to test the nutrient content of the biosolid. Biosolids have been found to have irregular nutrient contents and need to be tested before the application of biosolids as fertilizer.

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