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Information Bulletin

Biosolids

What are biosolids?

Biosolids are nutrient-rich organic materials recovered during the treatment of wastewater or sewage. Biosolids undergo regulated physical, chemical, and biological processes to reduce or eliminate pathogens, while ensuring the nutrients they produce are safe and healthy for plant fertilization, where they are ultimately applied. The resulting material provides essential bacteria in support of agriculture or other applications, including landscaping and site remediation efforts.

How are biosolids developed?

Urban centers devote significant resources to ensure that human waste does not enter rivers, lakes and other environments, preventing contamination and the spread of disease. Wastewater and sewage from domestic and industrial facilities (such as toilets, sinks, showers, dishwashers, washing machines etc.) flow through a network of pipes to a sewage processing plant where it undergoes various stages of treatment:

1. First, chemicals, sand, gravel, large objects and anything that will not break down is removed.
2. A separator removes things that float (grease, oil, soap, etc.) allowing the heavier sewage sludge to sink to the bottom and move to the next stage.
3. The sewage sludge is treated with chlorine to kill all microbes, pathogens and other organisms that could be harmful to people and/or the environment.
4. The sewage sludge is then processed in a heated bioreactor where beneficial microbes are added to break down the sludge, increasing the availability of the nutrients. The result is a black soil-like mixture of fat, carbohydrates, cellulose and a host of essential minerals such as nitrogen, phosphorous and potassium. This end product is called a biosolid. Across Canada, 666,000 dry tonnes of biosolids are produced annually.

The benefits of biosolids

Manure (animal waste) has been used to enrich soils since farming began. Biosolids are loaded with organic matter and vital nutrients that can be used in place of inorganic and animal fertilizers in support of healthy soils. When biosolids are used to replace inorganic fertilizers they reduce the emissions associated with the production of the inorganic fertilizers. Applying biosolids to agricultural and other land applications is also beneficial because it uses nutrients that would otherwise take up valuable space in a landfill and increase the emission of greenhouse gases.

Challenges

Energy consumption — More energy is used to produce biosolids than is used to dispose of sewage sludge. Although this higher energy consumption may be perceived as a challenge, the total carbon footprint of producing biosolids is lower than disposing of sludge in a landfill. When sludge sits in a landfill, without oxygen, anaerobic bacteria break it down, producing greenhouse gases such as methane. In contrast, biosolids are stored and aerated to ensure this does not happen.

Safety — Bacteria, viruses and parasites are very particular about where they live, how they breed and multiply. To ensure the maximum safety of biosolids, they are tested for dangerous

microbes and chemicals before they are transported to a site and applied. Biosolids are made from human waste, and for many the “ick” factor of knowing sewage is being utilized on the farm land around us can be disturbing.

The safety of biosolids is based on regulatory standards controlling how they were processed and the materials used to make them. New tools, like genomics, can offer even more insight into the composition and safety of biosolids, which will help to address any perceived health risks.

Storage and disposal — With a growing global population, the production of biosolids is increasing. Also, water treatment processes are improving. This also results in a higher quantity of biosolids produced each day. The environmental impact of biosolid storage and disposal methods presents an ongoing challenge. Genomics-based tools may provide insights into the long-term effects of biosolids on plant and microbial communities, soil health and water contamination.

Resources

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2094821/

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2094821/

http://aem.asm.org/content/75/1/164.short

https://www2.gov.bc.ca/gov/content/environment/waste-management/recycling/organics/biosolids-in-bc

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