

## Soil Amendment and Fertilizer Comparison

Agricultural producers have long recognized the need to enhance soil properties, including its structure, fertility and water retention by using soil amendments such as fertilizers and conditioners. Nutrient sources vary in their biological and chemical properties and characteristics. Some nutrients, notably nitrogen, can be lost from agricultural byproducts (e.g., manure) into the environment at any point in the nutrient management process. Careful management of any soil amendment is required to ensure that surface runoff and/or leachate does not contaminate water supplies.

The table below provides a summary comparison of the regulatory framework, product composition and general environmental considerations for three common soil amendments used in British Columbia: (1) biosolids, (2) manure, and (3) chemical fertilizers.

Regulatory Framework			
	Biosolids	Manure	Chemical Fertilizer
1. Is the product regulated?	YES production, use, monitoring requirements under OMRR	YES no quality or monitoring requirements, some use requirements under AWCR	YES Production and quality regulated under CFIA (no use or monitoring)
2. Is product testing required?	YES pathogen and metals testing	NO no testing requirements	YES metals testing
3. Are there requirements to reduce pathogens prior to use?	YES pathogen reduction is a regulatory requirement	NO no pathogen reduction requirements	YES Pathogen reduction for salmonella and fecal coliform
4. Does the product meet Canadian Food Inspection Agency (CFIA) limits for metals?	YES biosolids must meet CFIA metal concentration limits (same limits as OMRR)	N/A manure is known to contain heavy metals, but there is no testing requirement	YES product must meet CFIA metal concentration limits.
5. Are there regulated application buffer zones from sensitive areas such as water bodies?	YES risk-based buffer zones based on soil compounds and pathogen destruction periods	NO exempt from Riparian Areas Regulation (some protection measures under AWCR)	No requirements agricultural operations exempt from Riparian Areas Regulation
Product Composition			
	Biosolids	Manure	Chemical Fertilizer
1. What is the primary feedstock for the product?	treated municipal sewage	animal excrement (urine and feces) from livestock and poultry animals and soiled bedding (e.g., straw, wood shavings or sand)	manufactured product; mining and chemical processes.
2. What are the soil amendment benefits?	<ul style="list-style-type: none"> <li>soil nutrients (e.g., phosphorus, nitrogen)</li> <li>organic matter</li> </ul>	<ul style="list-style-type: none"> <li>soil nutrients (e.g. phosphorus, nitrogen)</li> <li>organic matter</li> </ul>	<ul style="list-style-type: none"> <li>soil nutrients only (e.g. phosphorus, nitrogen)</li> </ul>
3. What is the phosphorus source?	naturally-occurring byproduct	naturally-occurring byproduct	mined from phosphate rock (environmental impact, costly, resource-intensive)
4. Does the product contain heavy metals?	YES (all products have comparable list of possible metals) <sup>1</sup>	YES (all products have comparable list of possible metals)	YES (all products have comparable list of possible metals)
5. Are there organic pollutants such as antibiotics?	YES	YES	NO
General Environmental Considerations			
	Biosolids	Manure	Chemical Fertilizer
1. Overall phosphorus and nitrogen release rates <sup>2</sup>	variable, generally in the slower range	variable, generally in the medium to fast range	rapid-release (unless treated for slow release)
2. Total free nitrate <sup>3</sup>	variable, generally in the lower range	variable, generally in the medium to high range	high (not bound to organics)
3. Product publicly available for purchase	YES product meets regulated standards prior to sale	YES accessible without restrictions or testing	YES product meets regulated standards prior to sale
4. Relative Greenhouse Gas (GHG) impact of soil enhancement	GHG reduction potential (carbon storage in soils)	GHG reduction potential (carbon storage in soils)	N/A
5. Relative Greenhouse Gas (GHG) impact of product development	N/A no new materials required	N/A no new materials required	GHG increase <sup>4</sup> production and importation of product materials

<sup>1</sup> See Schedules 9 and 10 of the Organic Matter Recycling Regulation (OMRR) for a list metals under OMRR.

<sup>2</sup> A slower release of nutrients improves soil characteristics while minimizing environmental impacts.

<sup>3</sup> Free nitrate may leach into groundwater and cause pollution.

<sup>4</sup> Production and importation of chemical fertilizers is a GHG contributor. Production of Ammonium Nitrate and Phosphate generate the equivalent of 3.5 and 0.5 tonnes of Co<sub>2</sub>, respectively.