

BIOSOLIDS RECYCLING

fact sheet



AGRICULTURE

Biosolids recycled on agricultural lands provide plants with essential nutrients that speed growth and increase crop yield.

Seeking Solutions

Maintaining crop production and sustaining the environment are constant challenges to modern agriculture. Crop and livestock production removes nutrients from the land and can degrade the soil's structure and moisture holding capacity. This creates the potential for nutrient deficiencies, erosion and negative impacts to water quality.

Benefits of Biosolids

One way to improve soil quality and combat further deterioration is to replenish the soil nutrients that are needed for plant growth and add organic matter to improve soil structure and moisture retention. Biosolids recycling is a safe and environmentally sound way to return both nutrients and organic matter to agricultural soils, providing fertilization to crops and assisting in soil conservation.

How It Works

Biosolids contain essential plant macronutrients (used by plants in large amounts) including nitrogen, phosphorus and sulfur, as well as plant micronutrients (required in smaller amounts) such as zinc and copper. Applications of biosolids allow these nutrients to enter the soil for plant use. Biosolids are retained in the soil and release nutrients slowly as they are needed by plants. Appropriate applications of biosolids prevent nutrients from leaching beyond the plant rooting zone into the groundwater.

Biosolids applications promote plant root growth and generally help plants to grow greener, more vigorously and often with improved yields. The dense crops grown by biosolids create large amounts of straw and other organic matter that can be tilled back into the soil, improving soil moisture retention, tilth and erosion resistance, as well as increasing natural earthworm populations. Recent studies have shown that organic matter used in agriculture helps suppress plant disease. The addition of biosolids can also help to moderate highly alkaline or acidic soil conditions.



Biosolids have been recycled on pastureland, dryland wheat, barley, canola, hops, corn, raspberries and orchards in the Pacific Northwest. Application rates are carefully designed to meet the needs of individual crops. Dewatered biosolids are typically applied with calibrated manure spreaders and tilled into the soil, while liquid biosolids can be sprayed or injected below the soil surface.

Research and Demonstrations

Research plots and demonstration sites have shown that the quality of crops grown on biosolids-amended soils are equal or superior to those grown with commercial fertilizers. Biosolids applications also benefit soil through the additional crop organic matter grown and tilled back into the soil, which improves water infiltration and moisture retention.

What's Happening?

- **Dryland agriculture:** On biosolids-amended soils, farmers have seen good moisture retention (even during drought conditions), reduced wind erosion damage and improved crop color. Many dryland projects have shown improvements in crop yield and vigor and soil properties. *Hillsboro—Clean Water Services, Portland (Oregon) Ellensburg, Everett, King County, Pullman, Spokane (Washington)*

- **Irrigated agriculture:** Biosolids are a desirable soil amendment in irrigated agriculture, reducing stress to plants between irrigation cycles. Following biosolids applications to highly alkaline soils, the return of a normal, healthy soil ecology is often indicated by renewed soil organism activity. *Greater Vancouver Regional District (British Columbia); Boise, Grangeville (Idaho); Albany, Gresham, McMinnville, Salem (Oregon); Bingen, Bridgeport, Chehalis, Clark County, Enumclaw, Kennewick, King County, Tacoma, Washougal, Yakima (Washington)*



- **Rangeland and pastureland:** Biosolids improve the quality of grasslands and their ability to support grazing animals including cattle, sheep, bison and wildlife. Biosolids have successfully restored degraded rangeland and significantly improved soil fertility, resulting in increased biomass, superior forage quality and higher beef yields. Windblown dust is reduced on biosolids amended sites and water holding capacity is increased.

Greater Vancouver Regional District (British Columbia); Eugene, Clean Water Services, Portland (Oregon); Birch Bay, Blaine, Lynden, Everson, Nooksak, Sumas—BBLENS, Pierce County, Tacoma (Washington)

Key Plant Nutrients Provided by a Typical Application of Biosolids*

		lbs/acre
N	Nitrogen (available first year)	112
P	Phosphorus	210
K	Potassium	14
Fe	Iron	182
Mg	Magnesium	33
S	Sulfur (as sulfate)	4.0
B	Boron	0.2
Cu	Copper	6.5
Mo	Molybdenum	0.1
Mn	Manganese	13
Zn	Zinc	7.4
Ca	Calcium	258

* Based on a single biosolids application at the rate of 20 wet tons per acre, or 4 dry tons per acre