

Group Report

- What 3 slides did you pick for your selected audience?

- Which website format did you pick for your selected audience (circle one)?

 A

 B

 C

 D

- Please present your reasons for your selections.

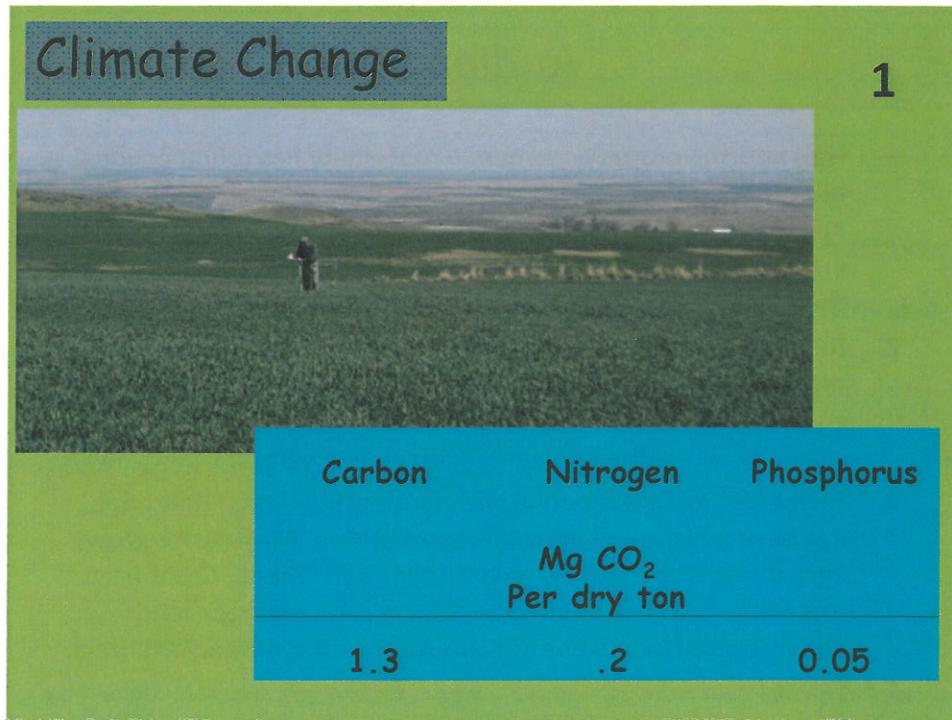
Audience

1. **Neighboring property owners** – Your utility has found an ideal biosolids land application site not far from your plant. There are neighboring property owners that have moved out of the city to enjoy a more rural environment. You are contacting them to let them know about the biosolids project.
2. **Regulators** – You are making a presentation to provide a regulator enough information for them to permit a site. This is a site in an area that has not previously received biosolids. The regulator has some familiarity with your program.
3. **Farmers** – You are meeting with farmers in an area that does not have a history of biosolids applications. Most farms grow agronomic crops such as cereal grains and wheat. Crops are irrigated. You are hoping that this area will embrace land application of biosolids as an alternative to synthetic fertilizers.

Audience

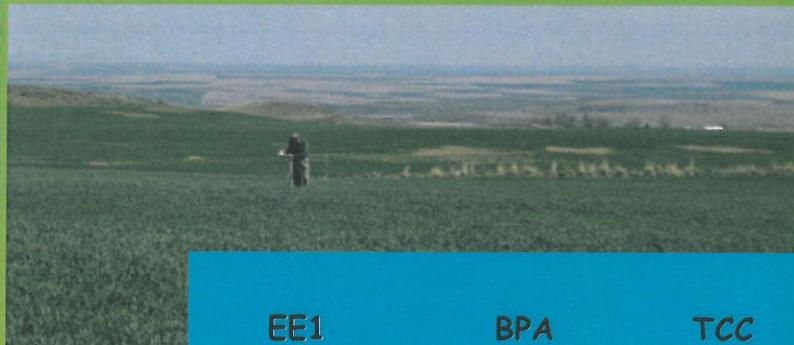
5. **County Council** – Your biosolids program is located in a small county where biosolids and septage have been land applied. The council is proposing a ban on land application based on concerns from a few citizens. You are preparing to speak to the council about the impacts of this ban,

6. **Environmental groups** – You are meeting with an environmental group who has expressed concerns over the land application of biosolids. The group prides itself on encouraging sustainable land development. They have never been to a wastewater treatment plant and have not previously thought about what happens when they flush.



Emerging Contaminants

2



EE1	BPA ppb	TCC
300	4500	18000

Trace metals

3



Cadmium	Mercury ppm	Lead
5.3	0.1	78

Fertilizer Value

4



Nitrogen	Phosphorus %	Potassium
5-7	1.5-3	0.1

Fertilizer Replacement Value

5



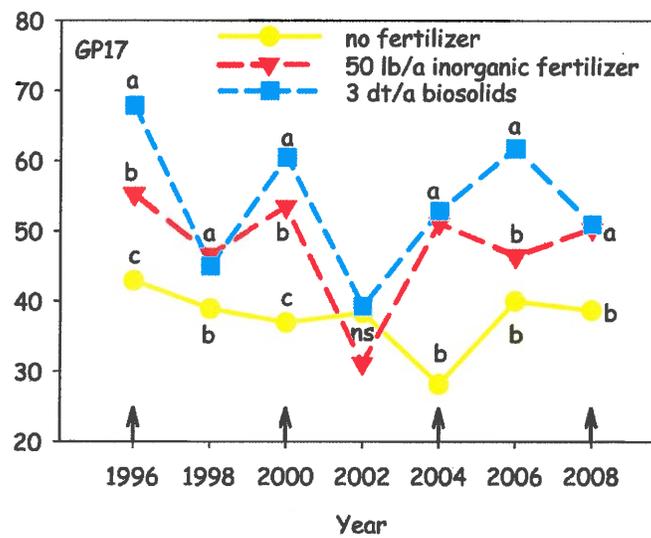
Nitrogen	Phosphorus	Potassium	Sulfur	TOTAL
\$/dry ton				
\$19.95	\$24.80	\$3.90	\$2.66	\$51.31



6

Grain yield 1996-2008

7



**City of Tacoma-TAGRO
Excellence in Biosolids Management Award Winner 8**



EDCs Concentrations in Environmental Media 9

EDC	Surface Water (ng/L)	Wastewater Effluent (ng/L)	Sewage Sludge (µg/g)	Sediments (µg/g)	Manure Feedlot (ng/L)
Natural Estrogens					
Estrone (E1)	<0.1-17	0.1-19	0.00143 (Dewatered)	<0.04-2520	17-10500
17β-estradiol (E2)	<0.1-6.0	0.1-650	0.00057 (Dewatered)	0.9-2480	<20-211
Estriol (E3)	1.0-2.5	5.0-7.3	NA	0.5-1.5	<8-6290
Synthetic Estrogens					
Ethinylestradiol (EE2)	<0.1-5.1	0.1-8.9	0.00061 (Dewatered)	<50-500	NF*
Ethoxylates	<20-97600	320-1570	<0.5-250 (Dry weight)	<0.003-38	NF*
Estrogen Mimics					
Nonylphenol (NP)	<10-15000	18-770	5-1000 (Dry weight)	<0.003-154	NF*
Bisphenol A	0.5-250	4.8-258	NF*	NF*	NF*
Bis(2-ethylhexyl)phthalate	NF*	NF*	20-160	NF*	NF*
Diethylhexyl phthalate	NF*	NF*	10.5	NF*	NF*

*NF- Not found in literature

Mine tailing roots

10



Figure 2. Comparison of tailings root contents after 13 years of reclamation with biosolids. The treatments B150 and B250 represent biosolid application rates of 150 and 250 dry Mg ha⁻¹. Samples were obtained from the 0-15 cm soil layer.

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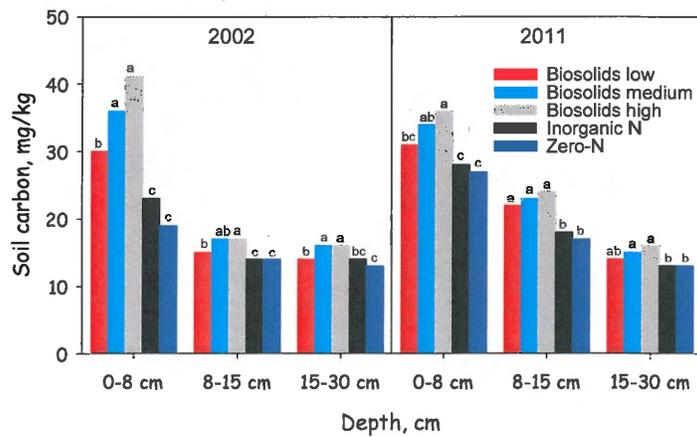


13



Soil carbon was higher in biosolids treatments 9 years after the final biosolids applications.

14

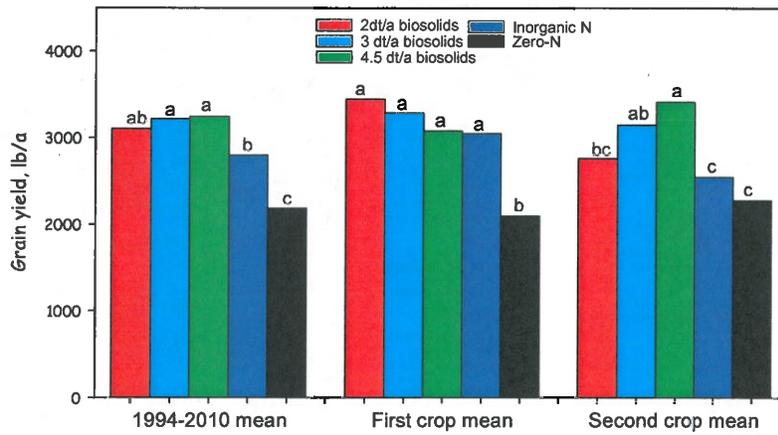


15



16

Yields averaged over the first crop and second crop following biosolids application





17

Sampling Block 2 (Intervale Farms Compost)-7-12-2011

GroCo meets the high quality standards for composts.

Laboratory analyses show that the amount of trace metals in GroCo is extremely low compared to quality limits set by Washington State for composts. Compost that meets these limits may be safely used for all landscaping and home gardening.

Pathogens have been destroyed in GroCo.

Many people ask if GroCo compost has a high level of pathogens - disease-causing organisms. The fact is that composting is a well-accepted and natural method to eliminate pathogens. The composting process kills pathogens with high temperatures over a specified amount of time.

Like other commercial composts, GroCo is produced in compliance with strict state regulations. Each batch of GroCo compost is tested for metals and pathogens to ensure the highest quality and safety before sale to the public.

Landscapers like GroCo because it is a consistently high quality compost product.



GroCo metals compared to state limits for metals (in parts per million)

	GroCo	Compost Limits
Arsenic	0.24	30
Cadmium	0.79	30
Copper	143	750
Lead	20	150
Manganese	1	4
Molybdenum	0.8	4
Nickel	1	210
Selenium	0.85	35
Zinc	143	1400

For more information
King County Biosolids Program.
Check our Web site at <http://biorecycle.gov/> or call 206-464-1247.
GroCo: Call 206-622-5141 to find out the cost and where and how to purchase.

What you can do to keep biosolids and wastewater recyclable:
King County processes our wastewater to produce biosolids, recycled water and energy. Please throw trash, fruit and vegetable stickers, pits, etc. in the garbage, not down your sink, in cars or trucks. Check our site at <http://biorecycle.gov/> (community) for more tips on how to safely dispose of almost everything.

To get this information in alternative formats, call 206-296-8361 or 711 (TTY)



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GroCo™ typical lab results: quality

GroCo is made by composting Loop broseeds and sawdust from local mills together for more than one year. GroCo is tested to ensure quality and safety.

	GroCo compost	US Composting Council Seal of Testing Assurance Standard
Organic matter	85.00%	At least 40%
C/N ratio	35	
pH	6.8	6.0 - 8.0
Conductivity (dS)	4.4	
Solubly	0.06 "very stable"	7.0 or below
Seedling emergence	100%	At least 80%
Seedling vigor	100%	At least 80%
Major nutrients		
Total nitrogen	1.24%	
Available nitrogen	0.24%	
Crude Nitrogen (slow release)	1.00%	
Phosphorus (as P ₂ O ₅)	1.04%	
Potassium (as K ₂ O)	0.19%	
Sulfur	0.33%	
Calcium	0.90%	
Magnesium	0.23%	
Micronutrients		
Boron	5017 parts per million (ppm)	
Manganese	265 ppm	
Iron	9 ppm	
Copper	130 ppm	
Zinc	304 ppm	
Particle Size		
Percent passing 1"	100%	results of safety testing on other site
Percent passing 3/8"	100%	
Percent passing 1/8"	100%	
Percent passing 1/4"	96%	



Pathways for Risk Assessment of Elements in Soils, and Highly Exposed Individuals-1. 21

Pathway	Highly Exposed Individual
1. Soil → Plant → Human	Farm markets; 2.5% of food
2. Soil → Plant → Human	Home gardens; 60% of garden foods for lifetime; 1000 t/ha
3. Soil → Human	200 mg/day soil/dust ingestion; 1000 t/ha
4. Sol → Plant → Animal → Human	Farms; 45% home-grown meat; 1000 t/ha
5. Soil → Animal → Human	Grazing ruminants; soil is 2.5% of annual diet; 45% home-grown meat.
6. Soil → Plant → Animal	100% of livestock feeds grown on soils; 1000 t/ha
7. Soil → Animal	Grazing ruminants; 2.5% soil in diet.



Four weeks after transplant.

**Natural Selection Forms
BioSoils Application Worksheet**

DATE: 8/1/2012 FIELD: 1307192-BA Acres: 255

Mineralization Rate (%): 80 CROP: Hard Red Winter Wheat
Volatilization Rate (%): 80

Crop N Requirement: 80 lbs/acre of PAN

Clark County	Not Approved	2.3	DT/A	37.2	WT/A	46.0	lbs. N / DT	3715	Totals WFT
Chemical Supply District	Not Approved	1.6	DT/A	107.0	WT/A	32.0	lbs. N / DT	6070	Totals WFT
Dawson	Not Approved	2.6	DT/A	3.0	WT/A	32.4	lbs. N / DT	425	Totals WFT
Elmore	Not Approved	2.4	DT/A	2.3	WT/A	34.7	lbs. N / DT	478	Totals WFT
Harold	Not Approved	2.7	DT/A	80.0	WT/A	33.7	lbs. N / DT	6070	Totals WFT
Harold	Not Approved	1.2	DT/A	80.0	WT/A	30.8	lbs. N / DT	6070	Totals WFT
Harold	Approved	3.2	DT/A	28.9	WT/A	18.7	lbs. N / DT	2134	Totals WFT
King Co - Buchanan	Not Approved	2.8	DT/A	22.2	WT/A	43.4	lbs. N / DT	2330	Totals WFT
King Co - Houston	Not Approved	2.4	DT/A	20.8	WT/A	40.3	lbs. N / DT	2345	Totals WFT
King Co - West Point	Not Approved	2.8	DT/A	20.8	WT/A	35.2	lbs. N / DT	2413	Totals WFT
Lyle	Not Approved	1.7	DT/A	3.6	WT/A	26.2	lbs. N / DT	1631	Totals WFT
Madison	Not Approved	1.7	DT/A	80.0	WT/A	26.7	lbs. N / DT	6070	Totals WFT
Madison	Not Approved	2.8	DT/A	3.3	WT/A	25.3	lbs. N / DT	792	Totals WFT
Payson	Not Approved	1.8	DT/A	11.4	WT/A	25.3	lbs. N / DT	2392	Totals WFT
Turney	Not Approved	2.4	DT/A	80.0	WT/A	42.3	lbs. N / DT	6070	Totals WFT
Tussock	Not Approved	2.0	DT/A	80.0	WT/A	48.6	lbs. N / DT	6070	Totals WFT
Wapato	Not Approved	1.6	DT/A	4.7	WT/A	26.0	lbs. N / DT	1042	Totals WFT
Yamhill	Not Approved	2.3	DT/A	26.8	WT/A	44.6	lbs. N / DT	2432	Totals WFT
Yonah	Not Approved	1.3	DT/A	20.3	WT/A	31.9	lbs. N / DT	4422	Totals WFT
Yonah	Not Approved	1.3	DT/A	80.0	WT/A	31.9	lbs. N / DT	6070	Totals WFT

Notes on Data

Clark County	Data from questions 1 & 2 2012
Chemical Supply District	Data from 2011 - 4 h soils
Dawson	Data from February 2012
Elmore	Crop from September 2011
Harold	Data is from 2011. correct to 42 estimate at 50%
Harold	Data is inadequate - must retest prior to land app. Need metal and nutrient data
Harold	Crop from 2012. recent data at 25%
King Co - Buchanan	Data from 2012 soil samples
King Co - Houston	Data from 2012 soil samples
King Co - West Point	Data from 2012 soil samples
Lyle	Data is 2012
Madison	Data is inadequate - must retest prior to land app. Need metal and nutrient data
Madison	Data is from 2011
Payson	Data is a composite from 2011 - dried during summer. estimate judge at 40%
Turney	Data from April 2012 - 4 h soils. need to update before next application
Tussock	Data is inadequate - must retest prior to land app. Need metal and nutrient data
Wapato	Data is from February 2012
Yamhill	Data is from January thru March 2012
Yonah	Data is December 2011 sampling
Yonah	

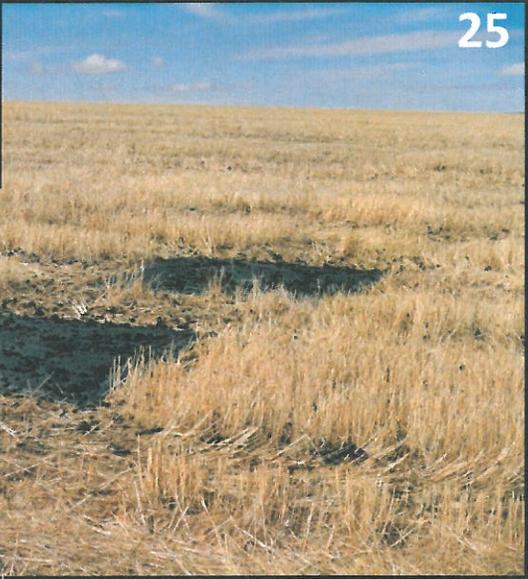
Agronomic Rate Approval 23

- ✓ NSF sends the agronomic rate recommendation along with supporting information to our DOE regional coordinator.
- ✓ ECY reviews rate, and provides approval or suggestions
- ✓ Approval includes current list of approved municipalities along with the appropriate dry ton/acre rate for each municipality





Calibration Tarps



- step 1** Determine the square footage of the project.
- step 2** Determine the depth in inches you want.
- step 3** Multiply: **step 1** x **step 2** x 0.0031 = cubic yards

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One cubic yard covers:	324 square feet	1' deep
	162 square feet	2' deep
	108 square feet	3' deep
	81 square feet	4' deep
	65 square feet	5' deep
	54 square feet	6' deep

How much GroCo?

Add it to your garden soil, containers, or indoor pots to get lush plant growth.

Annual flower and vegetable beds Add 1"-3" to the top of your garden soil and till it in 6-12" deep each spring.

Turf Add 1/2"-1" and rake evenly across the grass once a year.

Perennial shrubs and trees Add 1"-3" to the soil surface. As with any compost product or bark mulch, be sure to leave a 3" border around plant stems and trunks.

Indoor plants Sprinkle 1/2"-2" of compost on the surface of the soil.

Total Nitrogen	1.24%
Plant Available Nitrogen	0.24%
Organic Nitrogen (slow-release)	1.00%
Phosphorus (as P ₂ O ₅)	2.04%
Potassium (as K ₂ O)	0.19%
Sulfur	0.33%
Calcium	0.90%
Magnesium	0.23%
pH	6.8
Organic matter	85.6%
C to N ratio	35

All values are reported on a dry weight basis.

Typical values of major nutrients found in GroCo compost

How to use GroCo

What's in GroCo?

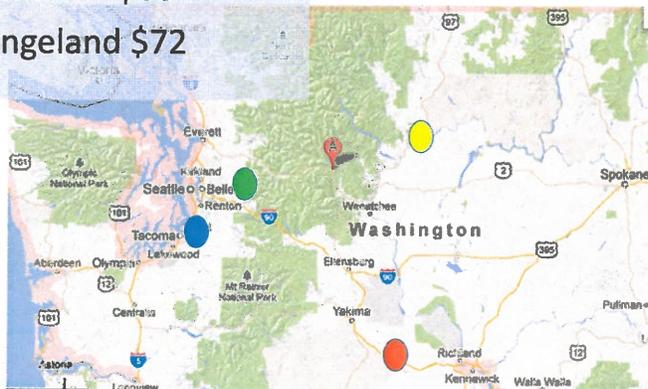
Biosolids are produced by MUNICIPAL wastewater treatment plants

- Regulated under CWA
- Biosolids use/disposal costs burden of municipality
- Every day the biosolids program managers have to decide where to send the trucks
- About 10 trucks (@ 33 wet tons) per day per million people



King County, WA – cost per wet ton

- Compost facility \$82
- Forest plantations \$79
- Dryland wheat \$68
- Hops and rangeland \$72





Application To Dryland Wheat
1.5 dt/acre

The basis for the agronomic rate calculation:
Existing soil nutrient levels

29



- ✓ 15-20 Soil Samples drawn at 1' , 2' , and 3' levels per field
- ✓ Store GPS coordinates of each sample site
- ✓ Newly permitted fields tested for metals
- ✓ Soil Samples are delivered to certified laboratory for analysis
- ✓ Analysis Report contains organic matter and soil residual nitrogen information

Additional selections

30. Plant Tour

31. Farm Tour

32. Open House with Q&A

33. Public Meeting

34. Research Demonstration

A

HOME SURVEY CLICK TO SEARCH

What is a Biosolids Environmental Management System?



A Biosolids Environmental Management System (EMS) is a program developed by the National Biosolids Partnership (NBP) to improve the quality of biosolids management programs nationwide and to promote public acceptance of biosolids use and disposal practices. In 2002, the City of Los Angeles implemented a Biosolids EMS to meet one of its program goals that was adopted in the **Biosolids Policy** by the Mayor and City Council in 2000. The biosolids EMS is a management tool utilized by the City to document regulatory compliance requirements and best management practices for biosolids, and to gain public confidence and acceptance in its biosolids beneficial use program.

MORE

GREEN ACRES FAR



what's here

- Our Program**
 The City of Los Angeles, Department of Public Works, Bureau of Sanitation is responsible for collection, treatment, and disposal of wastewater and its by-product, biosolids. The City produced over 250,000 tons of biosolids in 2011 that were beneficially reused. On these pages you can learn more about the City's Biosolids Environmental Management System.
- Program Performance**
 Find out what the City is doing to produce a product that is environmentally sound and acceptable for beneficial use. View regulatory compliance reports, environmental improvements, and program audit findings and results.
- Managing Our Biosolids**

B

Home Biosolids Compost Oilseeds Contact News



Compost rows

Natural Selection Farms (NSF) a third-generation, predominately organic, family farming operation quaintly nestled on the southern side of Snipes Mountain, we find our security in the productivity and sustainability of our soils, we recycle to preserve and protect our environment, our home, and our livelihood.

Biosolids: NSF is a Beneficial Use Facility (BUF) committed to diverting precious nutrients and energy sources away from landfills, and available to soils, and reducing our carbon footprint. Since 1980, NSF has managed biosolids programs and land application for both municipalities and farmers. Through our program, biosolids serve as a valuable, accessible, cost effective soil amendment rather than a waste product.

Compost: NSF is one the largest permitted compost facilities in Eastern Washington. We provide

Search

Slideshow



C

TURN YOUR DIRT AROUND

GARDENS & LANDSCAPES

GroCo compost provides organic matter to soils and improves the physical properties of both sandy and clayey soils. GroCo is appreciated by gardeners and commercial landscapers for its ability to curio soil, retain moisture, and produce beautiful blooms. GroCo also helps to protect Puget Sound because it helps urban soils retain rainwater like a sponge...

COMMERCIAL GROWERS

In Douglas County, Boulder Park, Inc. manages the distribution of Loop to local farmers, while Nature Selection Farms manages Loop in Yakima and neighboring counties. Loop is also used in commercial/leasing operations through special arrangements with King County.

FAQS

If you're new to Loop, you probably have questions about it – perfectly understandable. Most of us can go days, or even years, without thinking about soil amendments or wastewater treatment or how these two topics might be relevant to each other. But once the idea surfaces, curiosity is sure to follow. We hope to satisfy your new-found need to know.

D

City of Tacoma

Services / Public Works / **TAGRO**

Home users / Commercial users / Safety / What's in TAGRO? / Cost / Getting TAGRO / Awards / In the news / FAQ / Contact us

How does your garden grow?
With TAGRO premium soil products, it will grow faster, greener, better.

The City of Tacoma's TAGRO Mix and TAGRO Potting Soil can serve all of your gardening needs—indoors and outdoors. Short for "Tacoma Grow," our award-winning, environmentally friendly products will give you better results with your lawn and garden—even while you help to reuse community resources and protect our environment.

Proven safe and effective—and awarded the U.S. Environmental Protection Agency's highest rating for use in landscaping, vegetable gardens and indoor container gardens—all natural TAGRO products are made from a blend of pasteurized wastewater byproducts called biosolids and other weed-free gardening components.

By the bucket or truckload, TAGRO customers say their gardens grow faster, lawns grow thicker and trees grow taller. Vegetables and flowers grown in TAGRO have earned more than 120 ribbons at the Puyallup Fair since 1992. And our biosolids program has received national awards, including the Environmental Protection Agency's first place award for the best biosolids program in the country.

NEW! TAGRO Potting Soil is now available by the bag at 9 retail locations. [Read more.](#)

SUMMER HOURS
Mon-Fri 9 a.m.-5 p.m.
Sat: 9 a.m.-Noon

TAGRO Premium Soil products are available for pickup or delivery. Call (253) 962-2150 to schedule your delivery or come on by during regular business hours.

DID YOU KNOW
TAGRO Mix is free if you wheel it yourself (bring buckets, or a truck).
TAGRO Potting Soil is available by the bag at Portland Avenue Nursery, GardenSphere and Gray Lumber.

- Surplus Property
- Garbage and Recycling
- Facilities Condition Assessment
- Pacific Plaza
- Six-Year Comprehensive Transportation Program
- Community Gardens
- Tacoma Parking
- Abandoned Autos
- Commercial Vehicle Enforcement
- Central Treatment Plant upgrade
- Construction Projects
- EnviroChallenger
- Maps
- Neighborhood Programs
- Permits
- Real Estate

