Guide for Planting, Growing and Harvesting Fresh Produce to Reduce Health Risks

Urban agriculture plays an important role in creating vibrant gathering spaces, greening the environment, supporting local food resiliency and promoting social inclusion. The City of Vancouver has had a long history and support for food growing in the city. In order to better enable urban agriculture, the City of Vancouver and Vancouver Coastal Health have prepared this guide to further increase safe and healthy soil and harvesting practices.

The purpose of these best practices is to assist gardeners and farmers to reduce health risk in the planting, growing, and harvesting of fresh produce. This is accomplished by reducing contamination of soil and fresh produce by unhealthy bacteria, acid soluble metals, petroleum products or volatile organic compounds sometimes present in the urban environment.

To assist gardeners and farmers in reducing risk in the planting, growing and harvesting of fresh produce these best practices are divided in two categories

(a) Reducing Fresh Produce Contamination

(b) Soil Assessment and Testing

If present, contaminant levels are higher in the soil than in the plant material. Therefore, the risk of exposure is higher from direct contact with the soil (or soil particles on the surface of plants) rather than from eating produce.

Fruiting crops like squash or berries are less likely to take up common contaminants than root crops (E.g. carrot, potato) or greens (E.g. celery, lettuce).

Best Practices # 1 Reduce Fresh Produce Contamination

Fresh produce contamination in urban gardens and farms decreases significantly with proper and safe planting and production activities, harvest techniques and post-harvest practices. When planting, harvesting and handling produce, adhere to the following best practices.

Planting and Production	Harvest	Post-Harvest
• Test the soil (see Best Practices #2 for more information). • Use raised garden beds with filter cloth and imported healthy soil or other growing medium from approved sources that avoids planting directly into native or existing soil. • Do not use raw manure, but if manure is desired; purchase commercially composted manure. • Do not use pesticides and herbicides. • Locate compost on a flat surface away from the garden, wood piles, sheds & thick shrubbery and "downhill" from the garden. • Use rodent management practices including compost bins with secured lids and solid bottoms. Harvest fruits and vegetables promptly, and reduce water sources. • If using non-potable water (collected rain water), apply water at the base of the plants.	• Remove as much soil as possible before selling. • Gardeners should take care to wash hands, gardening clothes and tools. • Use cleanable containers such as plastic baskets, plastic bowls or coolers. • Clean all containers, scissors and other harvesting tools with warm, soapy water prior to harvest. • Sanitize tools with a solution of 1 teaspoon bleach per 4 litres of water, allow to stand for several minutes, rinse with water and air dry. • Do not harvest or handle produce if you have diarrhea, vomiting, fever or infected wounds.	• Wash produce completely to remove soil and airborne particulates. • Keep harvest containers covered. • Handle produce carefully during any loading or unloading to prevent damage. • Transport produce only in a clean vehicle. • Do not allow washed produce to contact the floor or soil. • Use only potable water for washing or cooling harvest produce. • Keep areas inside and outside packing areas clean and free of pests. • Ensure proper toilet, hand washing and personal hygiene practices are followed during harvest and post-harvest to avoid food contamination.

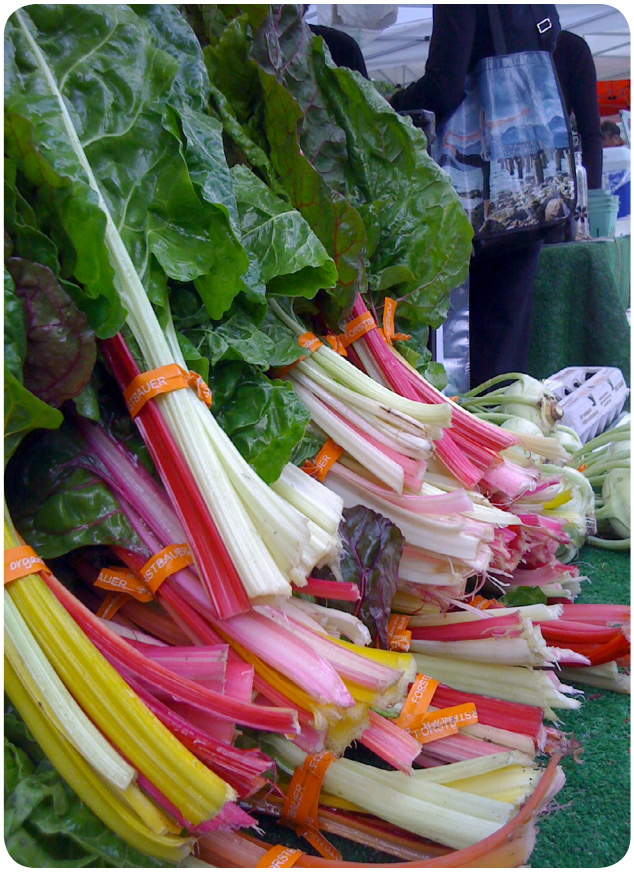
Best Practice # 2: Soil Assessment and Testing

Start by assessing the likelihood of soil quality concerns due to contamination from past activities. For the purposes of food growing, soil quality concerns are typically limited to surface soil (up to 1 metre below surface). To assess quality of soil conduct a site visit and research the land use history to determine if various indicators are present. Please see table "Indicators of Concern".

A site visit can be conducted by walking through and inspecting the site thoroughly for indicators of illegal dumping or burning of garbage. The soil should be turned over with a shovel and checked for soil staining (discolouration, unusually dark patches) and odours (chemical or gasoline smells).

A site history can be researched by searching the city archives and asking the local neighbourhood for information about the past and current uses of the site and adjacent properties.

While gas stations and dry cleaners produce contaminants, they pose less concern with respect to food growing as contaminants are typically found more than one metre below surface.



Indicators of Concern

Level of Concern	Indicators
Low Concern	Site is and has always been • Residential • Park • Farm • Child care centre and school Site is NOT located within: • 30 metres of a rail line or major arterial road Site does NOT reveal • Indications of burning or dumping • Smells in the soil • Staining of the soil
Medium Concern	Site is or has once been: • Infill Area (former streams that have been filled in or imported soil that has been used to level land) • Commercial land use (excluding printing or autobody) Site is located within: • 30 meters of a rail line or major arterial road
High Concern	Site is or has once been: • Former landfill • Printing Shop • Autobody Shop • Rail line or rail yard • Industrial land uses Site visit reveals • Indicators of dumping or burning • Debris in the soil • Smells in the soil • Staining of the soil

Sampling / Testing the Soil

The City of Vancouver encourages the use of raised garden beds with filter cloth and imported healthy soil or other growing medium from approved sources that avoids planting directly into native or existing soil to avoid possible contamination. Soil testing is strongly advised for all sites, particularly those with medium and high level of concern.

Depending on the potential environmental concerns, a soil sample can be analyzed for:

1. Total metals (such as lead, copper and cadmium)- recommended for all sites
2. Polycyclic Aromatic Hydrocarbons (PAH) (naphthalene, phenanthrene, pyrene, etc) - recommended for sites with infill, adjacent to rail, or former autobody or other industrial land uses
3. Volatile organic compounds (solvents such as lubricants) - recommended for sites with former paintshop, autobody or other industrial land uses

In Situ (in ground) sampling is conducted by collecting soils of similar material within 1 m3 and confined to the top 1 m below surface. One sample should be collected for each 10m3 of garden soil (up to a maximum of 5 samples). Then samples should be mixed in a large sealable bag (e.g. Ziploc) to create a composite sample. The composite sample should then be placed in a laboratory-supplied soil sampling jar and submitted for analyses.

If areas of suspect contamination are to be sampled, separate samples of this material should be collected and analysed and not be combined with soil not suspected to be contaminated.

Before sampling, contact an accredited (by Canadian Association for Laboratory Accreditation (CALA) laboratory of your preference to find out price listings, particular sampling requirements and methods of analyses. Go to www.cala.ca for a list of accredited laboratories.

Soil for Urban Farms

For the most part, if a site is and has always been residential, school or park, and is not located 30 meters from a rail line, there is lower level of soil safety concern. The majority of land base in Vancouver, and of Urban Farm Class A, is in this category. All Urban Farms Class A are encouraged to complete soil test. It is also recommended to use raised garden plots filled with quality growing medium that do not disturb ground cover.

Some land, particularly in commercial and industrial zones, may contain contaminates from historical land-use practices. If the land is an infill area, autobody shop, or other industrial land uses, the level of concern increases. Through Farm Class B Development Permit process, staff will work with applicant to determine level of concern, and will be required to submit a soils contamination assessment report.

More information on urban farms can be found here: www.vancouver.ca/foodpolicy

Interpreting the Soil Test

When soil testing is completed by the laboratory, compare the results to the "Contaminated Sites Regulation - standard soil parameters for comparison (mg/kg or ppm)" table. Values at or under the limits indicate soils that are safe for growing vegetables and other edible plants. If levels are higher than limits below, an exposure reduction plan for the site should be developed or another site selected. There are simple and inexpensive actions gardeners and farmers can take to reduce their exposure to urban soil contaminants; including raised bed or container gardens and adding clean soil and organic matter annually.

Contaminated Sites Regulation - standard soil parameters for comparison (mg/kg or ppm)*

* From Ministry of Environment Contaminated Site Regulations

Total Metals	
Aluminum (Al)	-
Antimony (Sb)	20
Arsenic (As) 2	50
Barium (Ba)	1000
Beryllium (Be)	4
Bismuth (Bi)	-
Boron (B)	-
Cadmium (Cd)	3
Calcium (Ca)	-
Chromium (Cr)	100
Cobalt (Co)	50
Copper (Cu)	150
Fluoride (F)	400
Iron (Fe)	-
Lead (Pb)	400
Magnesium (Mg)	-
Manganese (Mn)	-
Mercury (Hg)	15
Molybdenum (Mo)	10
Nickel (Ni)	100
Phosphorous (P)	-
Potassium (K)	-
Selenium (Se)	3
Silver (Ag)	20
Sodium (Na)	200
Strontium (Sr)	22000
Sulphur (S)	-
Thallium (Tl)	-
Tin (Sn)	50
Titanium (Ti)	-
Vanadium (V)	200
Zinc (Zn)	450
Polycyclic Aromatic Hydrocarbons	
Acenaphthene	-
Acenaphthylene	-
Anthracene	-
Naphthalene	5
Phenanthrene	5
Pyrene	10
Benzo(a)anthracene	1
Benzo(b)fluoranthene	1
Benzo(k)fluoranthene	1
Benzo(a)pyrene	1
Benzo(g,h,i)perylene	-
Chrysene	-
Indeno(1,2,3-c,d)pyrene	1
Dibenz(a,h)anthracene	1
Volatile Organic Compounds	
Trichloroethylene (TCE)	5

Links for additional information

History of land use:

- City of Vancouver Archives searchable data base
  http://searcharchives.vancouver.ca/

- Vanmap to assist search of former streams
  http://vancouver.ca/your-government/vanmap.aspx

Food Safety:

- Ministry of Health – Caring about Food Safety
  http://www.health.gov.bc.ca/protect/food-safety-module/files/home.htm

- Vancouver Coastal Health (VCH) Environmental Health Officer Contact
  http://www.vch.ca/about-us/contact-us/contact/

- City of Vancouver tips on managing rodents
  http://vancouver.ca/home-property-development/manage-rats-and-mice-yourself.aspx

- City of Vancouver Health By-Law 9535 (related to pesticide use)
  http://vancouver.ca/your-government/health-bylaw.aspx