

K: PSL FOR CROP PRODUCTION (311 CLAUSE 4)

CANADIAN ORGANIC STANDARDS PSL*

COG'S GUIDE TO THE STANDARDS

4. PERMITTED SUBSTANCES LISTS FOR CROP PRODUCTION

4.1 Classification

4.1.1 “Crop production substances are classified according to the following uses and applications:

a) Soil amendments and crop nutrition in Table 4.2 (Column 1) are substances applied to the soil to improve fertility and tilth and to correct soil problems. Fertilizers, plant foods and soil amendments are primarily used for their plant nutrient content and may be applied to the soil or to plant foliage.

b) Crop production aids and materials in Table 4.2 (Column 2) may be directly applied to the crop or soil, or used to control pests (including diseases, weeds and insects). Examples include: adjuvants, insect traps and plastic mulch, vertebrate animal pest management substances, plant disease and insect pest management substances.”

The Permitted Substances Lists authorize the use of substances that are considered necessary for organic production. The list pertaining specifically to crop production is Table 4.2 Soil Amendments and Crop Nutrients & Crop Production Aids and Materials. Substances that can be used as soil amendments, fertilizers or other sources of crop nutrients have a dot in Column 1. Substances that can be used as crop production aids and materials (such as substances for pest control, seed cleaning, wetting agents, etc. have a dot in Column 2.

The lists are in alphabetical order using common names for substances. Minerals are generally clustered under the name of the mineral. For example, under the substance name “Potassium,” you will find langbeinite, potassium chloride and potassium sulphate.

The Permitted Substances Lists (PSL) (CAN/CGSB-32.311) do not list products, but rather substances. Products are commercial formulations which are available on the market (brand name products). Producers are cautioned that commercial formulations often contain formulants in addition to the active ingredient. For example, formulants may be added to stabilize, preserve or improve the flowability of the active ingredient. Products can combine substances from the two columns which perform different functions, such as a fertilizer and a pest control substance. For example, boron (a fertilizer) and *Bacillus subtilis* can be applied together at planting time. Boron is listed in Table 4.2 (Column 1) as a soil amendment. *B. subtilis* is included under the general heading *Microorganisms and microbial products* in Table 4.2 (Column 2). It is used for disease control (the bacteria can outcompete fungi on the surface of the seed). Each component is subject to the specific requirements of the column and the annotations. Regarding *B. subtilis*, microorganisms are subject to 1.4 of CAN/CGSB-32.310 and cannot be genetically engineered or grown in a GE substrate unless a non-GE substrate product is not commercially available.

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Producers should take note of any restrictions regarding the acceptable origin, non-GE status, and requirements to document the need for a particular substance. Even if there is no specific mention of the GE prohibition in the annotation, GE substances are prohibited. See 4.1.3 below.

For certain substances, there are requirements to demonstrate that the substance will not cause a build-up of heavy metals or salts in the soil. Soil testing may be required to document levels of such substances.

Substances which have been certified as organic do not need to be on the Permitted Substances List to be used on organic operations. However, farmers and operators are required to report the use of all substances and in the case of certified organic products, obtain a copy of its organic certificate.

Occasionally, organic substances are listed as permitted to provide specific direction on how they may be used. Any product that bears the logo of the Canadian Organic Regulation is allowed even if it is not on the Permitted Substances List.

Production inputs which are certified to the National Organic Program in the U.S. can only be used in Canada if they comply with the Canada/U.S. Equivalency Agreement which addresses differences between the Canadian and U.S. organic systems. For example, seeds which have been grown in the U.S. in soil that has been amended with Chilean nitrate are not considered organic in Canada because Canada does not allow Chilean nitrate.

4.1.2 If a substance is allowed in one context in the PSL, that does not mean it is allowed to be used in another way. An annotation in one part of the PSL which allows the use of a substance does not affect its usage under another part of the standard.

As stated in the introduction of *CAN/CGSB-32.311-2015*, organic operations are required to abide by all other federal legislation.

Before using a product, its use should be approved by the certifier.

4.1.3 Prior to 2015, genetic engineering of microorganisms was not common; only GE vaccines were identified in the standards. In the current version, the GE prohibition has been extended to include all products of biofermentation.

4.1.2 “Use of a listed substance in a manner inconsistent with the scope of the table in which it appears is not permitted, except as specified in substance annotations.”

4.1.3 “Substances listed in Table 4.2 shall comply with prohibitions in 1.4 and 1.5 of *CAN/CGSB-32.310*. The following additional requirements apply

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to substances produced on substrates or growth media (for example, microorganisms and gibberellic acid):

- a) if the substance includes the substrates or growth media, the ingredients of the substrates or growth media shall be listed in Table 4.2;
- b) if the substance does not include the substrates or growth media, the substance shall be produced on non-genetically engineered substrates or growth media, if commercially available.”

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Many substances that we take for granted (such as amino acids, vitamins, flavours, enzymes, xanthan, natamycin, lysozyme, aspartame and chymosin) are now manufactured by genetically engineered microorganisms. Producers are required to provide documentation that confirms that the microorganism used to produce the substance was not genetically engineered.

Agar agar used to be the medium of choice for biofermentation but has been replaced almost entirely with a soy agar, most often produced from GE soybeans. Sugars are added to the biofermentation vats to feed the microorganisms and are primarily supplied by GE corn. The standard requires farmers and operators to search for a product produced on a non-GE substrate. If such a product cannot be found, the product produced on or in a GE substrate can be used.

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TABLE 4.2. SOIL AMENDMENTS AND CROP NUTRITION & CROP PRODUCTION AIDS AND MATERIALS

SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
Acetic acid	“Sources other than petrochemicals can be used. As an adjuvant, a pH regulator and for controlling pests (including weeds) and cleaning seeds.”	<p>Acetic acid and vinegar are terms which are used interchangeably until the percentage of acetic acid in a product reaches 8%. At that point it is usually referred to as acetic acid. Permitted sources include acetic acid produced through fermentation, but not through methanol carbonylation, acetaldehyde oxidation or ethylene oxidation.</p> <p>Acetobacter is a microorganism capable of producing up to 20% acetic acid through biofermentation.</p> <p>Operators are required to provide documentation stating that the bacteria used to manufacture acetic acid are not genetically engineered (GE). Operators must search for products that were not made on a GE substrate. However, operators can use products made with GE plant materials (such as GE corn or soybeans) as the substrate if there are no commercially available alternatives and the substrate does not remain in the final substance.</p>		•
Adhesives for sticky traps and barriers		<p>Trapping pest insects or disease spores using sticky traps can be effective in greenhouses and in the field. In the field, sticky traps are used primarily to monitor the pest population level and determine when additional pest control measures need to be employed. Adhesives used in sticky traps are not restricted.</p>		•

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
Agar	“For use in initial mushroom spawn production.”	Extracted from red algae, agar is a gelatinous substance used as a substrate on which microbial cultures are grown. Any algal source of agar is allowed. Soy agar (TSA) has replaced agar agar in many applications. For soy agar to be used, a non-GE affidavit needs to be obtained.	•	
Alfalfa meal and pellets	“Shall be organic if commercially available.”	Commercial availability is defined as: “The documented ability to obtain a production input or an ingredient in an appropriate form, quality, quantity or variety, irrespective of cost, in order to fulfill an essential function in organic production or preparation.” When a product is required to be organic “if commercially available,” a search for the organic form must be conducted. The failure to find an organic source must be recorded before using a non-organic version of the input. Record the known sources of the organic input and the reason for not using it. Cost is not a permitted reason for rejecting the organic version. If an organic product or seed cannot be imported into Canada due to import restrictions, it would be considered to be unavailable commercially.	•	
Algae	“See Table 4.2 <i>Aquatic plants and aquatic plant products.</i> ”		•	
Amino acids	“Derived from plants, animals or microorganisms, and extracted, hydrolyzed or isolated by non-chemical means, such as physical separation, or by substances	Amino acids (molecules) are the basic building blocks of proteins and are present in all forms of life.	•	•

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
	listed in Table 4.2 (Column 1 or Column 2) excluding <i>Formulants used in crop production aids.</i>	They are used in agriculture as chelating agents and as growth regulators for plants.		
Ammonium carbonate	“As an attractant in insect traps.”	This substance is known as smelling salts and can be used as a lure in insect traps.		•
Animal manure	“See clauses 5 and 6 of CAN/CGSB-32.310. See also <i>Table 4.2 Manure, composted and Manure, non-organic.</i> ”	<p>Animal manure can be a valuable source of nutrients for an organic farm. Manure is usually composted before applying to the soil. Most of the microorganisms that can cause disease in humans (or in other animals or plants) are killed by thorough composting, in which all parts of the compost pile or windrow reach a temperature 55°C (130°F) for at least four days (see <i>Compost produced on the farm</i> in PSL Table 4.2).</p> <p>If manure is not composted as described above, it is subject to the same restrictions as raw manure as outlined in 5.5.2.5 in the Standard. For example, raw, liquid or partially composted manure has to be incorporated into the soil at least 120 days before harvesting crops that have edible parts that may touch the soil, such as salad greens or tomatoes and at least 90 days before the harvest of crop products that do not come into contact with the soil and are intended for human consumption.</p> <p>See 5.5 <i>Manure management</i> of the Standard.</p>	•	

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
Animal manure, processed	<p>“Manures treated by mechanical or physical (including heat) methods are permitted. Additional ingredients shall be listed in Table 4.2 (Column 1).</p> <p>Manure sources shall conform to requirements specified in 5.5.1 of CAN/CGSB-32.310.</p> <p>The operator shall be able to demonstrate that best practices known to eliminate human pathogens during the treatment have been used or that the requirements in 5.5.2.5 of CAN/CGSB-32.310 have been met.</p> <p>See also <i>Table 4.2 Manure, composted</i> and <i>Manure, non-organic.</i>”</p>	<p>The most common processing method is to dehydrate and extrude the manure into pellets or granules. Dehydration and pelleting at 82C is sufficient to eliminate common pathogens.</p> <p>Pellets may contain other ingredients, such as binders and emulsifiers which can only be used if the additional ingredients are listed on Table 4.2 (Column 1). Documentation of the additives will be required. Often manufacturers will not share their secret recipes unless they can obtain a confidentiality agreement in exchange. Such agreements are commonly made with certifiers. Always check with your certifier before using a commercial product.</p>	•	
Aquatic plants and aquatic plant products	<p>“Aquatic plant products may be extracted by using the following substances in order of preference:</p> <p>a) substances in Table 4.2 <i>Extractants</i>;</p> <p>b) potassium hydroxide;</p> <p>c) sodium hydroxide provided the amount of solvent used does not exceed the amount necessary for extraction. The operator shall provide an affidavit from the manufacturer that proves the need to use sodium hydroxide.</p>	<p>This includes a range of products generically called seaweed meal (kelp meal, kelp extract, and liquid seaweed) which may have been simply dried or ground, or may have been extracted using allowed solvents. The products are used to supply minerals, micronutrients, vitamins and other substances that can promote plant growth. They are used to supplement the nutrients in the soil or potting mix. Most of the nutrients for the crop should come from the soil, not concentrated soil amendments.</p> <p>Substances listed in Table 4.2 Column 1 or 2 can be added to seaweed-based fertilizers to provide broad</p>	•	•

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
	Sodium benzoate and potassium sorbate may be used as preservatives for water-extracted aquatic plant products. All other preservatives are prohibited unless listed in Table 4.2 (Column 1 or 2) with the exception that <i>Formulants used in crop production aids</i> are prohibited.”	range of nutrients. These include fatty acids extracted from plant and animal sources provided they are not extracted using prohibited substances. See <i>Extractants</i> Table 4.2 Column 1. The preservatives are permitted because water-extracted products would be unstable without them.		
Ascorbic acid (vitamin C)		Both synthetic and non-synthetic forms are permitted.		•
Ash	May contain food or substances listed in Table 8.2.	<p>Hardwood ash is recognized as a valuable soil amendment which can provide up to 40% of the value of calcitic lime in raising the pH. Ash also contains potassium and phosphorus.</p> <p>If you use ash from your woodstove, it is important to document that you do not burn coloured paper, plastics or anything other than plain paper and untreated wood.</p> <p>If farmers obtain ash produced from unverifiable materials, such as forest waste burners, they will require an affidavit from the forestry company verifying that the wood waste has not been treated. Otherwise, test results will be needed to confirm that the ash does not contain levels of arsenic, cadmium, chromium, lead or mercury that exceed the maximum allowable levels as specified in the <i>Composting from off-farm sources</i> annotation.</p>	•	

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
Baits for rodent traps	"May contain food or substances listed in Table 8.2."			•
Bentonite	"See Table 4.2 <i>Mined minerals, unprocessed and Clay.</i> "	Bentonite is a form of clay which can be applied as a light coating on leaves to discourage insect pests.	•	•
Biochar	<p>"Produced through pyrolysis of forestry by-products which have not been treated or combined with prohibited substances.</p> <p>Recycled biochar from contaminated remediation sites is prohibited."</p>	<p>Biochar is an extremely durable form of charcoal. It takes up nutrients in soils, holds them and releases them over a long period of time. For this reason, biochar can be used as a soil amendment to rapidly improve soils that are low in carbon. It cannot be used as a soil substitute in containerized greenhouse production systems because it does not meet the requirements of a soil/growth media (32.310 7.5.2.1).</p> <p>Biochar, sometimes called greenchar, is also used to remove toxins from contaminated sites. The toxins bind to the biochar molecules and are slowly released back into the environment over time. To avoid introducing heavy metals, dioxins and other toxic substances to the soil, biochar may only be used if it is from untreated sources.</p>	•	
Biodegradable plant containers	"Biodegradable planting containers (for example, pots or cell packs) may be left to decompose in the field if all ingredients are listed in Table 4.2 (Column 1)."	Planting containers containing Kraft lignin can be left to decompose in soil if all their ingredients are listed in Table 4.2 Column 1. However, biodegradable plant containers that contain ingredients not listed in Table 4.2 Column 1, such as waxes and glues, must be removed when the transplant is set in the soil. Such		•

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
		containers can be reused, added to compost or disposed of through a municipal waste program.		
Biodynamic preparations for compost, soil and plants	“As described in Appendix 10 of the <i>Demeter Production Standards</i> .”	Biodynamic preparations can be added to compost or soil, or applied to plants provided they contain only recognized ingredients of biodynamic preparations.	•	•
Biological organisms	<p>“Biological organisms (living, dead or as extracts), such as viruses, bacteria, protozoa, phages, fungi, insects and nematodes. Pharmaceuticals derived from or by biological sources, such as natamycin, penicillin and streptomycin, are prohibited even if registered as pesticides.</p> <p>See Table 4.2 <i>Invertebrates; Microorganisms and microbial products</i>.”</p>	<p>Biological organisms refers to a wide range of beneficial insects, microorganisms, arthropods and other organisms, as well as products and extracts made from these. Examples of beneficial biological organisms and extracts include the following:</p> <ul style="list-style-type: none"> • Releasing sterile insects can be effective in controlling populations of insect pests, such as the codling moth in orchards in the Okanagan-Kootenay region of British Columbia. • Granulosis virus is a well-known virus spray used to combat codling moth in apple orchards. • Spinosad is an extract from a biological organism which can be used as an arthropod pathogen. Spinosad is produced by soil bacteria and is toxic to caterpillars, thrips, leafminers, spider mites, ants, fruit flies, fleas and potato beetle larvae. • Bees in a greenhouse used to spread other beneficial organisms or pesticides as allowed by Table 4.2 Column 2. 	•	•

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	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
		<ul style="list-style-type: none"> • Predatory insects, such as the two spotted stink bug or the spined soldier beetle, can effectively control many pest insects. • Parasitoid flies and wasps lay their eggs in the host's body. Once the eggs hatch, the larvae kill the host by eating it from the inside. • Insects can be released to help create a balanced ecosystem in the field or greenhouse. Lacewings and ladybeetles are examples of generalists that consume a wide range of insect eggs and/or larvae. 		
Blood meal	"Shall be sterilized."	<p>Blood meal is dried, powdered blood obtained from slaughterhouses and used in agriculture as a high-nitrogen fertilizer. It is one of the most potent biological sources of nitrogen; if too much is used, it can burn plants with excessive ammonia. As with other sources of plant-available nitrogen, it can also lead to excessive weed growth and problems with insect pests, such as aphids.</p> <p>To make blood meal, whole blood is centrifuged to remove foreign material and then spray-dried to give it a free-flowing consistency. Commercial manufacturing of blood meal requires a heating/drying phase to meet the definition of sterilization.</p>	•	
Bone meal	"Shall be guaranteed free of Specified Risk Materials (SRM)."	Any bone meal or blood meal marketed in Canada must comply with CFIA's Fertilizer Regulations. This restriction on the use of Specified Risk Material	•	

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
		(SRM), such as the brain and spinal cords from cattle, is designed to protect Canadian farms from the spread of Bovine Spongiform Encephalopathy, also known as BSE or Mad Cow Disease.		
Borate (boric acid)	<p>“Mined sources of sodium tetraborate and octaborate are permitted as wood preservatives.</p> <p>Permitted for structural pest control (example: for ants).</p> <p>Direct contact with organic food or crops is prohibited in the case of products formulated as pesticides.</p> <p>See Table 4.2 <i>Boron</i>.”</p>	Boric acid is a mild acid used as an insecticide, mostly indoors, such as controlling ants in warehouses. Boric acid cannot be used directly on, or even touch, organic crops or foods. It is produced mainly from borate minerals by a reaction with sulphuric acid.		•
Boron	<p>“The following soluble boron products are permitted:</p> <p>a) borate (boric acid);</p> <p>b) sodium tetraborate (borax and anhydrous); and</p> <p>c) sodium octaborate.</p> <p>May only be used when soil and plant deficiencies are documented by visual symptoms or by testing of soil or plant tissue, or when the need for a preventative application can be documented</p> <p>See Table 4.2 <i>Micronutrients</i>.”</p>	<p>Boron is an essential micronutrient which may be present in the soil at sufficient levels but not available to plants because of certain conditions (such as dry, sandy or alkaline soils). Also, certain soils are naturally low in boron. Soil or tissue testing or documents showing other signs of deficiency (such as records of visual symptoms) is recommended prior to the use of boron or other micronutrients to ensure that applications will not result in a damaging oversupply in the soil. Once an excess of boron has been created, it is very difficult to correct.</p> <p>Boron can be applied to prevent boron deficiencies in boron-demanding crops, such as beets, cabbage</p>	•	

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
		family plants and alfalfa, based on agronomic documents such as production guides.		
Botanical pesticides	<p>“Botanical pesticides shall be used in conjunction with a biorational pest management program. They shall not be the primary method of pest control. The least toxic botanicals shall be used in the least ecologically disruptive way possible. All label restrictions and directions shall be followed, including restrictions concerning crops, livestock, target pests, safety precautions, pre-harvest intervals and worker re-entry.”</p>	<p>Pyrethrum is an example of a pesticide derived from plants. A ‘biorational’ plan to prevent pests is required before any pest control product can be used. The term ‘biorational’ refers to a prevention plan which uses the least toxic form of pest control.</p> <p>Pest prevention plans include crop rotation, cover cropping, companion planting, a balanced nutrient management plan, and other crop management practices which reduce the need for reliance on pesticides. Even pesticides which are permitted have the potential to harm some beneficial organisms which help control pests.</p> <p>Formulants used with botanical pesticides shall comply with requirements in Table 4.2 <i>Formulants used in crop production aids</i>.</p> <p>A registered botanical pesticide can only be used for the purposes permitted by the registration and using the prescribed methods outlined on the label. For example, although rotenone is a botanical pesticide, it cannot be used for organic production in Canada, because rotenone products are no longer registered for agricultural use in Canada.</p>		•

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
Calcium	<p>“Calcium carbonate (calcitic limestone), calcium magnesium carbonate (dolomitic limestone), calcium silicate, and calcium sulphate (gypsum), all from mined sources.</p> <p>Other biological or mineral sources, such as shells from aquatic animals (for example, oyster shell flour), aragonite, eggshell meal and lime from sugar processing. Calcium chloride derived from naturally occurring brines and not chemically treated.</p> <p>Prohibited forms include slaked limestone (calcium hydroxide); quicklime (calcium oxide); calcium sulphate produced using sulphuric acid and calcium products that have been used in controlled atmosphere storage.</p> <p>See Table 4.2 <i>Calcium sulphate (gypsum)</i> for additional restrictions on this substance.”</p>	<p>Calcium is a common mineral found worldwide and is the main component of bones, shells of marine organisms, snails and eggshells. Many forms of calcium are available; organic growers need to check the details of the Calcium listing in Table 4.2 to find out which substances are permitted and under what circumstances.</p> <p>Calcitic and dolomitic lime are both permitted sources and are used to raise soil pH. Calcium carbonate is the active ingredient in agricultural calcitic lime. Dolomitic lime is calcium magnesium carbonate and can be effective in amending soils low in magnesium and calcium. Slaked lime (also called hydrated lime), however, is not allowed as a soil amendment because it may have deleterious effects on soil.</p> <p>Calcium chloride can be used if it is from natural brines and not chemically treated. Prohibited sources of calcium chloride are those derived from the ammonia-soda process (the Solvay process).</p> <p>Calcium silicate, including the mined product known as Canadian Wollastonite, improves the plant's immune system and its drought tolerance. It helps produce stronger cell walls (which discourage insect pests) and helps suppress powdery mildew.</p>	•	
Calcium lignin sulphonate	<p>“See Table 4.2 <i>Lignin and lignin sulphonates (lignosulphonates)</i>.”</p>			•

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	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
Calcium polysulphide	"See Table 4.2 <i>Lime sulphur</i> ."			•
Calcium sulphate (gypsum)	"Mined sources are allowed; calcium sulphate produced using sulphuric acid is prohibited. To correct calcium and sulphur deficiencies and soil salinity problems."	Only mined sources of gypsum may be used; gypsum reclaimed from drywall may contain synthetic adhesives, fire retardants or other prohibited substances.	•	
Cannery wastes	"Shall be from organic sources. Non-organic cannery wastes shall be composted. See Table 4.2 <i>Compost feedstocks</i> ."		•	
Carbon dioxide	"For soil and greenhouse use, for controlled atmosphere storage, and for storage pest control."	Carbon dioxide is a byproduct of combustion. Plants take in carbon dioxide and exhale oxygen. Any source is allowed for use in greenhouses or controlled atmosphere storage.		•
Cardboard	"Cardboard shall not be waxed or impregnated with fungicide or prohibited substances. For use as mulch, as composting feedstock or as pest trapping material. See Table 4.2 <i>Compost feedstocks</i> ."		•	•
Chelates	"Chelating agents that are listed in Table 4.2 (Column 2) are permitted. Examples include <i>Acetic acid</i> ; <i>Ascorbic</i>	Chelates are organic molecules that can trap highly reactive metal cations (including calcium, magnesium,	•	•

*Organic production systems: permitted substances lists. CAN/CGSB-32.311-2020. Canadian General Standards Board. Dec. 2020. publications.gc.ca/site/eng/9.854645/publication.html 15

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
	<i>acid; Citric acid; Humates; Lignin and lignin sulphonates (lignosulphonates) and Vinegar.</i>	cobalt, copper, zinc, iron and manganese) and make these nutrients more available to plants.		
Cholecalciferol (vitamin D₃)	<p>“Permitted if used outdoors and inside greenhouses for rodent control when methods described in 5.6.1 of CAN/CGSB-32.310 have failed.</p> <p>Prohibited inside on-farm food processing and food storage facilities.”</p>	<p>Cholecalciferol is a form of Vitamin D3 that is toxic to rodents as it affects the calcium and phosphate balance in their bodies. Section 8.3 (Facility Pest Management and Post-harvest Management) provides information on preventative pest control practices.</p> <p>If preventative practices are ineffective, products listed on Table 8.2 may be used. Section 8.3.3 allows additional products to be used provided there is no risk to the organic integrity of the products.</p>		•
Citric acid		<p>Most citric acid is not made from oranges but is produced from the fungus, <i>Aspergillus niger</i>. <i>A. niger</i> is fed a sucrose or glucose-containing diet to produce citric acid. The source of sugar is corn steep liquor, molasses, hydrolyzed corn starch and/or other inexpensive sugary solutions.</p> <p><i>A. niger</i> is sometimes genetically engineered to improve the efficiency of citric acid production, so it is important to ensure that your source is non-GE.</p> <p>Citric acid is allowed for various uses, including as a chelating agent or it can be added to a product to adjust the acidity (pH).</p>		•

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
Clay	<p>“Bentonite, perlite and kaolin as soil amendments, as seed pellet additives or for pest control.</p> <p>See Table 4.2 <i>Mined minerals, unprocessed; Bentonite; Kaolin clay.</i>”</p>	<p>Clay, such as bentonite or kaolin, can serve many roles on an organic farm. For example, pelleted seeds are coated with a thin layer of clay; this makes the seeds larger and easier to handle while sowing.</p> <p>Finely ground kaolin clay (often marketed as Surround pesticide) can be used for pest control, particularly in orchards. The fine powder can clog up the breathing tubes of insects and irritate the soft bodies of larvae. It also can repel flying insects from landing on crops. Note that care must be taken when using kaolin (or any substances that kills or repels pests); using kaolin can also kill or repel the natural predators of mites and other pests.</p> <p>Clay can be used as a soil amendment in sandy soil.</p>	•	•
Compost	<p>“Compost produced on the farm is restricted to compost produced on a certified organic farm. Compost from off-farm sources includes every other source, for example: municipal, residential or industrial sources, or from any organic or non-organic farm.</p> <p>See Table 4.2 <i>Compost from off-farm sources; Compost produced on the farm; Compost tea; and Compost feedstocks.</i> For information on compost starters, see Table 4.2 <i>Microorganisms and microbial products.</i> For information on vermicompost, see Table 4.2 <i>Worm castings.</i>”</p>	<p>Compost is an important tool in developing long-term soil health as it consists of both the raw materials added to the compost pile and also the microorganisms which biodegrade the raw materials. Nutrients from compost are released over more than one season and help build humus levels and tilth in the soil.</p> <p>This annotation provides clarity on what is considered to be “on-farm” as compared to “off-farm” compost. <i>On-farm compost</i> is produced on the organic farm that is applying for certification. All other</p>	•	

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
		<p>sources are considered “off-farm.” The relevant additional annotations are provided.</p> <p>The term “feedstock” refers to the materials being composted. Feedstocks are like ingredients used in making compost.</p>		
Compost feedstocks	<p>“Acceptable feedstocks include:</p> <p>a) animal manures conforming to criteria specified in 5.5.1 of CAN/CGSB-32.310;</p> <p>b) animals, animal products and by-products (including fishery);</p> <p>c) plants and plant by-products (including forestry and source-separated yard debris, such as grass clippings and leaves), pomaces and cannery wastes;</p> <p>d) soils and minerals that conform to the requirements of this standard and of CAN/CGSB-32.310; and</p> <p>e) paper yard waste bags which contain coloured ink.</p> <p>When evidence indicates that compost feedstocks could contain a substance or substances prohibited by 1.4 or 1.5 of CAN/CGSB-32.310 that is known to be potentially persistent in compost, testing of the compost before use is required or reference to scientific literature which establishes that the specific</p>	<p>Compost can be composed of:</p> <ul style="list-style-type: none"> · animal manures, carcasses and offal from slaughtering; · plants and by-products, including certain forestry materials, as well as source-separated yard debris; and · soil and minerals provided they meet the requirements in this standard and 32.310. <p>Plant materials from non-organic agriculture or urban sources are permitted because composting can degrade GE organisms and most other contaminants. For example, residential food waste collected in biodegradable bags can be used as a compost feedstock as long as the bags and food waste decompose effectively during the composting process. The absence of petrochemical residues may need to be confirmed by testing.</p> <p>Likewise, non-organic spent brewers’ grains from GE sources are an acceptable composting feedstock because GE residues break down during the thermophilic stage of the composting process</p>	•	

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
	<p>potential contaminant(s) will degrade during the composting process.</p> <p>The following composting feedstocks are prohibited: sewage sludge; compost starter and feedstocks fortified with substances not included in this standard; leather by-products; glossy paper; waxed cardboard; paper containing coloured ink other than paper yard waste bags; and animals, animal products and animal by-products not guaranteed free of Specified Risk Material (SRM).”</p>	<p>Knowing the source of feedstocks is extremely important. While most contaminants degrade in the composting process, some contaminants are persistent. For example, the picolinic acid family of herbicides (aminopyralid, clopyralid, picloram and triclopyr) do not degrade. These chemicals can accumulate in manure and compost and have devastating effects on crops for three years following the application. These herbicides are used on hydro right-of-ways and golf courses and are rarely used in conventional agriculture settings; clopyralid, such as in Lontrel, is sometimes used to control problems weeds, such as thistles, often in spot treatments. The exception is where picloram is applied in conjunction with 2, 4-D as in Tordon (Dow). Also, Reclaim, which contains aminopyralid, is used to control weeds on rangeland and pastures.</p> <p>If the feedstocks might contain chemicals that can survive the composting process, such as the herbicide picloram or petrochemicals, the operator will need to show that these are not in the compost being applied in the farm. The operator can either test the compost for residues of the specific contaminants or provide scientific research that demonstrates that the chemicals would have been degraded during the composting process used on that farm.</p>		

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
		Source-separated yard debris from municipalities may be in paper yard waste bags which contain coloured ink brand identification. This allowance for yard waste bags to be included in compost is a recent amendment, recognizing that urban homes can provide an important source of organic materials for organic farms. Leaves are an example of an excellent yard waste feedstock. Although yard waste bags are allowed, any other papers containing coloured inks cannot be added.		
Compost from off-farm sources	<p>Compost obtained from off-farm sources shall conform to the criteria specified in Table 4.2 <i>Compost feedstocks</i>. If compost is obtained from another farm, feedstock sources shall be documented. Compost obtained from all other sources shall comply to the following:</p> <p>a) shall not exceed the maximum acceptable levels of arsenic, cadmium, chromium, lead and mercury (mg/kg) and foreign matter outlined for unrestricted use compost (Category A), as specified in <i>Guidelines for Compost Quality</i>;</p> <p>b) shall meet criteria for acceptable levels (MPN/g total solids) of human pathogens as specified in <i>Guidelines for Compost Quality</i>; and</p> <p>c) shall not cause heavy metal buildup in soil.</p>	<p>Most commercial compost producers will provide a laboratory analysis of their product or a guarantee that the product meets the compost quality guidelines as specified. If compost is obtained from a non-organic farm, testing will be needed to ensure that the heavy metal content is within the CCME limits.</p> <p>Compost must meet the required specifications, regardless of whether it is applied directly to the soil or blended with other ingredients. It is not necessary to test each feedstock before composting. Testing (including heavy metal analysis) is required at the end of the composting process before it is blended with any other substances, such as potting mixes, minerals, other compost, etc.</p> <p>Coliform and salmonella testing can be avoided if the compost is applied as raw manure, outside of the restriction of “90/120 days to harvest” rule outlined in</p>	•	

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
		<p>5.5.2 of CAN/CGSB-32.310. Compost which is composed entirely of plant materials is known to be free of human pathogens. Therefore coliform testing is not required.</p> <p>Compost obtained from off-farm sources must also satisfy the requirements for "Compost feedstocks."</p>		
Compost produced on the farm	<p>"Compost produced on the farm shall conform to the criteria specified in Table 4.2 <i>Compost feedstocks</i>. In addition, if made from animal manures or other likely sources of human pathogens, compost produced on the farm shall:</p> <p>a) reach a temperature of 55°C (130°F) for a period of four consecutive days or more. The compost piles shall be mixed or managed to ensure that all of the feedstock heats to the required temperature for the minimum time; or</p> <p>b) meet limits for acceptable levels (MPN/g total solids) of human pathogens specified in <i>Guidelines for Compost Quality</i>; or</p> <p>c) be considered as aged or raw manure rather than compost, that is, meeting requirements specified in 5.5.2.5 of CAN/CGSB32.310."</p>	<p>This annotation outlines the requirements for making compost that is:</p> <ul style="list-style-type: none"> produced from feedstocks, such as manure, containing potential sources of human pathogens; and can be applied at any time throughout the growing season. <p>Many operators also employ a curing period of up to a year prior to application to allow the compost materials to fully stabilize and become a soil-like substance. Such well-cured compost is easy to apply and offers the greatest benefits to long-term soil health (although it has less of an immediate impact as a supply of readily available nutrients). Composting records are required including:</p> <ul style="list-style-type: none"> type of compost feedstocks; documentation of the temperatures which the pile reaches at the various stages of composting; and dates and rates of compost application. 		

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
		Or, one may decide not to monitor compost temperature, but rather rely on coliform and salmonella testing of the compost at the end of the process.		
Compost tea	<p>“Compost tea shall be made from composts that conform to criteria specified in Table 4.2 <i>Compost produced on the farm; Compost from off-farm sources; or Worm castings.</i></p> <p>Additional ingredients shall be listed in Table 4.2 (Column 1).</p> <p>If compost tea is applied directly to the edible parts of plants, the operator shall be able to demonstrate that best practices known to eliminate pathogens during the processing have been used OR that the requirements for raw manure, as specified in 5.5.2.5 of CAN/CGSB-32.310, have been met.</p> <p>See the <i>Compost tea</i> definition in clause 3 of CAN/CGSB32.310.”</p>	<p>Compost tea is as a source of available plant nutrients and a source of microorganisms which can outcompete disease organisms that are on leaves or soil.</p> <p>Substances are often added to improve the tea's effectiveness, including molasses to feed microorganisms, and a wetting agent such as yucca to help the compost tea adhere to leaves.</p> <p>Additives are permitted provided that they are listed on Table 4.2 (Column 1) and any restrictions are respected. For example, molasses is allowed as a soil amendment only if it is organic. This means that only organic molasses can be used as an ingredient in compost tea.</p>	•	
Copper (plant nutrition)	<p>“The following copper products may be used to correct documented copper deficiencies: copper sulphate, basic copper sulphate, copper oxide and copper oxysulphate.</p>	<p>A program of regular soil tests to monitor copper levels should be in place if copper products are used. High levels of copper in the soil can reduce plant growth and yields. Also, copper can accumulate in livestock forages and be toxic to animals, particularly sheep. High levels of copper are difficult to reverse.</p>	•	

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
	<p>Copper ammonia base, copper ammonium carbonate, copper nitrate and cuprous chloride are prohibited.</p> <p>Shall be used with caution to prevent excessive copper accumulation in the soil. Copper build-up in soil shall prohibit future use. Visible residue of copper products on harvested crops is prohibited.</p> <p>See Table 4.2 <i>Micronutrients.</i>"</p>			
Copper (production aid)	<p>"Copper sulphate, copper hydroxide, copper octanoate, Bordeaux mix, copper oxychloride and copper oxide.</p> <p>Permitted for use as a wood preservative, or for controlling pests, including diseases.</p> <p>Shall be used with caution to prevent excessive copper accumulation in the soil. Copper build-up in soil shall prohibit future use.</p> <p>Visible residue of copper products on harvested crops is prohibited."</p>	<p>To avoid excessive copper accumulation in the soil, use copper products sparingly and test soils regularly to ensure that you are not exceeding safe limits.</p> <p>The annotation lists several allowed uses for copper: as a fungicide, as wood preservative, and as a crop production aid (to correct nutritional deficiencies in plants).</p> <p>As a fungicide, copper is a common treatment to control late blight in potatoes. Copper is also used as a spray post-harvest on apricot and peach trees to prevent blight.</p>		•
Diatomaceous earth	<p>"Non-calcined forms.</p> <p>May contain substances listed in Table 4.2 (Column 2)."</p>	<p>Diatomaceous earth consists of the fossilized remains of diatoms, a type of hard-shelled algae. Contact with the fine powder leads to dehydration and death in soft-bodied insects.</p>		•

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	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
		It is important to check with the supplier that the DE is not calcined. Check that no pesticides or synergists have been added.		
Digestate, anaerobic	<p>“Permitted to be used for soil amendment, provided that the following conditions are met:</p> <p>a) the materials added to the digester shall be listed in Table 4.2 (Column 1). If feedstocks are obtained from off-farm sources, the digestate shall comply with the heavy metal restrictions in Table 4.2 <i>Compost from off-farm sources</i>;</p> <p>b) the criteria for the application of raw manure on land specified in 5.5.2 of CAN/CGSB-32.310 shall be met if the digestate feedstocks include manure;</p> <p>c) it is permitted to use anaerobic digestate as a compost feedstock if it is added to other substances which are then composted. See Table 4.2 <i>Compost feedstocks</i>.”</p>	<p>Anaerobic digestate is the byproduct of methane digestion. Anaerobic digestate was added in 2015 as methane digesters have become common on dairy farms. The digester produces methane from animal manure and other added feedstocks. A generator driven by methane produces electricity which provides power to the farm operation.</p> <p>All feedstocks must be listed on Table 4.2 Column I and any restrictions in the listing must be met.</p> <p>Anaerobic digestate is an excellent source of very available nutrients and should be applied carefully in the same way as raw manure is applied: only when the soil is biologically active, and at a rate that is capable of being absorbed and utilized by the soil microorganisms. This prevents nutrient run-off. Or anaerobic digestate can be harvested from the digester and placed into a holding tank where it can be composted with the addition of microorganisms and feedstocks. The composting process can then be monitored for temperature as outlined in the <i>Composting on the farm</i> annotation.</p>	•	

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	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
		If the temperature cannot be monitored, testing of the final product ensures that the composting process has been effective. Testing is not needed if the digestate will be applied 90/120 days before harvest as outlined in 5.5.2. Record what feedstocks are used in anaerobic digestion, and the dates and rates of application of the digestate.		
Dormant oils	“For use as a dormant spray on woody plants. Shall not be used as a dust suppressant.”	Dormant oils kill exposed insects and mites by either suffocating them (covering up their breathing tubes) or by directly penetrating the outside cuticle and destroying internal cells. Most dormant oils are light oils refined from crude oil. All oils manufactured for this purpose are allowed.		•
Dust suppressants	“Vegetable oils, organic molasses or substances listed in Table 4.2 (Column 1 or 2) (for example: <i>Lignin and lignin sulphonates (lignosulphonates)</i> are permitted, excluding <i>Formulants used in crop production aids</i> . Petroleum products are prohibited.”	Dust suppressants are added to minerals to protect workers from lung disease associated with fine particulate material. The most common dust suppressant is mineral oil, however mineral oil and other petroleum products cannot be used. In organic applications. Only vegetable oil, organic molasses or other substances listed in Table 4.2 (Column 1 or 2) are allowed with one exception. Formulants used in crop production aids are not permitted.	•	•
Enzymes	“Derived from plants, animals or microorganisms through the action of microorganisms.”	Enzymes are molecules that can increase the rate of chemical reactions within the root zone. Almost all enzymes are proteins and are produced using	•	

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		<p>biofermentation. As microorganisms break down nutrients in the fermentation vat, they release enzymes.</p> <p>Farmers wishing to use enzymes as soil amendments will need to verify that the product is derived from plants, animals or microorganisms through the action of microorganisms and has not been fortified with synthetic substances.</p> <p>Enzymes that are products of GE organisms and/or GE substrates cannot be used; however, there is an exception. If a specific enzyme product made with non-GE substrate is not commercially available, operators can use products made with GE plant material-based substrates but only if the substrate does not remain in the final substance.</p>		
Extractants	<p>“The following may be used as extractants:</p> <p>a) water;</p> <p>b) culinary steam, as described in 8.1.2 b) of CAN/CGSB-32.310;</p> <p>c) fats and oils, such as cocoa butter, vegetable oils, lanolin and animal fats, and alcohols other than isopropyl alcohol;</p> <p>d) supercritical CO₂; and</p> <p>e) substances listed in Table 4.2 (Column 1 or 2) except for <i>Formulants used in crop production aids.</i>”</p>	<p>Extractants are used to release active ingredients from plant materials. Examples of permitted extractants include enzymes, botanical pesticides, fats, amino acids, vitamins and other substances in Table 4.2 (Column 1 or 2).</p>	•	•

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
Feather meal		Feathers are ground up and extruded to make feathermeal which can be an excellent source of nitrogen. When applied to the soil, decomposition time is needed for the nitrogen to become available to plants.	•	
Ferric phosphate (iron ortho-phosphate, iron phosphate)	<p>“Permitted as a molluscicide (for slug and snail control).</p> <p>Shall be used in such a manner that runoff into water bodies is prevented.</p> <p>Contact with crops is prohibited.”</p>	Ferric phosphate is used as bait for slugs and snails.		•
Fibre row covers	<p>“Shall not be incorporated into the soil or left in the field to decompose; shall be removed at the end of the growing season.”</p>			•
Fish products	<p>“The following fish products are permitted: fish meal; fish powder; and hydrolysate, emulsions and solubles. Fish farm wastes shall be composted.</p> <p>Only substances listed in Column 1 or 2 of Table 4.2 can be added to fish products with the exception that the addition of <i>Formulants used in crop production aids</i> is prohibited. Chemical treatment is prohibited, with the exception of the following substances which are in preferential order:</p> <p>a) vinegar;</p>	<p>Most fish products consist of guts, fins and scales of fish harvested from the wild. These can be applied directly to the soil or processed and applied as liquid, meal or powder.</p> <p>If the fish waste comes from farmed fish, it must be composted before being applied. The composting process leads to biodegradation of many chemicals including certain veterinary treatments and pool/equipment treatments. Manufactured fish by-products, such as processed fish meals or liquid fish</p>	•	

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	<p>b) citric acid; c) phosphoric acid; or d) sulphuric acid.</p> <p>The amount of acid used shall not exceed the minimum needed to stabilize the product.”</p>	<p>fertilizers made with farmed fish and/or fish farm waste, do not have to be composted before use.</p> <p>Fish products often involve some processing, either dehydration to produce fish meal or liquefaction to produce hydrolysate. Note that preservatives are sometimes added to the processed fish product, only preservatives or other substances listed in Table 4.2 are allowed. Note however that <i>Formulants used in crop production aids</i> are prohibited.</p> <p>Farmers can use any substance in Table 4.2 other than <i>Formulants used in crop production aids</i> to adjust pH. While the standard expresses a preference for certain substances, it does not prohibit the use of any of these materials. The degree of pH adjustment is not limited by the standard but cannot exceed the amount required to stabilize the pH. This is to prevent fortification with prohibited substances.</p>		
Formulants used in soil amendments	<p>“<i>Formulants used in soil amendments</i> shall be derived from biological or mineral sources unless a substance annotation allows the use of a specified formulant. For example, see Table 4.2 <i>Aquatic plants and plant products; Fish products; Humates, humic acid and fulvic acid.</i>”</p>	<p>The type of formulant allowed depends on the use. The list of formulants that can be used in soil amendments is much more restrictive than those which can be used in crop production aids (in which formulants would typically be used in much lower quantities).</p>	•	
Formulants used in crop	<p>“<i>Formulants used in crop production aids</i> may only be used with substances listed in Column 2 of this table.</p>	<p>A formulant is any substance or group of substances other than the active ingredient that is</p>		•

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
production aids	<p>Only formulants classified as List 4A or 4B by the Pest Management Regulatory Agency (PMRA) or derived from biological or mineral sources may be used with substances in Table 4.2 (Column 2).</p> <p>Formulants classified as List 3 by PMRA may be used with passive pheromone dispensers.</p> <p>Formulants classified as List 4A, 4B or 3 by PMRA are not subject to 1.4 or 1.5 of CAN/CGSB-32.310.</p> <p>Formulants classified as List 1 or 2 by PMRA are prohibited.”</p>	<p>intentionally added to a product to improve its physical characteristics (e.g., sprayability, solubility, spreadability or stability).</p> <p>Unlike active ingredients, formulants which are contained in the composition of an end-use product are not often mentioned on the product label.</p> <p>PMRA List 3 formulants are generally prohibited but would be allowed if the substance is listed on Table 4.2 Column 2 (e.g., an essential oil or soap) or Table 4.2 mined minerals. Otherwise their use is restricted to passive pheromone dispensers.</p>		
Guano	<p>“Shall be decomposed, dried deposits from wild bats or birds.</p> <p>Domesticated fowl excrement is considered to be <i>manure</i>, not <i>guano</i>.”</p>		•	
Growth regulators for plants	<p>“Plant hormones, such as gibberellic acid, indoleacetic acid and cytokinins, derived from terrestrial or aquatic plants or produced by microorganisms.”</p>	<p>Cytokinins are a class of plant growth substances that enhance the rate of cell division and plant growth. Gibberellic acid is sometimes used in laboratory and greenhouse settings to trigger germination in seeds that would otherwise remain dormant. It is also widely used in the grape growing industry as a hormone to induce the production of larger bundles and bigger grapes, especially Thompson seedless grapes.</p>		•

*Organic production systems: permitted substances lists. CAN/CGSB-32.311-2020. Canadian General Standards Board. Dec. 2020. publications.gc.ca/site/eng/9.854645/publication.html 29

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
		<p>In the cherry industry, gibberellic acid is used as a growth regulator. Gibberellic acid produced by fermentation and extraction is considered to be non-synthetic and is permitted if produced using permitted extractants (<i>Extractants</i>). Requirements with regard to substrates/growth media must be met.</p> <p>Indoleacetic acid is another plant growth hormone produced in the bud region of the plant and can be used to enhance plant growth.</p> <p>As with all products of biofermentation, the substrate must be non-GE if such products are commercially available and the substance can only be used if the substrate does not remain in the final substance.</p>		
Homeopathic preparations		Homeopathic preparations are made from plant, animal and mineral sources which are diluted and shaken vigorously (succussed) many times until all that remains is water and the life energy of the original ingredients.		•
Hormones	"See Table 4.2 <i>Growth regulators for plants.</i> "			•
Humates, humic acid and fulvic acid	<p>"Permitted if mined; produced through microbial activity; extracted by physical processes; or with:</p> <p>a) Table 4.2 <i>Extractants</i>; or</p>	Humates are subsurface mineral deposits which are found above certain coal seams known as leonardite. They are formed by the decomposition and compression of prehistoric plant and animal lifeforms. Humic and fulvic acids are extracted from leonardite	•	

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
	<p>b) potassium hydroxide—potassium hydroxide levels used in the extraction process shall not exceed the amount required for extraction.</p> <p>Levels (mg/kg) of arsenic, cadmium, chromium, lead and mercury shall not exceed the limits (category C1) specified in <i>Guidelines for the Beneficial Use of Fertilising Residuals</i>. Shall not cause a build-up of heavy metals or micronutrients in soil.”</p>	and applied as a source of carbon to soils to help make organic nutrients more readily available to plants.		
Hydrated lime (calcium hydroxide)	"For plant disease control."	Also known as slaked lime, calcium hydroxide is formed by adding water to calcium oxide (quicklime). The most common use of hydrated lime in disease control is as part of a Bordeaux mixture, where its role is to reduce the phytotoxicity of copper sulphate. Hydrated lime cannot be used as a soil amendment.		•
Hydrogen peroxide		Hydrogen peroxide (H ₂ O ₂) is sometimes used as a fungicide.		•
Inoculants	"See Table 4.2 <i>Microorganisms and microbial products</i> ."	<p>Seed inoculants offer a number of benefits, as shown in the following examples.</p> <ul style="list-style-type: none"> • Rhizobia are naturally occurring soil bacteria that can bind with legumes to establish a trade of atmospheric nitrogen for carbohydrates. • <i>Bacillus subtilis</i> is a seed inoculant which can offer protection against the fungi that can inhibit germination in cool soils. 	•	

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
		<ul style="list-style-type: none"> Mycorrhizal fungi can be used as a seed inoculant to help plants access phosphorus and other nutrients. 		
Invertebrates	<p>“Worms, insects (including sterile insects), nematodes, arthropods and other invertebrates.</p> <p>See Table 4.2 <i>Worm castings; Shells from aquatic animals.</i>”</p>	<p>See examples in the annotation for <i>Biological organisms.</i></p>	•	•
Iron	<p>“The following sources of iron are permitted to correct documented iron deficiencies: ferric oxide, iron citrate, iron sulphate (ferric or ferrous) or iron tartrate.</p> <p>See Table 4.2 <i>Micronutrients.</i>”</p>		•	
Kaolin clay	<p>“May be calcined. Shall not be processed or fortified with substances unless listed in Table 4.2 (Column 2).”</p>	<p>Calcined kaolin clay is used to coat fine seeds; this separates the seeds and makes them easier to sow. It is also found in plastic mulches where calcined kaolin clay improves the thermal properties. Kaolin (often sold under the brand name Surround) is also used as a physical barrier against insect pests.</p> <p>Calcination is a process which heats the clay to a very high temperature to remove any moisture.</p>		•
Kelp and kelp products	<p>“See Table 4.2 <i>Aquatic plants and aquatic plant products.</i>”</p>		•	

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
Leaf mould		Leaf mould is produced by the breakdown of shrub and tree leaves and can be used as a soil amendment. Leaf mould can be added to compost, applied as mulch or dug into soil as a soil amendment.	•	
Lignin and lignin sulphonates (lignosulphonates)	<p>“Permitted as chelating agent(s), as formulant ingredient(s) and as dust suppressant(s). Ammonium lignosulphonate is prohibited.</p> <p>Other lignin forms such as lignosulphonic acid, calcium lignosulphonate, magnesium lignosulphonate, sodium lignin and sodium lignosulphonate are permitted.”</p>	Lignin sulphonates are a byproduct of forestry pulp and paper production.	•	•
Lime sulphur (calcium polysulphide)	<p>“Permitted on plants as:</p> <p>a) a fungicide;</p> <p>b) an insecticide; and</p> <p>c) an acaricide (mite control).”</p>			•
Limestone	“Mined magnesium and calcium carbonates. See Table 4.2 <i>Calcium</i> .”		•	
Magnesium	<p>“The following sources are permitted:</p> <p>a) mined magnesium rock;</p> <p>b) magnesium chloride derived from natural brines and not chemically treated;</p>	Magnesium rock can refer to any of more than 100 different magnesium compounds. For example, magnesite (magnesium carbonate occurs in rock formations, as does dolomitic lime (dolomite), which is derived from calcium-magnesium limestone.	•	

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
	<p>c) mined calcium magnesium carbonate (dolomitic limestone) that has not been slaked;</p> <p>d) potassium magnesium sulphate (langbeinite);</p> <p>e) magnesium sulphate (kieserite or Epsom salts) may be used when soil and plant deficiencies are documented by visual symptoms or by testing of soil or plant tissue, or when the need for a preventative application is documented.”</p>	<p>The natural source of magnesium chloride is extracted from brine solutions created by ancient sea beds and is permitted as a soil amendment. Anhydrous magnesium chloride is manufactured industrially and cannot be used.</p> <p>The farmer or operator will need to demonstrate that the soil or crop is deficient in magnesium (from soil or tissue tests or a soil consultant’s recommendation) before applying magnesium sulphate. Because mined magnesium sulphate is no longer available, Epsom salts are allowed even if they are not mined.</p>		
Manganese	<p>“Manganous oxide and manganese sulphate are permitted, to correct a documented manganese deficiency.</p> <p>See Table 4.2 <i>Micronutrients.</i>”</p>		•	
Manure, composted	<p>“See Table 4.2 <i>Compost.</i> See also Table 4.2 <i>Animal manure</i> and <i>Animal manure, processed.</i>”</p>	See guidance for <i>Animal manure.</i>	•	
Manure, non-organic manure source	<p>“See 5.5 of CAN/CGSB-32.310. See also Table 4.2 <i>Animal manure</i> and <i>Animal manure, processed.</i>”</p>	See guidance for <i>Animal manure.</i>	•	

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
Meat meal	<p>"Shall be processed by drying, heat sterilization and/or composting."</p>	<p>Meat meal, bone meal, blood meal and feathermeal are all slaughterhouse byproducts.</p> <p>All commercial meat meal products are monitored to ensure that they are properly processed.</p> <p>If done properly, on-farm composting of carcasses is recognized as an acceptable practice and does not pose a risk to livestock of Bovine Spongiform Encephalopathy, also known as BSE or Mad Cow Disease.</p>	•	
Micro-organisms and microbial products	<p>"Microorganisms, such as viruses, bacteria, protozoa, phages, and fungi, are permitted living, dead or as extracts. Microbial products may contain substances in Table 4.2 (Column 1 or 2). Examples include the following: rhizobium bacteria; mycorrhizal fungi; azolla; yeast; <i>Bacillus thuringiensis</i>; virus and virus sprays (e.g., granulosis); and spinosad.</p> <p>Microbial fertilizers or microbial soil amendments derived from substances that cannot be verified or derived from materials not listed in Table 4.2 (Column 1 or 2), may be used with the exception of municipal sewage sludge, which is prohibited.</p> <p>When used, microbial fertilizers shall not exceed the limits (category C1) for acceptable levels (mg/kg) of arsenic, cadmium, chromium, lead and mercury, as specified in <i>Guidelines for the Beneficial Use of Fertilising</i></p>	<p>These products are used for several purposes including:</p> <ul style="list-style-type: none"> • inoculating legumes before seeding (e.g., rhizobial bacteria used on soybeans or alfalfa); • as soil amendments (e.g., mycorrhizal fungi); • inoculating compost (e.g., yeast and effective microorganisms) and • as biofertilizers (e.g., bacteria, algae, fungi and other microbes are marketed as microbial fertilizers which can increase nutrient uptake by crops). <p>This allows for the use of any non-GE microorganism. However, operators must provide a statement from the supplier showing that the product is not genetically engineered.</p>	•	•

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
	<p><i>Residuals.</i> Shall not cause a build-up of heavy metals or micronutrients in the soil.</p> <p>Ionizing radiation is permitted for use on a peat moss carrier before the addition of microbial inoculants. Radiation is otherwise prohibited.</p> <p>Pharmaceuticals derived from biological sources, such as natamycin, penicillin and streptomycin, are prohibited even if registered as pesticides.”</p>	<p>There is one exception: if a specific product made with non-GE substrate is not commercially available, operators can use products made with GE plant material-based substrates (such as GE corn or soybean substrates) but only if the substrate does not remain in the final substance.</p>		
Micro-nutrients	<p>“Plant micronutrients (trace elements) are Iron, Manganese, Zinc, Copper, Molybdenum, Boron, Chlorine and Silicon.</p> <p>Micronutrient fertilizers may only be used when soil and plant deficiencies are documented by visual symptoms or by testing of soil or plant tissue, or when the need for a preventative application can be documented.</p> <p>Chelation with substances listed under Table 4.2 <i>Chelates</i> is permitted. EDTA, DTPA, EDDHA, nitrate and ammonium forms of micronutrients are prohibited.</p> <p>See specific annotations for <i>Boron; Silicon; Copper; Iron; Manganese; Molybdenum and Zinc</i> in Table 4.2.”</p>		•	

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
Milk and milk byproducts		Milk or whey used as a soil amendment does not have to be organic, but it must comply with 1.4 of the CAN/CGSB 32.310. Milk from non-organic cows treated with the GE hormone Recombinant Bovine Growth Hormone (rBST), such as used in the USA would not be compliant.	•	•
Mined minerals, unprocessed	<p>“Mined minerals include basalt, pumice, sand, feldspar, mica, granite dust and other unprocessed rock dust. Minerals extracted from seawater are permitted. To be allowed as a mined mineral, the product shall not have undergone any change in its molecular structure through heating, processing, ion exchange or combining with other substances.</p> <p>Sodium nitrate and rock dust that have been mixed with petroleum products, such as those from stone engraving, are prohibited.</p> <p>See annotations for specific minerals in Table 4.2 (Column I).”</p>	<p>Any mined mineral that has not been processed through heating or chemical reactions, and has not been combined with prohibited chemicals can be used. An example is Spanish River Carbonatite which is extracted, milled and bagged but does not undergo any change. Each load extracted from the mine site may have a slightly different composition but meets the minimum levels of calcium carbonite, biotite, apatite and rare earth minerals listed on the label.</p> <p>Minerals which have been extracted with flotation reagents are allowed given that the flotation reagents are removed from the final product.</p>	•	
Molasses	“Shall be organic.”	Molasses can provide a carbon source to enhance plant availability of nutrients and stimulate plant growth. It is sometimes an ingredient in compost tea and is also added to soils. Even if the soil amendment is a multi-ingredient product, the molasses component must be organic.	•	

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
Molybdenum	<p>“To correct documented molybdenum deficiencies. See Table 4.2 <i>Micronutrients</i>.”</p>	<p>Molybdenum deficiencies can be documented through soil or tissue tests, visual symptoms or the recommendation of a soil consultant</p>	•	
Mulches	<p>“Biological materials from organic sources are permitted (e.g., straw, leaves, grass clippings, hay, wool or untreated burlap). If organic materials are not commercially available, non-organic, non-genetically engineered sources may be used provided that prohibited substances have not been used on these materials for at least 60 days before harvest.</p> <p>Prohibited mulch material includes, but is not limited to, sawdust, wood chips, bark and shavings that is treated or processed with <i>Formulants used in crop production aids</i> or with substances, such as herbicides, preservatives and glues, not listed in Table 4.2 (Column 1 or 2).</p> <p>Newspaper and paper mulch are permitted; glossy paper and coloured ink are prohibited.</p> <p>Plastic mulches: Non-biodegradable and semi-biodegradable materials shall not be incorporated into the soil or left in the field to decompose. Use of polyvinyl chloride as plastic mulch or row cover is prohibited.</p> <p>Biodegradable mulches: 100% of biodegradable mulch films shall be derived from bio-based sources. Formulants or ingredients shall be listed in Table 4.2</p>	<p>In addition to plant materials, wool from organic or non-organic operations could be used as mulch.</p> <p>Plastic mulches: Plastic mulches can be used if they are picked up at the end of the season. A woven polypropylene weed barrier cloth can be left in place, for example in an orchard or vineyard, for years as long as it is doesn't start to degrade. Materials made from polyvinyl chloride are not permitted.</p> <p>Fully biodegradable mulches: Many farmers have grown accustomed to using mulch products marketed as biodegradable. The packaging of these products leads some customers to assume that they contain only substances which are consistent with organic principles. In fact, there are currently no fully biodegradable films on the market which meet the Canadian Organic Standard.</p> <p>Fully biodegradable mulches may not contain any synthetic substances including petrochemicals. The formulants and ingredients must all be listed on Table 4.2. Restrictions apply even if substances are used as components of a biodegradable mulching material. For example, if micronutrients are embedded in the mulch, the annotation for micronutrients must be</p>	•	•

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
	(Column 1 or 2). Biodegradable polymers and Carbon Black from GE or petroleum sources are not permitted.”	addressed. See also “Biodegradable plant containers” in Table 4.2 Column 2. The exemption which allowed the use of stockpiled non-compliant products expired January 1 st , 2017.		
Mushroom compost	“See Table 4.2 <i>Compost</i> .”	Often referred to as ‘spent mushroom substrate,’ mushroom compost is the growing medium left over after mushrooms have been harvested. Mushroom compost is made from agricultural materials, such as hay, straw, straw horse bedding, poultry litter and gypsum. Sphagnum peat moss is often added to the substrate. It is important to know the source of the mushroom compost as it may contain pesticide residues, particularly organochlorides used against the fungus gnat. Chemicals may also have been used to treat the straw and to sterilize the compost. Bags of mushroom compost sold at local garden centers do not come with guarantees that the product can be used in organic farming unless the bag carries a certifier’s logo. Check with your certifier before using any product that is not from a certified organic mushroom farm.	•	
Nitrogen gas	“For controlled atmosphere storage.”	Controlled atmosphere storage is a non-chemical process in which oxygen levels in sealed rooms are reduced, usually by the infusion of nitrogen gas. Temperatures are kept at a constant 0C to 2C (32F		•

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
		to 36F). Humidity is maintained at 95 percent and carbon dioxide levels are also controlled according to the product being stored. See "Oxygen."		
Oilseed meals	"Shall be organic if commercially available."	<p>Operators can avoid genetically engineered oilseed meals by using organic oilseeds. Finding non-GE oilseed meals may be challenging because most non-organic oilseed meals (including soybean, canola and cottonseed meal) are made from genetically engineered crops.</p> <p>If you use a non-organic oilseed meal, be sure to obtain a statement from the supplier confirming that organic oilseed meals are not available and that the non-organic oilseed meal is non-GE. This applies even if when the non-organic meal is a component of a multi-ingredient fertilizer: an operator would need to perform a commercial availability search for a fertilizer blend that is fully compliant (i.e., non-GE) before using this product.</p> <p>Anti-caking agents to keep non-organic oilseed meals free-flowing are not permitted unless they are listed on Table 4.2.</p>	•	
Oxygen	"For controlled atmosphere storage."			•

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
Peat moss		Much of the commercial peat moss contains wetting agents. Only the wetting agents listed in Table 4.2 <i>Surfactants</i> are permitted.	•	
Peracetic (peroxyacetic) acid	<p>“Formulations of peracetic acid may include unreacted residual reagents and catalysts, such as hydrogen peroxide, acetic acid and sulphuric acid.</p> <p>Permitted for: a) pest control; and b) disinfecting and cleaning seeds and plant stock.</p> <p>See Table 7.3.”</p>	Peracetic acid is produced by treating acetic acid with hydrogen peroxide. It is an ideal anti-microbial agent due to its high oxidizing potential. Peracetic acid kills microorganisms by oxidation and subsequent disruption of their cell membrane. Any source is allowed.		•
Pheromones and other semiochemicals	“All sources are permitted. For pest control. “	Pheromones trigger a behavioural response in another member of the same species, usually attracting the insects and keeping them from mating. A semiochemical is a generic term used for a chemical substance or mixture that affects insect behaviour; this includes pheromones, allomones, kairomones, attractants and repellents. Pheromones and semiochemicals are the only active ingredients allowed in pheromone traps; other pesticides are not permitted unless they are listed in Table 4.2 Column 2. Also, spray applications of semiochemicals are not permitted.		•
Phosphate rock	<p>“May be fortified or processed with substances listed in Table 4.2 (Column 1).</p> <p>Cadmium shall not exceed 90 mg/kg P₂O₅.”</p>	Cadmium often occurs naturally in association with mined phosphate rock. The amount of P ₂ O ₅ used in the calculation is the total amount, not the available amount.	•	

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
Plant by-products and plants	<p>“Includes plant preparations of aquatic or terrestrial plants or parts of plants, such as cover crops, green manures, crop wastes, hay, leaves and straw. Parts of plants used as soil amendments and foliar feeds are permitted. Wastes from crops that have been treated or produced with prohibited substances are permitted as compost feedstocks.</p> <p>For processing of plant by-products, see Table 4.2 <i>Extractants</i>.</p> <p>Prohibited substances include sawdust, wood chips, bark and shavings that are treated or processed with <i>Formulants used in crop production aids</i> or with substances, such as herbicides, preservatives and glues, not listed in Table 4.2 (Column 1 or 2).”</p>	<p>Organically produced green material can be applied directly to soils as mulch, as trench compost, or chopped and tilled into the soil. If the green material is from a non-organic source, it can only be used if it is added to compost. Composting breaks down most toxic substances.</p> <p>Plant materials can also be processed to extract the active ingredients but only <i>Extractants</i> listed in Table 4.2 Column 1 are permitted for plant materials used as soil amendments.</p>	•	
Plant extracts, oils and preparations	<p>“Permitted extractants include fats and oils (such as cocoa butter, lanolin and animal fats); alcohols; water; or substances listed on Table 4.2 (Column 2) other than <i>Formulants used in crop production aids</i>.</p> <p>Extraction with other solvents is prohibited except with, in order of preference:</p> <p>a) potassium hydroxide; or</p> <p>b) sodium hydroxide; provided the amount of solvent used does not exceed the amount necessary for extraction. The operator shall provide an affidavit</p>	<p>Plant oils can be used as spreader-stickers, surfactants and carriers.</p>		•

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	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
	<p>from the manufacturer that proves the need to use sodium hydroxide.</p> <p>For control of pests (e.g., diseases, weeds and insects).</p> <p>Clove oil is permitted for sprout inhibition in potatoes.”</p>			
Plant protectants	<p>“Mineral and biological substances including, but not limited to: calcium carbonate (from chalk, limestone, etc.); diatomaceous earth; kaolin clay; pine oil; pine resin; and yucca. White wash (solution of hydrated limestone) is permitted for use on trees to protect against sunburn and southwest disease.</p> <p>Permitted to protect plants from harsh environmental conditions (such as frost and sunburn), infection, the build-up of dirt on leaf surfaces, or injury by an invertebrate pest or disease.”</p>	See “Tree seals.”		•
Plastic for row covers and solarization	<p>“Non-biodegradable and semi-biodegradable materials shall not be incorporated into the soil or left in the field to decompose.</p> <p>Use of polyvinyl chloride as plastic mulch or row cover is prohibited.”</p>	PVC tubing is a stable form of polyvinyl chloride. Operators can use PVC tubing to suspend row cover over the row. However, sheet PVC cannot be used as row covers or as sheets to solarize the soil. See <i>Mulches</i> .		•
Pomaces	<p>“Feedstocks shall be from organically grown fruits or vegetables. Non-organic pomaces shall be composted. See Table 4.2 <i>Compost feedstocks</i>.”</p>	Pomace is the pulp, peel, seeds and stalks of fruit or vegetables after the oil, water, or other liquid has	•	

*Organic production systems: permitted substances lists. CAN/CGSB-32.311-2020. Canadian General Standards Board. Dec. 2020. publications.gc.ca/site/eng/9.854645/publication.html 43

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
		been pressed out. "Feedstocks" refers to the source of the material, such as the fruit or vegetable.		
Potassium	<p>"The following potassium sources are permitted:</p> <p>a) mined potassium magnesium sulphate (langbeinite) and mined potassium magnesium chlorides (sylvinite and kainite);</p> <p>b) potassium rock powder—includes basalt, biotite, mica, feldspar, granite, glauconite and greensand;</p> <p>c) potassium chloride—muriate of potash or rock potash. The use of potassium chloride shall not cause salt build-up in soil through repeated application;</p> <p>d) potassium sulphate—shall be produced by evaporating brines from seabed deposits or combining mined minerals using ion exchange. Potassium sulphate made using sulphuric acid as a reactant is prohibited."</p>	<p>When looking for a mineral source of potassium, mined sources are available, as well as refined minerals such as potassium chloride and potassium sulphate.</p> <p>Potassium chloride (also known as muriate of potash) is a naturally occurring potassium salt. Salt build-up can be monitored using soil tests.</p> <p>Potassium sulphate also provides sulphur. Allowed sources of potassium sulphate include both potassium sulphate produced by evaporating brines from seabed deposits, as well as potassium sulphate created through passive ion exchange when two mined minerals are mixed.</p>	•	
Potassium bicarbonate	<p>"For pest and disease control for crops grown in greenhouses and other structures, and for other crops."</p>	<p>Potassium bicarbonate can combat fungal organisms which are a major issue in green-houses, orchard crops and grapes. Good pest control practices, such as ensuring adequate air flow and reducing humidity, are essential first steps before resorting to pest control products. See CAN/CGSB-32.310-5.6.</p>		•
Pyrethrum	<p>"May be combined with <i>Formulants used in crop production aids</i>."</p>	<p>Pyrethrum is derived from the dried flower heads of the Dalmatian Chrysanthemum (<i>Chrysanthemum cinerarifolium</i>) and Persian Chrysanthemum (<i>C. coccin-</i></p>		•

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
	See Table 4.2 <i>Botanical pesticides</i> for restrictions.”	<p>eum). Pyrethroids, such as permethrin, are synthetic insecticides and are not permitted. Pyrethrins are often combined with a synthetic chemical, piperonyl butoxide, which is not permitted. The method of production determines whether a substance is permitted or not.</p> <p>For example, pyrethrin is used as a pest repellent. In its natural form, pyrethrin is an extract made from the flowers and seeds of <i>Chrysanthemum cinerarifolium</i>. However, when pyrethrin is paired with the synthetic synergist piperonyl butoxide, the combined formula is not permitted. Synergists enhance the action of the pesticide and increase its persistence in the environment. Tinkering with the pyrethrin formula in the lab has resulted in pyrethroids, synthetic chemicals derived from pyrethrin. The chemical change from pyrethrin to pyrethroids results in a product which is more toxic to non-target species and more persistent in the environment. Neither pyrethrins paired with piperonyl butoxide nor pyrethroids can be used; however, the non-synthetic pyrethrin is permitted.</p>		
Quick lime (calcium oxide)	“Shall not be used as a fertilizer or as a soil amendment.”	Quick lime is produced by heating calcium carbonate to at least 825°C. It can be used to make whitewash used as paint on farm buildings and painted on fruit tree trunks to prevent winter sunscald.		•
Repellents	“Shall be derived from biological sources, such as sterilized blood meal, rotten eggs, hair or predator			•

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
	scents. May contain substances listed in Table 4.2 Column 2.”			
Salt	<p>“Sodium chloride, calcium chloride or potassium chloride; shall be mined or derived from sources of natural brine.</p> <p>The effluent from ion exchange water softener regeneration may be used.</p> <p>For pest control.”</p>	Salt has various purposes. For example, in mushroom production, salt can be sprinkled on the top of the substrate to prevent disease from infecting the growing mushrooms.		•
Seaweed and seaweed products	“See Table 4.2 <i>Aquatic plants and aquatic plant products.</i> ”		•	
Seed treatments	<p>“Includes microbial products, kelp, yucca, gypsum, clays and botanicals.</p> <p>May contain substances listed in Table 4.2 (Column 1 or 2) or Table 7.3. See Table 4.2 <i>Peracetic Acid; Treated Seeds</i> and refer to CAN/CGSB-32.310- 5.3.2.”</p>	<p>Seed treatments include:</p> <ul style="list-style-type: none"> • kelp to help suppress disease, such as damping off; • biological organisms (e.g., Rhizobium) to provide nutrients to the growing plant. <p>Seed coat ingredients are often trade secrets and manufacturers may only be willing to disclose their recipes under confidentiality agreements with certifiers. Be sure to check with your certifier before using treated seeds.</p>		•

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
		<p>Seed pelleting covers the seed with clay or other substances to increase the size of small seeds to facilitate seeding.</p> <p>Pesticide seed treatments are not allowed unless they are listed in the Table 4.2</p>		
Shell from aquatic animals	“Includes chitin.”	<p>Chitin is the exoskeleton of insects and crustaceans. It is a major component of crabmeal and other crushed shellfish shells, which are commonly used as a soil amendment in coastal communities where shellfish is harvested. Chitosan, however, is extracted from chitin using various chemicals and is not permitted.</p> <p>Chitin has been used to control root knot nematodes when applied to the soil around potato and bean seed.</p>	•	•
Silicon, silica and silicates	<p>“Silicon products from mined sources such as diatomaceous earth, calcium silicate from wollastonite, or silicon dioxide (quartz). Sodium and potassium silicates are permitted only for Crop protection (Table 4.2 Column 2).</p> <p>See Table 4.2 <i>Diatomaceous earth</i>.”</p>	Sodium silicate can be used to reduce post-harvest decay due to fungal organisms.	•	•
Soaps	“Soaps (including insecticidal soaps) shall consist of fatty acids derived from animal or vegetable oils.”	Soaps may contain formulants such as isopropyl alcohol, provided the formulants are listed on PMRA 4A or 4B.		•

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
		Dehydrated alfalfa or other fertilizers may be added to boost nutrients. Limestone is often added to moderate acidity.		
Soaps, ammonium	“As a large animal repellent. Direct contact with soil or edible portion of crop is prohibited.”			•
Sodium bicarbonate	“For pest and disease control for crops grown in greenhouses and other structures, and for other crops.”			•
Soil	“From organic sources. Shall comply with restrictions specified in 5.1.2 of CAN/CGSB-32.310. See definition of <i>Soil</i> in Clause 3 of CAN/CGSB-32.310. For soils used in containers, see <i>Transplant media, potting soil and potting media.</i> ”	Soil can be used if the operator can verify that no prohibited substances have been applied in the past 36 months.	•	
Sphagnum moss	“May contain wetting agents listed in Table 4.2 <i>Surfactants.</i> ”	Sphagnum moss is a highly valued ingredient in peat moss as it is able to hold up to 20 times its own weight in water. Wetting agents are used to lower the surface tension of sphagnum moss, allowing water to penetrate the substance, instead of running off. Natural wetting agents, such as yucca, can be used and other surfactants permitted in Table 4.2 <i>Surfactants.</i>	•	

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
Stillage and stillage extract	<p>“Ammonium stillage is prohibited.”</p>	<p>Stillage or distillers’ grains are by-products from alcohol distillation of a fermented cereal grain mash. Stillage is not allowed as a soil amendment if ammonium biflouride was added during the recovery period (to prevent unintended bacterial growth). Corn stillage as a by-product of ethanol or corn oil production would require documentation confirming that the corn was non-GE.</p>	•	
Struvite (magnesium ammonium phosphate)	<p>“Allowed if made from biological sources, including plant and plant by-products or livestock manures. Prohibited if made from sewage sludge.</p> <p>All sources of magnesium are permitted in the manufacturing process.</p> <p>Levels (mg/kg) of arsenic, cadmium, chromium, lead and mercury shall not exceed the limits (category C1) specified in <i>Guidelines for the Beneficial Use of Fertilising Residuals</i>. Shall not cause a build-up of heavy metals or micronutrients in soil.”</p>	<p>On organic farms, particularly in the Prairies, the availability of phosphorus (P) may be a limiting factor to the long-term productivity of the farms. Rock phosphate is the main source of P but it is a finite, non-renewable resource which might be depleted in the near future. Also, the P contained in rock phosphorus is not readily available to plants.</p> <p>One way to solve the P shortage is to stop flushing away and recycle the phosphorus contained in livestock urine. In 2016, the Expert Group for Technical Advice on Organic Production concluded using struvite as a fertilizer should be considered to be in line with the objectives, criteria and principles of organic farming (however this is not specifically covered by the current EU Regulation). Likewise, the CGSB Committee on organic agriculture also explored the potential of struvite during the recent COS review.</p>	•	

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
		<p>Struvite from human urine will not be allowed because, as with sewage sludge, which is also prohibited, there are concerns over contamination by pharmaceuticals, harsh cleansers and other substances flushed into the sewage stream. However, unlike sewage sludge, it is highly unlikely that struvite from humane urine would be contaminated because the process of precipitation renders a relatively pure mineral, according to Dr. Kimberly Schneider. She co-leads a research activity on the use of struvite as a crop amendment under the Organic Science Cluster 3 project.</p> <p>Despite this, members of the Technical Committee on Organic Agriculture considered that there may be public concern, albeit unfounded, over potential contamination. Considering that research is currently being conducted on the use of struvite on organic farms (see podcast below), the use of struvite will likely be reviewed again in 2025. Hear the OFC Podcast or read the transcript.</p>		
Sugars	“Organic sugars (e.g., sucrose, glucose, fructose) are permitted.”	<p>Sugar is sometimes added to compost tea or used in seed treatments to both stimulate microbial activity and help a substance stick to where it’s needed (e.g., helping compost tea stick to foliage, or a seed inoculant stick to a seed).</p>	●	●

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
Sulphur smoke bombs	“Use of sulphur smoke bombs shall be permitted in conjunction with other methods used for rodent control when a full pest control program is maintained but temporarily overwhelmed.”			•
Sulphur, elemental	“Both mined and reclaimed sources of elemental sulphur are permitted.”	<p>Sulphur is usually applied as an ion in combination with a cation (potassium sulphate, calcium sulphate, magnesium sulphate) which is a plant-available form. It takes time for the soil to break down elemental sulphur and make it available to plants. For this reason, elemental sulphur should be applied well in advance of the time when the plant needs sulphur.</p> <p>Elemental sulphur can acidify the soil.</p>	•	•
Summer oils	“On foliage, as suffocating or stilet oils.”	Summer oils are used to create a barrier that protects the foliage of fruit trees against insects. They are only used before the fruiting period.		•
Surfactants	“Includes plant-derived saponins, such as <i>Yucca schidigera</i> and <i>Quillaja saponaria</i> , or substances listed in Table 4.2 <i>Formulants used in soil amendmets; Formulants used in crop production aids; Soaps.</i> ”	<p>Surfactants break the surface tension on water to disperse ingredients and they help dry materials to absorb water.</p> <p>Surfactants break the surface tension on water to disperse ingredients; they also help dry out materials so they can absorb water.</p>	•	•
Transplant, potting soil	“Shall be composed entirely of permitted substances listed in Table 4.2 (Column 1 or 2). Soil from the field may be used provided that prohibited	Potting soil can be purchased or made on the farm. Most potting soils are a mix of peat moss, sand, compost, bark, perlite and/or vermiculite. Dehydrated		•

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SUBSTANCE NAME(S)	ORIGIN AND USAGE		Soil (1)	Aids (2)
	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
and potting media	substances have not been used on the soil for at least 36 months.”	alfalfa or other fertilizers may be added to boost nutrients. Limestone is often added to moderate acidity. Natural wetting agents, such as yucca extract, may be used.		
Treated seed	“See Table 4.2 <i>Peracetic acid</i> ; <i>Seed treatments</i> and refer to CAN/CGSB-32.310- 5.3.2.”	See <i>Seed treatments</i> .		•
Tree seals	“Plant or milk-based paints are permitted. May only be combined with substances listed in Table 4.2 (Column 1 or 2). See Table 4.2 <i>Plant Protectants</i> . For planting stock: commercial grafting materials are permitted, provided that plants are maintained in accordance with requirements of CAN/CGSB-32.310 for at least 12 months prior to harvest of organic products.”	Tree seals can be used to protect trees from pests and winter sunscald; they can also be used as a sealant on injuries to prevent disease entering the tree. Because organic tree whips are not available in most areas, conventional planting stock treated with synthetic grafting materials and other substances not listed on the PSL can be purchased as outlined in CAN/CGSB-32.310 (5.3). The non-bearing trees must be reared organically for a minimum of 12 months before organic products can be harvested from them.		•
Vermicasts	“See Table 4.2 <i>Worm castings</i> .”	Earthworm droppings are called vermicasts or worm castings.	•	
Vermiculite		Vermiculite is a natural mineral that expands with the application of heat. Vermiculite is commonly used as an addition to potting soil to hold moisture for slow release.	•	

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	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
Vinegar (acetic acid)	"See Table 4.2 <i>Acetic acid</i> ."			•
Vitamins	"Biological and mineral sources of all vitamins are permitted. Non-biological and non-mineral sources of vitamins B ₁ , C (ascorbic acid) and E are permitted."	Vitamins can stimulate plant growth but their effectiveness has not been documented. Most permitted vitamins are derived from plants or minerals, although there are exceptions for vitamins B ₁ , C (ascorbic acid) and E.		•
Water		All water sources including seawater are allowed. Farmers are wise to be cautious to protect their soils from salination if salty sea water is added regularly. Soil salination can be difficult to reverse. Soil salinization is defined as an increase in salt in the soil to a level at which salt becomes toxic to plants. It can occur over time from continuous use of irrigation in dry areas or from the application of soil amendments that are high in salts.	•	•
Water, recycled	"Recycled water shall only contain substances listed in Tables 4.2 (Column 1 or 2), 7.3 and 7.4. Recycled wash water from all organic operations, including dairy operations, may be spread on crop lands. Requirements for land application, as specified in 5.5.2.5 of CAN/CGSB-32.310, shall be met. In all other uses, recycled water shall meet applicable irrigation water regulatory requirements."	Recycled water is water that has been used on the farm to wash vegetables, irrigate crops or rinse dairy equipment. Vegetable wash water normally contains only particles of dirt but may contain chlorine residues from municipal water sources. Irrigation or flooding water that has been captured before it runs off the field normally contains only soil particles and nutrient residues. Dairy equipment wash water contains milk residues and approved cleaners.	•	•

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	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
		Any off-farm sources of recycled water require a statement from the supplier identifying the ingredients. For example, run-off from conventional fields containing pesticide residues would not be accepted.		
Wetting agents	"See Table 4.2 <i>Surfactants</i> ."	A wetting agent is often added to help a substance, such as a potting soil, absorb water. Saponins are soapy compounds produced by plants which can help to break the surface tension. They are sometimes used to help substances, such as compost tea, adhere to leaves. Given compost tea's ability to help prevent disease, the improved adherence will protect the plant over a longer period of time and fewer applications will be required.	•	•
Wood ash	"See Table 4.2 <i>Ash</i> ."		•	
Worm castings	<p>"Worm castings (also called vermicompost, worm compost, vermicasts, worm humus or worm manure) are the end product of the breakdown of organic matter and compounds by some earthworm species.</p> <p>Feedstocks for earthworms shall meet the criteria in Table 4.2 <i>Compost feedstocks</i>.</p> <p>The operator shall be able to demonstrate that:</p> <p>a) worm castings produced either on the farm or obtained from off-farm sources meet the limits for</p>		•	

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	CANADIAN ORGANIC STANDARDS* PSL	COG'S GUIDE TO THE STANDARDS		
	<p>acceptable levels (MPN/g total solids) of human pathogens as specified in <i>Guidelines for Compost Quality</i>; or</p> <p>b) best practices known to eliminate human pathogens during vermicomposting have been used.</p> <p>See Table 4.2 <i>Microorganisms and microbial products</i> for information on compost starters.”</p>			
Yeast	“See Table 4.2 <i>Microorganisms and microbial products</i> .”		•	
Zinc	“See Table 4.2 <i>Micronutrients</i> .”	<p>Zinc oxide occurs in nature as the mineral zincite but can also be chemically synthesized.</p> <p>Zinc sulphate is produced through a chemical process in which sulphuric acid and zinc oxide are combined. Sulphuric acid sources of zinc sulphate are permitted as there are no other available sources.</p>	•	

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