## TABLE 3. Soil Amendments and Crop Inputs

| **Amendment** | **Metric/Rationale** |
| --- | --- |
| **Raw manure, untreated animal products/by-products, or not fully composted green waste, biosolids, and/or animal manure-containing soil amendments and crop inputs** | **DO NOT USE OR APPLY** soil amendments, or crop inputs, that contain un-composted, incompletely composted or non- treated animal manure and/or animal product/by-products, or \*biosolids to fields which will be used for lettuce and leafy greens production or to lettuce and leafy greens crops. If these materials have been applied to a field, wait one year prior to planting and producing lettuce and leafy greens. Applications include, but are not limited to, the intentional use of an untreated soil amendment or crop input, the use of animals for field management of weeds and crop residue, the unintentional application due to drift from an adjacent area. **If applied to the crop the crop cannot be harvested for the fresh market.** \*For Class A Biosolids use the one calendar year guidance. For Class B Biosolids the field cannot be replanted for a minimum of 38 months from discontinued use of Class B Biosolids. Soil testing must also be conducted demonstrating the soil meets the standard for compost.  |
| **Time interval and mitigations before planting can commence following the application of unallowed materials.**  | • Minimum (1) one calendar year after application of the product.Please note that certain environmental conditions particularly heavy rains, long periods (or unusual amounts) of rain or moisture, and increased humidity can cause pathogens of concern to persist for longer periods of time or to re-grow after being shown to be nondetectable. Also, the type, and amount of the soil amendment and crop input can also impact the persistence of pathogens which may change the minimum time required before replanting. When deemed acceptable, and guided through a proper risk assessment, appropriate soil testing can be used to shorten this period to no less than **270 days** prior to planting. * Suitable representative samples shall be collected for the entire area suspected to have been exposed to the applied products. This testing must be performed in a manner that accurately represents the production field.
* Results must indicate that soil levels of microorganisms meet the recommended standards for processed compost.
	+ For additional guidance on appropriate soil sampling techniques, use the Soil Screening Guidance: Technical Background Document (US EPA 1996). Specifically, Part 4 provides guidance for site investigations. Reputable third-party environmental consultants or laboratories provide sampling services consistent with this guidance.
	+ Appropriate mitigation and mitigation strategies are included in the text portion of the document.
 |
| **7a Composted Soil Amendments and Crop Inputs (containing animal manure or animal products)** | **Please see Figure 7A: Decision Tree for Use of Biological Soil Amendments and Crop inputs of Animal Origin.****:****Composting Process Validation:**Enclosed or within-vessel composting:Active compost must maintain a minimum of 131oF for 3 days or longerWindrow composting:Active compost must maintain aerobic conditions for a minimum of 131oF for 15 days or longer, with a minimum of five turnings during this period followed by adequate curing.Aerated static pile composting:Active compost must be covered with insulating materials per federal, state, and local regulation and maintain a minimum of 131oF for 3 days or longer with proper management to ensure elevated temperatures throughout all materials followed by adequate curing. **Target Organisms:*** Fecal coliforms
* *Salmonella* spp.
* *STEC*

**Acceptance Criteria:*** Fecal coliforms: < 1,000 MPN / gram of total solids (dry weight basis)
* *Salmonella* spp.: Negative or < DL (< 1 MPN / 30 grams)
* *STEC*: Negative or < DL (< 1 MPN / 30 grams)

**Recommended Test Methods:*** Fecal coliforms: U.S. EPA Method 1680; multiple tube MPN
* *Salmonella* spp.: U.S. EPA Method 1682
* *STEC*: Any laboratory validated method for compost sampling.
* Other U.S. EPA, FDA, AOAC, TMECC or validated/accredited methods may be used as appropriate.

**Sampling Plan:*** A composite sample shall be representative and random.
* Sample may be taken by a trained representative.
* A composite sample shall be representative and random and obtained as described in the California state regulations.[[1]](#footnote-2) (See Appendix E)

.[[2]](#footnote-3)**Testing Frequency:*** Each lot before application to production fields. A sampling lot is defined as a unit of production equal to or less than 5,000 cubic yards.
* A unit of production is meant to be physically unique. Some characteristics could include the same ingredients, same time of production, same production conditions, same equipment, etc. i.e. for each production lot, take one sample per each 5,000 cu yards.
* Reconditioned/re-processed product suspected of being contaminated.

Bulk finished product, not enclosed or packaged, must be re-tested at minimum annually if it is stored for greater than one calendar year and none of the product has been distributed. If some part has been distributed the remaining product should be reconditioned minimally annually and re-tested. **Application Interval:*** Must be applied > 45 days before harvest.

Note: See best practices regarding what to consider when applying materials that may contact the edible portion of the crop.**Documentation:*** All products must have documentation that demonstrates they are free of pathogens of concern.
* All test results, Certificates of Analysis, and documentation shall be current, reviewed before use, and available for verification from the grower (the responsible party) for a period of two years. Policies, procedures, letters of guarantee, and similar types of documents, must be updated annually.
* Records of process control monitoring for on-farm produced soil amendments must be reviewed, dated, and signed, within a week after the records are made, by a supervisor or responsible party.

**Rationale:*** The microbial metrics and validated processes are based on allowable levels from California state regulations for compost (CCR Title 14 - Chapter 3.1 - Article 7), with the addition of testing for *STEC* as microbe of particular concern.
* The 45-day application interval was deemed appropriate due to the specified multiple hurdle risk reduction approach outlined. Raw manure must be composted with an approved process and pass testing requirements before an application.
* All products must be used in accordance with all local, state, and federal regulations.
 |

|  |  |
| --- | --- |
| **7b – Composted Not Containing products of Animal origin (green/plant waste, vegetative material, pre/post-consumer waste not containing products of animal origin, etc)** | **Please see Figure 7B: Decision Tree for Use of Biological Soil Amendments and Crop inputs of non-Animal Origin.****Composting Process Validation:**Enclosed or within-vessel composting:Active compost must maintain a minimum of 131oF for 3 days or longerWindrow composting:Active compost must maintain aerobic conditions for a minimum of 131oF for 15 days or longer, with a minimum of five turnings during this period followed by adequate curing.Aerated static pile composting:Active compost must be covered with insulating materials per federal, state, and local regulation and maintain a minimum of 131oF for 3 days or longer with proper management to ensure elevated temperatures throughout all materials followed by adequate curing. **Target Organisms:*** Fecal coliforms
* *Salmonella* spp.
* *STEC*

**Acceptance Criteria:*** Fecal coliforms: < 1000 MPN / gram of total solids (dry weight basis)
* *Salmonella* spp.: Negative or < DL (< 1 MPN / 30 grams)
* *STEC*: Negative or < DL (< 1 MPN / 30 grams)

**Recommended Test Methods:*** Fecal coliforms: U.S. EPA Method 1680; multiple tube MPN
* *Salmonella* spp.: U.S. EPA Method 1682
* *STEC*: Any laboratory validated method for compost sampling.
* *Other U.S. EPA, FDA, AOAC, TMECC or validated/accredited methods may be used as appropriate.*

***Sampling Plan:**** A composite sample shall be representative and random and obtained as described in the California state regulations.[[3]](#footnote-4) (See Appendix E)
* Sample may be taken by a trained representative.

**Testing Frequency:*** Each lot before application to production fields. A sampling lot is defined as a unit of production equal to or less than 5,000 cubic yards.
* A unit of production is meant to be physically unique. Some characteristics could include the same ingredients, same time of production, same production conditions, same equipment, etc. i.e. for each production lot, take one sample per each 5,000 cu yards.
* Reconditioned/re-processed product suspected of being contaminated.
* Bulk finished product, not enclosed or packaged, must be re-tested at minimum annually if it is stored for greater than one calendar year and none of the product has been distributed. If some part has been distributed the remaining product should be reconditioned minimally annually and re-tested.

**Application Interval:*** Must be applied > 45 days before harvest.

Note: See best practices regarding what to consider when applying materials that may contact the edible portion of the crop.**Documentation:*** All products must have documentation that demonstrates they are free of pathogens of concern.
* Any biological soil amendment or crop input that DOES NOT contain products of animal origin must have documentation that shows the material is free of products of animal origin.
* All test results, Certificates of Analysis, and documentation shall be current, reviewed before use, and available for verification from the grower (the responsible party) for a period of two years. Policies, procedures, letters of guarantee, and similar types of documents, must be updated annually.
* Records of process control monitoring for on-farm produced soil amendments must be reviewed, dated, and signed, within a week after the records are made, by a supervisor or responsible party.

**Rationale:*** The microbial metrics and validated processes are based on allowable levels from California state regulations for compost (CCR Title 14 - Chapter 3.1 - Article 7), with the addition of testing for *E. coli* O157:H7 as microbe of particular concern.
* The 45-day application interval was deemed appropriate due to the specified multiple hurdle risk reduction approach outlined. Raw manure must be composted with an approved process and pass testing requirements before an application.
* All products must be used in accordance with all local, state, and federal regulations.
 |
| **7b - Non – Composted, Solid and Liquid, Soil Amendments and Crop Inputs Not Containing products of Animal origin** (fungal/bacterial extracts, green/plant waste, plant extracts, vegetative material, algae, yeast extract, pre/post-consumer waste not containing products of animal origin, etc)\*These products have not gone through a validated treatment process to reduce microorganisms of concern. | **Products** Products included in this section could include: Biofertilizers, biologicals, biorationals, bio-stimulants, biopesticides, agricultural and compost teas not of animal origin, and other products not derived from ingredients of animal origin. **Target Organisms:*** Fecal coliforms:
* *Salmonella* spp.
* *STEC*
* *Listeria monocytogenes*

**Acceptance Criteria:*** Fecal coliforms: < 1000 MPN / gram of total solids (dry weight basis)
* *Salmonella* spp.: Negative or < DL (< 1 MPN / 30 grams)
* *STEC*: Negative or < DL (< 1 MPN / 30 grams)
* *Listeria monocytogenes: Negative*

**Recommended Test Methods:*** Other U.S. EPA, FDA, AOAC, TMECC or validated/accredited methods may be used as appropriate.

**Sampling Plan:*** Sample may be taken by a trained sampler and/or verified automated process.
* A composite sample shall be representative and random and obtained as described in the California state regulations.[[4]](#footnote-5) (See Appendix E)

**Testing Frequency:*** Each lot before application to production fields.
* Lot means a specific quantity of a finished product or other material that is intended to have uniform character and quality, within specified limits, and is produced according to a single manufacturing order during the same cycle of manufacture.
* Reconditioned/re-processed product suspected of being contaminated.

**Application Interval*** If a COA is available demonstrating that the input meets the microbial acceptance criteria outlined above, then no time interval is needed between application and harvest.

Note: See best practices regarding what to consider when applying materials that may contact the edible portion of the crop.**Documentation:*** All products must have documentation that demonstrates they are free of pathogens of concern.
* All test results, Certificates of Analysis, and documentation shall be current, reviewed before use, and available for verification from the grower (the responsible party) for a period of two years. Policies, procedures, letters of guarantee, and similar types of documents, must be updated annually.
* Records of process control monitoring for on-farm produced soil amendments must be reviewed, dated, and signed, within a week after the records are made, by a supervisor or responsible party.
* Lot information shall be described on the COA or lot information must accompany the COA if the information cannot be described on the COA. Lot information is required to be able to conduct traceability for the material applied to the growing location and to link the product to a test result. Information that could be used to confirm the lot description could be lot identification # associated with a treatment step, shift, time parameters, sanitation breaks, volume, weight, size but other parameters could also be used based on a specific production process.
* Any biological soil amendment or crop input that DOES NOT contain products of animal origin must have documentation that shows the material is free of products of animal origin.

**Rationale:*** For Liquids sample size needs to be per production process lot sizes.
* All products must be used in accordance with all local, state, and federal regulations.
 |
| **7c– Biological Soil amendments and/or crop inputs that have gone through a validated treatment process** (not including composting)(Chicken pellets, blood meal, bone meal, feather meal, Soybean meal, Kelp meal, Alfalfa meal, Cotton seed meal, Mustard Meal, Rice Bran, treated fish emulsion, treated agricultural teas, etc) | **Please see Figure 7B: Decision Tree for Use of Heat-Treated Soil Amendments.****Heat Process Validation*** The heat treatment processes applied to the soil amendment-containing animal manure shall be done via a process validated to assure the process is capable of reducing pathogens of human health significance to acceptable levels.

**Target Organism:** * Fecal coliforms
* *Salmonella* spp.
* *STEC*
* *Listeria monocytogenes*

**Acceptance Criteria:*** Fecal coliforms Negative or <DL per gram
* *Salmonella:* Negative or <DL (<1/30 grams)
* *STEC* Negative of <DL (<1/30 grams)
* *Listeria monocytogenes:* Not detected or < DL (<1 CFU/5 grams)

**Recommended Test Methods:** * Fecal coliforms: U.S. EPA Method 1680;multiple tube MPN
* *Salmonella* spp*.*: U.S. EPA Method 1682
* *E. coli* O157:H7 and *Listeria monocytogenes*: Any laboratory validated method for testing soil amendments
* U.S. EPA, FDA, AOAC or other validated / accredited methods may be used as appropriate.

**Sampling Plan:*** A sample shall be representative and random.
* Sample may be taken by a trained sampler and/or verified automated process.
* Extract at least 12 equivolume samples (identify 12 separate locations from which to collect the sub-sample, in case of bagged product 12 individual bags)

**Testing Frequency:** * Each lot before application to production fields.
* Lot means a specific quantity of a finished product or other material that is intended to have uniform character and quality, within specified limits, and is produced according to a single manufacturing order during the same cycle of manufacture.
* Reconditioned/re-processed product suspected of being contaminated.

**Application Interval:*** If the treatment process used to inactivate human pathogens of significant public health concern meets the microbial acceptance criteria outlined above, then no time interval is needed between application and harvest.
* If the treatment process used to inactivate human pathogens of significant public health concern is not validated but will likely significantly reduce microbial populations of human pathogens and product COAs meets microbial acceptance criteria outlined above, then a 45-day interval between application and harvest is required.

Note: See best practices regarding what to consider when applying materials that may contact the edible potion of the crop. **Documentation:*** All test results, Certificates of Analysis, and documentation shall be current, reviewed before use, and available for verification from the grower (the responsible party) for a period of two years. Policies, procedures, letters of guarantee, and similar types of documents, must be updated annually.
* Records of process control monitoring for on-farm produced soil amendments must be reviewed, dated, and signed, within a week after the records are made, by a supervisor or responsible party.
* Lot information shall be described on the COA or lot information must accompany the COA if the information cannot be described on the COA. Lot information is required to be able to conduct traceability for the material applied to the growing location and to link the product to a test result. Information that could be used to confirm the lot description could be lot identification # associated with a treatment step, shift, time parameters, sanitation breaks, volume, weight, size but other parameters could also be used based on a specific production process.
* All products must be used in accordance with all local, state, and federal regulations.

**Rationale:** * FDA has established the validity of D-values and Z-values for key pathogens of concern in foods. This method of process validation is currently acceptable to US regulators. Alternatively, results of an inoculated test pack utilizing the specific process is also an acceptable validation of the lethality of the process.
 |
| **7d – synthetic and/or inorganic Soil Amendments or Crop inputs** | * Any soil amendment or crop input that is synthetic or inorganic must have documentation that it is free of non-synthetic products and not containing ingredients of animal origin or manure.
* All products shall be produced, transported, stored, and applied to prevent contamination of lettuce and leafy greens crops and production areas.
* All products must be used in accordance with all local, state, and federal regulations.
* The documentation must be available for verification before use.
* Any test results and/or documentation shall be available for verification from the grower who is the responsible party for a period of two years.
* Note: See best practices regarding what to consider when applying materials that may contact the edible potion of the crop.
 |
| **7e – Combined Components** | * Any soil amendment or crop input that is combined must follow the criteria for the highest risk ingredient. (See 7a, 7b, 7c, and 7d above)
* The documentation must be available for verification before use.

Any test results and/or documentation shall be available for verification from the grower who is the responsible party for a period of two years. |

##

1. CCR Title 14 - Chapter 3.1 - Article 7 - **Section 17868.1** <http://www.calrecycle.ca.gov/Laws/Regulations/Title14/ch31a5.htm#article7> [↑](#footnote-ref-2)
2. [↑](#footnote-ref-3)
3. [↑](#footnote-ref-4)
4. [↑](#footnote-ref-5)