e-GRO Edible Alert

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Surface Disinfectants for Use Against SARS-CoV-2

The U.S. Department of Homeland Security, the United States Department of Agriculture (USDA), and most U.S. states have categorized farms as *Essential Critical Infrastructure*— meaning that these operations remain open during the COVID-19 pandemic. Therefore, it is important that growers implement proper sanitation strategies to protect themselves and their staff from SARS-CoV-2 (Figure 1), the coronavirus that causes COVID-19.

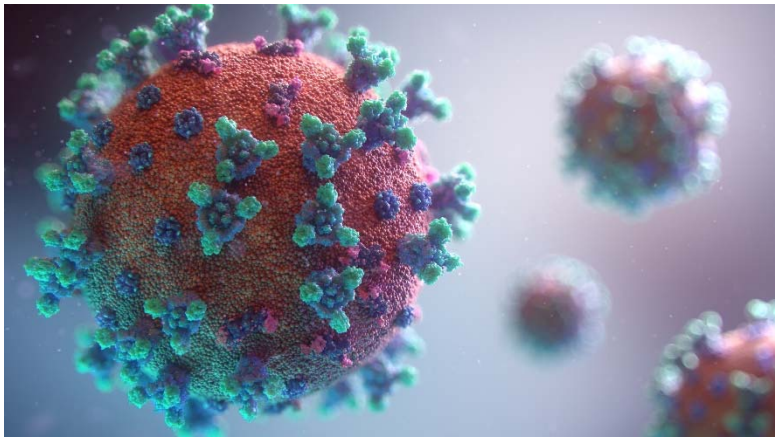

Figure 1. SARS-CoV-2 I causal agent of COVID-19.
Photo credit: Fusion Medical Animation on Unsplash

USDA recommends that farms follow the Environmental Protection Agency (EPA) guidelines to handle cleanup of facilities (www.usda.gov/coronavirus).

In this e-Gro Edible Alert, I will provide a summary of the options available for surface sanitation based on the Environmental Protection Agency guidelines.

USDA
United States Department of Agriculture
National Institute of Food and Agriculture

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In the U.S., the EPA —under the Federal Insecticide, Fungicide, and Rodenticide Act— is mandated to evaluate and label of antimicrobials products that can be used for pathogens that are detrimental to public health. On March, 2020 the EPA released *List N: Disinfectants for Use Against SARS-CoV-2* which consists of a list of over 300 EPA-registered products for use against SARS-CoV-2. The efficacy of these disinfectants has not been tested specifically against SARS-CoV-2. However, they were included in the list because they have been tested and proven effective on other viruses, including other coronaviruses.

Table 1 includes a summary of the active ingredients for application on hard-nonporous surfaces. Hydrogen peroxide and quaternary ammonium were the only two active ingredients listed for application on porous surfaces.

The EPA continually updates the list, please refer to the original source for updated information: https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2

After selecting an active ingredient:

1. Choose a product that is EPA approved and included in list N. Avoid products that do not have an EPA number.
2. Follow the disinfection directions and preparation for the virus included in list N.
3. Keep records of the safety operation procedures (SOPs) implemented and update SOPs as needed.

General Rules When Using Surface Sanitizers:

1. **Do no apply the sanitizers to or near the crops.** Some sanitizers (i.e. chlorine dioxide, or hydrogen peroxide) can off-gas and be toxic to crops. The rates recommended for surface sanitation are higher than what plants can tolerate, do not attempt using the same rates near crops or in irrigation systems.
2. Remove organic debris before applying the sanitizer. Organic matter may react with sanitizers and reduce its efficacy.
3. Extend contact time, if possible. The contact time listed on table 1 is the minimum amount of time recommended to achieve adequate control. However, extended contact time increases the efficacy of sanitizers. You could also use the lower recommended rate if you can extend the contact time of a product with a surface.
4. Seal and store the containers properly to maintain efficacy of the product.
5. Do not prepare mixed solutions with more than one product. Some active ingredients can react and become extremely toxic. Do not combine products unless it is specifically indicated on the label. You can, however, alternate between products.

As of 15 April 2020, EPA noted that SARS-CoV-2 has not been detected in drinking water and they believe that the risk of infection via water is low. Therefore, water treatment for SARS-CoV-2 has not been recommended.

Table 1. Active ingredients of products listed *by EPA as Disinfectants for Use Against SARS-CoV-2*

Active Ingredient(s) as listed in EPA list N	Contact Time (minutes)
Chlorine dioxide (alone or with Quaternary ammonium)	10 - 15
Chlorine dioxide; Quaternary ammonium	10
Citric acid (alone or with Thymol)	5 - 10
Dodecylbenzenesulfonic acid; Lactic acid	0.5
Ethanol	0.5-5
Ethyl alcohol; Quaternary Ammonium	1
Glycolic acid	10
Hydrochloric acid	10
Hydrogen peroxide	0.5-15
Hydrogen peroxide; Ammonium carbonate; Ammonium bicarbonate	4-6
Hydrogen peroxide; Peroxyacetic Acid	1-10
Hydrogen peroxide; Peroxyoctanoic acid; Peroxyacetic acid	5
Hydrogen peroxide; Silver	10
Hypochloric acid	10
Hypochlorous acid	1-10
Isopropanol	5
Isopropyl alcohol; Quaternary ammonium	5
Lactic acid	0.5
L-Lactic Acid	5 -10
Octanoic acid	2
Peracetic acid; Hydrogen peroxide	1
Peroxyacetic acid	1
Peroxyacetic acid; Hydrogen peroxide	2-5
Phenolic	5-10
Phenolic; Ethanol	10
Potassium peroxymonosulfate; Sodium choride	10
Quarternary ammonium	0.5- 10
Quarternary ammonium; Isopropanol	3
Quaternary ammonium; Citric acid	5
Quaternary ammonium; Ethanol	1-10
Quaternary ammonium; Ethanol; Isopropanol	3-10
Quaternary ammonium; Glutaraldehyde	10
Quaternary ammonium; Hydrogen peroxide	10
Quaternary ammonium; Isopropanol	0.5-3
Quaternary ammonium; Isopropanol; Ethanol	3
Quaternary ammonium; Sodium carbonate Peroxyhydrate	10
Silver ion; Citric acid	1-3
Sodium chloride	10
Sodium chlorite	1-10
Sodium chlorite; citric acid	0.5 (30 seconds)
Sodium chlorite; Sodium dischloroisocyanurate dihydrate	10
Sodium dichloroisocyanurate	10
Sodium dichloro-S-triazinetrione	1
Sodium hypochlorite	1-10
Sodium hypochlorite; Sodium carbonate	0.5 (30 seconds)
Thymol	4-10
Triethylene glycol; Quaternary ammonium	5

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