School & Home Integrated Pest Management (IPM) Newsletter – April 2020

Agriculture, Life & Veterinary Sciences & Cooperative Extension

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People Unite Against the Threat of COVID-19

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On March 11, the COVID-19 outbreak was characterized as a pandemic by the World Health Organization (WHO). The same month Jay C. Butler, MD (CAPT, USPHS, RET), Deputy Director for Infectious Diseases, Centers for Disease Control and Prevention (CDC) stated "**As of March 2020, the international outbreak of COVID-19 poses a serious public health threat**."

According to the CDC, this is the first **global** outbreak of a disease caused by the emergence of a novel (new) coronavirus. SARS-CoV-2 is the virus that causes the COVID-19 disease. The virus is transmitted from person-to-person, and community spread is occurring in many locations. The federal government is working with state, local, tribal, and territorial partners, as well as public health partners, to respond.

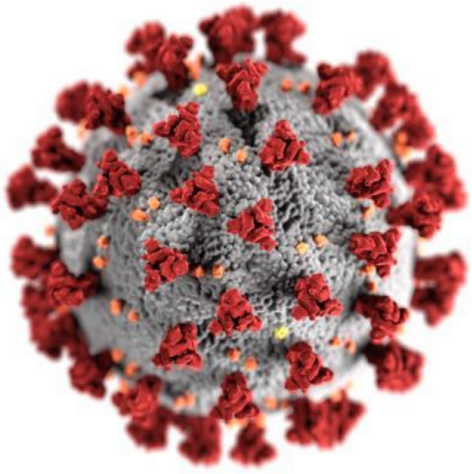

Fig. 1. The novel coronavirus SARS-CoV-2
Credit: CDC (Alissa Eckert)

The basics about SARS-CoV-2 and the disease COVID-19

- SARS-CoV-2 is a **novel coronavirus.** Coronaviruses are named after the crown of spikes on the surface (Fig. 1), which enable them to invade host cells.
- Prior to SARS-CoV-2, there were 6 other human coronaviruses described.
- People around the world commonly get infected with one of the four human coronaviruses (229E, NL63, OC43, or HKU1), which cause about 20% of common colds, usually during winter and spring months.
- Sometimes coronaviruses that infect animals, infect humans (called a zoonosis). Other recent coronavirus examples are MERS-CoV that caused Middle East Respiratory Syndrome or MERS, and SARS-CoV that caused severe acute respiratory syndrome or SARS.
- If a **zoonotic pathogen** can transfer from **person to person,** a local **epidemic** (outbreak of cases) may follow. An epidemic becomes a **pandemic** if the illness spreads over multiple countries or continents.
- **80%** of people infected with SARS-CoV-2 develop a **mild to moderate upper respiratory tract infection** and can recover at home without hospitalization.
- COVID-19 symptoms may include a fever, dry cough, shortness of breath, headache, muscle pain and tiredness.
- More serious symptoms and even fatal disease can develop. Approximately **20% of people develop lower respiratory infections in the lungs, causing potentially fatal bronchitis and pneumonia**.
- **Older adults**, people who have other **serious illness**, **healthcare professionals and in-home caregivers** looking after people who are sick with COVID-19 are at a **higher risk** of contracting the virus.
- **Some people with SARS-CoV-2 show no symptoms and <u>can still be infectious</u>.**
- SARS-CoV-2 can remain in an infectious form on some surfaces for **several days**.
- Climate change and the expansion of human populations into wild spaces cause human populations to encounter animals and pathogens they have never been exposed to before.
- Novel viruses and pathogens may emerge from **anywhere.**
- Irrespective of where they emerge, they can potentially impact the **world.**
- **The only way to prepare and respond to an emerging disease like SARS-CoV-2 is to support a <u>Global</u> One Health approach to disease management. We are all in this together, and together is the only path to a healthier world.**

What residents and communities can do to prevent the spread of SARS-CoV-2

1. *Encourage community members to…*
    a. Practice good hygiene
        i. Stop handshaking and hugging and use noncontact methods of greeting.
        ii. Clean hands frequently and thoroughly.

iii. Create habits and ways to remind people to avoid touching the face and covering coughs and sneezes.
iv. Disinfect frequently touched surfaces, such as doorknobs, tables, desks, and handrails.

b. Practice good food safety
   i. Limit food sharing.
   ii. Strengthen health screening for food service staff and close contacts.
   iii. Ensure cafeteria staff and close contacts practice strict hygiene.

c. Avoid exposing people
   i. Stay home when feeling sick.
   ii. Stay home if sharing a home with a sick family member.
   iii. Rearrange group activities and gatherings.
   iv. Hold classes and meetings online.

The CDC has produced excellent guidance materials https://www.cdc.gov/coronavirus/2019-ncov/index.html, focused on many different situations (Fig. 2).

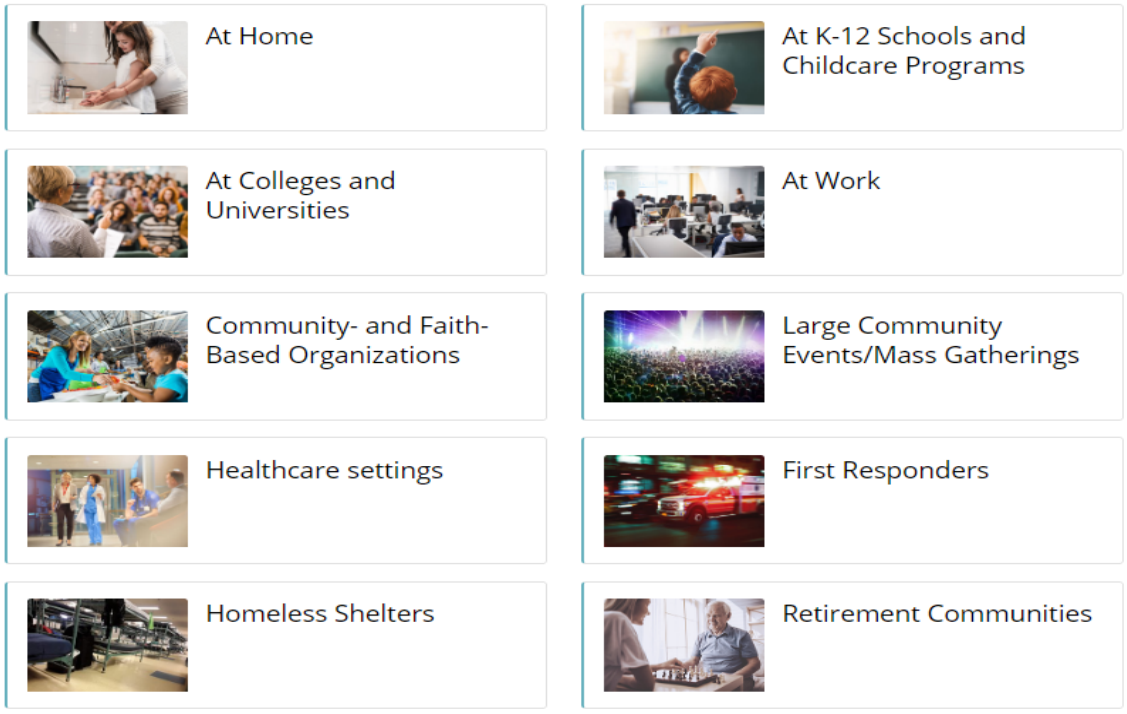

Fig. 2. CDC resources on how to prepare for COVID-19.

2. *Social Distancing*

Another important measure to help slow down the spread of disease is social distancing. Social distancing is the deliberate increase of physical space between people to avoid spreading a disease-causing pathogen. Cancelling events that are likely

to draw crowds, such as sporting events, festivals, and cultural gatherings are all examples of social distancing.

There are other examples of social distancing that avoid people congregating in enclosed spaces, these include working from home, closing schools and switching to online classes, postponing meetings, and visiting with loved ones using telephone or video connections instead of in-person.

Coughs and sneezes play a key role in transferring respiratory disease-causing pathogens between infected people and susceptible people. Contaminated articles and surfaces generally play a secondary but important role in virus transmission.

What's a Cough?

Coughing is an important reflex as it clears the airways of foreign particles including irritants, microbes, mucus and allergens from the throat. We cough when sensory receptors in the upper respiratory tract send a signal to the brain indicating that there is something irritating in the airway. The part of the brain that receives and interprets messages is called the "cough center." The cough center then triggers muscles in the throat and chest resulting in a cough, and here's what happens step-by-step:

1. Air is inhaled into the lungs (about half a gallon),
2. The opening at the back of the throat (the epiglottis) closes as the chest and diaphragm muscles contract, compressing the air in the lungs,
3. The epiglottis opens suddenly, and air bursts out of the mouth. The resulting expulsion of air from the lungs shoots around 3,000 droplets of fluid out of a mouth at speeds up to 50 miles per hour. Coughing spreads droplets as far as six meters!

Fig. 3. High speed imaging of a sneeze (Credit: Dr. John Brackenbury – Science photo library)

What's a Sneeze?

Sneezing is a reflex triggered by irritants in the nose. Hundreds of receptors line the nasal cavity and if irritated send a signal to the brain initiating a sneeze. Here's what happens:

1. Muscles in the nose tense,
2. The tongue moves to the roof of the mouth,
3. Eyes squeeze shut and ambulatory motion stops (the person freezes on the spot),
4. Air is inhaled into the lungs sharply,
5. The opening at the back of the throat (the epiglottis) closes,
6. In one rapid muscular contraction the epiglottis opens, and chest and diaphragm muscles expel the air from the lungs out the nose and mouth.

As many as 40,000 droplets of fluid shoot out from the face at speeds greater than 100 miles per hour (Fig. 3). Most of the droplets are less than 100 microns in diameter (the same thickness as a piece of standard printer paper). Many droplets are so small they are invisible. Larger, heavier droplets fall onto surfaces or the ground quite rapidly, but smaller droplets can stay airborne and be moved around on air currents. Sneezing spreads droplets as far as eight meters!

A single cough or sneeze can contain hundreds of millions of virus particles (Fig.4). Social distancing in all forms simply aims at reducing the number of people exposed to people coughing and sneezing, as well as contaminated surfaces and articles.

Humans are droplet generators

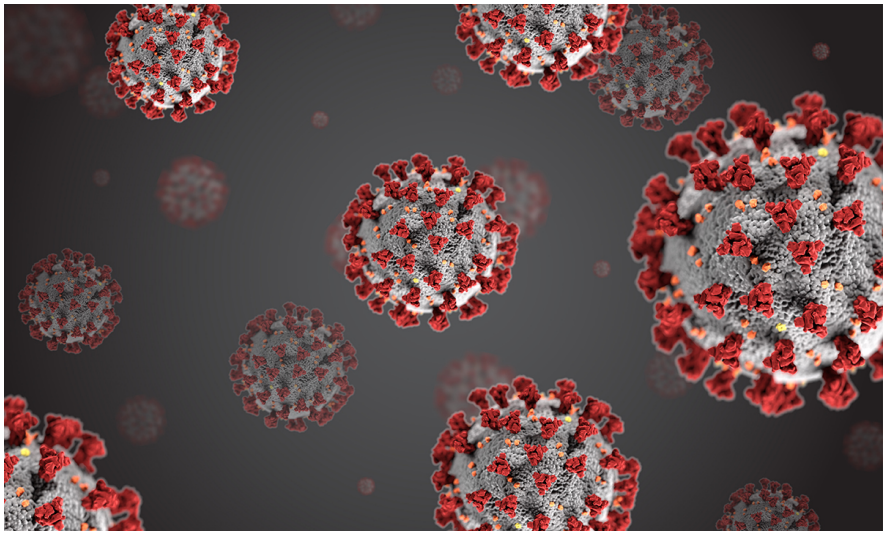

Fig. 4. SARS-CoV-2 (Credit: CDC (Alissa Eckert)

Unfortunately, an infectious person can distribute droplets carrying viral pathogens into the air even when breathing or talking normally (but to a far lesser extent).

SARS-CoV-2 persistence in indoor environments

Researchers are studying how long SARS-CoV-2 can persist in the air and on surfaces in an infectious form. In all cases lots of environmental factors will influence persistence. However, scientists in Germany (Kampf et al., 2020) analyzed 22 published studies covering human coronaviruses such as Severe Acute Respiratory Syndrome (SARS), Middle East Respiratory Syndrome (MERS), and endemic human coronaviruses (HCoV), and find that the viruses can persist on inanimate surfaces like metal, glass or plastic for up to 9 days, but can be destroyed with commonly used disinfectants including 62-71% ethanol, 0.5% hydrogen peroxide, and 0.1% sodium hypochlorite.

Early research indicates SARS-CoV-2 can persist in an infectious form in indoor air for minutes to hours.

Reducing exposure

- Respiratory hygiene - cover coughs and sneezes, increase your personal space to a six-foot radius and avoid sharing enclosed spaces with others when possible.
- Avoid crowds (particularly in poorly ventilated spaces), and if possible, avoid close contact with ill individuals.
- Avoid touching the face. Virus particles infect the body through mucous membranes, especially the eyes, nose, and mouth.
- Wash hands with soap and water for at least 20 seconds, particularly after being out in public.
- Use hand sanitizer that contains 60% alcohol or higher when no soap and water is available.
- Clean and disinfect objects and surfaces that are frequently touched.

Cleaning

To help reduce the spread of SARS-CoV-2, cleaning and disinfection of homes, schools, and other indoor environments is an important part of infection control. This is a two-step process:

1. Use soap and water to remove dirt, grime, and biolayers that form on surfaces.
2. Disinfect frequently touched surfaces, toys, tools, and equipment.

The application of a disinfectant on a dirty surface will not be very effective.

The power of soap and warm water

Each SARS-CoV-2 particle consists of genetic material (RNA) enveloped in a lipid (fat) and protein layer (Fig. 5). Soapy warm water acts to break down the lipid layer coating, helping to breakdown and destroy the virus. Soap also provides the added benefit of removing dirt, grease and grime from a surface.

The CDC states routine cleaning and disinfection procedures are appropriate, and the EPA has produced a list of disinfectants for use against SARS-CoV-2 https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2. Disinfectants are antimicrobial pesticides. Make sure the products you are using are appropriate for the intended use. **Please read the label and follow all instructions**.

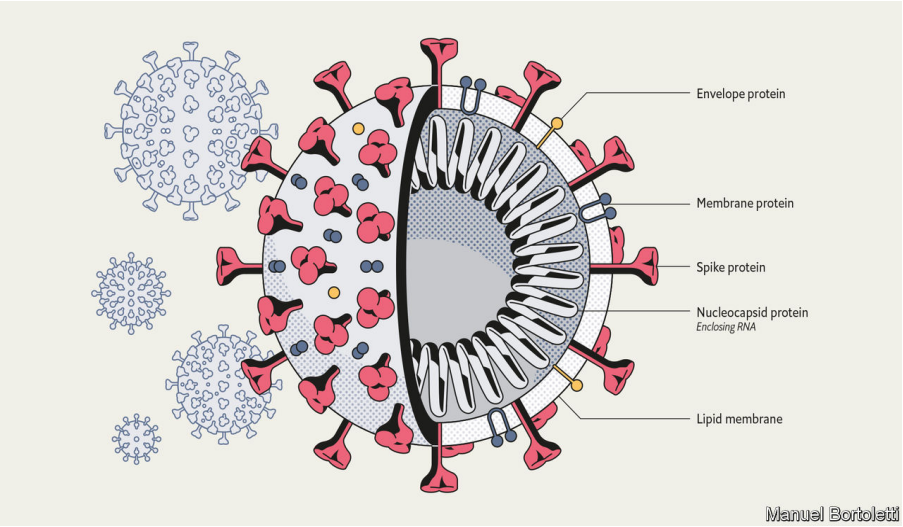

Fig. 5. SARS-CoV-2 (Credit: Manuel Bortetti)

Antimicrobial pesticides are products intended to be used to:

Disinfect, sanitize, reduce or mitigate growth or development of microbial organisms. They are also used to protect inanimate objects, industrial processes or systems, surfaces, water or other chemical substances from contamination, fouling or deterioration caused by bacteria, viruses, fungi, protozoa, algae or slime.

Antimicrobial pesticides come in a wide variety of forms and can be used to treat surfaces, air, and water to prevent, reduce or kill dangerous harmful and non-harmful bacteria, fungi, algae, and viruses. Antimicrobial pesticides are categorized based on the type of microbial pest they are designed to reduce or eliminate. Some products are intended to kill certain algae and odor-causing bacteria that are generally not a threat to human health.

Other antimicrobials are designed to sanitize, disinfect or sterilize surfaces against microbes that are harmful to human health.

The three types of antimicrobial pesticides used to protect public health are:

1. **Sanitizers** – products used to reduce microorganisms from inanimate surfaces to levels considered safe as determined by public health codes or regulations. Sanitizers are the **weakest** type of public-health antimicrobials. Some sanitizers

can be used for areas where food products are placed and stored, and other sanitizers can only be used for non-food contact surfaces like carpets or in air.
2. **Disinfectants** - products used on hard inanimate objects and surfaces to destroy or inactivate the growth of bacteria, fungi and **viruses**. Some disinfectants **target specific viruses**. Disinfectants are used to disinfect hard, non-porous surfaces such as linens, toilets, bathtubs, kitchen floors, and other hard surfaces.
3. **Sterilizers** - products used to destroy or eliminate **all** forms of microbial life including fungi, viruses, and all forms of bacteria and their spores. They are the **strongest** type of public health antimicrobials. Sterilizers are generally used in medical and research settings where the presence of microbes must be prevented as much as possible. Sterilizers should be used by highly trained professionals. Many require removal after specific treatment application times.

Best practice reminders

- Disinfectants and sanitizers have very specific instructions that must be followed very carefully.
- Use the correct personal protective equipment (PPE). Ensure that everyone who will use antimicrobials is provided with, uses, and maintains the PPE that is required on the pesticide label.
- Be aware of stand times for specific products to work.
- Be aware of any products that need to be removed using water rinses.
- Do not overuse disinfectant wipes. In fact, dragging dry or even almost dry wipes across surfaces will not disinfect the area.
- Do **not** use disinfectant wipes as hand wipes
- Do **not** use hand wipes or hand sanitizer to clean articles or surfaces.
- Disinfectant wipes are pesticides and therefore, do not allow children to use them.
- Monitor children using hand sanitizers carefully as they are harmful if ingested.
- Follow **all** label instructions.
- Never mix antimicrobial pesticides with other antimicrobials or chemicals unless instructed to do so on the product label.
- If there is an accident or illness that resulted from exposure to an antimicrobial, **seek immediate medical attention**, follow the first aid information on the label and ensure that medical personnel are aware of what product and ingredients were used.
- Store and dispose of leftover products and containers as directed on the label.
- 10% bleach is cheap and effective but needs to be diluted fresh daily.

Precautions

Handle disinfectants with care. Many commonly used chemicals can cause severe eye and vision damage if the product is splashed into the eyes; skin injury if the skin is exposed; and/or respiratory problems after inhaling fumes.

Labels on bleach products that are not registered as disinfectants lack necessary use instructions for achieving adequate disinfection and additional precautionary measures for protecting users, other people and the environment.

For disinfection, use only bleach products and other disinfectants that are registered by the U.S. EPA.

Never mix ammonium (quats) with hypochlorite (bleach) - toxic gases will be produced.

If a medical emergency occurs call 911.

If an exposure occurs call the poison help line.

The National Pesticide Information Center can offer guidance 1.800.858.7378 npic@ace.orst.edu. Open 8:00AM to 12:00PM Pacific Time, Monday-Friday

One Health

SARS-CoV-2 is **not** just another "flu". We gain a better understanding of the virus and the disease COVID-19 with each passing day. However, based on the available data so far scientists affirm that SARS-CoV-2 is more infectious than an average influenza virus, and has the potential to kill a higher percentage of those infected. The death rate from a typical flu is about 0.1%, with the very young and the elderly the most vulnerable to fatal disease. The death rate from COVID-19 is estimated at about 3.4%, and although it can be severe or even fatal for young people. The elderly population over the age of 80 years are by far the most vulnerable to fatal disease.

The CDC leads a One Health initiative that is a collaborative, multisectoral, and transdisciplinary approach, working at local, regional, national, and global levels with the goal of achieving optimal health outcomes recognizing the interconnection between people, animals, plants, and their shared environment (Fig. 6).

Fig. 6. The One Health Triad

Other resources

CDC Coronavirus (COVID-19)
https://www.cdc.gov/coronavirus/2019-ncov/index.html

Disinfecting Wipes: Not for Kids!
http://healthyschools.org/data/files/Disenfectant_Wipes_Guide.pdf

EPA Coronavirus Main Page: https://www.epa.gov/coronavirus

NPIC has newly-updated fact sheets on disinfectants and sanitizers at http://npic.orst.edu/factsheets/antimicrobials.html, COVID-19 virus information http://npic.orst.edu/ingred/ptype/amicrob/covid19.html, and a video at https://www.youtube.com/watch?v=rfkzHv40Pz0.

References

Kampf, G., D. Todt, S. Pfaender, E. Steinmann. 2020 Persistence of coronaviruses on inanimate surfaces and their inactivation with biocidal agents. Journal of Hospital Infection 104: 246-251.

Information in the newsletter was compiled from CDC, EPA, NPIC, the American Institute of Physics Science News, and Journal of Hospital Infection.

Upcoming Events

Save the Date: April 28th, 2020, Tuesday, 7:30am - 5:00 pm. 3rd Arizona School IPM Conference. Online, information to follow.

Check out upcoming Integrated Pest Management Webinars at https://www.epa.gov/managing-pests-schools/upcoming-integrated-pest-management-webinars

For more information about the EPA Schools program: http://www.epa.gov/schools/.

To view all our previous newsletters, visit: https://acis.cals.arizona.edu/community-ipm/home-and-school-ipm-newsletters

Acknowledgements

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ARIZONA PEST MANAGEMENT CENTER

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