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143. Preventing greenhouse fires. Jones, E. Greenhouse Management 31(7):78-81. 2011.

Greenhouse components like glazings, shade curtains and wooden benches, and commonly stored materials like plastic containers, cardboard and fertilizers, can fuel fires.

PREVENTING FIRES

Greenhouse

By Eric Jones

You can reduce the risk of greenhouse fires by knowing the contributors



Combustible components and materials stored within the greenhouse act as fuel. It's important to identify what will be "fuel" if a greenhouse fire were to start.

It took only 20 minutes for the 2½ acres of a Wisconsin greenhouse operation to become fully engulfed in flames. After the fire was extinguished, all that remained was the melted aluminum roof draping the ground like collapsed skeletal ribs. An electrical issue was the probable cause of the fire, according to the cause and origin engineer. Greenhouse components, such as glazings, shade cloth, plastic containers, along with unique traits, such as the forms of energy in a typical greenhouse environment, allow a fire to spread rapidly.

While greenhouse fires do not always cause complete destruction, even small fires have the potential to be catastrophic. Some fires are unavoidable. However, in many cases basic risk management procedures can reduce exposure.

Understanding the nature of fire is essential to applying proper risk management techniques. Understanding the nature of fire begins with knowing the three elements (heat, oxygen and fuel) that contribute to the ignition, spread and duration of a fire. If these three elements are present, the conditions are in place to start a fire that can easily and quickly spread horizontally and vertically through a structure. If one of these three elements is removed, the fire cannot survive.

Elements of a greenhouse fire

To understand exposure to a greenhouse fire it is first important to identify the heat, oxygen and fuel elements that are in your greenhouse. You also need to be aware of the unique traits that contribute to the severity of a greenhouse fire.

Heat

Heat can be generated by a few forms of energy that are common in a greenhouse. The typical forms of energy are electrical, chemical and mechanical/frictional.

- Electrical issues, including degradation of wire, improper installation, overheated wiring and arcing can ignite combustible components and materials in a greenhouse.

- Exhaust pipes from open flame unit heaters. As heating equipment releases unburned gases through the exhaust pipe, the temperature of the gases heats the exhaust pipe to dangerously high levels.

- “Hot work,” including but not limited to welding and use of a torch during maintenance work.

Oxygen

Oxygen can play a large role in the speed of the spread of fire and the severity of fire damage. However, you can't remove oxygen. Venting and air distribution systems common to greenhouse structures contribute to the amount and flow of oxygen. In some cases, this equipment is automated to vent as the temperature

rises inside the structure. In a situation where a fire starts in a greenhouse, a thermostat senses the increase in temperature and vents accordingly. This action provides the necessary oxygen for the fire to be sustained and spread.

Fuel

Combustible components and materials stored within the greenhouse act as fuel. It's important to identify what will be “fuel” if a fire were to start in your greenhouse.

The following greenhouse components and commonly stored materials can fuel fires.

- Greenhouse coverings. All polymer coverings are combustible. Common polymer greenhouse coverings include acrylic, fiberglass, polyethylene

and polycarbonate.

- Shade cloth, energy curtains and ground covers. These components may be combustible, and also provide a continuous path for a fire to follow (for example, when shade cloth and energy curtains are in the closed position). In many cases, energy curtains used for shade and heat retention are highly flammable. The highly flammable energy curtains are composed of nylon, plastic and aluminized materials.

- Wood benching, work tables and storage racks.
- Plastic pots and flats.
- Fertilizers (nitrogen-based), fungicides, insecticides.
- Fuel oil, propane/natural gas stored inside or around the greenhouse perimeter.
- Miscellaneous storage of cardboard, straw, etc.

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GREENHOUSE STRUCTURES

Risk management

After the elements of a greenhouse fire have been identified, it's important to analyze and choose the risk management approach to reduce the risk of fire exposure. The following recommended items and actions should be strongly considered.

Ensure that proper firefighting equipment is available in each structure. ABC dry chemical fire extinguishers (5 to 10 pounds) should be used, with an appropriate number of extinguishers for the size of the building. Travel distance to the nearest fire extinguisher should be no more than 75 feet.

Under no circumstances should garden hoses be considered adequate for fire extinguishing purposes. A typical garden hose is ½ inch in diameter as



Invite the local fire department to do a tour of your facility so that fire officials are familiar with your operation in case of an emergency. With familiarity you're better assured the fire department will dispatch the right equipment should a fire occur.

opposed to 2½ inches for a fire hose. The limited volume of water a garden hose emits is ineffective for extinguishing extremely fast burning fires that may occur.

Correct potential wiring problems that may result in fires. If wires are not in conduit and are showing signs of wear in the sheathing, this run of wiring

should be replaced to avoid having a hot wire in contact with combustible materials. Also, ensure that all connections are enclosed in a UL-approved junction box. Exposed junction "pig tails" are against most local codes. A junction in the open could mean an exposed hot wire coming in contact with combustible components.

Ensure that heating exhaust pipes are always at least 3 feet from aluminized energy curtains that are not fire resistive. For other combustible materials, make sure that a metal thimble is used where the exhaust pipe passes through the material. For new construction or replacement consider using a double walled Class B gas vent.

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Install fire breaks where feasible. A fire break is non-combustible or fire resistive material used to separate the continued run of combustible materials. This tactic is typically used with highly combustible aluminized shade cloth.

A generally tidy workplace reduces the risk of fire, especially in the context of contributing fuel and heat elements. A tidy workplace is always a safer workplace, regardless of what hazard is being considered.

Install and maintain fire alarms in all greenhouses.

Post emergency numbers near all telephones.

Maintain regular communications with the fire department that services your area. Invite the local fire department to the property for a tour so that fire

officials are familiar with your operation in case of an emergency. With familiarity you're better assured the fire department will dispatch the right equipment should a fire occur.

When considering new greenhouse construction or the replacement of a component of an existing greenhouse, consider the combustibility of the product you plan to install. Speak with your supplier or an insurance provider regarding the information they have about the product.

It's also important to communicate regularly with your employees regarding fire prevention and emergency response if a fire should occur.

When training employees, it's important to communicate the potential hazards of greenhouse

fires. The following fire prevention and management points should be provided to employees.

If steps you take to contain and extinguish the fire are not effective, immediately activate the emergency management system by dialing 911 and evacuating the facility.

Know the location of all fire extinguishers in the facility and know how to operate the extinguishers. Make sure all fire extinguishers have been charged and inspected by local firefighting authorities.

Energy curtains should be retracted (placed in a gathered position to form a natural fire break) if a fire should start.

Vents should be manually closed and all air movement equipment shut down, if possible.

Inform employees who perform "hot work" (e.g. welding torch use) of the potential hazards and risk that this type of work causes. Institute a safe hot-work program that focuses on fire hazards. This should include a fire watch. A fire watch uses a designated person, not doing the hot work, to keep watch for fire while the hot work is in progress. It's important to note that the fire watch should continue for 30 minutes after the hot work is completed.

For more detailed information on fire safety practices, talk to your insurance provider. **GM**

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