

Study: Direct-fired heating system is safe, efficient

By Gary Pullano
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A recent study conducted by Ohio State University (OSU) has shown that the L.B. White Co.'s propane-fueled, direct-fired heater system, called Therma Grow, is fuel-efficient and plant-safe for use in greenhouses.

The study, funded by the Propane Education & Research Council (PERC), showed the Onalaska, Wis.-based company's product is up to 11.6 percent more efficient than certain indirect-fired models.

Researchers also concluded that the Therma Grow system does not cause plant damage, according to a PERC press release and study documents presented by L.B. White.

The trial compared the Therma Grow system with an indirect-fired model. It took place Feb. 16-April 16, 2012, in two separate, 24- by 48-foot double-poly greenhouses.

Results of the study do not validate the use of direct-fired heaters in greenhouses, other than that of the Therma Grow system. L.B. White statements indicate it is the combination of the heater's "clean-burning design and its air management system that allows it to achieve the lower-than-expected relative humidity and ethylene in the greenhouse found in the study."

The two heaters tested were the Therma Grow HW120 Plus (direct-fired) with indoor mount installation kit, and the Modine PDP150AE185 (indirect-fired, power vent).

During the trial, scientists monitored fuel consumption, relative humidity, temperature, CO₂ and ethylene in both greenhouse environments. The greenhouse using the Therma Grow system reportedly used 11.6 percent less fuel than the greenhouse with the indirect-fired heater.

According to PERC, the reduction in fuel consumption was the result of Therma Grow's heat combustion design, which converts almost all fuel energy into usable heated air. While an average heater is able to convert only 80 percent of its given fuel into usable heat, the Therma Grow is reportedly able to convert 99.9 percent.

Along with monitoring fuel usage of the two houses, six plant varieties were tested during the study for signs of damage and overall quality. They were tomato, zinnia, marigold, impatiens, snapdragon and petunia plants. Researchers monitored plants for symptoms of off-gas damage, as well as pests, diseases and signs of phytotoxicity throughout the experiment. No damage or other issues were reported

while using the Therma Grow system, according to PERC statements.

Included in the findings were references to plant growth and development. In general, the study found, the plants in the direct-fired greenhouse seemed to have more compact growth than plants in the indirect-fired greenhouse. Plant heights were only measured on tomatoes, and the tomatoes at final harvest were shorter in the direct-fired greenhouse.

"Short, sturdy plants would be a benefit to growers," the test summary stated. "Growers spend a lot of time and money on plant growth regulator

applications to keep plants short. Short, sturdy plants also withstand shipping with less mechanical damage."

Also at final harvest, only tomatoes and impatiens had lower shoot dry weights in the direct-fired greenhouse. The largest decrease was measured in tomatoes, where their stems were shorter and sturdier than in the indirect-fired house.

While there was variability between plants in a species, the study showed the crops in both greenhouses reached a marketable state at the same time.

"All plants in both greenhouses were of very good quality," according to test results.

OSU staff involved in the test included associate professors Peter Ling, Michele Jones and Claudio Pasian.

"PERC is committed to engaging in new research and development projects to bring forth improved technology for the agricultural industry," said Mark Leitman, director of business development and marketing at PERC. "This research study is yet another example of how PERC is partnering with manufacturers to develop innovative products that are beneficial to producers and powered by a fuel-efficient, clean and abundant fuel."

Historically, vented indirect-fired units have been used in greenhouses because the usable air is free from combustion byproducts, such as carbon monoxide and ethylene, that are unhealthy for plants and humans. This method, however, can prove inefficient, due to the energy that is expelled along with byproducts during the process – essentially causing growers to spend money on fuel that is going out the stack, according to PERC.

"We're confident that producers who switch to the L.B. White Therma Grow heater will save thousands of dollars due to increased fuel efficiency," Leitman said. "The 11.6 percent reduction in fuel also benefits the environment and growers' bottom lines."

For more information about the study, go to www.lbwhite.com. **VGN**





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