USE OF VACUUM/STEAM IN QUARANTINE TREATMENTS

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Heat has been used for years in quarantine treatments for wood, and plant material. Niger seed is treated for weed seeds with a temperature of 248° F for 15 minutes. Wood is heat treated at 56° C for 30 minutes, 60° C for 60 minutes or 71° C for 75 minutes depending on the wood commodity. Vacuum/ steam treatments are currently used in commercial treatments for cotton and spice sterilization.

A vacuum/steam system consists of vacuum pumps, vacuum gauge, and vacuum chamber, steam generating system, air compressor, temperature recorder, temperature sensors and computer operating system. Each system varies depending on manufacturer and commodity. Some commercial systems are known as H2O Express and Xorella AG. Vacuum/steam treatments are a series of vacuum and live steam introductions. Treatments can have one or more cycles with four cycles as a normal occurrence. Live steam is introduced into the chamber followed by a vacuum. This is repeated until the desirable temperature and duration is achieved. A PSIG of 250 can reach a temperature of 406.11° F. This wide range of temperatures offers a variety of temperatures for quarantine treatments. The vacuum creates a uniform temperature and moisture in the commodity. This limits cold spots in a commodity that are common with dry heat treatments. The relative humidity of the treatment is around 75% and does not cause excessive wetting of the commodity.

An H2O Express system is currently being used for heat treatment of weed seed in Niger seed. The treatment is 248° F or longer for 15 minutes or longer. The chamber is large enough to accommodate two rows of 13 pallets with one row stacked on top of the other. Each pallet holds 20 one hundred pound bags of Niger seed. For heat treatment certification, each pallet had four portable sensors placed inside four different bags. This creates a thermal map of the Niger seeds during treatment to determine the low temperature zones. There are eight permanent facility sensors that are placed in the Niger seed bags. Certification

determined that there was a need for 4 cycles of vacuum/steam to reach a temperature of 260° F. All 104 sensors reached treatment temperature of 252° F or higher in 4 cycles with uniform temperatures in all pallets. The commercial treatments were conducted using the 8 chamber sensors.

There is a new quarantine treatment, T521, for infestation of plant pathogenic fungi and bacteria on articles made with dried plant material. The treatment requires moist heat at 80° C for one hour. Vacuum/steam systems were successfully used to complete T521 for a variety of different dried plant commodities.

Other quarantine uses for the vacuum/steam system could be insects and fungi in cotton bales, wood packing material and logs.

The vacuum/steam systems offer quarantine heat treatment for commodities that are currently fumigated with methyl bromide.