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Selectivity of infrared treatment on inactivation of fungi on corn

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Fungi are associated with enormous diversity of habitats which include grains. Once occurring on grains, the spores easily proliferate on high moisture content grains, increasing the risk of toxin production and potentially contaminate the grain thereby posing important risk to the public. The objective of this study was to characterize effects of using selected peak wavelengths of infrared (IR) heat emission for varied durations on inactivation responses of fungi. Previous study was done using a newly-built, single-zone, continuous-flow IR heating system, which utilized catalytic IR heaters powered by natural gas, to dry freshly-harvested corn at initial moisture contents (MC) of 24% to 13% (wet basis). The microbial load on corn at 24% MC when dried at the high intensity and intermittent heating duration of 180 seconds to 13% MC were significantly reduced from 4.79 ± 0.15 to 2.03 ± 1.2 log CFU/g of corn (Figure-1). In order to identify specific mold that was inactivated, metagenomics techniques was used to characterize effects of selected peak wavelengths that falls in the mid and far IR heating region of the electromagnetic spectrum (3.1 μm , 4.2 μm and 5.8 μm) for IR heat emission on inactivation responses of the general fungal microflora on corn; this was tracked for variable treatment durations and IR heating intensities as regulated by the product-to-emitter-gap sizes (11, 22 and 44 cm). Based on the previous results, IR drying of corn shows potential benefits of microbial decontamination which may help the industry prevents mycotoxin development on corn.

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