

Economic decision-making model for best ozonation treatment system for stored-product protection

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Abstract

Ozonation treatment systems have been proved as a potential non-chemical, non-residual and environmentally friendly alternative for stored-product protection. Based on scale-up and demonstration trials, static bed ozonation, semi-continuous counter-flow ozonation and continuous ozonation flow systems have been designed and successfully tested for pest control. Each system has different engineering and economic design parameters base on its treatment principle. The purpose of this study was to develop an economic decision-making computer model that will allow full-scale farms and commercial processing facilities to determine the best ozonation treatment option for insect mortality, mold and mycotoxin reduction and off-odor removal for grain based on the different design parameters of each case, equipment and storage availability, projected running cost and treatment time without affecting grain quality. The design set-up prototype of the economic decision-making model resulted into five blocks for user determination of treatment system, input parameters and fixed variables. Based on these blocks, calculations are performed for determination of power consumption per hour, treatment time and total treatment cost per year that lead into a decision of the best treatment system option for each specific case. The economic decision-making tool also determines the best option of either purchasing or renting an ozone generator for treatment during a specific number of usage years.

Keywords: Ozonation, Continuous Treatments, Stored-Product Pests, Molds, Mycotoxins, Economic Models