

Modeling the efficacy of ambient aeration strategies in a grain silo under Eastern Australian weather conditions

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Abstract

Effective storage of cereal grains relies upon storage conditions such as temperature and moisture content. In order to achieve proper temperatures and relative humidity within the grain mass, it is often beneficial to use an ambient aeration strategy in order to lower temperature and maintain moisture content, and limit insect population growth and grain spoilage potential. Ambient aeration, however, requires knowledge of weather conditions and their interaction with the three dimensional geometry of the grain storage silo and grain mass within to develop a site specific strategy. Site specific aeration strategies are of interest for silo storage in Australia, where both grain quality and insect populations can be challenging, particularly along the eastern coast where temperatures are relatively high year round with seasonal summer rainfall. Australian weather data and grain silo specifications were used along with a three dimensional computer simulation model developed at Kansas State to determine the effectiveness of aeration in commercial sized grain silos located in eastern Australia. How the predictions compare to observed trends, and how the model may be extended to analyze insect fumigation situations for silos was also explored.

Keywords: ambient aeration, modeling, stored grain, silos, fumigation