Title Humidity Constraints on Controlled Summer Aeration of Wheat

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Abstract

Aeration is an inexpensive way o maintain stored grain quality, but can be difficult to implement immediately after harvest in much of the hard red winter wheat belt due to high ambient temperature during the day and high relative humidity at night. The effective temperature (T_{eff}), which predicts the final grain temperature after aeration, was studied in field tests and using historical weather data for Kansas. During a typical year, 20 days were required in Topeka, Kansas immediately after harvest to accumulate enough fan hours with ambient temperature below 24°C to move an aeration front through a grain bin with a low airflow rate of 0.11 m^3/min/t (0.1 cfm/bu). However, twice as many days were required when the fan was not operated during periods of high relative humidity that would cause the effective aeration temperature to be above 24°C. Results from 46 years of hourly weather data showed that the warmest ears had only one-half the available hours for aeration as an average year. These results showed that the high effective temperatures for aeration, caused by high humidity, dramatically reduced useful available time for summer aeration and will hamper the effectiveness temperature-based aeration controllers during summer in this warm, humid climate.