Effects of Irrigation on Wheat Canopy Temperature and Yield
C.A. Followell¹ and C.A. Knott²
¹Murray State University and ²University of Kentucky, Princeton

INTRODUCTION
Traditionally in Kentucky, irrigation is unnecessary due to the high precipitation usually experienced in the state. However, with bouts of droughts becoming increasingly frequent in recent years, irrigation is serving as a backup method to ensure crop success for many producers. As a grain crop, wheat favors cooler temperatures with a higher yield generally being associated with a lower average canopy temperatures. The goal of this research project was to increase the overall yield by lowering the canopy temperature during grain fill. The specific objective was to determine whether canopy temperature and grain yield were affected by irrigation of 0.12" at noon on sunny days.

MATERIALS AND METHODS
The soft red winter wheat cultivar Pembroke 2016 was planted in late October 2017 under a lateral irrigation system at the University of Kentucky Research and Education Center in Princeton, Kentucky. Plots were managed according to University of Kentucky recommendations1. There were four replications of two treatments: one with 0.12" water irrigated to it at noon every day if it was sunny, and the other received no irrigation. Canopy temperature was measured with Decagon infrared thermometers. The thermometers were 14° half angle ultra narrow field of view mounted at a 60° angle at a height of 5 feet to measure an area of approximately 6' x 19'. EM50 data loggers were used to collect and store canopy temperature once per minute from May 23rd to physiological maturity (Feekes 11.4) on June 11, as determined when the peduncle area closest to the wheat head had turned brown. Grain was harvested June 11th and 12th with a Wintersteiger small plot combine equipped with a Harvest Master weighing system. Yield and test weight were determined and adjusted to 13.5% grain moisture.

RESULTS
The soft red winter wheat cultivar Pembroke 2016 was planted in late October 2017 under a lateral irrigation system at the University of Kentucky Research and Education Center in Princeton, Kentucky. Plots were managed according to University of Kentucky recommendations1. There were four replications of two treatments: one with 0.12" water irrigated to it at noon every day if it was sunny, and the other received no irrigation. Canopy temperature was measured with Decagon infrared thermometers. The thermometers were 14° half angle ultra narrow field of view mounted at a 60° angle at a height of 5 feet to measure an area of approximately 6’ x 19’. EM50 data loggers were used to collect and store canopy temperature once per minute from May 23rd to physiological maturity (Feekes 11.4) on June 11, as determined when the peduncle area closest to the wheat head had turned brown. Grain was harvested June 11th and 12th with a Wintersteiger small plot combine equipped with a Harvest Master weighing system. Yield and test weight were determined and adjusted to 13.5% grain moisture. Data was analyzed with SAS (version 9.4; PROC MIXED) to determine differences in yield, test weight and canopy temperature existed.

REFERENCES
1 Comprehensive Guide to Wheat Management in Kentucky http://www2.ca.uky.edu/agcomm/pubs/id/id125.pdf
2 University of Kentucky Ag Weather Center http://weather.uky.edu/

CONCLUSIONS
We were able to decrease canopy temperatures and increase yield with as few as six irrigation events, which is likely due to an increased grain fill period as a result of the lowered canopy temperatures.

FUTURE WORK
Future work could include the analysis of the applicability to a producer, specifically whether similar results are realized with much larger pivot irrigation system and if it would be profitable.