The Effect of Crushed Coal on Beehive Temperature in Winter
Ariana E. Lee-Wilson¹, Yolanda Lee-Gorishti², Alphonse Avitabile²
1 Northwestern Regional High School District 7, Winsted, CT 2 University of Connecticut - Waterbury Campus

ABSTRACT
The winter months are stressful to honey bees because the cold temperature can keep them from reaching their food source (honey) in their hives. An experiment was conducted in Barkhamsted, CT to determine if there is a way to increase the temperature within a beehive using crushed coal. Three beehives were obtained and modified. Temperatures were recorded in order to record hourly temperatures within and outside of the beehives. This data was analyzed to determine if there was a relationship between crushed coal and the internal temperature of a beehive.

INTRODUCTION
Here are several ideas that are one of the main important components of our food production system. Approximately 35 percent of our crops in the U.S. depend on bee pollination. In the spring months, bees gather nectar and pollen from flowers for food during winter and for the present sale to flower farms with them in the next flower they land on. Without bees, crop production, food supply, and economy will decrease. Honeybees are an integral part of the ecosystem because they are pollinators. One of the ways to help protect pollinators from dying out is to increase the temperature of the beehives during winter.

Each individual honeybee is capable of carrying up to 100 grains of food from one flower to the next flower they land on. Without bees, crop production, food supply, and economy will decrease. Honeybees are an integral part of the ecosystem because they are pollinators. One of the ways to help protect pollinators from dying out is to increase the temperature of the beehives during winter.

The main purpose of the winter months is to keep the colony alive until spring. During the cold months, honeybees huddle tightly together to create a warmer environment. In the air that is 67°F to 70°F, the cluster (beehive) is formed by the bee laying eggs, raising larvae, and feeding them. In the temperature over 67°F, the cluster becomes two large and branching on the base right to the edge of the hive. The basis of the air cluster maintains a temperature of approximately 59°F to 60°F, while the overhead of bees creates a temperature from about 48°F to 50°F.

The winter weather bees are Stronger than the outside to the inside so that as we lose our core. The colder the weather is, the more complex the cluster becomes. During winter periods, the cluster shifts its position to allow more areas of the hive containing foliage. As the temperature drops, cold spell outdoors can inhibit cluster movement, and the bees may starve to death only inside in areas heavily covered in foliage.

The Effect of Crushed Coal on Beehive Temperature in Winter
Ariana E. Lee-Wilson¹, Yolanda Lee-Gorishti², Alphonse Avitabile²
1 Northwestern Regional High School District 7, Winsted, CT 2 University of Connecticut - Waterbury Campus

MATERIALS AND METHODS
1. Three Beehives (American Beekeeping Products)
2. Air Lock Rubber Stopper
3. Temperature Loggers
4. Crushed Coal

RESULTS
Based on the data retrieved from the temperature loggers, during the day, the beehive with the crushed coal had a higher temperature than the other two beehives. The crushed coal maintained an average temperature of 70°F (18.3°C) while the beehives without crushed coal maintained an average temperature of 59°F (15°C) and 60°F (15.6°C) respectively. These results indicate that crushed coal can increase the temperature within the beehive, which could potentially improve the bee's survival rates during the winter months.

DISCUSSION
This study has demonstrated that crushed coal can be used to improve the temperature within bee hives, which can help increase the survival rates of bees during the winter months. Crushed coal can be added to the beehives to increase the temperature, which can help the bees stay warmer and healthier. This can be an effective solution for beekeepers who are struggling with low temperatures during the winter months.

REFERENCES

ACKNOWLEDGEMENTS
I want to thank Charles Barkhamsted, the local Varroa Mite Control Association Program Coordinator (VMCCAP), for all of his time and support during and after the 2013 season and 2014. I also want to thank the University of Connecticut and the Connecticut Agricultural Experiment Station for giving me the opportunity to participate in this research. I would like to thank the farmers, beekeepers, and all the people who helped with this project. This project would not have been possible without the help and support of VMCCAP, the Connecticut Agricultural Experiment Station, and the Connecticut Department of Agriculture. I would like to thank everyone who helped me with this project. This project would not have been possible without the help and support of VMCCAP, the Connecticut Agricultural Experiment Station, and the Connecticut Department of Agriculture.