Purdue University
Department of Entomology
Undergraduate Capstone
Project Summary

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Project Title:

Species Composition and Insect Succession on Pig Cadavers Subjected to Three Wrapping Treatments

Project Summary:

Insect evidence often plays a crucial role in death investigations. If a death has occurred as a result of a crime the guilty party will likely take steps to conceal the body often times by wrapping the body before discarding it. This capstone project was designed to examine how wrappings, such as those often seen in death investigations, would affect insects found during these investigations.

The objective of this capstone project was to compare the rates of insect succession with three different wrapping treatments: tarps, blankets, and black trash bags. Our hypothesis was two-fold. We expected the composition of insect species present to be different from the control in the tarp and trash bag conditions more so than the blanket. We also expected the rate of succession to be slowest on the trash bag and tarp samples and fastest on the blanket samples.

Materials and Methods:

The experiment included two trials lasting 14 days each. Eleven newborn pig cadavers weighing between 1.4kg and 2.3kg were used per trial with each pig cadaver assigned to a treatment. Three pigs were allotted to each treatment and two cadavers were left as controls. Three treatments were tested, which consisted of 0.9m x 0.9m black fleece blanket, construction-grade black trash bags, and standard blue tarps. The pig cadavers were then wrapped and assigned a number depending on the treatment. The numbers were run through an online randomizer to determine plot placement, then placed in the appropriate plot square at the Purdue University Forensic Entomology Research Compound. The plot was 4.6m x 6.1m that was divided into 12 equal squares and cleared of vegetation before each trial. In order to prevent scavenging, reflective ribbon was hung above the compound.

Data and photographs were taken daily. One pig per treatment was removed from the experiment every 4-5 days in order to observe decomposition and insect composition on the cadaver in greater detail. Insect samples were collected at each removal and samples were taken periodically from the controls. All observations were recorded in an excel spread sheet.

Results:

Species Composition

The insect samples collected from the 22 samples were identified to species and divided by treatment type. (Figure1) The insects collected were from the orders Diptera and Coleoptera. There was a strong presence of several species of Staphylinidae but there was no discernible pattern between treatments. There were three species discoveries that appeared to be significant. One blanket sample (trial 1, sample 5) was found to have two beetles belonging to the family Trogidae. These were identified as *Trox sp*. Species identification could not accurately be attained. Two trash bag samples were found to have dipteran larvae belonging to the species *Fannia canicularus.* Finally, larvae of the species *Lucillia sericata* were found on both the control cadavers as well as the blanket samples but were not discovered on any of the tarp or trash bag samples.

Insect Succession

We chose to analyze only the presence of adult flies on our cadavers because the wrappings prevented us from seeing all of the insects present on the cadavers before they were removed from the trials. The excel data was averaged over the two trials and a pivot table was used to give us the probability of adult fly occurrence for a 14 day duration (Figure 2). The data clearly shows a relationship between treatment and probability of seeing active fly presence on the cadavers. After approximately 5 days, the likelihood of seeing an adult fly on a blanket or control cadaver was reduced to zero. However, the tarp and trash bag cadavers were still experiencing active fly presence through the end of both 14 day trials (Figures 3 and 4).

Conclusions:

Species Composition

The species found on all treatments over both trials varied extensively. The presence of *Trox sp*. on the blanket, *F. canicularus* on the trash bags and absence of *L. sericata* on the blankets or controls suggest that perhaps there is a relationship between wrapping type and species attracted to the cadavers. The presence of these species may suggest preferential selection of food sources or may suggest an inability of certain species to access certain cadavers. However, there were not enough samples to observe any consistent patterns. More experiments would need to be performed in order to establish any validity to this hypothesis.

Insect Succession

The results of the succession portion of this experiment were consistent with our hypothesis. Adult flies were observed longest on both the tarp and trash bag samples. This is most likely due to the extended presence of soft tissue on the cadavers. The tarp and trash bag samples were better protected from scavengers, insects, and the elements thus preserving their tissues longest. This allowed for an extended period of time for adult flies to be attracted to the

scent of the cadavers. The cadavers in the blankets and those that were left as controls decomposed completely within the first 5 days and no longer had any soft tissue to be colonized.

Adjustments

If this experiment were to be run again, many adjustments would need to be made. More replicates should be added to observe potential patterns in species composition. The method of succession data needs to be improved as well. Ideally, if one had the resources, cameras could be set up to monitor the arrival and departure of insects over the full trial period. Trials should also be extended in length to allow for complete decomposition of all samples. Improvements should also be made in the control of scavengers. Had the resources been available, a net over the compound would have been ideal. The study should also focus on only species composition or succession or perhaps even on one single treatment.

Figures:

	Blanket	**Tarp**	**Trash bag**	**Control**
Diptera	*L. sericata*	*P. regina* *C. macellaria*	***F. canicularus*** *P. regina* *C. macellaria*	*L. sericata* *C. macellaria*
Coleoptera	*O. cingulatus* *P. asper* ***Trox sp.*** *C. maxillosus* *H. depurator*	*P. maculosus* *P. asper* *C.maxillosus* *Supranus sp.* *O. tuberculifrons*	*C. maxillosus* *P. rufulus* *N. americana* *Supranus sp.*	*C. maxillosus* *N. americana* *Supranus sp.*

Figure1. List of total species collected from cadavers at the time of removal

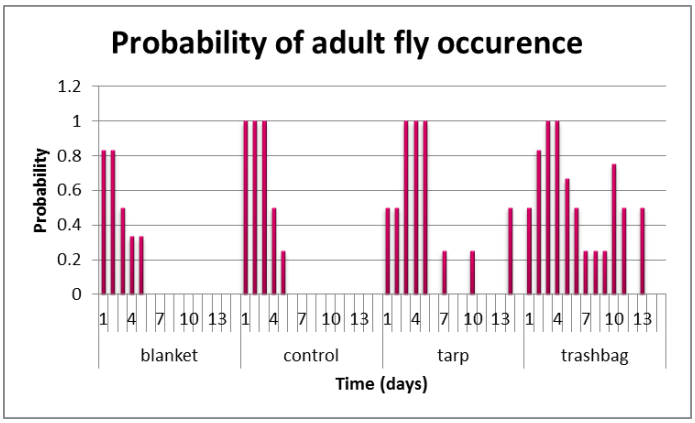

Figure 2. This figure shows the probability of adult fly occurrence over 14 day period. Probability of adult fly occurrence = # of pigs observed with flies/ # of pigs observed total

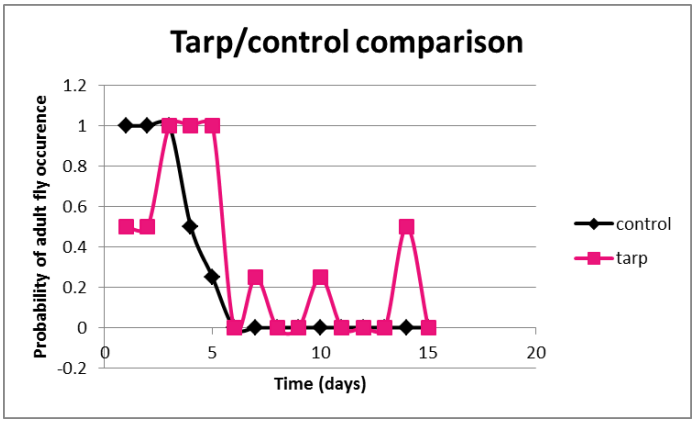

Figure 3. Comparison of the Tarp treatment versus the control

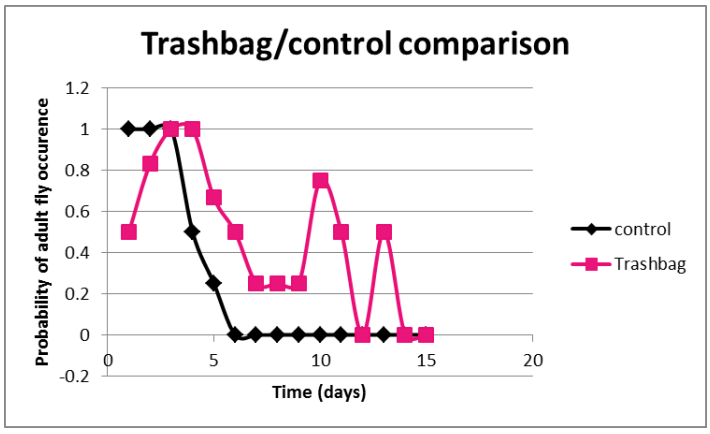

Figure 4. Comparison of the trash bag treatment versus the control

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References:

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