

## Abstract

- *Blattella germanica*, *Periplaneta americana*, *Periplaneta fuliginosa*, and *Supella longipalpa* were studied to see which was the most effective composter.
- Food waste was weighed and recorded before entering the cockroach habitats, each species got an equal amount of food. Mass of produce consumed was calculated by removing uneaten food or cockroach waste.
- Smokey Brown cockroaches had the highest percentage of food consumed. Larger cockroaches consumed over twice as much food in the same time period compared to smaller species, like German cockroaches.

## Background - Why Cockroaches?

- Food waste is a global problem. According to the Food and Agriculture Organization of the United Nations, approximately one-third of food produced for humans is wasted annually.<sup>1</sup>

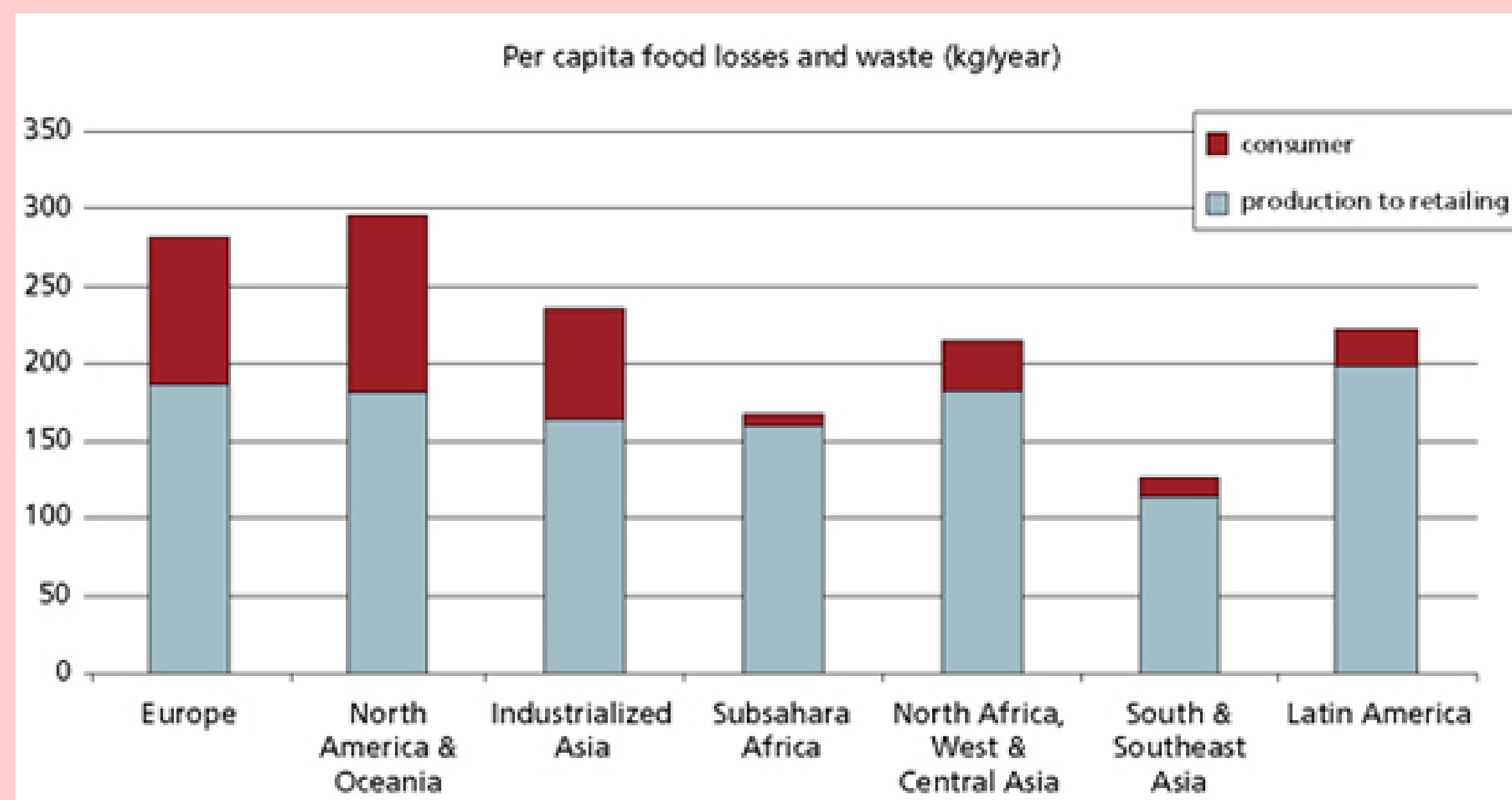


Figure 1: Magnitudes of food loss and waste per region<sup>1</sup>

- Using cockroaches to recycle food waste is a promising alternative to vermicomposting (composting with worms).
- Cockroaches consume more food, which leads to a higher food scrap turnover and frass (insect waste) production.
- Unlike worms, cockroaches can tolerate dry conditions which deters the attraction of other pests, odors, and mold growth.<sup>2</sup>



Figure 2: American cockroach (*Periplaneta americana*)

## Methods and Materials

- The cockroach species used in the study were donated from Purdue University's Department of Entomology.
- Each cockroach species was separated from other species in aquariums.
- The cockroaches were housed in 10-gallon aquariums with a wire screen cover. The cover was reinforced with window screens. Along the walls of the aquarium was a Vaseline barrier to keep cockroaches from crawling up the sides. Cardboard egg cartons and newspaper were used as substrates for the cockroaches.



Figure 3: Aquarium enclosure with the modified lid, Vaseline barrier, and substrates.

- Prior to feeding, cockroaches were placed in the refrigerator to slow their movement.
- Food scraps were weighed. Each species got approximately the same weight of food. Water was refilled as needed.
- The cockroaches were monitored daily to monitor their behavior and feeding.
- After a week, the remaining food scraps would be removed and weighed to determine the amount of mass consumed by the species.
- The process was then repeated with new food scraps.

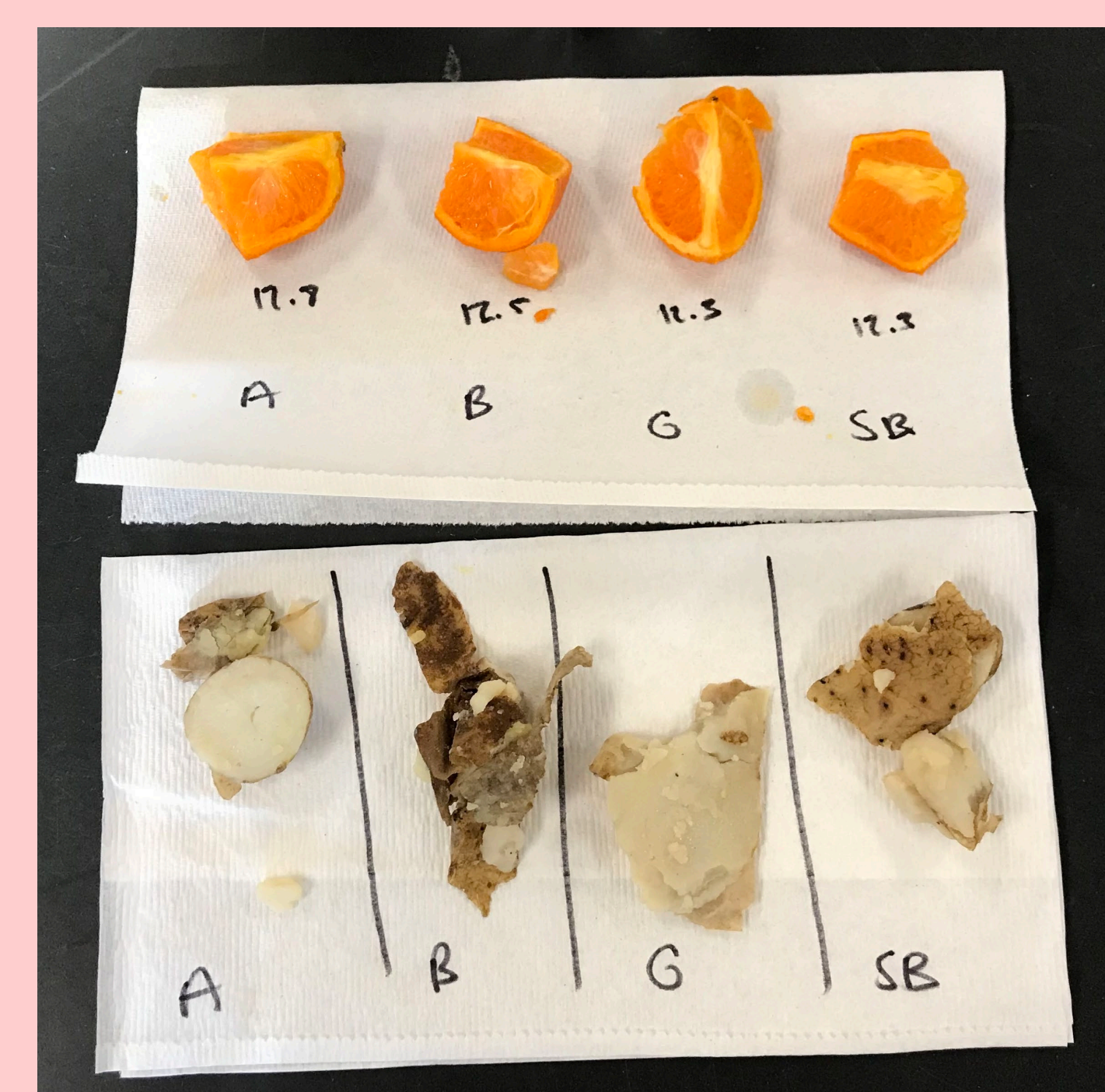


Figure 4: Weighed food for the cockroaches.

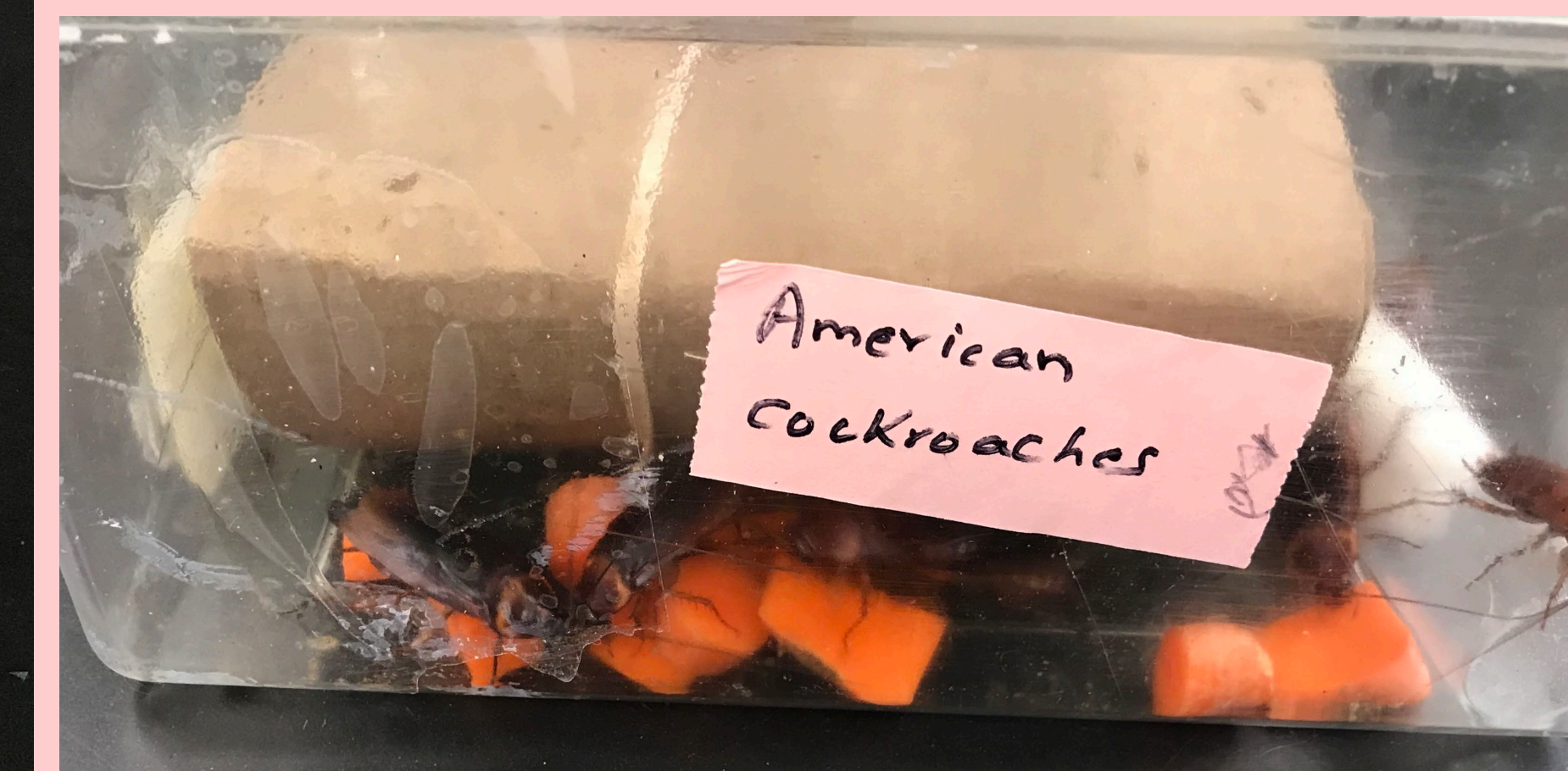


Figure 5: American cockroaches inspecting carrot scraps.

## Results and Conclusions

- Table 1 shows the measurements of which species consumed the most food.
- The Smokey Brown cockroaches had the highest percentage of food consumed, followed closely by American cockroaches. American, Brown-Banded, and Smokey Brown were approximately the same size. The high percentage consumed in Smokey Brown roaches can be because of population growth during the experiment that contributed to more food consumption.
- German cockroaches had drastically different numbers. The size of the German cockroaches was also drastically smaller than the other species studied. These data show a correlation between cockroach size and food turnover that does not favor smaller species.

American			
Mass in (g)	Mass out (g)	Consumed (g)	Percent Consumed
253.4	14.42	238.98	94.31%
Brown-Banded			
Mass in (g)	Mass out (g)	Consumed (g)	Percent Consumed
253.4	21.33	232.07	91.58%
Smokey Brown (10/5/19-10/22/19)			
Mass in (g)	Mass out (g)	Consumed (g)	Percent Consumed
109.7	4.96	104.74	95.48%
German (10/5/19-10/22/19)			
Mass in (g)	Mass out (g)	Consumed (g)	Percent Consumed
62.1	35.7	26.4	42.51%

Table 1: Data for food each cockroach species consumed.

## Selected References

1. Food and Agriculture Organization of the United Nations. (2019). Key facts on food loss and waste you should know!
2. University of Michigan- Dearborn. (2018, August 17). Blatticomposting.

## Acknowledgements

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