The experiment of superworms to consume more foam

Background:

The research revolves around utilizing enzymes in worms as a means to eliminate foam polystyrene. The concept involves feeding foam to the worms, which possess enzymes capable of breaking down the polystyrene foam efficiently. This process not only addresses the issue of global warming but also aids in the decomposition of foam in a shorter time frame.

We firmly believe that this research has the potential to expand and develop further, benefiting the community in various ways. It can be instrumental in reducing waste by applying the knowledge and business skills to support and assist the community. Moreover, this project has the capability to create numerous advantages by combining expertise with its core objectives.

Objectives:

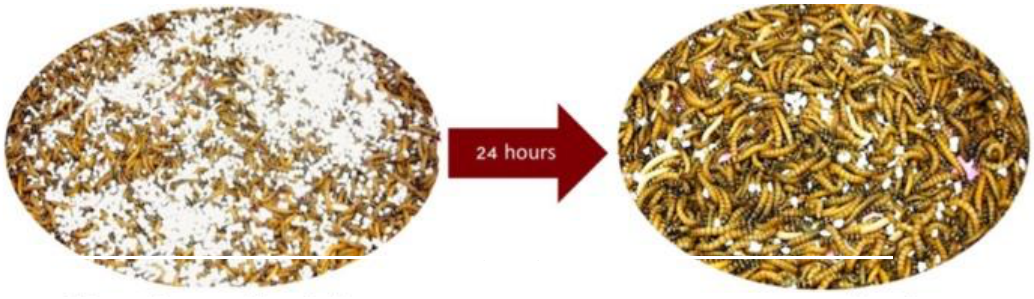
- To investigate superworms' ability to consume ESP and the effect on superworms metamorphosis.
- To investigate various factors, including feeding approach, ESP shape, light, temperature, and moisture, affecting PS consumption rate.
- To investigate ESP degradation in a larger scale (pilot scale)
- To develop and expand the project in a business-oriented format, aimed at creating a prototype community as a model.

Methods and Results:

Experiment 1: To investigate the superworms' consumption rate PS foam.

Superworms were fed with commercial feeds and PS foam. The amount of these food consumed were observed and the number of days to pupae was recorded.

The results showed that superworms were able to consume PS foam efficiently. Moreover, they can consume solely PS foam, but the consumption rate of the PS foam is less than that of the commercial feeds. Feeding solely the PS foam made the worms morphed to pupae 30 days slower than feeding with the commercial feeds.



AMAZING SUPERWORM
BIODIGESTER

Figure 1 Approximately 10,000 superworms can consume about 10,000 grams of foam (the size of a lunch box) within 24 hour.

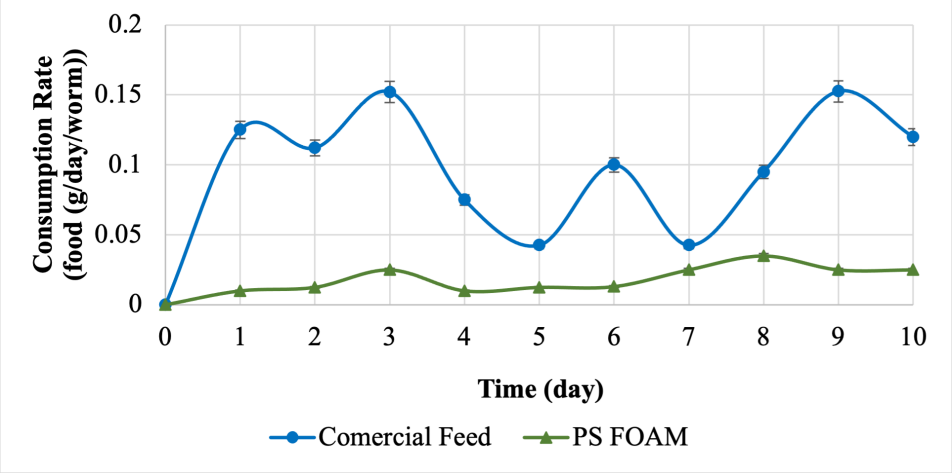


Figure 2 Superworms's ability to consume solely PS foam compared to those fed by commercial feed.

Experiment2:

Examination of the factors affecting consuming rate

Step 1: Examination of superworms' feeds

The superworms reared in groups displayed higher PS foam consumption rate than those reared individually.

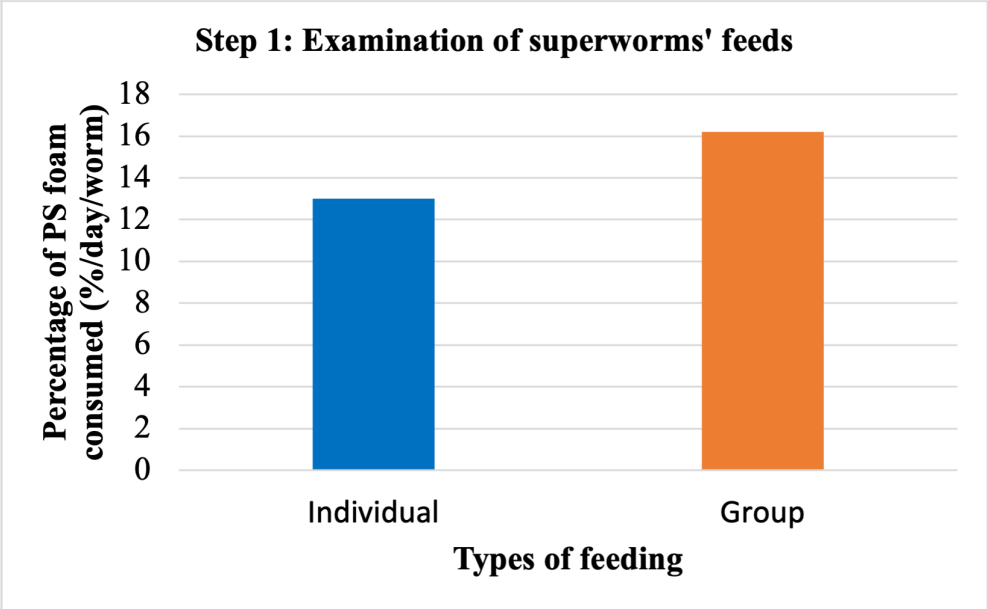


Figure 3 PS foam weight consume by the superworms after rearing (5 superworms) individually or in group of 5.

AMAZING SUPERWORM BIODIGESTER

Step 2: Examination of PS foam consumption rate with different shapes of polystyrene foam

The superworms consumed the PS foam with rectangular or square shapes more than the PS foam with circular shape. This is most likely because the superworms need to seize the sharp edge of polystyrene foam before consuming.

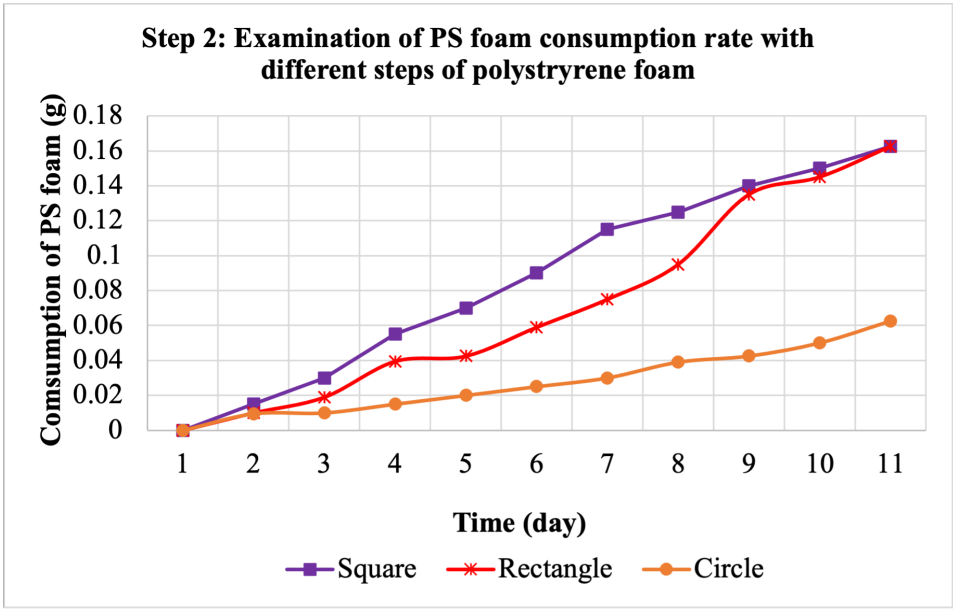


Figure 4 Superworms's PS foam consumption with different shapes of PS foam.

Step 3: Examination at different illuminations

The superworms consumed more PS foam with alternating Warm white and dark periods (Day/Night) than with Cool daylight, or Warm white light. The consumption rate with lights were also higher than that without light (in the dark)

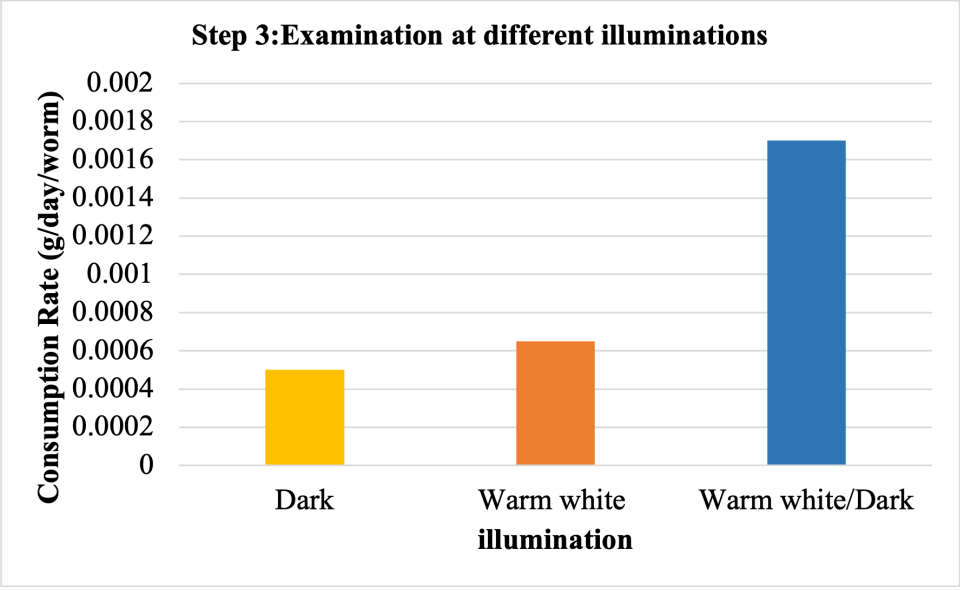


Figure 5 Superworms's PS foam consumption with different illumination levels.

AMAZING SUPERWORM BIODIGESTER

Step 4: Examination of superworm' consumption rate at different temperatures (℃)

The superworms consumed the PS foam at 27℃ more than at 25,30 and 35℃. Temperature of 27℃ is also the optimal temperature for their growth.

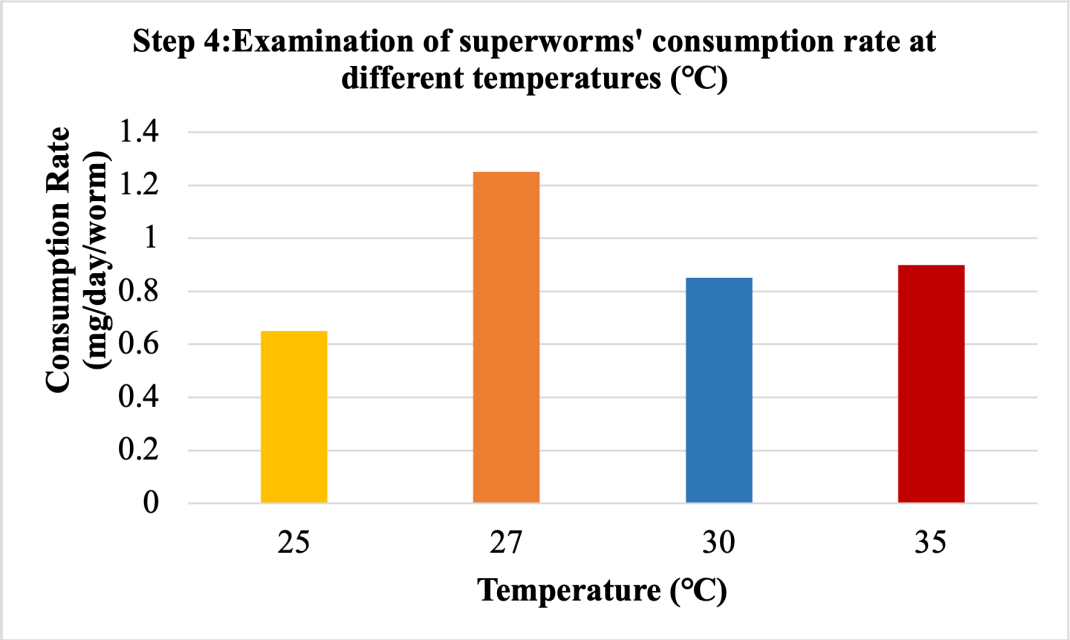


Figure 6 Superworms's PS foam consumption with different temperatures.

Step 5: Examination of superworms' consumption rate in different relative humidity

The superworms were fed with the PS foam at approximately 60%, 70% and 80% relative humidity, the PS consumption rate was higher at 60% than that at 70%, and 80% relative humidity.

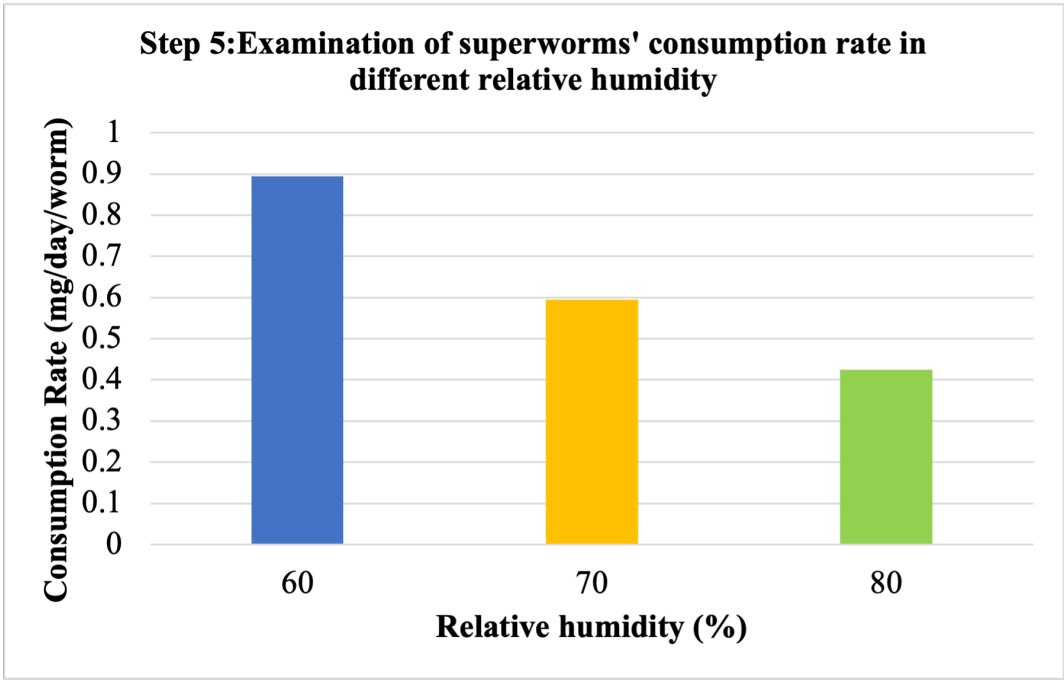


Figure 7 Superworms's PS foam consumption with different relative humidity.

Experiment 3: A larger scale feeding (pilot-scale)

The consumption rate is directly proportional to the number of superworms. The formula is y = $1.85X^{-8}$, where x is the number of superworms and y is the consumption rate.

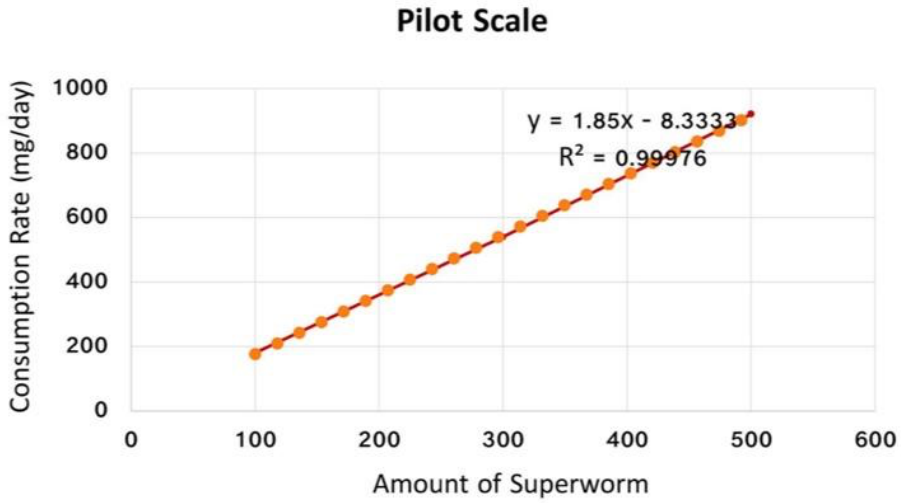


Figure 8 The best result from all the factors related to the PS foam consumption in a larger scale

Conclusion

It is expected that the factors of the feeding approach, polystyrene shapes, illumination, temperature, and moisture affect the consumption rate of the superworms. The optimal conditions with regards to those factors must be adjusted for the highest PS foam consumption rate of the superworms.

Data1 Collection from Worm Cultivation Experiment in December 2022

Data 1: Dec 2022							
Date	**Amount of worms**	**Amount of PS foam (g)**	**Amount of worms (g)**	**Amount of worms (kg)**	**Wt. lose of worms (g)**	**Amount of worms loss**	**Wt. Foam final (g)**
1/12/2022	10,000	14.83	11500	11.5	0	0	0.67
5/12/2022	9,975	14.62	11471.25	11.47125	28.75	25	0.88
10/12/2022	9,968	14.57	11463.2	11.4632	36.8	32	0.93
15/12/2022	9,961	14.52	11455.15	11.45515	44.85	39	0.98
20/12/2022	9,961	14.25	11455.15	11.45515	44.85	39	1.25
25/12/2022	9,960	14.24	11454	11.454	46	40	1.26
29/12/2022	9,955	14.16	11448.25	11.44825	51.75	45	1.34

Data2 Collection from Worm Cultivation Experiment in January 2023

Data 2: Jan 2023							
Date	**Amount of worms**	**Amount of PS foam (g)**	**Amount of worms (g)**	**Amount of worms (kg)**	**Wt. lose of worms (g)**	**Amount of worms loss**	**Wt. Foam final (g)**
2/1/2022	9,952	14.08	11444.8	11.4448	55.2	48	1.42
7/12/2022	9,947	13.91	11439.05	11.43905	60.95	53	1.59
12/12/2022	9,940	13.87	11431	11.431	69	60	1.63
17/12/2022	9,934	13.72	11424.1	11.4241	75.9	66	1.78
22/12/2022	9,928	13.65	11417.2	11.4172	82.8	72	1.85
27/12/2022	9,925	13.44	11413.75	11.41375	86.25	75	2.06
31/12/2022	9,919	13.32	11406.85	11.40685	93.15	81	2.18

Title: Data Collection from Worm Cultivation Experiment

Introduction:

In this study, we collected samples from a worm cultivation experiment to investigate various aspects of their growth and development. The experiment spanned six months, during which data was collected at regular intervals to monitor changes in the worm population.

Sampling Procedure:

To ensure representative samples, we employed a systematic sampling method. Each week, we randomly selected worms from different sections of the cultivation area. We carefully collected samples from various parts of the substrate to avoid any data bias.

Measurement Parameters:

During the data collection process, we measured several parameters. These included the weight of worms consumption, as well as the overall population density within the cultivation area. Additionally, we recorded environmental factors such as temperature, humidity, and pH levels to assess their potential influence on the worms' growth.

Data Analysis:

Upon completing the data collection phase, we conducted a comprehensive analysis of the gathered information. We utilized statistical methods, such as mean, standard deviation, and correlation analysis, to identify trends and relationships between different variables.

Results:

The data analysis revealed a significant increase in the worm population and worm’s consumption over the course of the experiment. Moreover, we observed a positive correlation

between temperature and the rate of worm reproduction. However, further investigation is necessary to determine the precise impact of environmental factors on the worms' growth and development.

Conclusion:

The data collected from this worm’s consumption of PS foam experiment offer valuable insights into the factors influencing the growth and development of worms. These findings could have important implications for optimizing worm cultivation practices and exploring their potential applications in various fields, such as waste management and organic fertilizer production. Further research is recommended to expand on these results and gain a deeper understanding of the complex dynamics involved in worm cultivation