



# ANDABEE Tec-Chihuahua Mexico

# US \$577 BILLON

# 87% OF FOOD

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### COLONY COLLAPSE DISORDER



AMERICAN FOULBROOD



Paenibacillus larvae





Melissococcus plutonius









### **ANTIMICROBIAL PEPTIDES MECHANISMS OF ACTION**



#### E. coli BL21 (DE3)





# **GENETIC DESIGN**



E TOUR ISOCIDE











Abaecin (Digested with EcoRI and Pstl)



#### **B. subtilis VS Abaecin**



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# HUMAN PRACTICES







### SPECIALISTS AND INVESTIGATORS

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## **GOVERMENT INSTITUTIONS**

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SAFE

### RESPONSIBLE

# UNITED NATIONS

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### INTERNATIONAL STANDARDS



### LEGAL PLAN

CRAFTING

#### PACKAGING

#### DISTRIBUTION

### PRODUCT DEVELOPMENT

### **USE CONDITIONS**

#### **RISK ASSESSMENT**

#### CONTINGENCY PLAN

### ENVIRONMENTAL





### ECONOMIC



# ENTREPRENEURSHIP

#### Unique product

Outcompetes current treatments

Strengthens bees' immune system

In accordance to international regulations

Aimed at big scale Apis mellifera lingustica handlers

### PHARMACEUTICAL COMPANY



### BEE HIVES FOR EXPERIMENTATION





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#### Fickian diffusion equation

$$\frac{M_t}{M_{\infty}} = 1 - \frac{6}{\pi^2} \sum_{n=1}^{\infty} \frac{1}{n^2} \exp\left(-\frac{n^2 \pi^2}{R^2} Dt\right) + \alpha$$



### Best fit diffusion calculator



Concentration measured 5 times

> Value at: 0 hours = 0.30 24 hours= 0.32 48 hours= 0.35 72 hours= 0.37 96 hours= 0.40

#### Diffusion coefficient that best explains this behaivour

3.5000e-18

#### **Dosage loss simulator**

What is the radius of nanoparticles? 4.5\*10^-5 What is the diffusion coefficient inside honey bees? 3.5\*10^-18 What is the diffusion coefficient in royal jelly? 9\*10^-17



Effective release = 65.9% - 41.29% = 24.61% Initial Concentration = Minimum Inhibitory Concentration / 0.24614 Abaecin's MIC for *P. larvae* is 200 µg/mL 200 / 0.24614 = Initial Concentration

Initial concentration of 812.68 µg/mL



# PUBLIC ENGAGEMENT





### CONCLUSION

- We produced honey bee AMPs in E. coli.
- We thoroughly assessed the social, environmental, and economical impact.
- We explored the factors needed to take up this business venture.
- We developed a model to simulate peptide diffusion.



- We established a back and forth exchange that continues to shape our project.
- We worked hand in hand with beekeepers, experts, and fellow iGEMers to achieve satisfactory results.

### ATTRIBUTIONS

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### SPECIAL THANKS TO









### **ThermoFisher** SCIENTIFIC





### THANK YOU!

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# ANDABEE Tec-Chihuahua Mexico

#### B. subtilis VS Apidaecin



Control ■ BL21LC ■ Apidaecin LC ■ BL21 HC ■ Apidaecin HC

#### B. subtilis vs Defensin 1



■ Control ■ BL21 LC ■ Defensin 1 LC ■ BL21 HC ■ Defensin 1 HC



![](_page_48_Figure_0.jpeg)