**PROJECT**

3 billion gallons of frying oil waste are produced in the United States each year. This waste has high-energy components which may provide an alternative feedstock for cell growth. Our project aims to make possible the use of this feedstock for production of high-value products, namely trans-zeatin.

Trans-zeatin is a plant growth hormone which increases bud growth. Its extraction is costly because of the large amounts of downstream processing of the plant biomass required. We propose using *E. coli* as a host for trans-zeatin production.

We also believe that considering safety during production is critical to evaluating feasibility of our process. KillerRed is a first-generation kill switch which causes cells to create reactive oxygen species and lyse when exposed to green light. We evaluated the effectiveness of this part for use in our process.

**METHODOLOGY**

- Increase oil breakdown
- Produce trans-zeatin
- Characterize KillerRed

**RESULTS**

**PROJECT**

*E. coli* production of trans-zeatin was achieved using the trans-zeatin construct (BBa_K1495000). While we were interested in the effectiveness of using *E. coli* to produce trans-zeatin, we decided that, to prevent patent violation, we would not proceed with production for our process with the help of CSU’s technology transfer office. This included consideration of the alternatives: proprietary information and open sourcing. We also investigated the policy surrounding agricultural G.M.O.s to better understand how our product would be regulated, and found that it would most likely be regulated by the USDA.

**KEY ACHIEVEMENTS**

- Construction and submission of multiple BioBrick Parts (Bba_K1702000-Bba_K1702005)
- Experimental validation of fatty acid breakdown (Bba_K1702001, Bba_K1702002)
- Addressed questions beyond the bench about IP and bridging the gap between academia and industry and used knowledge to file provisional patent
- Provided sequence data and improved characterization of previously existing BioBrick Part, KillerRed (Bba_k1495000)
- Created functional prototype of *E. coli* growing on frying oil

**FUTURE DIRECTIONS**

- Optimize frying oil breakdown pathways
- Troubleshoot trans-zeatin production using more sensitive detection (like mass spectrometry) or real-time PCR
- Investigate new kill switch (e.g. toxin-antitoxin system)