**Background**

**Problem Statement**
- Growing population is increasing pressure on global food supply
- Decreasing availability of agricultural land

**Objectives**
- To design a student operated plant for raw oil extraction from cricket flour
- Optimize equipment with respect to environmental impact and cost

**Global Impact & Market**

Worldwide agricultural area per capita has decreased with growing population.

Between 1990 and 2012 the world land area used for agriculture has remained constant.

**Crickets are a sustainable alternative to meet growing global food demand.**

**Objectives**

- Decreasing availability of agricultural land
- Growing population is increasing pressure on global food supply

**Final Design**

**Process Description**
- Mechanical expression produces press cake and high quality oil
- Leaching extracts remaining oil using hexane
- Evaporation recovers oil and recycles hexane through condensation
- Microfiltration removes remaining flour particles from oil product
- Dryer removes hexane from solid byproduct

**Economic Analysis**

**Annual Cost**

- Raw Materials: $1,497,000
- Utilities: $432,496
- Labor: $177,000
- Maintenance: $434,250
- Outsourcing: $21,112
- Total: $2,010,676

**Product Pricing**

- Mechanically expelled oil: $70/kg
- Hexane extracted oil: $60/kg
- Processing 7,698kg of oil per year leads to a breakeven point after 10.3 years and a 10% return on investment

**Investment**

- Fixed Capital Investment: $1,851,083
- Direct Cost: $1,306,138
- Indirect Cost: $545,945
- Working Capital: $321,372
- Total Capital Investment: $2,175,459

**Equipment Cost**

- Batch Press: $21,500
- Leaching Unit: $21,112
- Evaporator + Condenser: $149,000
- Dryer + Condenser: $177,000
- Microfiltration: $26,000
- Fluid Transport: $56,884
- Total: $432,496

**SWOT Analysis**

**Strengths**
- Environmentally sustainable
- Novel product
- Non-allergenic alternative
- Organic product

**Weaknesses**
- Small annual product yield
- Small and specific market
- High raw material cost
- Low initial ROI

**Opportunities**
- FDA regulations
- Confronts social norms
- Further research and testing of insect pathogens is required

**Plant Sustainability**

- Plant has minimal discharge of environmentally harmful toxins
- Hexane is recycled for continuous usage
- Byproducts are sold as animal feed

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**References:**

