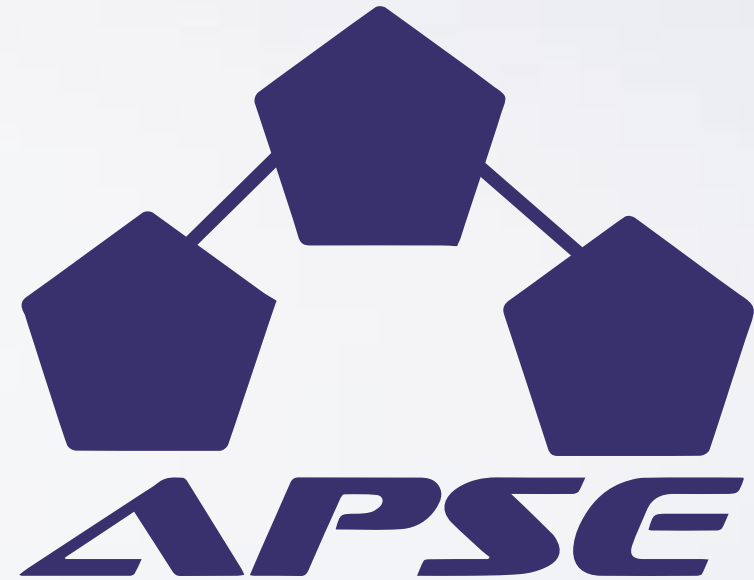




Global forum
for **innovations**
in **agriculture**



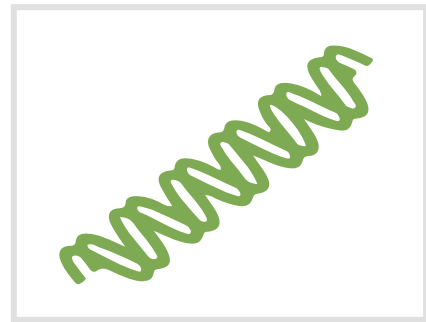


RNAi

Bioproduction and Products

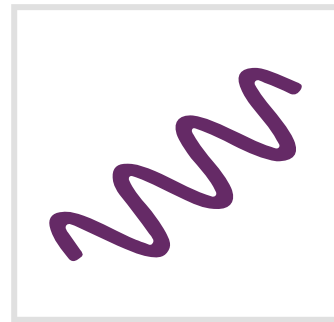
RNAi Non-GMO Technology

Down Regulates Genes



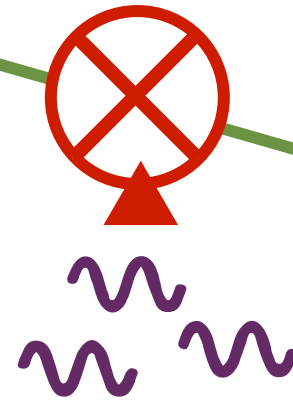
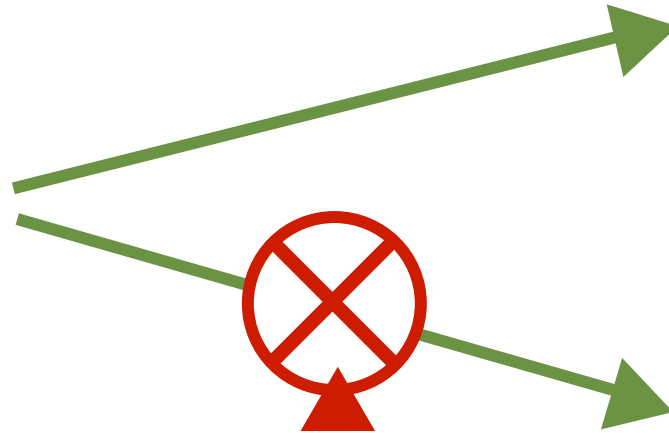
DNA

Database of instructions



RNA

Specific instructions



RNAi



Protein

Functional product

No functional protein

RNAi (RNA Interference) Applications

AGRICULTURE



URBAN/STRUCTURAL PESTS



ANIMAL HUSBANDRY



AQUACULTURE



APSE Opportunities, Problems and Value

Opportunities

- RNA is benign
- RNA is specific (no off target effects)
- RNA is environmentally sustainable and can contribute to biodiversity

Problems

- RNA is expensive and difficult to make
- RNA purity is important to specificity

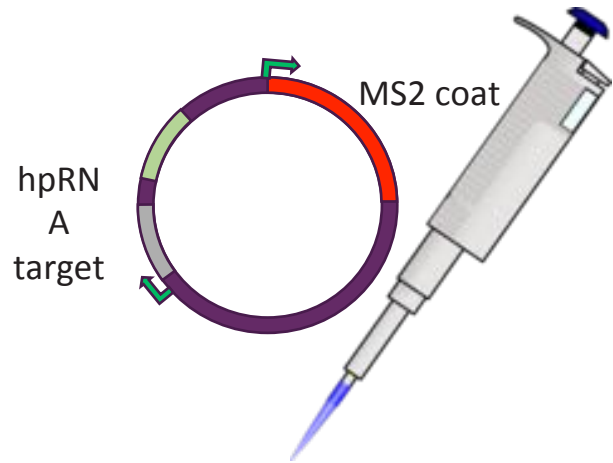
Value – RNA at low cost and high volume

- \$2 gram target costs (use rates of 1-5 grams per acre)
- Low costs provide delivery leverage

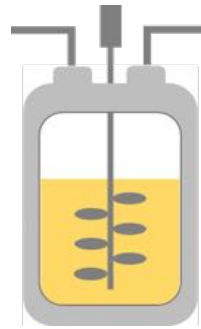


APSE Solution

MOLECULAR BIOLOGY



FERMENTATION/CONDITION



PURIFICATION



LOW COST | HIGH PURITY | HIGH VOLUME

APSE Business Model

MANUFACTURING

- Licenses
 - Per sequence
 - Utility
- Royalties



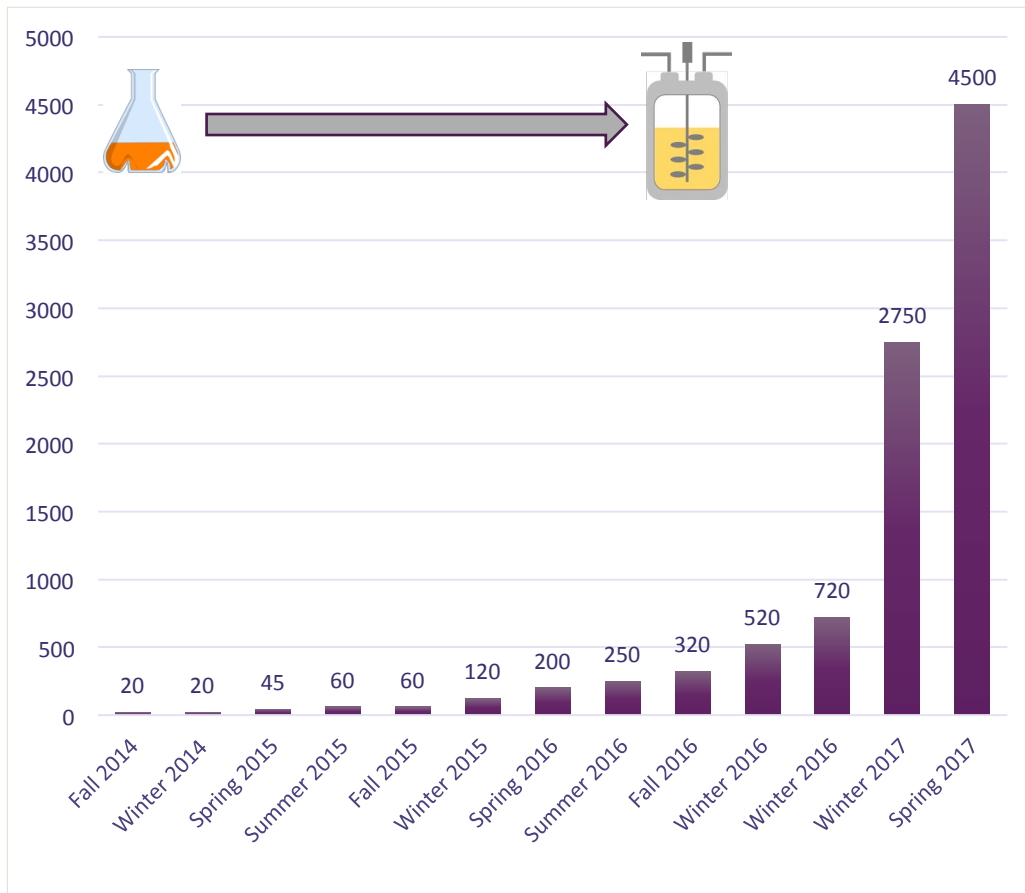
URBAN/STRUCTURAL PRODUCTS

- Fire ants
- Household ants
- Cockroaches
- Termites



APSE Yields & Costs

YIELDS INCREASED OVER 200X



COSTS ON TARGET FOR \$2/GRAM

Type of Production	Volume	Cost/Gram
Toll only	1MT	\$10.58
Toll + Backend Capex	1MT	\$8.57
Toll only	5MT	\$4.58
Toll only	10MT	\$3.61
Toll + Backend Capex	10MT	\$2.79
All Capex (no toll)	10MT	\$2.00

APSE Competition

Very few patents or publications
on **high volume RNA production**

Chemical

In vitro

Fermentation

APSE

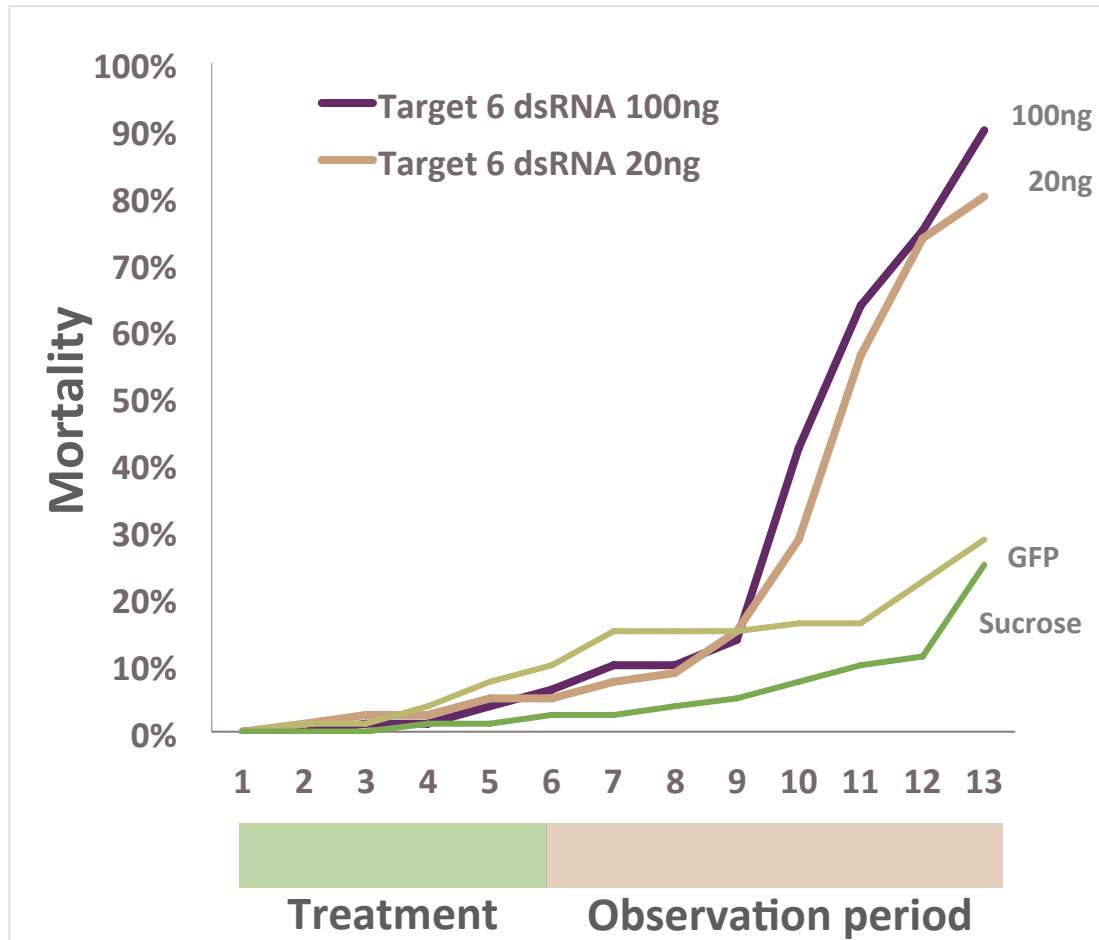
Low cost
High Purity

Fundamental Patent Granted
Several Patents Pending
3rd Party IP/FTO Review

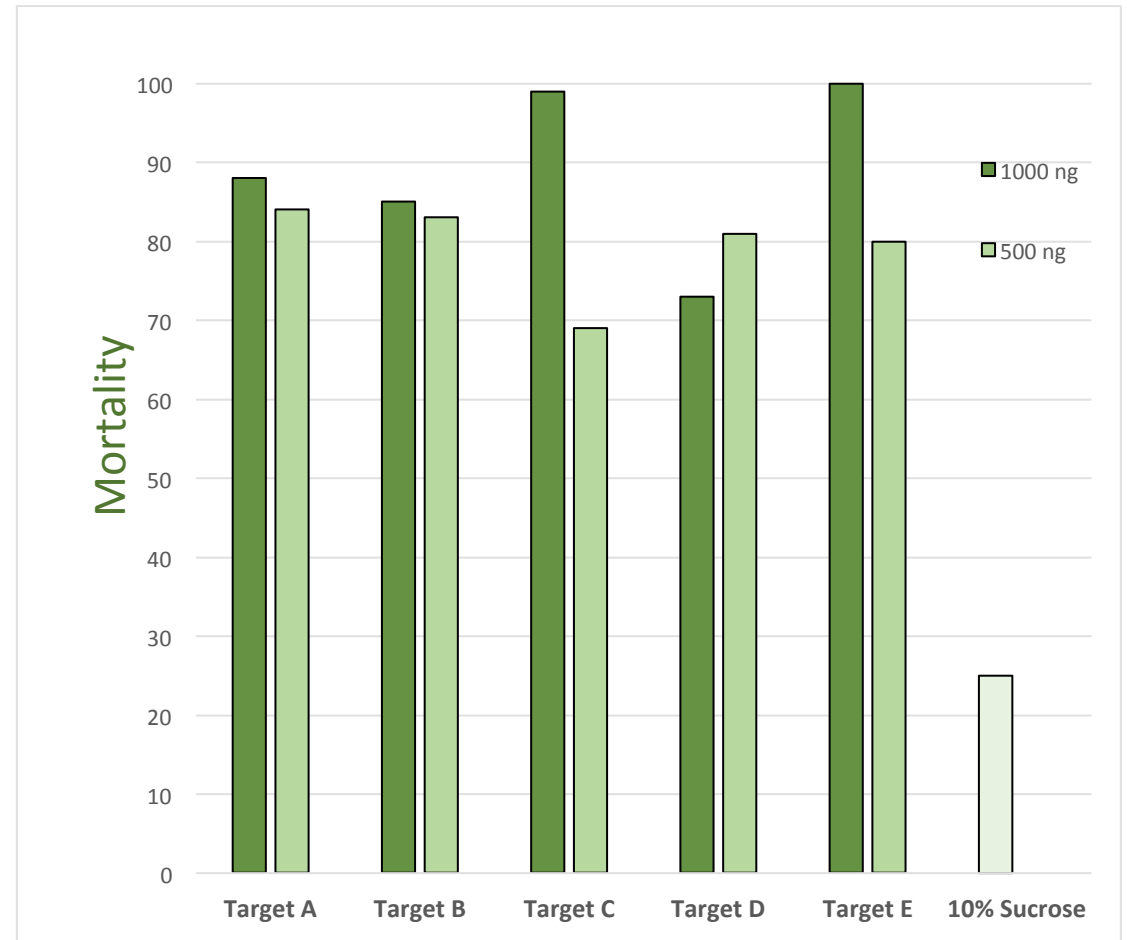


APSE RNAi Controls Fire Ants

DOSE RESPONSE FIRE ANT RNAi



SEVERAL RNA SEQUENCES WITH FIRE ANT ACTIVITY



Management Team



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Dir. Mol. Biol.



JOHN
KILLMER Ph.D.

CEO



ANIL
Kumar Ph.D.

Mol. Biology

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Kathleen Hall (Washington Univ.)
Henry Huang (Washington Univ.)



APSE Milestones

- Manufacturing
 - \$2 gram at scale (2018)
 - License for one sequence (2019)
- Fire ant product
 - Field trial (2017)
 - Regulatory (2017 start)
 - Partners (2018)
 - Commercial (2020)



APSE Summary

Resources to Accelerate Development



Products/Processes

- Production ahead of schedule
 - IP solid
 - Licenses available
- Products on schedule for 2020
- Product portfolio mapped




Financing

- \$2M since founding
- \$500K annual burn
- Need \$3M
 - \$1M annual for 3 years
- Optimize yield and products

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