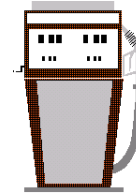


**Agrivida**

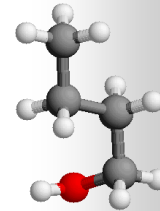


# Engineering Biomass Feedstocks



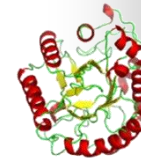
Fuels:  
butanol,  
diesel,  
ethanol

Chemicals:  
monomers,  
polymers,  
plastics



Animal  
feed

Enzymes,  
industrial  
proteins

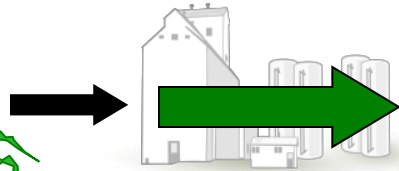
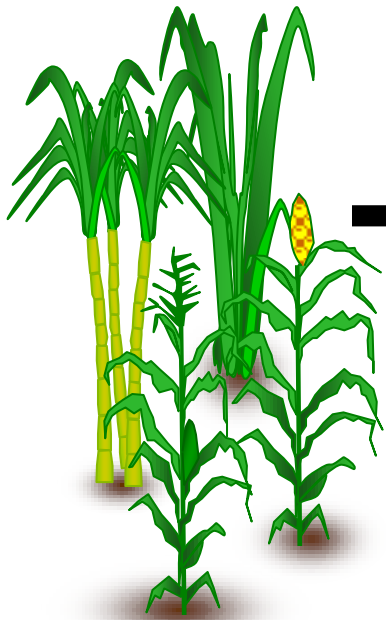


Biomass has a similar chemical composition to petroleum and its cell wall polymers could be used as the basis for replacing fuels, plastics, electronics, textiles, chemicals, building materials...

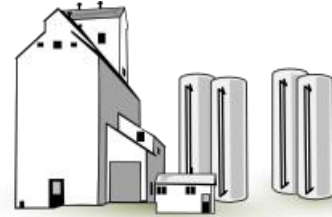
## for Industrial Biotechnology

# Cheap Sugar for Fuels and Chemicals Production

Agrivida  
Feedstocks



- Low cost pretreatment
- No enzyme requirements
- Potential retrofit possibilities

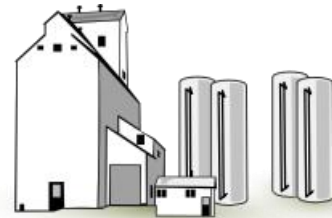


## Fuels

**\$25B in 2008**

**\$100B in 2020**

Butanol  
Ethanol  
Biosynthetic HCs



## Chemicals & Plastics

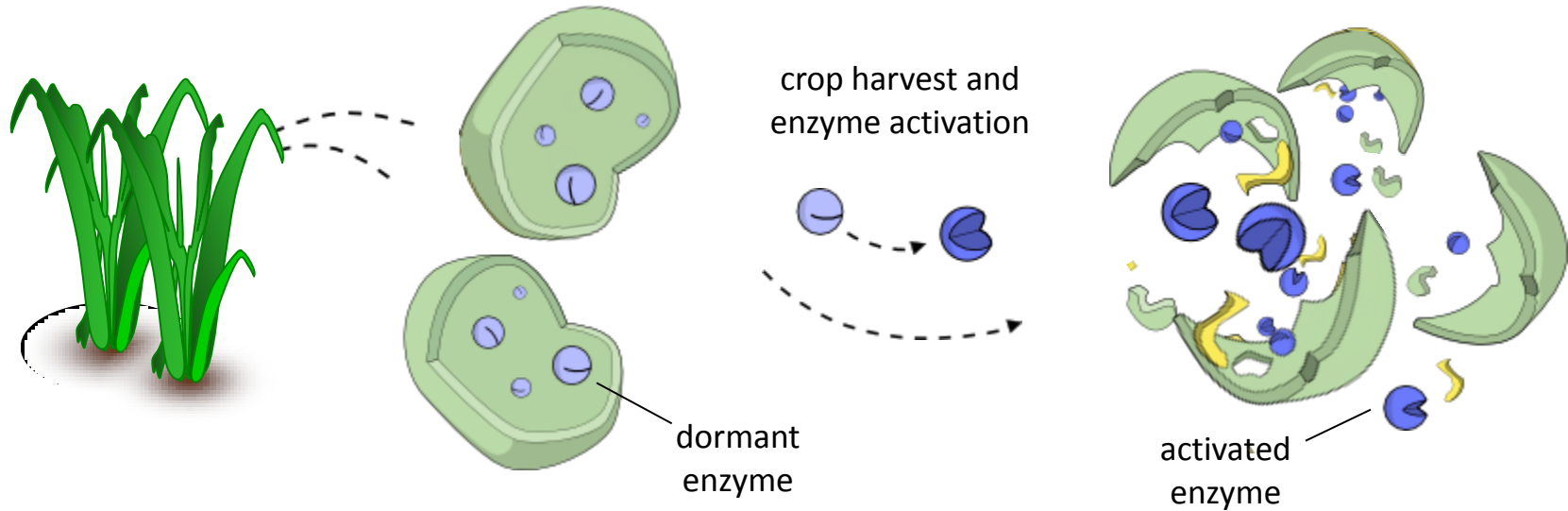
**\$15B in 2008**

**\$20-30B in 2020**

Amino Acids  
Organic Acids  
Biopolymers  
Chemical building blocks

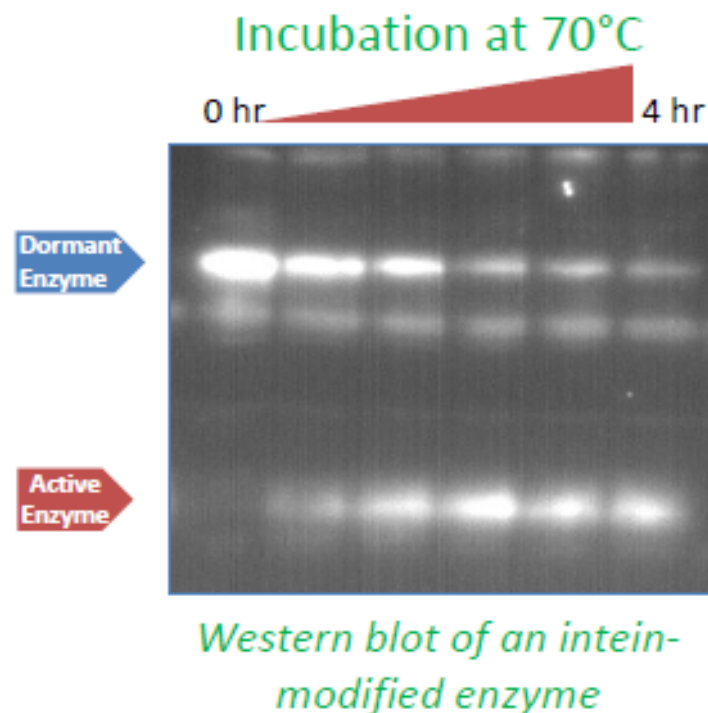
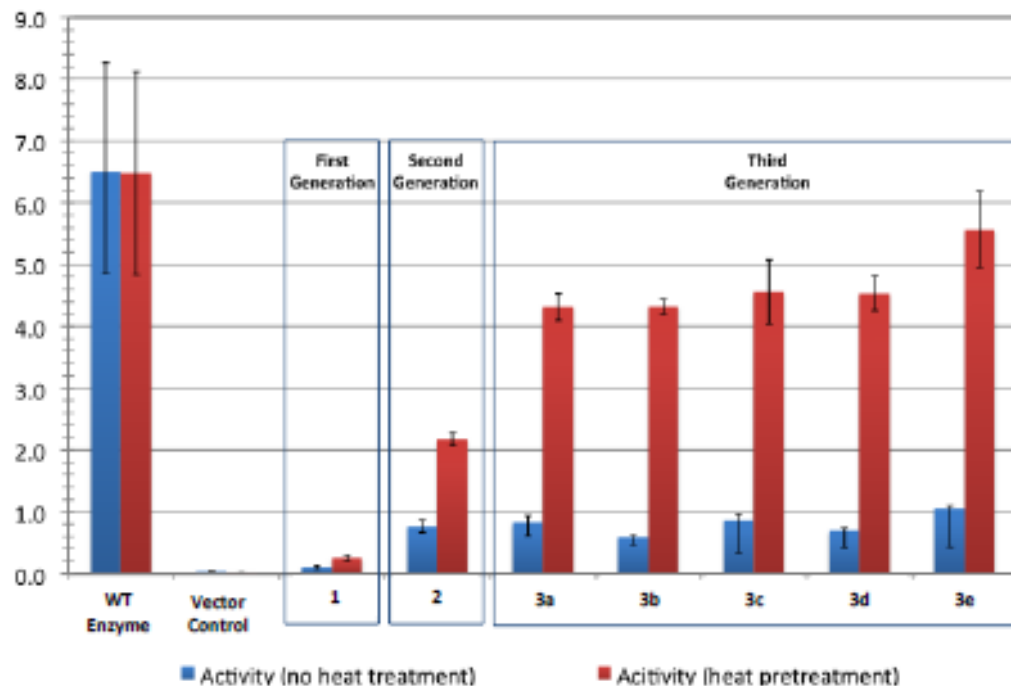
Production costs comparable to using petroleum at \$60/bbl

# Agrivida GreenGenes™ Technology



1. Agrivida's proprietary molecular engineering technology produces energy crops containing dormant enzymes.
2. The dormant enzymes are activated using a proprietary switch after harvest.
3. The activated enzymes degrade the cell wall, converting cellulose into sugar.

# Intein-modified Enzyme Development



High throughput screening combined with mutagenesis and computational design is used for optimization of intein splicing in cell wall degrading enzymes.

# Plant Transformation

“Dwarf phenotype”



Transgenic maize expressing CWD enzymes

Age matched, control wild-type maize

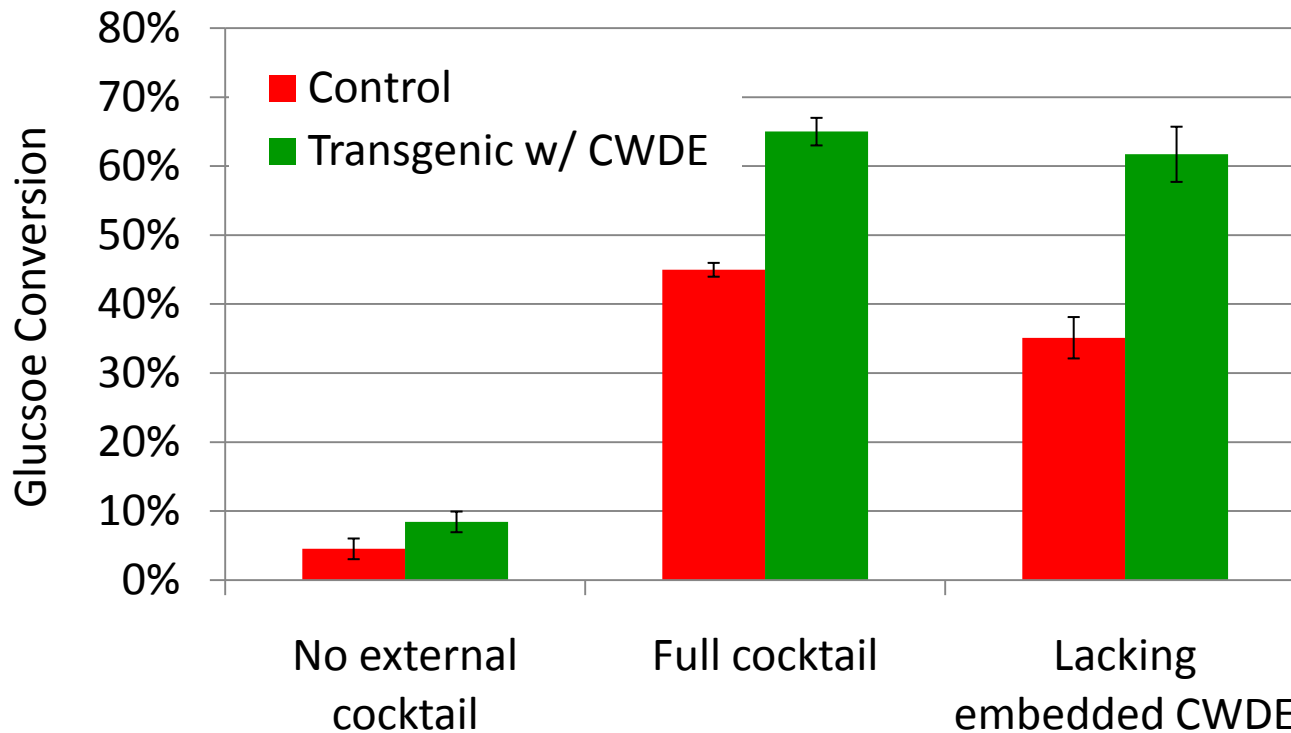
“Seed phenotype”



Segregating phenotype seen in maize seed.

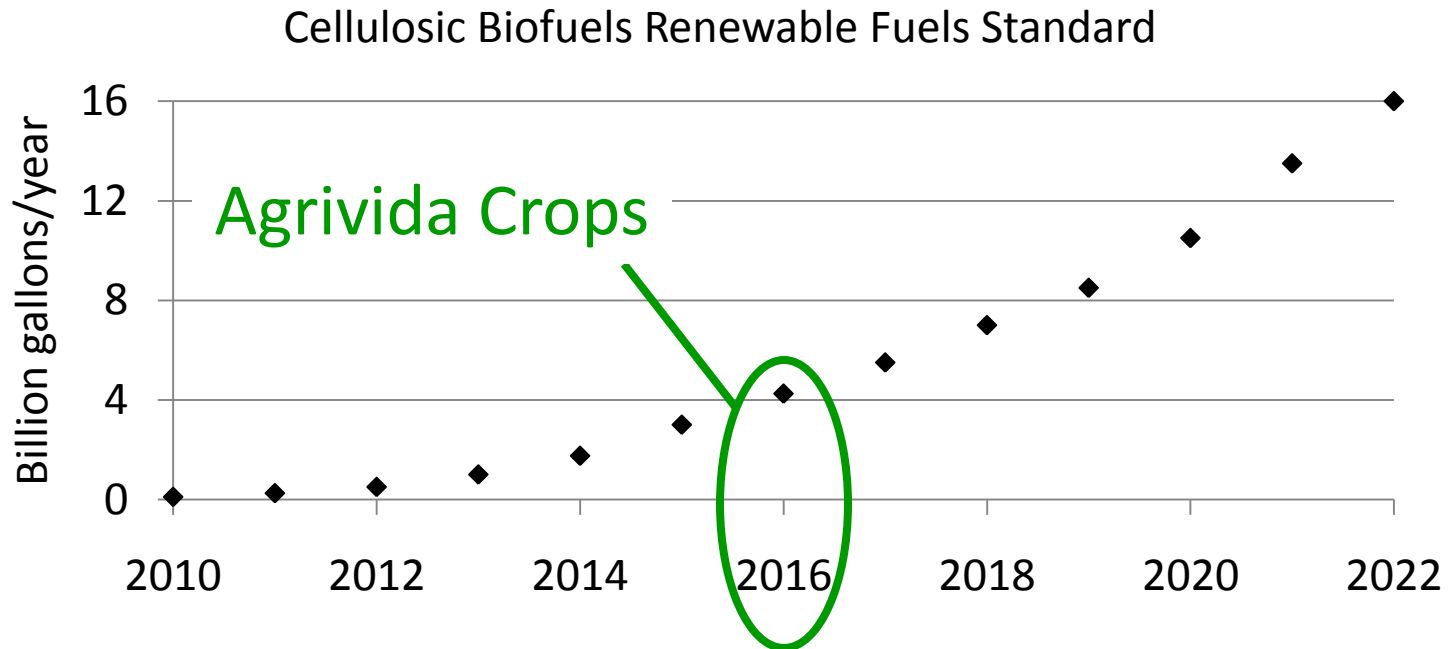
Transformation of corn, switchgrass, and sorghum is used to embed the enzymes into the plants. Unmodified enzymes lead to detrimental effects.

# Processing Impact of Enzymes



A cocktail of cell wall degrading enzymes are required to hydrolyze cellulosic material. Tissues from plants that express one of these enzymes do not require the same level of external addition to release equivalent sugars.

# Market Penetration



- As proposed, only 25% built out by 2016
- First year requirement decreased by 95%
- Value achieved from retrofits to existing facilities



# Agrivida

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