

Just Beets

Steve Libsack

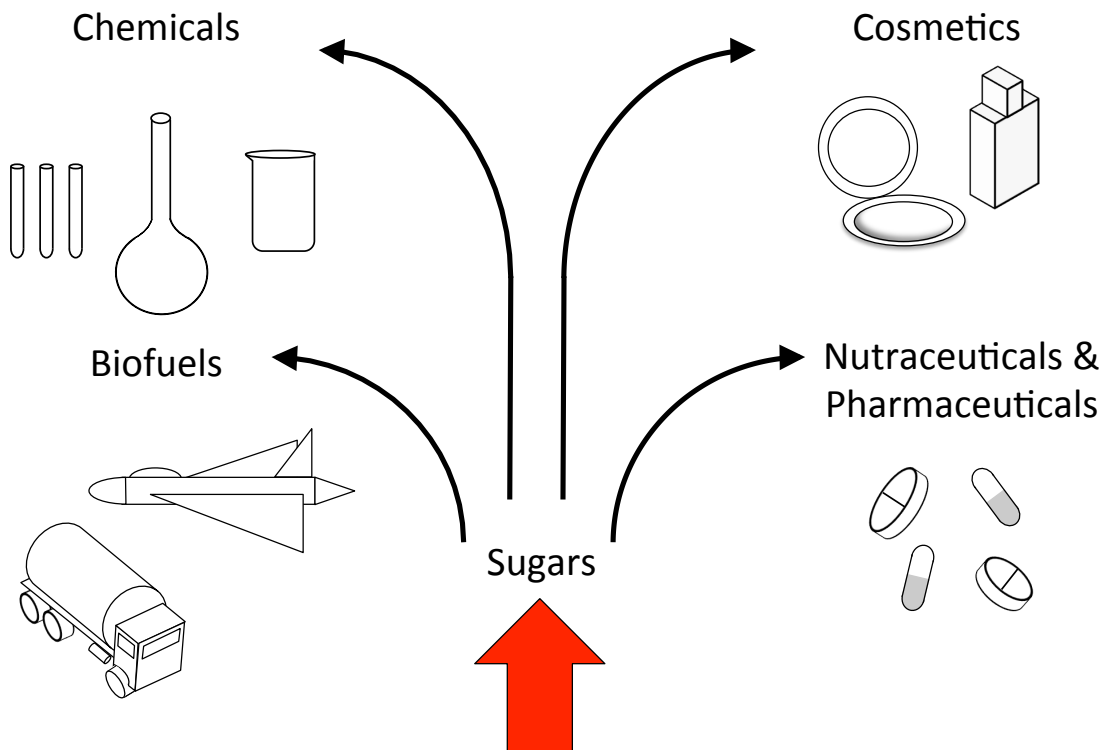
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Discussion Points – Why Beets?

- Market demand for low cost sugars
- What is an Industrial (sugar) Beet?
- Industrial Beets in crop rotations
- NUEST technology
- Building partnerships & projects

Bio-based Industry Needs Low Cost Sugars

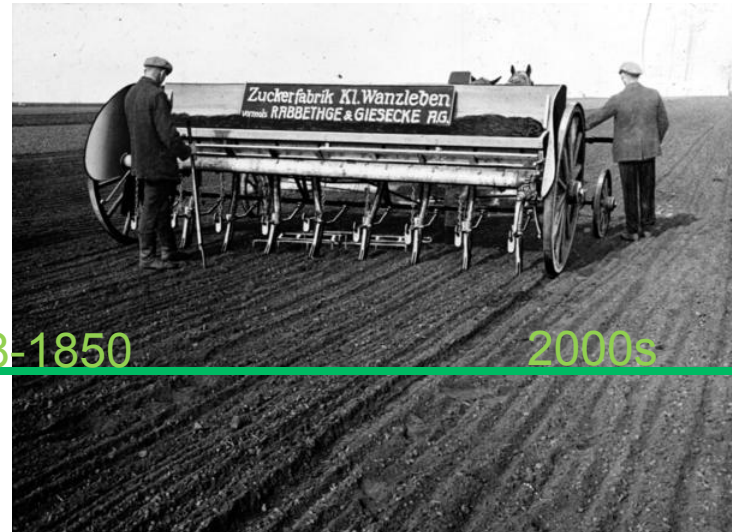
US bio-based industry was \$369B in 2013



What is an Industrial Beet?

- Beets grown for non-food use
- Cultivated beet producing:
 - Sugars (C6 and C12)
 - Cellulose
- Beets grown where sugar market access is unavailable
- Increased fermentable sugars/acre (C12 and C6)







“The energy requirement for converting sugar into ethanol is about half that for corn” – *James Jacobs, Ag Economist USDA Rural Development*

Beet yield can vary from 25 ton/acre to 60 ton/acre. Beets in the north country average 25 ton/acre+ while beets in the IV and southern US average near 50 ton/acre – *Kaffka, UC Davis*

Beets are among the crops that can be most widely grown in the US. And, the beet has by far the best potential alcohol yield – 800 to 1200 gallon per acre – *Fapri, Missouri EDU*

Industrial Beet as a Feedstock

- Industrial beet, like cane and sweet sorghum, is a “Generation 1.5” simple sugar crop
- Beet and sweet sorghum are excellent complementary crops
 - Growing and harvest seasons – opposite one another
 - Utilize processing facility 10+ months of the year
 - Both produce primarily C6 (or C12) sugars
- Approximately 2x yield of fermentable sugars compared to corn
- Industrial beet processing is simple and flexible to minimize capex
- Makes small plant projects economically viable in areas with limited acreage availability
- Net water producer = water positive facility

Industrial Beet as a Feedstock

- Flexible growing season and harvest window
- Industrial sugars and beets are not traded on CBOT
 - Feedstock will have stable price for grower and processor
- Does not compete with sugar market - allocations
- Beets grow well during winter months in warmer climates
- Environmental and land management advantages
 - (Nitrogen scavenger, grows in high salt soils, utilizes excess water)
- Beets can be stored in the soil – will continue to grow until needed for processing

Southern US Energy Beet Life Cycle



Biofuel Cropping System Model

Sugar crops can be grown to provide a February - December supply of industrial sugars

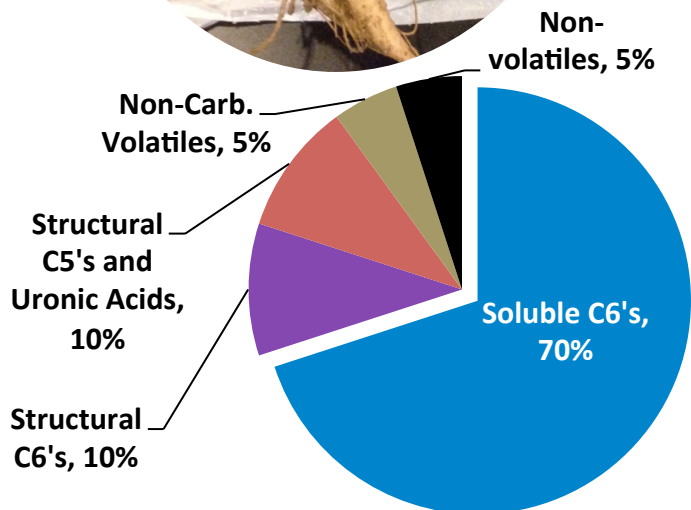
	J	F	M	A	M	J	J	A	S	O	N	D
Beets		Harvest								Plant Beet		
Sweet Sorghum							Harvest					
Energy Cane										Harvest		

NUEST Beets

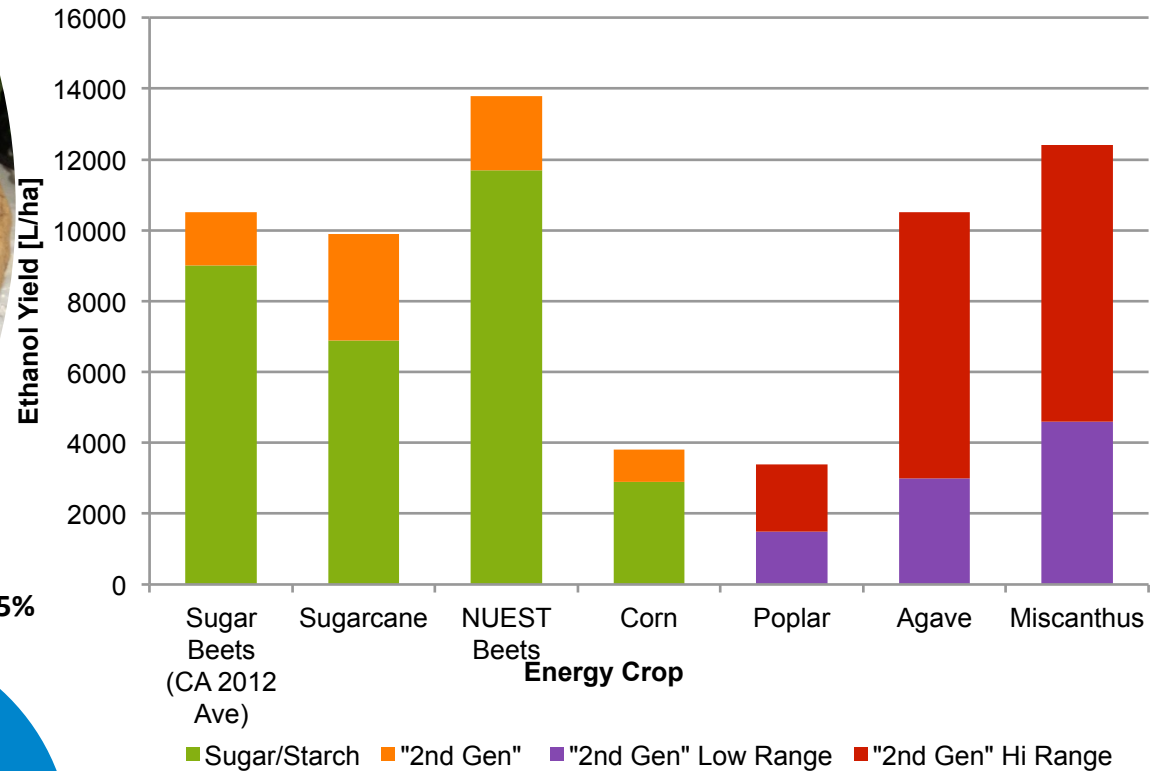


- Produces ~30% more sugar per acre than traditional sugarbeet
- Requires less nitrogen fertilizer
- Requires less water

Industrial (NUEST) Beets



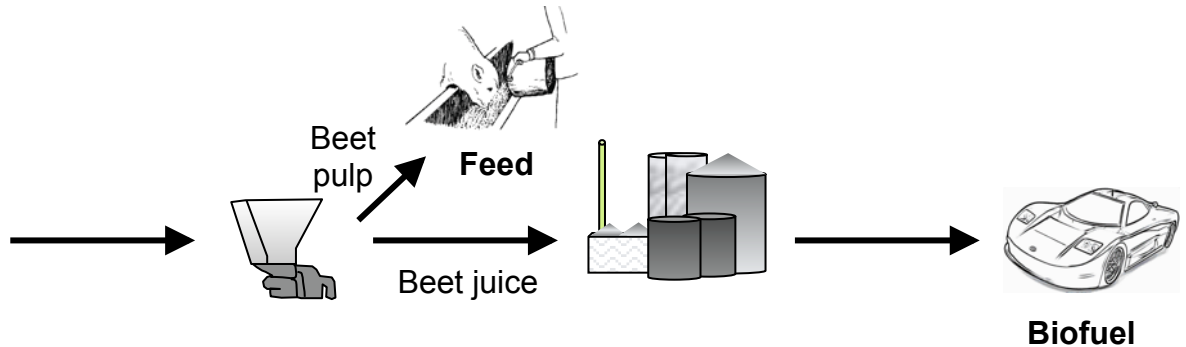
Benchmarking Beet Ethanol



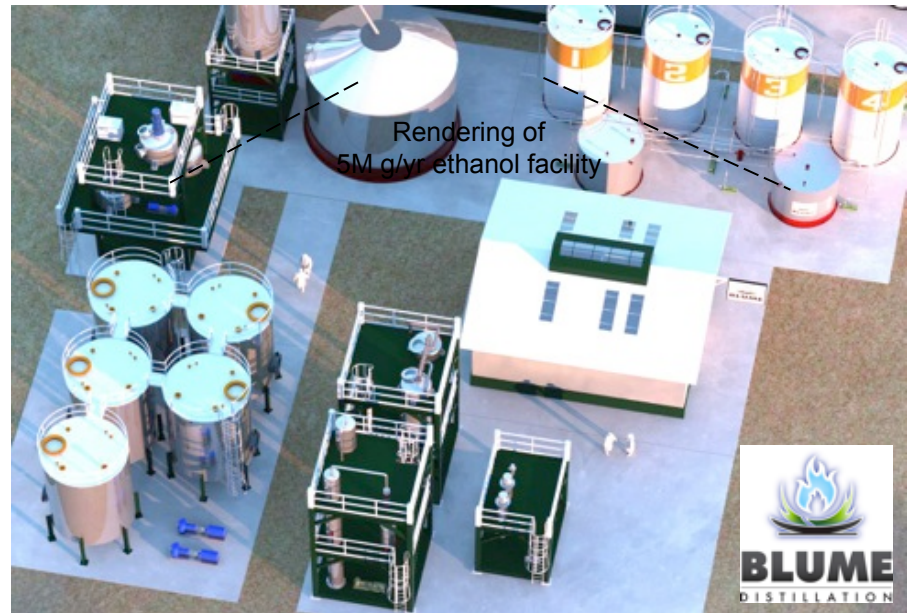
- Supplies “Advanced” Biofuel Market
- Non-food “Industrial Beet” Development

**Non-beet data from Somerville, et al. (2010) Science 329(5993)*

NUEST Beet Opportunity



**Advanced Biofuel Pathway
under EPA review**



Conclusions:

- **Industrial sugars needed for biofuels, cosmetics, plastics, biochemical and pharmaceutical products**
- **Industrial Beets, like sweet sorghum and cane, are generation 1.5 sugar crops**
- **Smaller scale Industrial Beets processing plants can be very profitable**
- **An advanced biofuel pathway petition for Just Beets' Industrial Beets is under EPA review**
- **NUEST Beets will produce the lowest cost industrial sugars**
- **Working together is key to success**

Questions?

Thank You!

Just Beets 

Just Beets LLC

For Additional Information

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