
Sorghum as a Biofuels Feedstock: Strengths, Weaknesses, Opportunities & Threats from an Industry/Farmer's Perspective

Mr. Tim Lust

CEO

NSP



Why a SWOT Analysis?

- Provides background information on emerging industries
- Helps us position sorghum to exploit these new markets
- Shows our strengths
 - Helps market sorghum to both new and existing industries, and producers
- Shows our weaknesses
 - Allows us to target research & education



Sorghum Strengths

- Crop can fit into all renewable fuel schemes
 - Grain sorghum moves into starch-to-ethanol
 - Sweet sorghum can be used in sugar-to-ethanol
 - Forages and sudangrasses can produce high tonnage biomass for conversion in cellulosic/lignocellulosic-to-ethanol





What Will it Take in the US?

Feedstocks (gal per ac)	E-10 (16 B gal)	E-85 (136 B gal)
Grain (435)	37 M ac	313 M ac
Sugar (1,150)	14 M ac	118 M ac
Cellulosic (1,500)	11 M ac	91 M ac
Lignocellulosic (1,800)	9 M ac	76 M ac
Sugar & Lig (2,000)	8 M ac	68 M ac

Estimated future gas usage in the US is approximately 160 B gallons

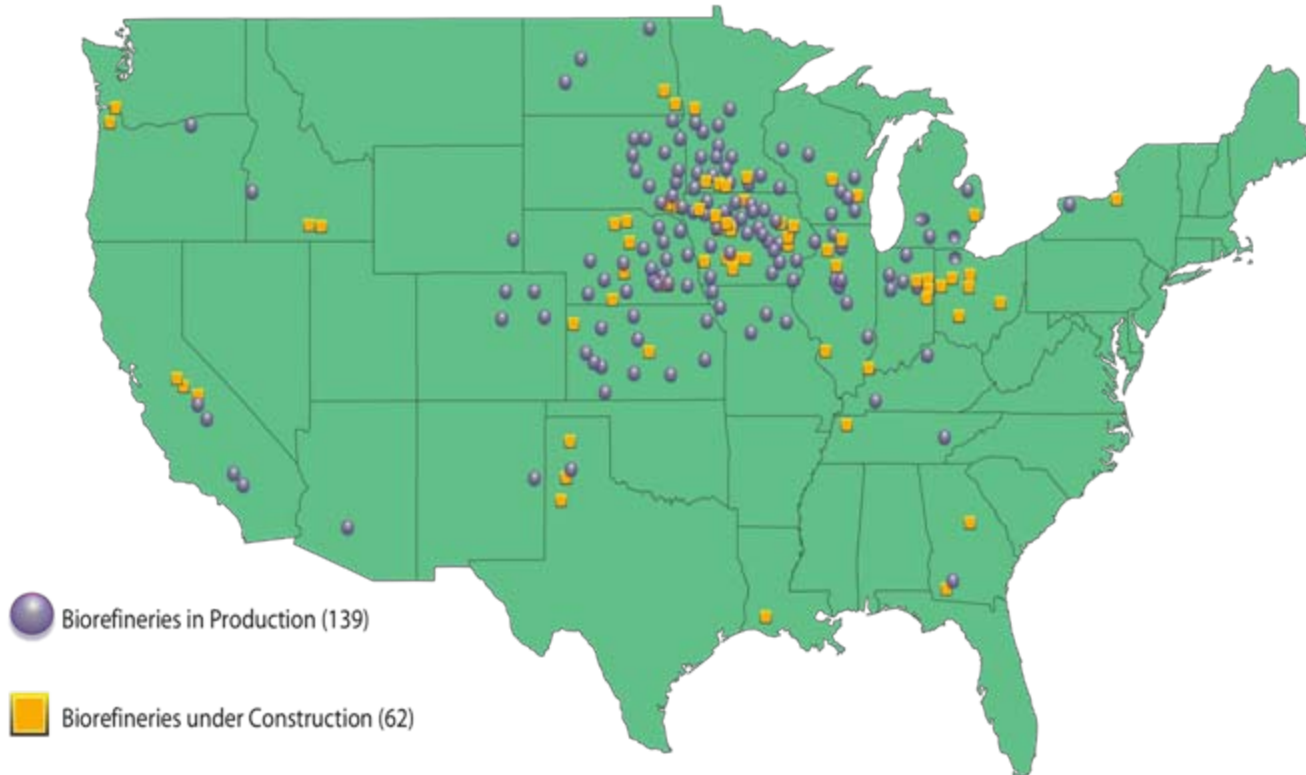


Where are We Now?

- Currently producing 9.4 B gallons ethanol in the US
- Approximately 20% of the current domestic grain sorghum is going to ethanol
- More ethanol plants coming on-line in the sorghum belt



U.S. Ethanol Biorefinery Locations



Source: Renewable Fuels Association
01.24.08

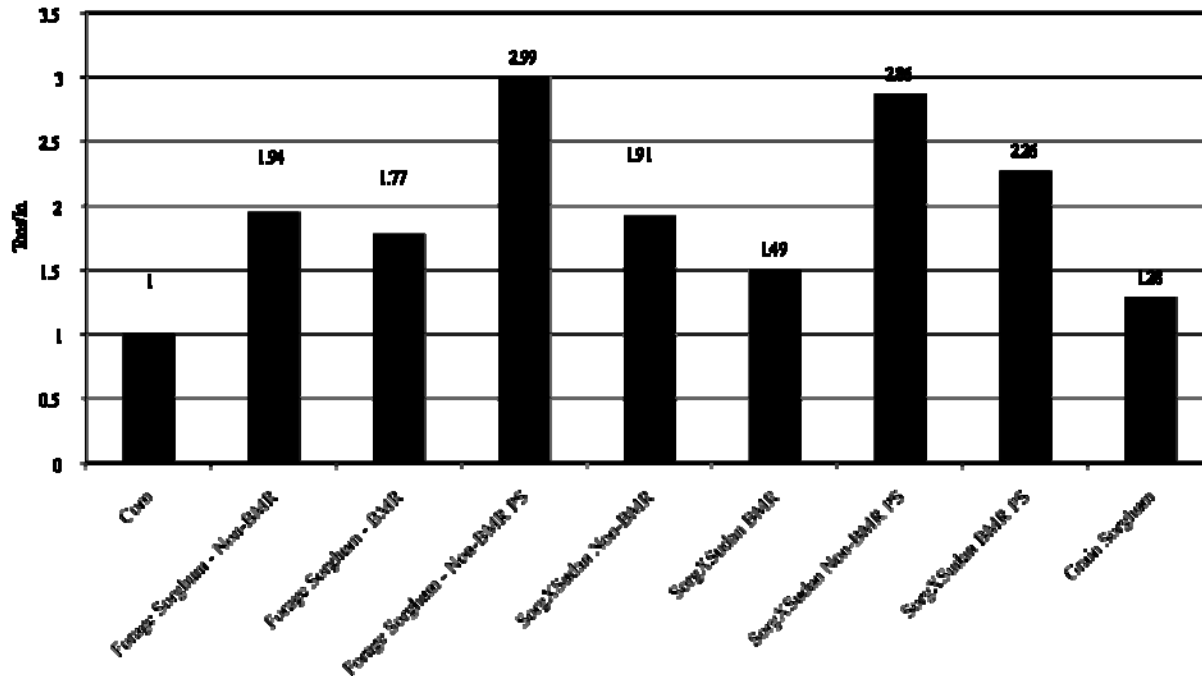


Sorghum Strengths

Stay Green Drought Tolerance



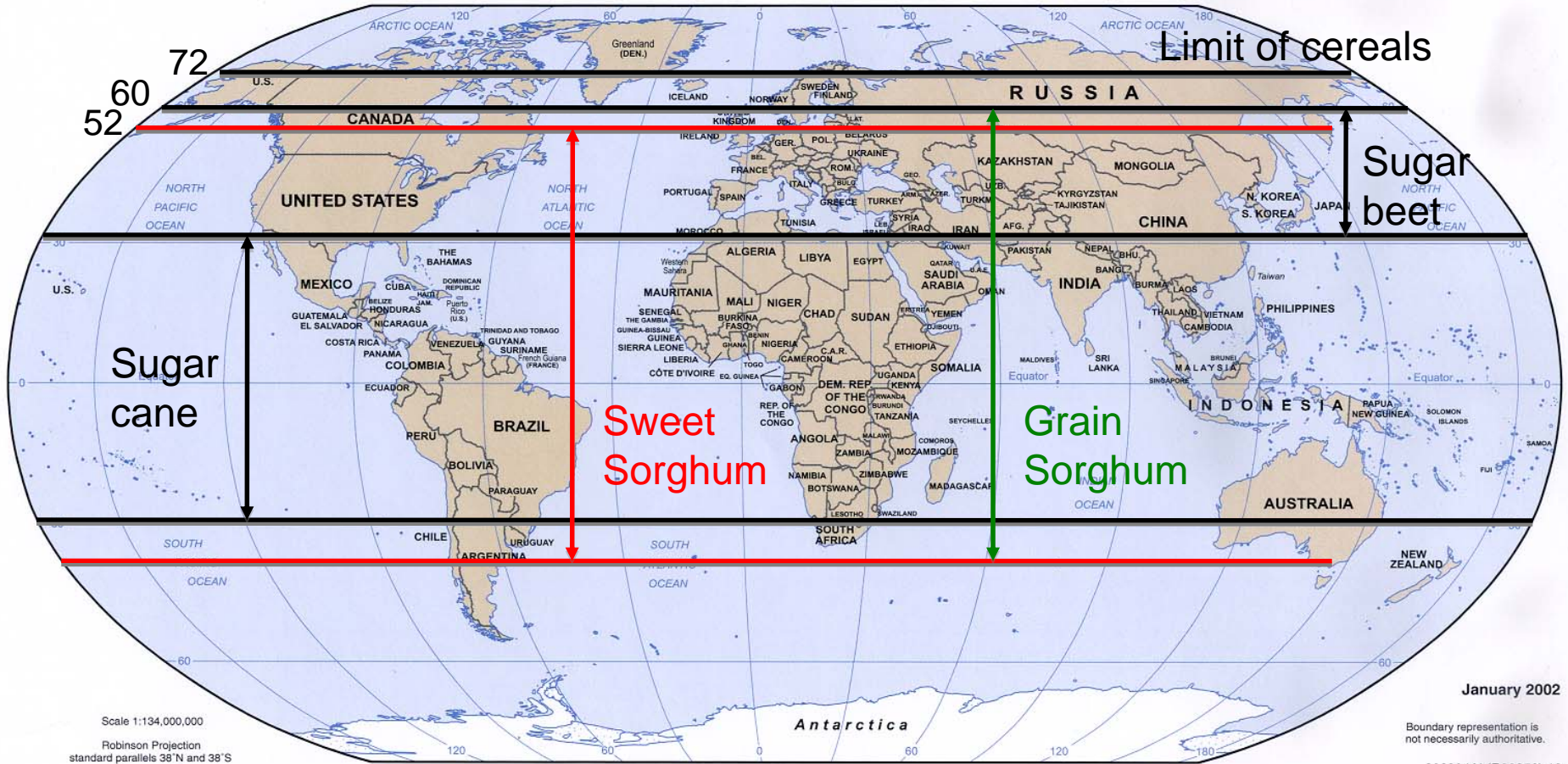
Drought Tolerant Forages



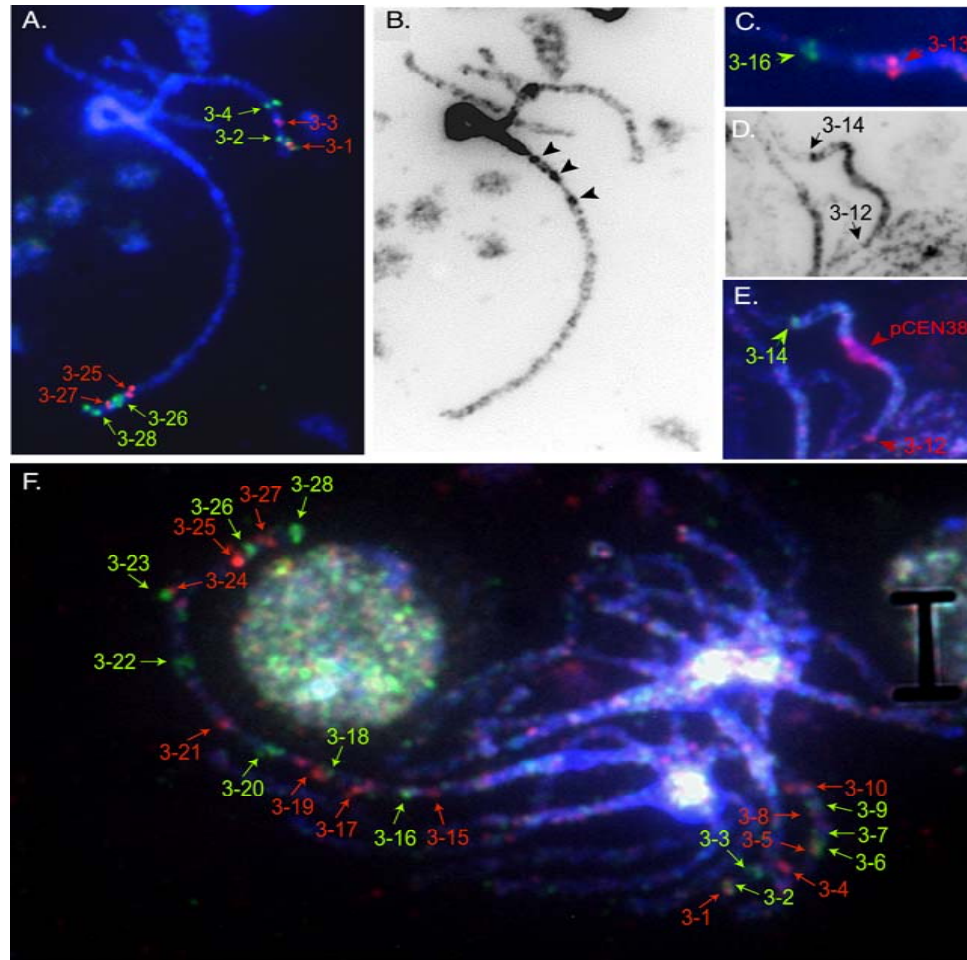
Research from Texas AgriLife, Bushland Texas



Potential adaptation of *S. bicolor*



Sorghum Genome Platform



Additional Strengths

- Seed Industry
- Diverse Germplasm
- Farmer Funding - New National Checkoff
- Known Agronomics, Insects, & Disease
- Active Public Research Sector
- Non-GMO



Weaknesses

- Decreased investment in Private Industry
 - Consolidation of Seed Industry
 - GMO-centric research
 - Gross/Net Seed Revenue per acre
 - 1 Billion being invested annually
- Decreased US grain acres
- Fewer Research Institutions



Additional Weaknesses

- Limited research on sorghum as a biofuel
 - No ethanol specific grain hybrids
 - Limited seed availability and equipment for sweet sorghum to plant significant acres
 - Limited International exposure and information exchange



Opportunities

- TONS, TONS, TONS
- WATER, WATER, WATER
- A new generation of researchers and entrepreneurs have discovered sorghum
- Increased Worldwide sorghum acres
- Part of the international solution to renewable fuels



Opportunities

- Advanced Biofuel Definition -Small Carbon/Nitrogen Footprint
- Compositional Analysis of Biomass
- “New” sorghum has the potential to be one of the great biofuels crops



Sweet Sorghum Potential



Sweet sorghum could double our gallons per acre production when combined with cellulosic/lignocellulosic ethanol



Threats

- Energy Prices
 - Other alternative sources
 - Low costs drive disinterest in biofuels
- Food vs Fuel Debate (Biofuels overall)
- Policy Changes by Governments - RFS
- Credit Crunch – Funding by Private Industry



Sorghum Threats

- Logistics –
 - Harvest
 - Transport
 - Storage
- Concentration on Perennial Crops
- Critical Mass – US and Worldwide

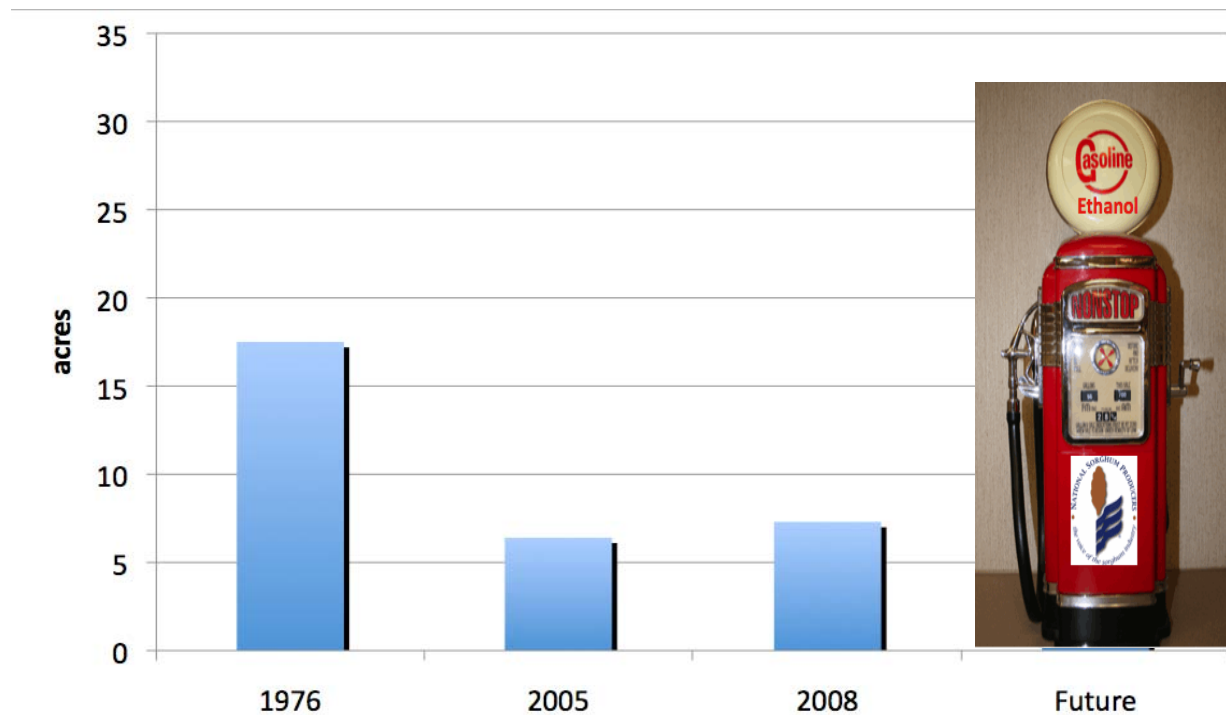


So What Has this Taught Us?

- Sorghum has tremendous potential as a biofuels crop worldwide
- Worldwide water issues will make worldwide energy lean towards crops that use water more efficiently
- Sorghum is the low cost, drought tolerant feedstock that can be grown on 80% of the agricultural acres on earth



New Acres for All Types of Sorghum



The Future of Sorghum

