# Video Lecture – Steve Moose

* Relatives of corn fixate carbon very well
* Switchgrass, sorghum, sugarcane, etc are good at this too
* Opportunity in increasing value of biomass
* Need to convert cellulose, start, sugars, lignin, lipids from plants and chitin and lipids into
  + Biodiesel – vegetable oil
  + Microbial Fermentation – ethanol & butanol
  + Biogas/Syngas – Exchange with methane and hydrogen
  + Direct Chemical Synthesis – alkanes and many others
  + Pyrolysis – heat + pressure to bio-oil gives syngas or biochar
  + Combustion – to electricity, releasing CO2
* Biomass conversion via microbial fermentation
  + Grow plants
  + Pretreatment with harsh chemicals that break down the lignin
  + Add microbes in fermentation to break into alcohol or specialty chemicals
* Biomass can be used to produce a variety of high-value specialty chemicals
* Biology is specific and chemistry is general
* Andropogoneae (plants for man) grasses are important as they have
  + Versatile carbon forms: starch, sugar, lignocellulose
  + C4 photosynthesis
  + Tropical and temperate
  + Perennial and annual
  + Tolerance to abiotic stresses
* Perennial grasses offer sustainability benefits
  + Lower requirements and remove removal of nutrients
  + Nutrient recycling to overwintering rhizomes
  + Carbon sequestered underground
  + BUT they grow slowly
* Models suggest expansion of bioenergy crops will minimally impact food crop acreage
* Pastures will be where these crops are planted
* Biomass more popular in EU
* CABBI is the Illinois institute that focuses on biomass fixation
* Moose says to have a sustainable biomass industry, we need to switch to specialty products and not biofuel itself

# Significance and Challenges of Biomass

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