

MU Biofuels Garden

Peanut	Eastern Gamagrass	Miscanthus	
Sunflower	Indiangrass	Sweet Sorghum	Forage Sorghum
Canola	Big Bluestem	Sugarcane	Grain Sorghum
Soybean	Switchgrass	Sugar beet	Corn

Ethanol from starch

Ethanol is made from the starch stored in grains. Before fermentation the starch molecules must be transformed by enzymes into free sugars. Yeast uses the sugars to produce ethanol.

Corn: Approximately 2.8 gallons of ethanol can be made from each bushel (56 pounds) of corn grain. The ethanol yield from a corn crop of 160 bushels/acre crop would be about 448 gallons/acre.

Grain sorghum: Approximately 2.8 gallons of ethanol can be made from each bushel (56 pounds) of grain sorghum. Average grain sorghum yield in Missouri for the past several years is about 100 bushels/acre. The ethanol yield from that average crop would be about 280 gallons/acre.

Ethanol from sugar

Unlike starch, the sugar, sucrose, can be used by yeast to make ethanol. No transformation by enzymes is required.

Sweet sorghum: Sucrose is stored in the stalks of sweet sorghum. Sap, containing the sugars, is squeezed from the stalks using mechanical pressure. Ethanol production of about 400 gallons/acre is possible from sweet sorghum.

Sugar beet: Sucrose is stored in sugar beet roots. Sugar beet is not currently grown in Missouri, but is an important crop in North Dakota, South Dakota, and Idaho. Estimated ethanol yield from sugar beet is about 550 gallons/acre.

Sugarcane: Sucrose stored in sugarcane stems. Sugarcane is not grown in Missouri, but is an important crop in Louisiana, Texas, Florida, and Hawaii. Estimated ethanol yield from sugarcane is about 600 gallons/acre.

Ethanol from cellulose

Ethanol is made from cellulose and other structural carbohydrates in plant stems, branches, and leaves. Before fermentation the structural carbohydrate molecules must be transformed by enzymes to free sugars. Yeast uses the sugars to produce alcohol. Approximately 100 gallons of ethanol can be made from each ton of biomass

Forage sorghum yield in Missouri is about 8 tons/acre. The ethanol yield from that average crop would be about 800 gallons/acre.

Miscanthus is a tall perennial grass that is being evaluated for biofuel use. Test plots in Illinois have produced 15 tons of biomass per acre. Ethanol yield from that size crop would be about 1500 gallons/acre.

Switchgrass is a native, perennial, warm-season grass. Yield in Missouri is approximately 4 tons of biomass per acre. The ethanol yield from that size crop would be about 400 gallons/acre.

Big bluestem is a native, perennial, warm-season grass. Big bluestem yield in Missouri is approximately 4 tons of biomass per acre. The ethanol yield from that size crop would be about 400 gallons/acre.

Indiangrass is a native, perennial, warm-season grass. Yield in Missouri is approximately 4 tons of biomass per acre. The ethanol yield from that size crop would be about 400 gallons/acre.

Eastern gamagrass is a native, perennial, warm-season grass. Yield in Missouri is approximately 5 tons of biomass per acre. The ethanol yield from that size crop would be about 500 gallons/acre.

Biodiesel from plant oils



Vegetable oils are stored in seeds. The oil is separated from the protein meal during normal processing. Biodiesel is made by adding alcohol (usually methanol) to vegetable oil. Glycerin is a by-product.

Soybean: Approximately 1.5 gallons of biodiesel can be made from each bushel (60 pounds) of soybean grain. The average soybean yield in Missouri for the past several years is about 38 bushels/acre. The biodiesel yield from that average crop would be about 60 gallons/acre

Canola: Oil content in canola seeds is approximately 40%. Canola is not currently grown in Missouri, but estimated yield is approximately 1600 pounds/acre. The biodiesel yield from that estimated crop would be about 80 gallons/acre.

Sunflower: Oil content in sunflower seeds (black-seeded oil types) is approximately 45%. Sunflower is grown in Missouri, but primarily for bird seed. Estimated yield for grain is approximately 1600 pounds/acre. The biodiesel yield from that estimated crop would be about 90 gallons/acre.

Peanut: Oil content in peanut seeds is approximately 50%. Peanut is not grown in Missouri. Estimated biodiesel yield from peanut is about 120 gallons/acre.