


Miscanthus giganteus

<i>Miscanthus</i>	
	
<i>Miscanthus giganteus</i>	
Scientific classification	
Kingdom:	Plantae
(unranked):	Angiosperms
(unranked):	Monocots
(unranked):	Commelinids
Order:	Poales
Family:	Poaceae
Subfamily:	Panicoideae
Genus:	<i>Miscanthus</i> Keng

Miscanthus giganteus is a large, perennial grass hybrid of *Miscanthus sinensis* and *Miscanthus sacchariflorus* native to Japan. It is currently used in the European Union as a commercial energy crop, as a source of heat and electricity, or converted into biofuel products such as ethanol.^[1]

Physiology

M. giganteus is a C4 plant, and thus exhibits greater photosynthetic efficiency and lower water use requirements than other kinds of plants.^[2] It has very low nutritional requirements – it has high nitrogen use efficiency and therefore is capable of growing well on barren land without the aid of heavy fertilization. *M. giganteus* is a sterile hybrid, therefore propagates vegetatively through its rhizomes.^[3] This quality makes it attractive for growth in areas foreign to *M. giganteus* – it is a completely noninvasive species. Additional researched benefits of *M. giganteus* include its ability to sequester carbon into the earth.^[4]

Uses

Research trials being conducted in the United Kingdom, United States and Ireland are making strides towards developing *Miscanthus x giganteus* as a source of biomass for the production of energy either for direct combustion or through cellulosic ethanol or other biofuel production.^[5] *Miscanthus* is grown in Europe mainly for cofiring in coal power generating facilities, and could supply 12% of the EU's energy need by 2050.^[6] In the United States, SunBelt Biofuels founder Phillip Jennings has worked with Mississippi State's Brian Baldwin to develop a more effective, marketable *Miscanthus* grass strain. SunBelt has since been renamed REPREEVE Renewables^[7], and has developed a program to distribute the strain to growers, refiners, and others interested in the plant (dubbed "FREEDOM giant miscanthus",^[8] as the company hopes to reduce American dependence on foreign oil).

In a significant development for the large scale production of this energy crop, Aloterra Energy LLC^[9] was approved by the USDA in 2011 to manage four *Miscanthus x giganteus* energy crop projects under a 2008 Farm Bill program named the Biomass Crop Assistance Program (BCAP).^[10] ^[11] These projects are being operated by Aloterra Energy LLC and MFA Oil Biomass LLC^[12] (a partnership between Aloterra Energy LLC and MFA Oil Company). Each BCAP Project Area is projected to establish 50,000 acres of *Miscanthus* to initially convert into solid fuel pellets.^[13] As technologies develop, their miscanthus will be used to create renewable liquid fuels and biobased chemicals and products. As part of the USDA BCAP program, Aloterra Energy and MFA Oil Biomass are working together on an initial planting of approximately 18,000 acres of miscanthus in 2012.^[14]

Some manufacturers are currently exploring the possibility of using *Miscanthus* grass as input for plastics and other products traditionally constructed from petroleum fuels.

Productivity

Comparison to corn (ethanol)

Compared to other ethanol inputs, giant *Miscanthus* grass produces more mass overall, as well as more ethanol. For example, a typical acre of corn yields around 7.6 tons of biomass per acre and 756 gallons of ethanol. Giant *Miscanthus* is capable of producing up to 20 tons of biomass and 3,250 gallons of ethanol fuel.

Another major potential benefit of *Miscanthus* grass is that it is not a food crop. Corn-based ethanol, which is the version with which most people are familiar, is based on creating fuel from a product that could be used to feed people or livestock. When market forces change the demand for corn, prices can fluctuate wildly, deeply affecting the ability of many to purchase food. Since *Miscanthus* grass is not a food crop in the Western Hemisphere, changes in demand will not have a direct effect on the price of food, unless land used for food crops is converted to growing this crop.

Comparison to timber and other grasses

Wood timber is one of the worst sources for ethanol production. At a maximum of four tons of biomass per acre, and around 520 gallons of ethanol produced, it is a relatively poor performer, compared to *Miscanthus*'s 3,250 gallons, assuming it could be grown on the same land. While this may seem like an unfair comparison, *Miscanthus* even outperforms other grasses, such as switchgrass, which yields around 3-6 tons of biomass and 400-900 gallons of ethanol fuel.

Funding and research

Large colleges, such as the University of Illinois, Mississippi State University and University of Georgia have committed several years and large portions of money to studying ethanol production in general. Along the way, some, such as UI, Michigan State University, and the University of Wisconsin have dedicated entire programs to researching the benefits of *Miscanthus* grass as an ethanol feedstock. One such program is the Great Lakes Bioenergy Research Center (GLBRC) led by the University of Wisconsin and Michigan State University. Recently, with the addition of Dr. Emily Heaton, Iowa State University has also increased their research into *Miscanthus x*

giganteus. Dr. Heaton's lab [15] focuses on producing dedicated energy crops.

On June 15th, 2011, U.S. Secretary of Agriculture Tom Vilsack and U.S. Senator Roy Blunt announced a pilot program to produce miscanthus in Missouri. [16]

References

- [1] <http://bioenergy.ornl.gov/papers/miscanthus/miscanthus.html>
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- [4] Clifton-Brown, John, Joern Breuer, and Michael Jones. "Carbon Mitigation by the Energy Crop, *Miscanthus*." *Global Change Biology* 13, no. 11 (2007): 2296-307.
- [5] National Non-Food Crops Centre. "NNFCC Crop Factsheet: *Miscanthus*" (<http://www.nnfcc.co.uk/publications/nnfcc-crop-factsheet-miscanthus>). Retrieved on 2011-02-17.
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- [10] http://www.usda.gov/wps/portal/usda!/ut/p/c4/04_SB8K8xLLM9MSSzPy8xBz9CP0os_gAC9-wMJ8QY0MLF3MjA89gE28Xx0AnA2dLE_2CbEdFAFE_YHg!/?PC_7_P8MVVLT318D720IS4KDAQB0CN3005915_parentnav=LATEST_RELEASES&PC_7_P8MVVLT318D720IS4KDAQB0CN3005915_navid=NEWS_RELEASE&PC_7_P8MVVLT318D720IS4KDAQB0CN3005915_contentid=2011%2F06%2F0254.xml
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- [14] <http://www.aloterraenergy.com>
- [15] <http://sites.google.com/site/heatonlabgroup/>
- [16] <http://www.joplinglobe.com/local/x947029399/Southwest-Missouri-selected-as-site-for-biofuels-project>

External links

- Investing in Alternative (http://investinginalternative.com/Miscanthus_Biofuel.html) - Miscanthus Investment Research
- Mississippi State University (<http://msucare.com/news/print/agnews/an09/091203.html>) press release announcing the viability of *Miscanthus* grass as a biofuel feedstock
- *Miscanthus* Study (<http://www.serc.msstate.edu/index.html>) at SERC at Mississippi State University
- *Miscanthus* Study (<http://miscanthus.illinois.edu/>) at the University of Illinois
- US Can meet US Biofuel goals using less land (<http://news.illinois.edu/NEWS/08/0730miscanthus.html>) - A study showing how *Miscanthus* can create more ethanol with less space
- REPREEVE Renewables (<http://www.repreverenewables.com/>) US supplier of Freedom giant miscanthus, a variety for the southeastern United States
- New EnergyFarms (<http://www.newenergyfarms.com/>) US, Canada and EU developer and commercial supplier of *Miscanthus*
- *Miscanthus* (<http://www.champs-energies.com/miscanthus-gigantus>) *Crops pictures* (<http://www.champs-energies.com/photos>)
- *Miscanthus* (<http://bioenergy.ornl.gov/papers/miscanthus/miscanthus.html>)
- *Miscanthus x giganteus* - as an energy crop (<http://miscanthus.uiuc.edu/>) - *Miscanthus* Research at the University of Illinois

- NovaBiom (<http://www.novabiom.com/en/parcelles-de-miscanthus/field-gallery>) Pictures of commercially grown *Miscanthus* in Europe

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