

# Forage sorghum shows promise as energy crop

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A sorghum crop flattened by snow in October of 2009.

(PhysOrg.com) -- In their continuing effort to evaluate crops that can serve as biofuel feedstocks as well as cover crops (and that can fit into crop rotations in Pennsylvania and the Northeast) researchers in Penn State's College of Agricultural Sciences have found that forage sorghum holds potential for producers in the region.

Forage sorghum has intrigued agricultural scientists for some time, according to Glen Cauffman, manager of farm operations and facilities at Penn State, who oversaw a recent investigation of the plant on University fields.

"It is of interest as a biomass energy crop," he said. "Being a rapid-growing annual, sorghum has the potential to fit into a traditional crop rotation on a short-term basis and can yield 5 to 10 tons per acre of dry

matter."

The best [cover crops](#) not only reduce [soil erosion](#), but leave nutrients in the soil for the benefit of [food crops](#) that follow in farm-field rotations. The biomass is harvested and then converted to fuel or burned to generate energy. Agricultural scientists are working toward a time when farms will produce substantial amounts of biomass for energy production, as well as food and feed, in a sustainable way.

The goal is for farms of the future to be nearly energy independent and to produce enough biomass crops to largely supplant fossil fuels. The key is to develop crop rotations that include biomass-producing plants such as [switchgrass](#) or sudangrass, while maintaining production of conventional staples such as soybeans and corn, because energy production cannot supplant food production.

Penn State crop scientists evaluated forage sorghum during the past two growing seasons. In 2008, two varieties of forage sorghum were grown. Both varieties grew to a height in excess of 10 feet and stood upright until the end of the growing season.

"Usually the crop would have been harvested just after the first killing frost, however we decided to leave the sorghum in the field and follow the winter-dry-down-and-harvest strategy often used for switchgrass," said Don Rill, a research support associate responsible for the sorghum biomass experiment. "However, by mid-December the plants had fallen over, even though there was no unusual weather event to make the crop go down -- there were some windy days, but nothing considered to be out of the ordinary for late fall in Pennsylvania."

The downed sorghum was left to continue to dry until it was harvested in March of 2009. The crop going down doesn't change the process of converting it to ethanol, Rill said. However, it does significantly decrease

yield due to harvest losses.

"There can be substantial amounts of biomass left in the field when a crop is not standing upright," he said.

However, Rill said, the fact that sorghum is a rapid-growing annual crop makes it a good candidate for biomass production.

"Because it is an annual, sorghum can be grown without a multiple-year commitment like that required to grow switchgrass."

In the 2009 growing season, one variety of sorghum was planted and grew much like those from the previous year, Rill reported, with the average plant height again in the 10- to 12-foot range. From the 2008 experience, the intent for 2009 was to harvest the crop as soon as the moisture level was low enough to store the crop as round bales.

"Unfortunately, an unusual wet snow event in October 2009 flattened the crop," Rill said. "The biomass was harvested and removed in November, but the mowing had to be done from one direction so the plant material could be picked up off of the ground."

Based on the past two years' experiences, forage sorghum's lack of stalk strength is a concern, Rill said.

"So it is not a crop to be left in the field to dry and harvest in mid-winter like can be done with switchgrass or sudangrass," he said, "but forage sorghum is still a viable option for biomass production, as long as it is harvested early in the fall."

Penn State's Farm Operations and Services wanted to gain experience growing and harvesting sorghum and to evaluate how this crop may integrate into a typical crop rotation, Rill said.

"Sorghum can be grown and harvested, but the conversion from biomass to fuel seems to be a limiting factor," he said. "Nonetheless, I think it is valuable to gain experience growing the crop to be able to provide information to potential growers once the cellulosic-ethanol industry is developed and there is more demand for [biomass](#) feedstocks."

Provided by Pennsylvania State University

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