

## Switchgrass: A Resource Efficient Plant For Conversion to Ethanol

### Dependable and productive yields

Up to 14 tonnes per acre have been recorded in the U.S., with yields of 3 - 5 tonnes per acre in Central Canada, and 2.5 - 3 tonnes per acre on the Prairies, being reasonable (but conservative) production levels for Canadian regions. Yields are relatively stable from year to year, even with climatic changes.

### Water efficient

It has a deep root system and is a C4 species which provides it with excellent drought tolerance (it uses only one half the water of cool season grasses per gram of dry matter produced).

### Nutrient efficient

Switchgrass possesses a lower N, P and K content than cool season grasses. Optimal yield can be obtained at much lower N fertilizer application rates than cool season grasses. It responds to phosphorus only on soils possessing a low, or very low, P level, and rarely responds to potassium. It may even be getting some of its nitrogen from free living (nitrogen-fixing) bacteria in the soil that are commonly associated with warm season grasses.

### Low establishment costs

Seeding rates of 1.6 kg per acre are required, at a seed cost of approximately \$7/ kg.

### Low harvest costs

Harvested only once during the production year, minimizing cutting, raking and baling operations.

### Stand longevity

Switchgrass has a productive stand life of 10 years or more. It has minimal disease and insect problems and adapted cultivars are as winter hardy as timothy.

### Land base availability

Switchgrass can be grown on marginal crop lands where other crops have caused soil degradation, or where weather conditions are too variable for reliable production of other crops.

### Soil restoring

Switchgrass was a dominant grass on the North America prairie that originally built some of the most productive and rich topsoils in the Western Hemisphere.

It improves soil aggregate stability and increases soil organic matter levels.

### High ethanol yield

Switchgrass has a lower nitrogen, ash and lignin content than other herbaceous species. Current ethanol yield estimates are 400 litres per tonne, which is as high or higher than ethanol yields from grain.

### Farmer friendly

Switchgrass can be rotated with regular farm crops and can be grazed or hayed to supplement forage production on livestock farms. It can be grown and harvested with equipment that most farms already possess and is harvested in early fall when haying equipment is generally not in use.

### Environmentally friendly

Switchgrass is an endemic species to Canada.

It provides excellent nesting cover for birds. It has a tremendous root mass which provides it with a large underground biomass storage of carbon, thereby acting as a sink for carbon to help offset the greenhouse effect.



*Switchgrass*

# Switchgrass

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the land that was previously under soil improving biomass crops.

## Other Environmental Impacts

Some concerns have been expressed about developing 35 million acres of tallgrass prairie and potential negative impacts on the environment. Firstly, this should be viewed in the perspective of current land use, and secondly, with the soil's original state. Presently the land is used primarily for 20 million acres in summerfallow and 45 million acres in cereals; a herbaceous biomass crop is certainly more environmentally desirable than annual grain production or summerfallow. Switchgrass doesn't necessarily need to be monocultured and could be sown in mixtures with other native warm season species if high yielding cultivars could be identified and developed. At the time of settlement in North America, an area 1600 kilometres from east to west and 1600 kilometres north to south, stretched across the Great Plains, dominated by Bluestems, Indiangrass and Switchgrass. In the northern prairie, cool-season grasses, such as crested and intermediate wheatgrasses, may be better adapted than switchgrass. In moist areas in the north, reed canarygrass may also prove well adapted.

## Wildlife & Water Quality

The re-establishment of 35 million acres of tallgrasses on the prairies would also have a tremendous impact on reviving wildlife populations. This could greatly revive the populations of grassland birds species as well as game birds and mammals.

In Ontario and Quebec, switchgrass may be able to play a significant role in improving water quality. It could be planted on highly erodible sites and on field borders (such as the three metre band being imple-

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mented along water courses in Quebec). As well, it may be used on sandy soils where excessive nitrate leaching is associated with conventional corn production methods.

## Promise for the Prairies

The Prairies are in desperate need of a long term solution to the farm crisis. The diversification of the agricultural economy through the development of a tallgrass-based ethanol industry looks very promising. More research on breeding and production of tallgrass prairie species, such as switchgrass, and on ethanol conversion is required. A full cost accounting of government expenditures to the grains and oilseed sector, and to the Canadian oil industry, is also required to clearly show the justification of developing the biomass-based ethanol industry. Even more essential is a vision for bringing back pride to the Prairies through environmentally-sound, energy-efficient and economically stimulating programs.

*Based on a REAP-Canada presentation to the House of Commons Standing Committee on Agriculture, Study on Sustainable Agriculture, October 21, 1991.*



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