



SUMMARY FACTSHEET – SWITCHGRASS

Switchgrass is a C4 Poacea with high biomass production potential.
Main varieties used for biomass production are Kanlow and Cave-in-Rock.



Switchgrass (*Panicum virgatum*)

Original area of cultivation : North America
Primary end use : Combustion (main use), biogas production, second-generation biofuels
Preferred kind of soils : Large array of soils except for water-logged soils and stony soils. Preferentially deep soils with high water retention capacity. More tolerant than miscanthus regarding soil draught.
Crop establishment : around May, soil temperature around 15°C.
Plantation density : 10 kg/ha
Production : after 2 years of establishment , 6-15 tDM/ha
Harvest : preferentially end of winter (dry product), autumn(silage)
Optimal cutting height : 10 cm

Crop assets and constraints :

Assets	Constraints
High biomass production potential	Delicate establishment costs (germination difficulties)
Adapted to various soils and climates	Sensitive to self-propagating plant competition on the first year
Harvesting once biomass is dry (end of winter), directly usable for combustion	Full production after 2 years of establishment
Perennial crop (> 10 years)	Need for soils with an high load-bearing capacity
Moderate fertilizer input (nitrogen, phosphorus, potassium)	Loose product with low density
Low phytosanitary inputs	Parcel destruction and rehabilitation to be planned at the end of the crop cultivation
No specific material required for sowing/harvest	
A few number of interventions on the crop	
Ensures winter soil coverage	

Focus on :

Crop Establishment

Plantation is realised around May, once soil temperature has reached **15°C**.
 Switchgrass seeds are very small (Thousand seeds weight equals 0.9 to 1.9 g depending on varieties used), soils should be well prepared.
 A shallow sowing is recommended (0.5 to 1 cm) with a conventional cereals seed drill equipment, followed by rolling operations.

Crop management

A key success for switchgrass optimal establishment is a parcel cleaned from self propagating plants. Mechanical or chemical weeding control are required during the first 2 years of crop establishment. False seed bed technique could also be used but requires to be repeated several times.
 No fertilizer is required until the switchgrass has entered full production capacity (minimum 2 years).
 Nitrogen, phosphorus and potassium inputs are moderate if switchgrass is harvested at the end of winter. Fertilising must be thought out in order to compensate N,P and K biomass exportation.



Harvest

Preferred period of harvesting is end of winter once the biomass is dry, enabling a direct use in combustion.

No specific material is required : silager or mower combined with a press can be used in order to densify the end product.

Harvest can be realised sooner in Autumn but will be processed as silage. This practising could although reduce the crop longevity.

Destruction and parcel rehabilitation

Crop destruction is realised from June to August. First step consists in harvesting or grinding the aerial biomass at the beginning of june. The objective is to empty rhizome's reserves considering they are at their lower stage at this time. Once rhizomes start over their growth, a mechanical intervention is recommended (rotovator) to destroy the new growth and subdivide the rhizome. Switchgrass appears to be more sensitive to mechanical destruction than miscanthus.

New growth can be observed end of July/August : one mechanical or chemical intervention should then be realised.

Potential biomass production

	Harvest end of winter (dry biomass)	Harvest in autumn (silaging)
Favorable situation Deep soils with sufficient water provision. pH between 5.5 and 8	10 to 20 tDM/ha	15 to 25 tDM/ha
Unfavorable situation Water stressed crops	7 to 12 tDM/ha	10 to 20 tDM/ha

Production Costs

Low establishment costs

- Operational costs (seeds, fertilizers, fuel, etc.): approx. 100 €/ha
- Specific costs : approx. 145 €/ha
- Complete production cost : 70 to 120 €/tDM

Environmental impacts

Water consumption is **moderate** but relatively higher than annual crops.

Phytosanitary inputs are particularly **low** with an average TFI of 0.2 during the 15 years of the switchgrass cycle.

Energy production / consumption : **low** energy consumption (40% consumed by fuel). High ratio of energy production upon energy consumption.

GHG emissions : **low**, inferior to 1.000 kg eq CO₂/ha.

Valorisation

- Nowadays use :
 - Combustion: pellets, bulk

- Developing use:
 - Biobased material: building block, composite
 - Second generation biofuel