



SUMMARY FACTSHEET – SORGHUM

Sorghum (*Sorghum bicolor* (L) Moench) are C4 Poacea originally from tropical areas. They present a high genotypical and phenotypical variability with different kinds of sorghum: sorghum for grain, for fodder, for sugar or for fiber (biomass). These are annual summer crops.



Sorghum (*Sorghum bicolor* (L) Moench)

Primary end use : Biogas production, second-generation biofuels

Preferred conditions for establishment : Large array of soils excepting hydromorphic soils

Crop establishment : April/May, once soil temperature has reached more than 12°C

Ploughing density : 18 to 20 plants/m² or 30 pl/m² for double cropping system

Production : 4 to 5 months cycle duration depending on harvest stage, minimum 10 to 15 tDM/ha

Harvest : for biomass sorghum at heading stage

Crop assets and constraints :

| Assets | Constraints |
|---|---|
| Annual crop, easy to introduce in a crop rotation system | Only a few varieties existing for biomass production |
| High water use efficiency | Strong requirement for high temperature |
| Interesting potential of biomass production | Sensitive to lodging |
| Opportunity to grow in double cropping system as a summer energy cover crop | Loose product with low density |
| High genetic variability | High moisture for combustion or dry process of valorisation |

Focus on :

Crop Establishment

Sorghum can be implanted on a large array of climate and soils.

It is sowed from April to May once soil temperature has reached more than 12°C (at the beginning of july in double cropping systems).

Sowing operations should be realised with a monoseed air seeder.

Objectives for seed density is 180.000 to 200.000 plants/ha, 10 to 50% of loss are expected.

For summer energy cover crop, seed density can be increased to 300 000 pl/ha with decreased space between rows

Crop Management

Sorghum is very sensitive to self propagating plant competition on the first weeks following sowing operation. Chemical weeding should be realised between germination and 3 leaves stage.

Nitrogen input is recommended (80-100U) in order to avoid over uptake of nitrogen contained into the soil. Fertilisation has to compensate N,P and K biomass exportation.

Low water demand (400mm), irrigation can be considered in dry regions.

Sorghum is tolerant to most diseases once set up but is sensitive to lodging after heading.



Harvest

Biomass sorghum has to be harvested at heading to prevent from lodging risks.



Potential biomass production according to crop management

| | Cycle duration | Harvest date | Dry Matter rate (in %) | Biomass production |
|------------------------------|----------------|----------------------------|------------------------|--------------------|
| Favorable situation | 5-6 months | August to end of September | 20 to 35% | 15 to 20 tDM/ha |
| Unfavorable situation | 5-6 months | August to end of September | 20 to 35% | 5 to 15 tDM/ha |

Production Costs

- Complete cost : 70 to 120 €/tDM as main energy crop
 - o 100 to 130 €/tDM for energy catch vcop in double cropping system
- Operational costs (seeds, fertilizers, etc.): approx. 300 €/ha

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 and High energy efficiency.
GHG emissions : **medium**, around to 1.500 kg eq CO₂/ha.

Valorisation

- Nowadays use :
 - o Biogas:

- Developing use:
 - o Biobased material: composite
 - o Second generation biofuel
 - o Green chemistry