

Sorghum for anaerobic digestion

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French Biogas Farmers Association : AAMF



- **580 members**
 - Min. 50% agricultural inputs and min. 50% agricultural capital
- **Our goals**
 - To improve practices : 
 - Technical experts 
 - To foster exchanges and feedback
 - Support for project leaders or functioning plants 
 - To represent agricultural anaerobic digestion sector to institutions

- **Our staff**

22 biogas farmers directors and many others implied in working groups 4 permanent employees



My two anaerobic digestion plants

- Medium heat-and-power 250 kWe (since 2019)



➔ 18 000-20 000t/year

- Cow manure
- Cover Crops

⇒ From several farms

- Food industry wastes

- Small grid injection : $130 \text{ Nm}^3 \text{ CH}_4/\text{h}$

Total costs estim. : ~6M€



French culture decree

n°2022-1120 from August 2022

- To limit concurrence with food and feed
- 15% max. of the tonnage coming from “main crops”
- Intermediate crops are usable if main crop is harvested after 1st June (or declared to CAP) ➔ **SORGHUM OPPORTUNITY**



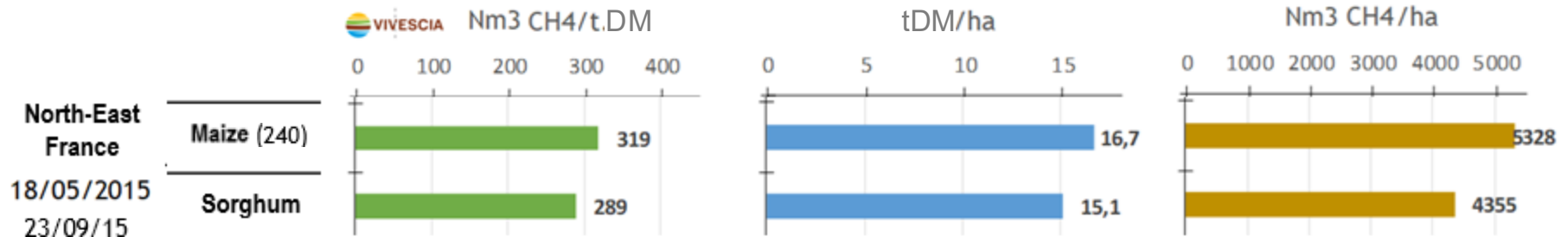
Example of integrating summer intermediate crop into the rotation (in East of France)

- After harvesting :
 - Winter wheat in July
 - ⇒ Deep soils or irrigated sorghum for good yield
 - Winter pea or winter barley in June
- Before sowing :
 - Winter wheat in October
 - Spring barley in February
 - Beets in March



Production

Achievable yield in cereal-growing areas :



- Similar cereals methane production
- ⇒ Methane yield/ha directly correlated with **biomass yield**
- Slightly lower methane potential for sorghum compared to maize
- Growth requires **a minimum amount of rainfall**
 - Otherwise yield = 0, especially with late sowing
 - Temperature deficit can lead to yields below 3-4 tDM/ha (break-even point)

Interests and limits

- **Differs from maize** in the following points:
 - Less water-demanding (very developed root system) and more consistent productivity under dry conditions
 - Lower production cost / fewer inputs (weeding, fertilization)
 - 13 N u/t DM, low-demand P and K, with high-risk situation (=low OM) 30 u Sulfur/ha
 - Good storage (15 to 20% denser than corn silage, easier to pack)
- Temperature demanding at the start of the cycle: **no sowing below 12 °C**
- The list of usable herbicides is limited (ex : dimethinamide-P)
 - Weeds can be anaerobically digested BUT
 - sensitive to early graminaceous plants and perennial weed pressure
- Later harvest date than corn (min. 15 d):
harvest before the first frost (target 30% dry matter, dough stage)

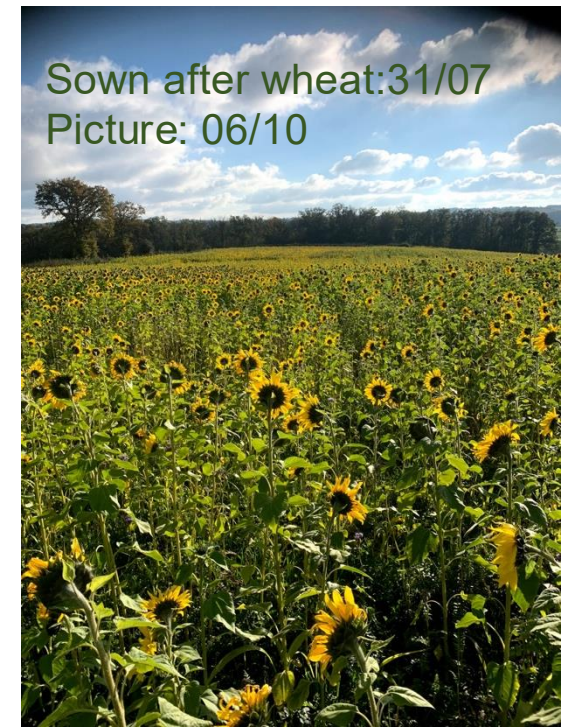
Varieties

- Single-cut
 - ≈ 15 tDM/ha in cereal growing areas
 - **To keep for high potential and/or irrigated lands**
 - Cultivated similarly to inter-row corn (40 cm wide, weeding required) **and possible with regular cereal seeder (25 cm)**
 - $\approx +50$ €/ha inputs compensated by yields (sold : 90 to 120 €/tDM)
 - Range of available varieties on market form very early to late maturing, and **biomass potential >20 tDM/ha**
- Multi-cut
 - ≈ 13 tDM/ha in cereal growing areas (sold : 90 to 120 €/tDM)
 - **No specific equipment required:** cereal seeder (1 row/2)
 - **More “weed tolerant”**

Sorghum is a good option for summer intermediate crop

In my fields

- Mountain area = less suitable for double cultivation (less sunshine but also little less dry)
 - Yield $\approx$ 2,5 to 8 tDM/ha (average 4tDM/ha)
 - Sometimes regrowth 1-2 tDM/ha grazed
 - Minimized cultural itinerary 75 N units/ha (through digestate) and **zero phytosanitary**
- Mix : sorghum, sunflower and phacelia
 - ⇒ Bees and acceptability



Thank You

Any question? **!?**

