THE PLACE OF SORGHUM IN CROP ROTATION IN FRANCE
Production areas

Grain collect by department
Variety choice must take into account precocity group suitable for its production area and the cumulative GDD available.

<table>
<thead>
<tr>
<th>Precocity group and area</th>
<th>Cumulative GDD (*) from planting to maturity</th>
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<tbody>
<tr>
<td>Very early variety</td>
<td>1830 - 1890</td>
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<tr>
<td>Early and mid early variety</td>
<td>1900 - 1970</td>
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<tr>
<td>Late variety</td>
<td>1970 - 2020</td>
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(*) : Growing Degree Day (base 6°C)
Most of the French sorghum crops are grown without irrigation

Examples of sorghum place in crop rotation

- Sorghum
- Winter wheat
- Sunflower

Sorghum in Innovative system (conservation tillage, agroecology)

- Cover crop
- Sorghum
- Winter wheat
- Sunflower
- Winter wheat
- Sunflower
- Winter wheat

- Cover crop
- Sorghum
- Winter wheat
- Sunflower
- Winter wheat
- Sunflower

Extension and diversification of rotation:
- Best management of pest (disease, insect, weed)
- Improving system performances (economic, environmental, ...)

Idem +
- Best nitrogen management, soil protection and fertility, ...
SEEDING RATE

PLANT DENSITY IS THE FIRST YIELD COMPONENT MANAGEABLE BY THE PRODUCER

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SEEDING RATE

SEEDING RATE MUST BE ADAPTED TO THE CONTEXT

<table>
<thead>
<tr>
<th>Plant objective (1000/ha)</th>
<th>180</th>
<th>200</th>
<th>220</th>
<th>240</th>
<th>260</th>
<th>280</th>
<th>300</th>
<th>320</th>
<th>340</th>
<th>360</th>
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<td>Early and mid early variety</td>
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<td>Late variety</td>
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Seeding rate in good conditions (1000/ha)

- Very early variety:
  - 325 to 370
  - 370 to 430

- Early and mid early variety:
  - 270 to 320
  - 320 to 380

- Late variety:
  - 250 to 300
  - 300 to 360

A : Medium soil and without irrigation
B : Deep soil or irrigation

In good conditions, seeding rate must take into account 20% loss.
Sorghum benefits in crop rotation:

- In case of big problems in winter grain (herbicide resistance, heavy infestations). Insertion of summer crop like sorghum allow to decrease weed density.

- Effectives herbicides solutions available in sorghum is beneficial for the management of these weeds in crop rotation.
Difficult weeds in sorghum:

- *Panicum miliaceum*
- *Digitaria spp*
- *Echinochloa crus-gali*
- *Setaria spp*
- *Sorghum halepense*
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Annual grass weeds:

**Residual herbicides**
- S-metolachlor

**Residual and foliar herbicides**
- S-metolachlor
- Dimethenamid-P
- Pendimethalin
- Sulcotrione
- Penoxsulam

*Only if seed safener*
Broadleaf weeds:

Contact foliar herbicides
- Bentazone
- Bromoxynil

Systemic foliar herbicides
- 2,4D
- Clopyralid
- Fluroxypyr
- Prosulfuron
- Dicamba

2,4D: be careful; do not apply after 8 leaves stage
Grain sorghum water response is strongly linked to soil depth and water reserve

First points: without irrigation

0.35 t ha / 10mm of irrigation

Water available between boot stage and physiologically maturity stage (mm) (soil supplies + rain + irrigation)

2010 → High drought stress
2011 → Low drought stress

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Grain desiccation

Grain maturity

Still green leaves (stay-green)

1% H2O seed ≈ 15°C cumul degree day base 6

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