

# EuroBioRef

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## SP2 – STUDIES ON BIOMASS FEEDSTOCK AND OPTIMISATION FOR THE SELECTED VALUE CHAINS WP2.1 – BIOMASS FEEDSTOCK OPTIONS

### Deliverable report

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#### Deliverable Identification

*Deliverable Number:* D2.1.6  
*Deliverable Title:* List of lignocellulosic materials classified as CO<sub>2</sub> capture per hectare  
*Responsible Beneficiary:* ARKEMA  
*Contributing Beneficiaries:* CRES, DTI, UWM, CIRCC  
*To be Submitted to the EC:* Yes

#### History

Version	Author	Modification	Date
V1	Christophe CALAIS	First version	24/01/2013

#### Approval

	Name	Organization	Date	Visa
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PU	Public	X
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## Content

Content .....	2
Executive summary .....	3
Description of the deliverable objective and content .....	3
Brief description of the state of the art .....	3
Deviation from objectives and corrective actions .....	3
Innovation brought and technological progress .....	3
Analysis of the results .....	3
Impact of the results .....	4
Related IPR .....	4
Publishable information .....	4
Conclusion .....	4
ANNEX I – Technical content .....	5
References from where originate yields and/or carbon content listed in the table .....	5

## Executive summary

### *Description of the deliverable objective and content*

The objective of this deliverable is to characterize the lignocellulosic crops studied within the EuroBioRef project in terms of CO<sub>2</sub> capture per hectare in order to contribute to define the most appropriate feedstock.

### *Brief description of the state of the art*

Not relevant

### *Deviation from objectives and corrective actions*

No deviation to be reported

### *Innovation brought and technological progress*

Not relevant

### *Analysis of the results*

Cellulosic materials considered here are those involved in the EuroBioRef project, namely:

- straw,
- willow,
- miscanthus,
- giant reed,
- switchgrass,
- cardoon,
- reed canary grass.

For each of these crops, the calculation of the CO<sub>2</sub> capture per hectare was calculated as follow:

$$\text{CO}_2 \text{ capture/ha} = (\text{yield/ha}) \times (\% \text{ C} / 100) \times 44/12$$

where % C is the carbon content of the plant considered.

The yield per hectare for each crop was obtained from the data published by CRES (Myrsini Christou, presentation at EuroBioRef Summer School + D1.2.1). Then, knowing the carbon content of each biomass (from available data from CRES for willow, and miscanthus, or from different literature sources for the others, see ANNEX 1), the CO<sub>2</sub> capture was calculated. The results are compiled in the table next page.

### CO<sub>2</sub> capture per hectare for lignocellulosic crops

Cellulosic material	Yield		C content	CO <sub>2</sub> capture	
	(t/ha)			(%)	(t/ha)
	min	max	min		max
Straw (wheat)	3	5,5	46	5,1	9,3
Willow	10	20	50	18,3	36,7
Miscanthus	10	30	45	16,5	49,5
Giant reed	15	35	43	23,7	55,2
Switchgrass	10	25	45	16,5	41,3
Cardoon	10	22	44	16,1	35,5
Reed Canary Grass	4	15	48	7,0	26,4

#### Impact of the results

The results regarding the CO<sub>2</sub> capture per ha of the lignocellulosic crops will be crossed with other information related to task 2.1.3 led by CRES to serve as a guide towards for refining the general strategies/approach for the project and define the most appropriate biomass feedstocks matching to several biorefinery options.

For example, among the crops which can be grown in a wide range of EU environments and agricultural zones, miscanthus and willow will be preferred to switchgrass from a carbon capture point of view. For the crops more adapted in the Mediterranean agricultural zone, giant reed will be preferred from this point of view.

#### Related IPR

Not relevant

#### Publishable information

This deliverable is public

#### Conclusion

Results obtained in terms of CO<sub>2</sub> capture per hectare show that:

- Values vary a lot depending on the crop nature and the yield (typically from 5 to 55 t CO<sub>2</sub>/ha).
- The highest CO<sub>2</sub> capture per hectare are obtained for Giant Reed (20 to 55 t CO<sub>2</sub>/ha), and Miscanthus (15 to 50 t CO<sub>2</sub>/ha) for the perennial crops and willow (18 to 36 t CO<sub>2</sub>/ha) for the woody biomass.

## ANNEX I – Technical content

### *References from where originate yields and/or carbon content listed in the table*

1. D121 from M. Christou, CRES (straw, willow)
2. The terrestrial biomass from M. Christou, CRES (miscanthus, giant reed, switchgrass, cardoon, reed canary grass)
3. <http://www.thebioenergysite.com/articles/contents/Torrefaction.pdf> (straw, reed canary grass)
4. [http://www.actahort.org/books/792/792\\_84.htm](http://www.actahort.org/books/792/792_84.htm) (giant reed)
5. <http://www.springerlink.com/content/27n9269556xl2212/> (switchgrass)
6. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2635723/> (cardoon)