

# Monosaccharidic content of hemicelluloses in various lignocellulosic crops

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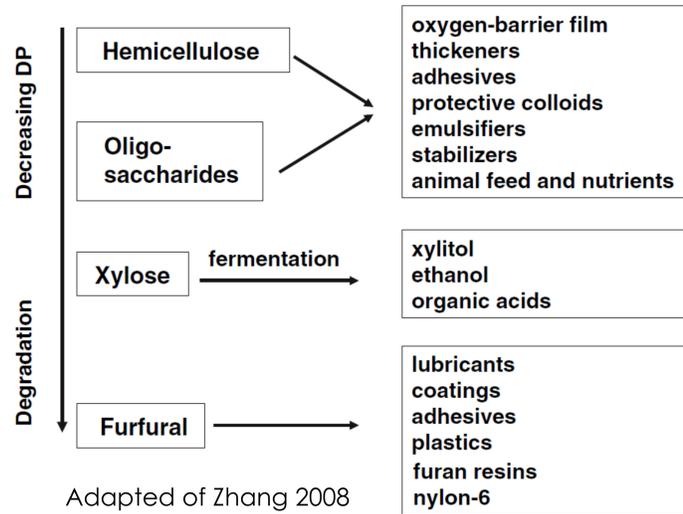
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## Introduction

- Hemicelluloses** represent the second most abundant structural polysaccharide in nature behind cellulose. They constitute **between 10 and 40% of lignocellulosic biomass** such as lignocellulosic crops, agricultural and woods residues.

- They represent therefore a huge amount of **renewable resource** for a sustainable biobased economy that can be used in **lignocellulose-feedstock biorefineries** for the production of biofuels and chemicals as an alternative to products coming from fossil fuel refineries.



## Hemicelluloses monosaccharidic content

- The **aim** of this study is to determine the **impact** of **plant species** and of **its growth stage** on **hemicelluloses monosaccharidic content** to evaluate if these criteria have to be considered in order to optimize hemicelluloses valorization in lignocellulose-feedstock biorefineries.

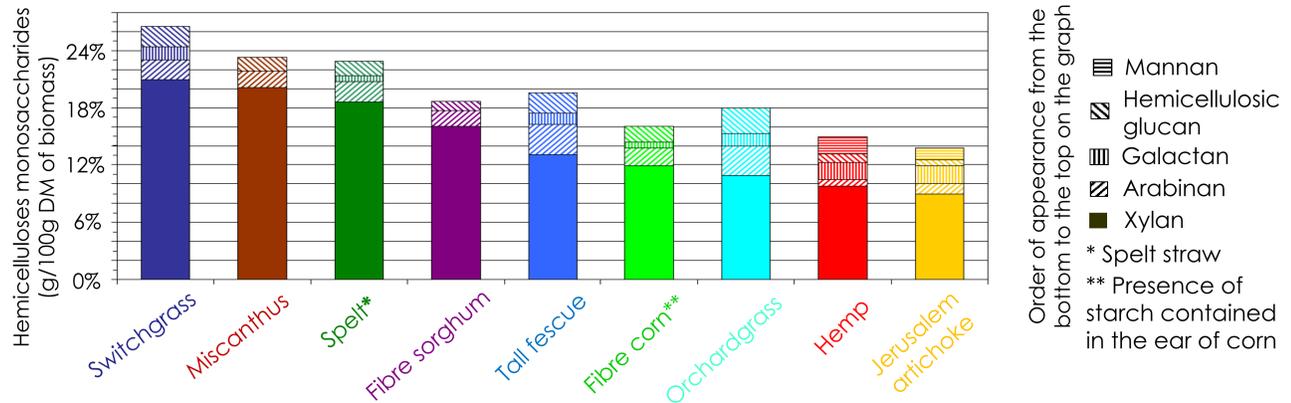
- Hemicelluloses** (xylan, arabinan, galactan, hemicellulosic glucan and mannan) of **various lignocellulosic crop trials** made in **2009** in **Libramont** (Belgium) and in **Gembloux** (Belgium) were extracted by a method inspired of the Van Soest method. Then, the hemicelluloses were hydrolyzed by H<sub>2</sub>SO<sub>4</sub> (H<sub>2</sub>SO<sub>4</sub> 12M at 35°C during 1h then H<sub>2</sub>SO<sub>4</sub> 1M at 95°C during 5h) to get the solution with the monosaccharides that was analyzed by HPLC-CAD with an Aminex HPX-87P column of Biorad.

### Monosaccharidic composition of hemicelluloses (xylan, arabinan, galactan, hemicellulosic glucan and mannan) according to the plant species harvested at maturity

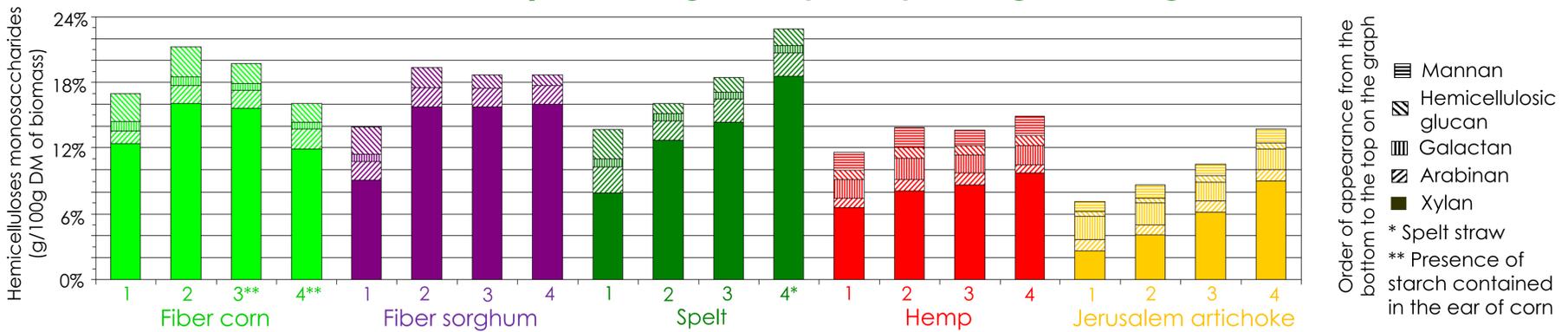
- Hemicelluloses** are **mainly** made of **xylan**

- Highest** amount of **xylan, arabinan and hemicellulosic glucan** in switchgrass, miscanthus, spelt\*, fiber sorghum, tall fescue, fiber corn\*\* and orchardgrass → **monocotyledons**

- Highest** amount of **galactan and mannan** in hemp and jerusalem artichoke → **dicotyledons**



### Monosaccharidic composition of hemicelluloses (xylan, arabinan, galactan, hemicellulosic glucan and mannan) according to the plant species growth stage



Harvest date	Fibre corn	Fibre sorghum	Spelt	Hemp	Jerusalem artichoke
1	02/07/09	30/07/09	18/05/09	29/06/09	29/06/09
2	30/07/09	28/08/09	17/06/09	28/07/09	28/07/09
3	24/08/09**	28/09/09	14/07/09	31/08/09	31/08/09
4	24/09/09**	20/10/09	18/08/09*	22/09/09	22/09/09

- Xylan** content **increases** during its growth

- Hemicellulosic glucan** content **decreases** during its growth

## Conclusions

- The results underlined that both **plant species** and **its growth stage** have a **significant impact** on **hemicelluloses monosaccharidic content**. These two criteria have to be considered in order to optimize hemicelluloses valorization in lignocellulose-feedstock biorefineries.

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