FROM HEMICELLULOSE-DERIVED PENTOSES TO MULTIFUNCTIONAL BUILDING BLOCKS

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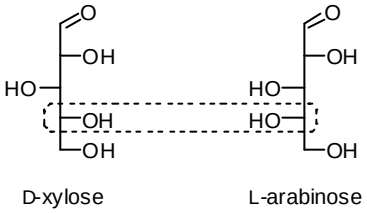
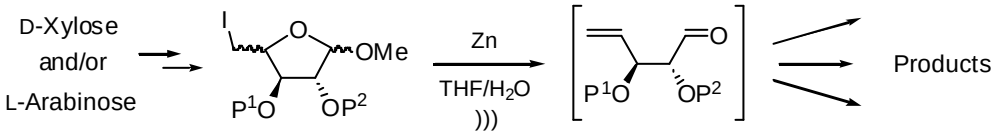
Hemicellulose is an abundant component (~25% of dry matter) of wheat industry by-products such as bran and straw. D-Xylose and L-arabinose, the main components of wheat hemicellulose, are two epimeric pentoses the stucture of which differs at the C-4 configuration. This feature is responsible for several significant differences in their physico-chemical properties. That is not problematic for applications towards products where a strict molecular structure is not mandatory as in surfactants field, where the starting material is a mixture of sugars.[1] On the other hand any attempt to consider D-xylose or L-arabinose as a source for organic intermediates for fine chemistry applications should use pure starting material, except if we were able to transform both epimeric sugar into a common intermediate.



We were interested to explore the possibility to perform the co-transformation of D-Xylose and L-arabinose into a unique intermediate or line of intermediates. To achieve that goal we must remove what makes the two sugars different: the chiral character of C-4.
We have reasoned that the Bernet-Vasella reaction, which would convert the epimeric carbon to an sp^2 C-4 would be an interesting entry to this investigation. This reductive elimination of halo sugars is a widely used reaction in carbohydrate chemistry, in both hexoses and pentoses series.[2] The pentoses have to be previously converted into 5-iodo derivatives, with various possibilities as far as the hydroxyl groups protection system. The resulting 1,4-pentenal exhibits a high potential for further transformations to a variety of enantiopure polyfunctional building-blocks.



We will present several approaches to show the feasibility of this co-transformation concept[3] and some preliminary results on further transformation of the enal.

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[1] Bertho, J.-N.; Mathaly, P.; Dubois, V.; De, Baynast De Septfontaines R. Eur. Pat. EP 699472 (CAN 124:292924), **1996.**

[2] a/ Bernet, B.; Vasella, A. *Helv. Chim. Acta*, **1979**, 62, 2411–2431. b/ Madsen, R. *Eur. J. Org. Chem.* **2007**, 399–415, and references cited therein.

[3] a/ Henon, E.; Bercier, A.; Plantier-Royon, R.; Harakat, D.; Portella, C. *J. Org. Chem.* **2007**, 72, 2271-2278. b/ Bercier, A.; Plantier-Royon, R.; Portella, C.. Carbohyd. Res. **2007**, 342, 2450-2455.