XXII EUCARPIA

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Resources in Maize and Sorghum Breeding

Opatija, Croatia, June 19-22, 2011

Conference Book

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Compiled by
Domagoj Šimić
Tatjana Ledenčan
Sonja Grljušić
Tomislav Duvnjak

Administration
Maja Matoša
Saša Mesarić

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Zvonimir Zdunić, Aleksandra Sudarić

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3.25 Towards a sorghum ideotype with optimized cell wall degradability: insights from degradation kinetics, histological, biochemical, and pre-treatment analyses

Pot D.[1*], Méchin V.[2*], Chabbert B.[3*], Devaux M.F.[4*], Jouanin L.[2*], Bastianelli D.[5], Trouche G.[1], Guillon F.[4], Saulnier L.[4], Maleyrat J.[1], Cezard L.[2], Legée F.[2], Lapierre C.[2], Pollet B.[2], Culhaoglu T.[2], Citerne S.[2], Mouille G.[2], Aubry N.[3], Crônier D.[3], Rémond C.[3], Bonnal L.[5], Looten R.[4], Hélary L.[4], Prévot M.[4], Barrière Y. [6]

[*] These authors contributed equally to this work

[1]UMR AGAP, Montpellier, France; [2]Institut Jean-Pierre Bourgin, Versailles, France; [3]UMR FARE, INRA, Reims, France; [4]UR BIA, INRA, Nantes, France; [5]UMR SELMET, Montpellier, France; [6]INRA, Unité de Génétique et d'Amélioration des Plantes Fourragères, Lusignan, France

In addition to being the fifth cereal in terms of grain production, the interest of sorghum as a feed and energy crop is increasingly underlined. Selection of sorghum genotypes for fodder and energy production relies on an in-depth understanding of stem tissue organization and cell wall characteristics variability. Although histological analyses of two genotypes harboring contrasting stem diameter revealed similar tissue organizations and cell sizes, their kinetics of biomass degradation when treated with enzymatic cocktails were different, the largest stem diameter genotype presenting a faster degradation with a lower percentage of monosaccharide solubilised, suggesting differences in soluble sugar content and cell wall polymer content and accessibility. According to these results we then focus our attention on the cell wall composition. From a previous characterization of 410 sorghum accessions using near infrared reflectance spectroscopy, a panel of 13 genotypes maximizing the diversity of cell wall properties were subjected to FTIR analyses, klason lignin and *p*-hydroxycinnamic acids contents measurement, and determination of lignin monomeric composition. In parallel, saccharification efficiency of the cell walls was evaluated. These analyses revealed a significant genetic variability of cell wall saccharification yield which has been associated with the variability of the lignin content in the cell wall, the S monomers content in the uncondensed lignin part and the concentration in esterified p-coumaric acid. Finally, addition of an Alkali pre-treatment before the enzymatic treatment showed significant improvement of cell wall saccharification yield but contrasting responses of the genotypes analyzed in terms of final yield and degree of improvement.