

XXII EUCARPIA

Maize and Sorghum Conference

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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Association mapping of biomass and cell wall related traits in sorghum

Pot D.¹, Trouche G.¹, Vaksman M.¹, Clerget B.¹, Bastianelli D.²,
Chantereau J.¹, Maleyrat J.¹, Rivallan R.¹, Bonnal L.², Rami J.F.¹,
Barrière Y.³

¹UMR AGAP, Montpellier, France; ²UMR SELMET, Montpellier, France; ³INRA, Unité de Génétique et d'Amélioration des Plantes Fourragères, Lusignan, France

Sorghum is among the world's most important cereals in terms of human and animal nutrition and it is currently considered as a promising energy crop. In this study, the variability of biomass yield, composition (soluble sugars, lignin, cellulose, hemicelluloses) and properties (biomass and cell wall degradability), that constitute key targets for biomass quality optimization, was characterized for 410 accessions representing sorghum worldwide diversity. These evaluations were based on 5 field-experiments and biomass characteristics were estimated based on NIRS calibrations. The broad-sense heritabilities, which ranged from 0.5 to 0.9, associated with medium levels of phenotypic variability and the absence of negative genetic correlation between biomass yield and composition indicated that significant genetic gains can be achieved in the medium term. In order to reach a better understanding of the genetic determinism of these traits, 1122 sequenced DArT markers were genotyped on 177 genotypes representing the cultivated sorghum diversity. For lignin content, known to be the main limiting factor of cell wall degradability, 8 marker-trait- associations were detected (pvalue<0.0001 in one trial and <0.05 in at least one additional trial). In parallel, 23 genes from the lignin biosynthesis pathway were sequenced on a discovery panel of 24 genotypes allowing the detection of more than 500 SNP. Haplotype SNP tags were genotyped on the whole association population (410) and association mapping analysis performed. These results are expected to provide a solid framework towards the development of innovative strategies for sorghum breeding dedicated to biomass and animal feed production.