



# Sorghum in the 21st Century

## Global Sorghum Conference

Resiliency and Sustainability in the Face of Climate Change

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## Combining abilities and heterosis for biomass yield and quality related traits in single-cut forage sorghum adapted to temperate climates

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Sorghum is among the most important cereals in the world in terms of human and animal nutrition and contributes to several bio-based value chains, including bioenergy production. The development of varieties fitting the expectations of these different end-products requires a better understanding of the genetic determinism of the traits contributing to the targeted ideotypes. In this context, the objectives of this study were to estimate the general and specific combining abilities of biomass quality and production related traits, explore their correlations and assess the heterosis levels achieved. To reach, these goals a factorial design based on 10 female and 16 male parents that were selected for their General Combining Abilities (GCA) for biomass production has been developed. One hundred and forty seven hybrids were evaluated on 3 sites together with their parental lines in 2014. Heritability of 0.69, 0.79 and 0.90 were observed respectively for the dry matter yield, lodging at maturity and biomass digestibility. Correlations' analysis between hybrid genetic values and combining ability components showed that hybrid performance is mainly correlated with the male parents GCA and depends only weakly of the female GCA. Higher best parent relative heterosis (up to 49%) was observed for biomass yield compared to biomass digestibility (up to 9%) and a negative genetic correlation (-0.54 for the blup values and -0.6 for the GCA values) was observed between biomass yield and digestibility in the factorial design. The best hybrids were selected and evaluated on 4 and 3 sites respectively in 2015 and 2016. In addition to allow the identification of elite parental lines that will be used in future crosses, this study underlined the negative correlations between biomass production and quality that will need to be tackled and the lack of strategies to accurately predict heterosis in single cut forage sorghum.