

Report on evaluating *Brachiaria interspecific* Br19 hybrid performance

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Summary

The population Br19 corresponds to the hybrids obtained by the cross of a tetraploid synthetic population of sexual genotypes used as female parents and CIAT 606 used as male tester. The tetraploid synthetic population of sexual genotypes consisted of the ninth cross of recurrent selection of the breeding program. The methodology to evaluate the hybrid performance starts by germinating around 8000 hybrid seeds, out of them 7144 plants were obtained, and samples were taken in order to apply marker-assisted selection to separate apomictic and sexual. As this is a trait, which segregates mendelian, near half of the population is discarded by the sexual behavior and only 3507 apomictic genotypes were established afterwards on the field to measure the hybrid performance for the following traits: Visual assessment of biomass production, vigor, high, visual assessment of leaf steam ratio and drone based measurements like biomass and greenness. The trials were established at two locations: CIAT Palmira and Llanos-Cabuyaro. Each trial followed an augmented design with 46 incomplete blocks. At the end, we expect to complete data for various cuttings in each location, each cutting after 6 weeks from previous one, to pursue two cuttings from the dry and two from the wet season. Currently, two evaluations have been taken in each location.

General Objective

First phenotypic evaluation to identify apomictic hybrids of the population *Br19* that outperform the commercial benchmark in at least one of the traits of environmental and economic importance, without reducing the performance in any other important trait.

Methodology and results

1. Germination and plantlet development in the glasshouse: The process started in November from 2018 with the selection and scarification of the seeds to be planted in January 2019 (as shown in Table 1).

Table 1: List of activities from hybrid seed selection to establishment of field trials.

Fecha	Titulo	Descripcion
19-Nov-18	Seleccion semillas	Seleccion de familias y cuantificacion de semillas.
17-Dec-18	Escarificacion de semilla	Eliminacion de testa con acido sulfurico puro.
9-Jan-18	Siembra en arena	Siembra por familia en arena.
5-Feb-19	Llenar giffys	llenar con suelo o ensayar los de Mauricio Sotelo.
6-Feb-19	transplantar a giffys	Sembrar las plantulas en los giffys.
7-Feb-19	Colecta para molecular	Colecta de material vegetal para caracterizacion molecular.
	Siembra de testigos	Siembra, por semilla, de genotipos a utilizar como testigos.
	Multiplicacion de madres	
18-Mar-19	Resultados cony	Entrega de quienes son apomicticos y cuales sexuales
27-Mar-19	Eliminacion sexuales	Primer descarte masivo por modo de reproduccion sexual
3-Apr-19	Trasplante ap	transplantar las apomicticas a pote para multiplicaicon clonal
	Multiplicacion BR19	Sacar 3 estolones por planta para ensayos,
3-Apr-19	Fertilizacion	4gr*Lt de coljap desarrollo 200ml de solucion/matera
	Descartar	Reducir poblacion a 2500 plantas (por macollamiento)
8-Apr-19	Transplante madres	Transplante 299 madres Sx18 (2/genotipo)
	Trasplante testigos	
	Aleatorizacion	
13-May-19	Siembra en llanos	se sembró el ensayo Br19 las Bh18 y las br12 en el porvenir
5/28/2019	mapa palmira	se realizó la aleatorización en r y el respectivo mapa de campo
5/29/2019	siembra estolones	siembra para palmira
	fertilizacion llanos	preguntar a daniel que fertilizacion se realizo
5-May-19	evaluacion supervivencia	En los llanos daniel evaluo supervivencia de plantas (0 muerta; 1 viva)



Figure1: Seed germination for each family of sexual female parent Sx18.

- Sample for DNA extraction, and marker assisted selection for the trait apomixes with the primers p779/p780 occurred during February until March 2019. At the end, the population size of plant to be established in the field was 2500.

Table 2: Description of population sizes subjected to each step: Total of seeds germinated, proportion of apomictic/sexual and final population size of apomictic hybrids for the field.

Total Hybridos BR19	Apomitic	DESCARTES				BR19 Muertas	Poblacion Actual(Llanos)
		Sexual	Mal Formacion	poco macollamiento			
7144	3507	3637	599	372	36	2500	

- Establishment of trials in two locations. Field trials followed the augmented design with 46 incomplete blocks in two locations, Llanos and Palmira. In Llanos two replicates were planted, each following a different soil treatment, to simulate different “environments”. The following figure show the map of both trials.

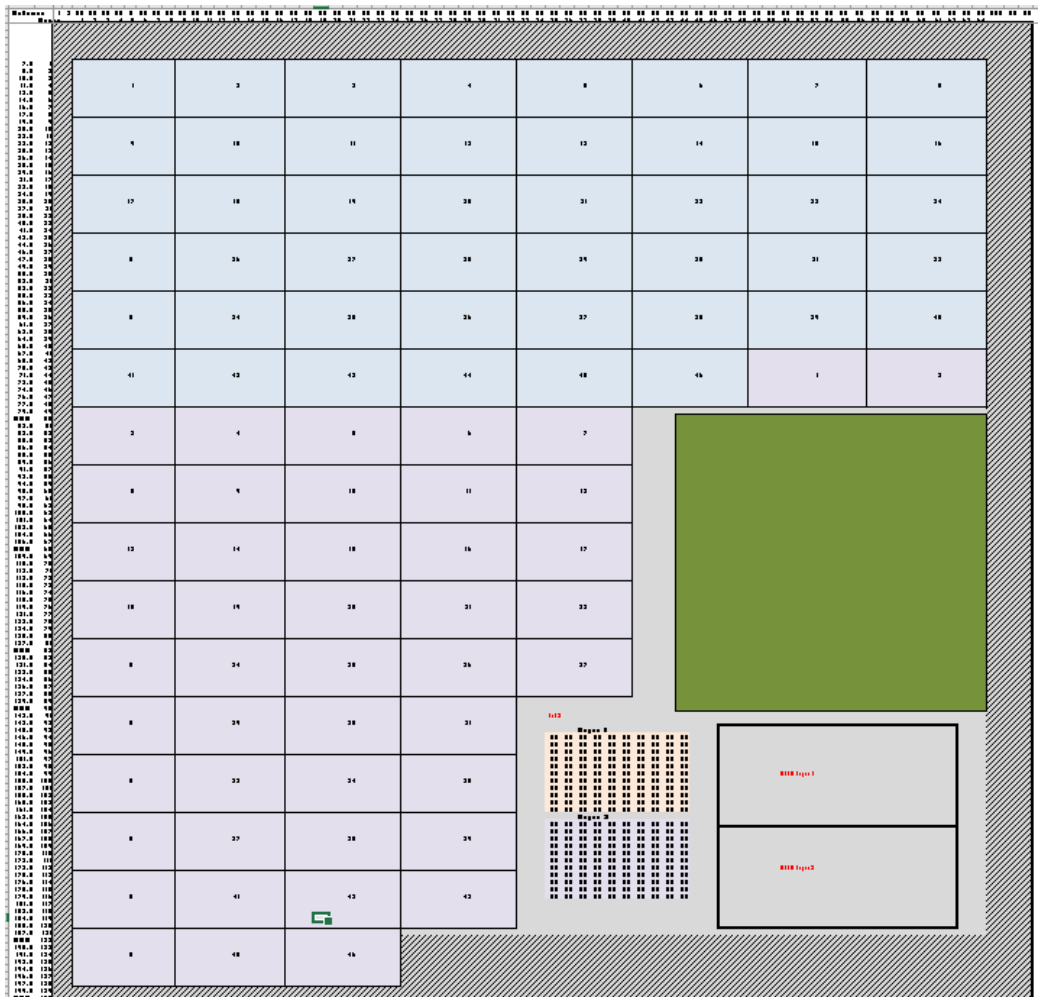


Figure 2: Map of the field trial in Llanos.

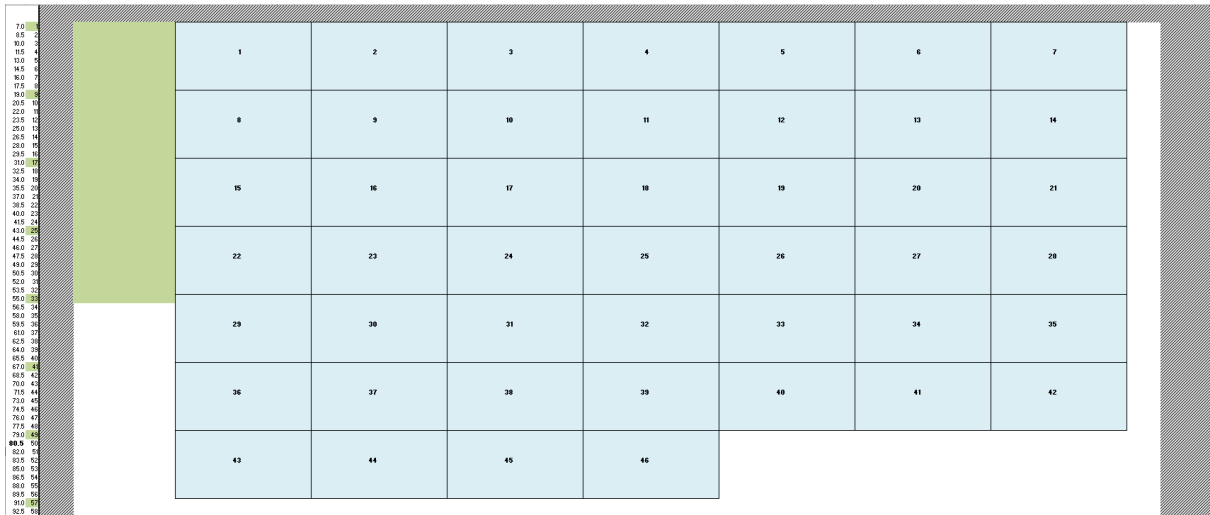


Figure 3: Map of the field trial in Palmira.

4. Standardization cuttings and evaluations: Currently we have evaluated twice in each locations. Still two evaluations in each trial is needed to complete the dataset.

Next steps:

1. Complete two more evaluations in each location
2. Statistical analysis and selection: We will analyze the data using R in the friendly environment of RStudio; using packages as AsReml and Agricolae. We aim to calculate, variance components, best unbiased predictors of the means for each genotype in each location and analyses genotype by environment interaction using genetic correlations as well as AMMI analyses. Finally, a selection index will be used to identify the hybrids to be advance to the next selections phase.
3. Quality measurements for pre-selection at least in one location and one cutting using NIRS equations.
4. Final selection of hybrids that will be promoted to the phase of testing 2: Multi-environmental trial.