

List of promising *Urochloa* hybrids defined:

Research and distribution of *B. humidicola* and Tetraploid *B. ruziziensis* X various accessions of *B. decumbens* or *B. brizantha*

The main objective has been the breeding of tropical forages from *Brachiaria* species in order to produce hybrids which outperform in yield, biotic and abiotic resistances and nutritional quality. *Brachiaria* species of agronomic importance are apomictic and tetraploids. The forage group at CIAT adapted a breeding methodology that exploits these characteristics plus heterosis. This methodology follows a scheme of recurrent selection based in specific combining ability, in which a population of sexual clones is selected in every cycle based on the performance of their progeny when crossed against a tester genetically complementary. Every cycle of selection consist in three years (some times more in the case of *B. humidicola*): 1) open pollinated cross of sexual clones; 2) Test crosses formation against the tester; and 3) Multienvironmental evaluation of hybrids performance for further selection. For each of the breeding programs, a set of promising *Urochloa* hybrids were defined. The activities developed conducted in order to reach those materials are described as follows:

***Brachiaria ruziziensis* x *decumbens* x *brizantha*:**

A final set of (BR09) hybrids was delivered to private sector in 2011. A new set of hybrids (BR12) was generated during 2011, in a testcross crossing block at CIAT-Popayán. Testcross hybrid seed was germinated in 2012 to originate the BR12 population. These hybrid seedlings were transplanted to field trials at two sites (La Florida and El Porvenir farms, properties of Semillano in the Colombian Llanos. Several thousand seedlings were transplanted at these two sites. The population was culled, on visual assessment and open pollinated seed harvested from 128 “pre-selected” hybrids. From this seed, progenies were established in 2013 at CIAT, with two objectives:

- i) To confirm (or otherwise) apomictic reproduction of selected hybrids;
- ii) To multiply seed to deliver to DOW to initiate evaluation/development of cultivar(s) for future commercial release.

The 128 progenies were transplanted to the field on 29 and 30 April, in 5-plant plots, with two, three, or four replications (i.e., 10, 15, or 20 individuals per progeny).

Identification of segregating progenies (from sexual [or facultatively apomictic] BR12 selections) was done by visual assessment of sibling uniformity or segregation on several dates following transplanting. By August, progenies were culled to 103 based on apparent apomictic reproduction (uniform progenies) and plant vigor. Seed harvest extended from August through October 2013. Plants were sampled on three dates (i.e., different ages of regrowth) for nutritional quality assessments. These selected hybrids were additionally assessed for reaction to nymphs and to adults of four spittlebug species, and for reaction to *Rhizoctonia foliar* blight. Additional culling was imposed on the basis of one or more of these additional attributes.

Ninety two BR12 hybrids were finally selected for dispatch to the private sector.

Seed of a new set of testcross hybrids (BR15) was produced in a testcross crossing block at CIAT-Popayán during 2014. The BR15 hybrid seedlings were produced in early 2015. Seedlings were transplanted to two field sites (La Florida and El Porvenir farms, Llanos Orientales) in April 2015. Culling was on visual evaluation of field-grown plants.

One hundred thirty-three BR15, putatively apomictic testcross progeny were selected for advanced trials based on general vigor and leafiness during four bimonthly (three wet-season and one dry-season) evaluations during 2015-2016. Open pollinated seed of these “pre-selected” BR15 hybrids was produced.

Advances during 2017: The selected hybrid genotypes were tested for reproductive mode (by progeny test), seed production and for spittlebug resistance (**ANNEX 2: 81 hybrids from population Br15**).

During 2018 hybrid seed will be produced for 81 apparently (on observation of progeny-trial) apomictic BR15 preselections (of the original 133 preselections). Nearly all of 131 BR15 preselections tested for spittlebug reaction were as or more resistant (by plant damage or nymphal survival) as Cv. Marandu, a testament to the high levels of resistance that has been achieved over the years in our sexually-reproducing breeding population. The generally high resistance in these hybrids is particularly notable given that the male parent (the tester) of every hybrid is the very susceptible natural genotype cv. Basilisk. A set of apomictic seed would be available once import and export requirements are satisfied.

Brachiaria humidicola

In mid-2011 we were in the process of synthesizing a broad-based, sexual breeding population of *B. humidicola*. In 2012, a first set of Bh hybrids was produced (with the objective of selecting an apomictic “tester”), with 20 sexual clones exposed to pollination by six apomictic germplasm accessions in six isolated crossing blocks. The resulting set of hybrid plants was generated in 2013 (Bh13). These were assessed in field trials at two field sites in the Colombian Llanos Orientales, culled on visual assessment, and the “pre-selected clones vegetatively propagated to CIAT-Palmira. OP seed was produced at CIAT-Popayán for progeny testing, at CIAT-Palmira, and apomictic hybrids identified on this basis. A set of 45 of these Bh13 hybrids was selected for dispatch to DOW.

In 2014, a testcross crossing block was established at CIAT-Popayán. Testcross seed was harvested during 2015, and a set of testcross hybrids (Bh16) generated in 2016.

One thousand seven hundred ninety-four testcross progeny clones (Bh16) were established in each of two sites in the Colombian Llanos in May 2016. Two visual assessments of overall agronomic performance (apparent biomass production, leaf:stem ratio, etc.) have been conducted and a “short-list” of 154 pre-selections (8.6%) has been identified by ranking the sum of the four ratings on each hybrid clone. These pre-selections were genotyped with the University of Georgia marker of the “*apospory-specific genomic region*” (ASGR), and apomicts will undergo further assessment for spittlebug reaction; low pH; forage nutritional quality parameters, and, perhaps, BNI activity. After further culling, open-pollinated seed for a confirmatory progeny test will be produced.

CONCLUSION

Hybrid seed is ready to be sent to the private sector corresponding to: 92 hybrids from the population Br12 and 100 hybrids from population Br15, which belong to the fifth and sixth selection cycles, respectively, in the interspecific *Brachiaria ruziziensis* x *decumbens* x *brizantha* breeding program. In the *B. humidicola* breeding program a first set of 45 hybrids were obtained from the first selection cycle, and the set from the second cycle, corresponding to 27 promising apomictic hybrids, will be further selected according to progeny test once multiplication of seed is successful.

ANNEX 1: 92 hybrids from the population Br12

Unit	BR12 Name
1	937
2	1370
3	2321
4	2661
5	2756
6	91
7	796
8	1188
9	1282
10	1427
11	2360
12	2471
13	2611
14	2679
15	2762
16	2947
17	3018
18	3067
19	3136
20	3245
21	3358
22	3563
23	3809
24	4101
25	4653
26	5176
27	5213
28	5323
29	5925
30	5963
31	5967

Unit	BR12 Name
32	1794
33	49
34	61
35	62
36	173
37	181
38	184
39	255
40	446
41	461
42	533
43	804
44	805
45	1176
46	1280
47	1325
48	1362
49	1399
50	1411
51	1418
52	1509
53	1532
54	1535
55	1620
56	1663
57	1685
58	1716
59	1844
60	1888
61	1889
62	1939

Unit	BR12 Name
63	2176
64	2243
65	2254
66	2255
67	2305
68	2316
69	2367
70	2461
71	2462
72	2937
73	3069
74	3377
75	3436
76	3654
77	3659
78	3868
79	4012
80	4039
81	4400
82	4707
83	4856
84	4951
85	5023
86	5029
87	5049
88	5082
89	5350
90	5697
91	5873
92	5921

ANNEX 2: 81 hybrids from population Br15

Unit	BR15 Name
1	58
2	60
3	361
4	378
5	395
6	503
7	582
8	722
9	757
10	780
11	800
12	823
13	972
14	1168
15	1462
16	1468
17	1628
18	1689
19	1712
20	1830
21	1851
22	1865
23	1877
24	2174
25	2464
26	2528
27	2532
28	2538
29	2545
30	2558

Unit	BR15 Name
31	2767
32	2811
33	2891
34	3013
35	3017
36	3025
37	3186
38	3234
39	3248
40	3280
41	3294
42	3434
43	3571
44	3597
45	3726
46	3810
47	3811
48	4368
49	4442
50	4483
51	5152
52	5232
53	6346
54	6401
55	6402
56	6434
57	6487
58	6504
59	6508
60	6543

Unit	BR15 Name
61	6547
62	6571
63	6590
64	6758
65	7006
66	7121
67	7316
68	7318
69	7659
70	8529
71	8543
72	8650
73	8756
74	8881
75	8887
76	8905
77	8919
78	8976
79	9125
80	9141
81	9142