Relationship among Seed Parameters and Flowering Cycles on Three Gamba Grass (*Andropogon gayanus* Kunth) Segregating Populations

R. Usberti
Plant Protection Agency, Brazil

J. A. Usberti Jr.
Campinas Agronomic Institute, Brazil

P. B. Alcantara
Zootecnia Institute, Brazil

V. B. G. Alcantara
Zootecnia Institute, Brazil

Waldssimiler T. Mattos
Zootecnia Institute, Brazil

See next page for additional authors

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R. Usberti, J. A. Usberti Jr., P. B. Alcantara, V. B. G. Alcantara, Waldssimiler T. Mattos, R. A. Possenti, Luciana Gerdes, M. A. C. Lucena, and A. T. Tsuhako

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R. Usberti[1]; J. A. Usberti Jr.[2]; P. B. Alcantara[3]; V. B. G. Alcantara[3]; W. T. Mattos[3]; R. Possenti[3]; L. Gerdes[3]; M. A. C. Lucena[3] and A. T. Tsuhako[4]

[1] Plant Protection Agency, Campinas. Brazil, P. O. Box 960, CEP 13073-001. E-mail: usberti@ cati. sp. gov. br
[2] Agronomic Institute, Campinas, Brazil; [3] Zootechnic Institute, Nova Odessa, Brazil; [4] Matsuda Seeds and Animal Nutrition Co., Alvares Machado, Brazil.

Key words: gamba grass, seed parameters, flowering cycles, plant breeding

Introduction *Andropogon gayanus* sp. is a tropical forage grass species often used in Brazilian pastures whenever drought stress is the most limiting factor (Buldgen *et al*., 1995; Garcia *et al*,. 1998). Being a cross-pollinated species, there are several cultivars and ecotypes available, which show a remarkable range of variation as to morpho-agronomic, seed and forage traits. However, early flowering is usually present in most of the genetic materials cited (Parihar and Tomer, 2001), which causes fast and significant loss of forage quality in cultivated pastures. The main purpose of this research work has been to develop new populations with intermediate and late flowering cycles and correlate these characters with chosen phenologycal and seed traits. In case of success, the recurrent selection scheme used would became easier and cheaper.

Materials and methods In the first growing season (2006), several cultivars and foreign accessions were assembled in a polycross plot and free intercrossing allowed. Only seeds of intermediate and late flowering plants were picked up and six populations established through mixture of seeds, as follows: PN-I and PN-L; 1914-I and 1914-L; Mix-I and Mix-L (PN= cultivar Planaltina"; 1914=African accession; Mix=mixture of several types; I=intermediate and L=late flowering). In the next growing season (2007), all populations were sown in isolated field plots. In both growing seasons, two phenological traits (plant height and tiller number) and three seed characters (physical purity, number of intact and scarified seeds / gram) were recorded at full blooming stage and harvesting time, respectively. Linear correlations between plant and seed traits were estimated.

Results and discussion Not taking into account their flowering cycles (intermediate or late), all populations have shown significant decreases in seed physical purities due to the recurrent selection for higher forage yields (significant increases observed for plant height and tiller number). This fact may be due to a greater energy allocation to vegetative growth instead of reproductive activities. Intact seed sizes (as scored by number of seeds/g) seemed to be little influenced by the selection scheme, showing small fluctuations in the measured values. On the other hand, sulphuric acid scarified seed sizes remained constant for the three populations (1914-I, 1914-L and PN-L) but showed significant reductions (increases of number of seeds/g) in the other populations (PN-I, Mix-I and Mix-L (Table 1). There was a general trend of increase of the linear correlation values among plant and seed traits, after one cycle of recurrent selection, much more evident on the late-flowering populations (Table 2). From the results above, it is clear that there must be a strict compromise between forage yield and pure seed production in the development of new cultivars of the species. The occurrence of large or small pure seeds will mostly depend on the genetic background of each population.

Table 1 *Mean results for two plant traits (plant height (PH) and tiller number (TN)) and three seed parameters (seed physical purity (SPP), number of intact and scarified seeds/g (NIS/g and NES/g in six segregating populations of* Andropogon gayanus*, during two growing seasons (2006 and 2007).*

	Growing Season									
	2006					2007				
Population	PH(m)	TN	SPP	NIS/g	NES/g	PH(m)	TN	SPP	NIS/g	NES/g
1914-L	1.83	68.3	72.7	231.8	806.9	2.43	103.9	37.9	225.2	789.5
1914-L	1.79	54.5	75.2	235.4	815.7	2.30	86.3	36.5	241.4	801.5
PN-I	1.90	58.7	64.4	228.7	638.4	2.42	90.8	31.0	238.7	818.7
PN-L	1.85	56.0	60.5	249.1	777.1	2.51	84.5	38.7	245.1	755.2
Mix-I	1.98	62.4	65.7	246.2	713.0	2.61	100.7	38.8	240.0	777.4
Mix-L	1.78	53.8	62.8	255.2	709.2	2.13	82.6	33.4	272.9	886.1
Mean	1.85	58.9	66.9	241.0	743.4	2.40	91.5	36.1	243.8	804.7

Observations: [1] 1914=South Africa accession; PN= Planaltina" cultivar; Mix=mixture of sexual types; I and L= Intermediate and Late flowering cycles

Table 2 *Mean results for three seed parameters (seed physical purity (SPP), number of intact and scarified seeds/g (NIS/g and NES/g) in six segregating populations of Andropogon gayanus, during two growing seasons (2006 and 2007).*

	Growing Season					
	2006			2007		
Population[1]	SPP×NISg	SPP×NESg	NIS×NSE	SPP×NISg	SPP×NESg	NIS×NSE
1914-I	-0.06	-0.47	-0.57	-0.44	-0.44	0.53
1914-L	-0.23	-0.10	-0.06	-0.31	-0.44	0.44
PN-I	-0.07	-0.38	0.58	-0.25	-0.27	0.38
PN-L	-0.05	-0.40	-0.50	-0.21	-0.07	0.50
Mix-I	-0.05	-0.36	0.17	-0.41	-0.37	0.41
Mix-L	-0.19	-0.14	0.37	-0.63	-0.64	0.51

Conclusion Effective selection of new cultivars with desired flowering cycles is feasible, keeping in mind that the higher the forage yield, the lower will be pure seed production.

References

Buldgen A, Francois J and Falla J. (1995). Seedling establishment of *Andropogon gayanus var. bisquamulatus* under dry conditions. *Tropical Grassland*, 29 (4): 248-256.
Garcia R, Pereira OG, Altuve SM and Alvarenga EM. (1998). Effect of water potential on seed germination of three tropical forage grasses. *Brazilian Journal of Animal Science*, 27 (1): 9-15.
Parihar SS and Tomer PS. (2001). Flowering phenology and pure germinating seed (PGS) yield in gamba grass (*Andropogon gayanus* Kunth). *Seed Science and Technology*, 29 (2): 445-452.