SELECTION OF THE COMPONENTS OF A SYNTHETIC VARIETY OF *Andropogon gayanus* /

by

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Andropogon gayanus Kunth var. *bisquamulatus* Hack, is a polymorphic bunch grass, widely distributed throughout most of the tropical and subtropical savannas of Africa, south of the Sahara in areas with a long dry season. This grass was introduced into the Colombian Llanos from the Shika Agricultural Research Station, Northern Nigeria, in 1974. Subsequent to its introduction, a series of agronomic trials were initiated by CIAT (at the Carimagua Research Centre) and various national research institutions in Latin America to evaluate the potential of *A. gayanus*, primarily in the vast Ultisol and Oxisol savanna regions of the continent. As a result of further evaluation at a number of locations, accession *A. gayanus* var. *bisquamulatus* CIAT 621 has now been released in Brazil as cv. Planaltina (1979) and in Colombia as cv. Carimagua 1 (1979). Peru (1982), Venezuela (1982), Panama (1983) subsequently released the same accession under the cultivar names of San Martín, Sabanero and Veranero, respectively.

9p. Ingl., 2 Refs., 2 Cuas.

It is estimated that 168,000 ha have been sown with A. gayanus in Brazil since 1982 (J.E. FERGUSON, C. SERE and R. de ANDRADE, pers. comm.). Smaller areas have been established in other countries.

In equatorial regions, multiple annual flowering peaks occur in populations of A. gayanus cv. Carimagua 1. Although there is a considerable range in flowering/heading dates, early flowering genotypes predominate in the population.

In northern Nigeria, inflorescences produce pollen over the full flowering period of five days while stigmas are exserted on only the first three. This will tend to result in an earlier flowering date for the population as a whole (FOSTER, 1962).

FOSTER (1962) reported that a high degree of cross-fertilization occurred in both diploid (2n = 20) and tetraploid forms of A. gayanus collected in various ecological regions throughout northern Nigeria. This collection displayed a range of 48 days in the commencement of flowering. The same author proposed lengthening the period of vegetative growth of A. gayanus as a means of extending the supply of green feed into the long dry season in Nigeria.

It is difficult to control the large bulk of stemmy, lignified material of this grass by pasture management alone during the wet season. The aim of the A. gayanus improvement project described in this paper was to produce a uniformly late flowering and vigorous cultivar.

The location of the experiment was 160 m above sea level, at N 4°.34', W 71° 20' in the Llanos Orientales of Colombia. The annual rainfall averages (11 years) 2163 mm. A very marked dry season occurs from mid-December to late March. The soil is an acid Oxisol (pH 4.3), deficient in N, P, K, Ca, Mg, S and some microelements. There is a marked Al toxicity, Al saturation of the bases in 86 per cent.

Because A. gayanus is a strongly out-crossing, practically self-incompatible grass, the polycross technique was considered the most appropriate to employ with the species.

This technique is based on the vegetative propagation of clones with the desired characteristics, and the selection of those progenies exhibiting the highest percentage of these characteristics. The principle of this method is to arrange the provisionally selected plants in such a way that they pollinate each other uniformly. Late-flowering, vigorous genotypes were selected from two successive polycross generations and the resulting Synthetic II was exposed to grazing in a grass/legume association with Centrosema sp. nov. CIAT 5568 as the companion legume. It was relatively easy to identify the late-flowering genotypes because these plants were preferentially grazed by cattle.

Heading dates of 16 clonal propagates of Synthetic II were monitored during the first and second semester of 1984. Cv. Carimagua 1 was used as the standard for comparison.

The sixteen clones and cv. Carimagua 1 were established in 5 m row-plots with 2 m inter-row spaces arranged in three randomized blocks. Heading dates were recorded by counting the number of emerged raceme pairs weekly over a period of 122 days during the first semester. Prior to the commencement of the experiment, an equalizing cut was made to a height of 25 cm. The procedure was repeated during the second semester at the time of the equalizing cut on August 15. Emerged raceme pairs were counted weekly over a 107-day period until December 4.

Cv. Carimagua 1 exhibited several flowering peaks during the 122-day trial period. Commencement of flowering was earliest in this cultivar, the "full seedhead" stage being reached on day 35. The range of heading dates during the experiment was 87 days. The mean number of raceme pairs in Carimagua 1 was 50.27 per plant, significantly greater than that of 14 clones. Eleven clones had produced less than 10 raceme pairs by the end of the 122-day trial period. The mean number of raceme pairs for the 10 latest flowering clones ranged from 0 to 6.04 per plant. Clones which did not differ significantly from the control in total number of racemes commenced heading three weeks later on day 59 than cv. Carimagua 1.

Significant differences in the commencement of flowering and in the mean number of raceme pairs produced during the second observation period of 107 days were recorded. The mean number of raceme pairs of cv. Carimagua 1 was 56.08, significantly greater than in 15 clonal selections. Again, commencement of flowering was earliest in cv.

Carimagua 1, occurring after the equalizing cut on day 56. The range in heading date was 43 days in the second semester (Table 1, Figures 1 and 2).

In the course of this study, late-flowering, vigorous components of a Synthetic variety were identified. These will be incorporated into a multi-clone Synthetic III to form a new variety.

The chief advantages of a late-flowering cultivar of A. gayanus is the ease of management through grazing and control of excessive stemmy herbage during the active period of growth, early and late in the wet season. The late-flowering characteristic of the Synthetic should permit a longer period of vegetative growth and continued grazing of leaf and immature stems after Carimagua 1 has gone to seed.

REFERENCES

FOSTER, W.H. (1962). Investigations preliminary to the production of cultivars of Andropogon gayanus. Euphytica, 11, 47-52.

SCHAEPMAN, H. (1952). Application of the polycross test to grass breeding. Euphytica, 1, 105-111.

Table 1. Mean number of emerged raceme pairs per plant in Andropogon gayanus cv. Carimagua 1 and 16 clonal propagates of a late-flowering Synthetic variety. Carimagua, Llanos Orientales.

RACEME PAIRS/PLANT				
1st. SEMESTER (122 days)			2nd. SEMESTER (107 days)	
cv. Carimagua 1	50.27 (6.35)*		cv. Carimagua 1	56.08 (7.47)*
Clones: 12	44.68 (6.70)		Clones: 10	41.45 (6.44)
16	37.85 (5.19)		11	30.13 (5.52)
3	16.24 (3.75		15	24.09 (4.82)
14	13.48 (3.37)		12	22.21 (4.73)
15	11.82 (3.50)		16	21.72 (4.61)
13	9.26 (3.04)		13	18.58 (4.36)
2	6.04 (2.28)		3	18.44 (4.34)
10	2.12 (1.34)		1	14.57 (3.95)
11	1.84 (1.34)		4	14.57 (3.85)
6	1.24 (1.25)		6	14.35 (3.83)
7	1.16 (1.14)		9	14.33 (3.71)
5	1.05 (1.23)		2	12.02 (3.42)
9	0.18 (0.82)		14	11.79 (3.45)
8	0.09 (0.76)		7	11.46 (3.45)
1	0.04 (0.73)		5	11.11 (3.40)
4	0.00 (0.71)		8	1.00 (1.17)
s.e.	11.66 (1.07)			5.13 (0.51)
l.s.d. 5%	23.80 (2.19)			10.47 (1.05)
l.s.d. 1%	32.06 (2.94)			14.10 (1.41)

Transformed values in parentheses: $\sqrt{X + 0.5}$

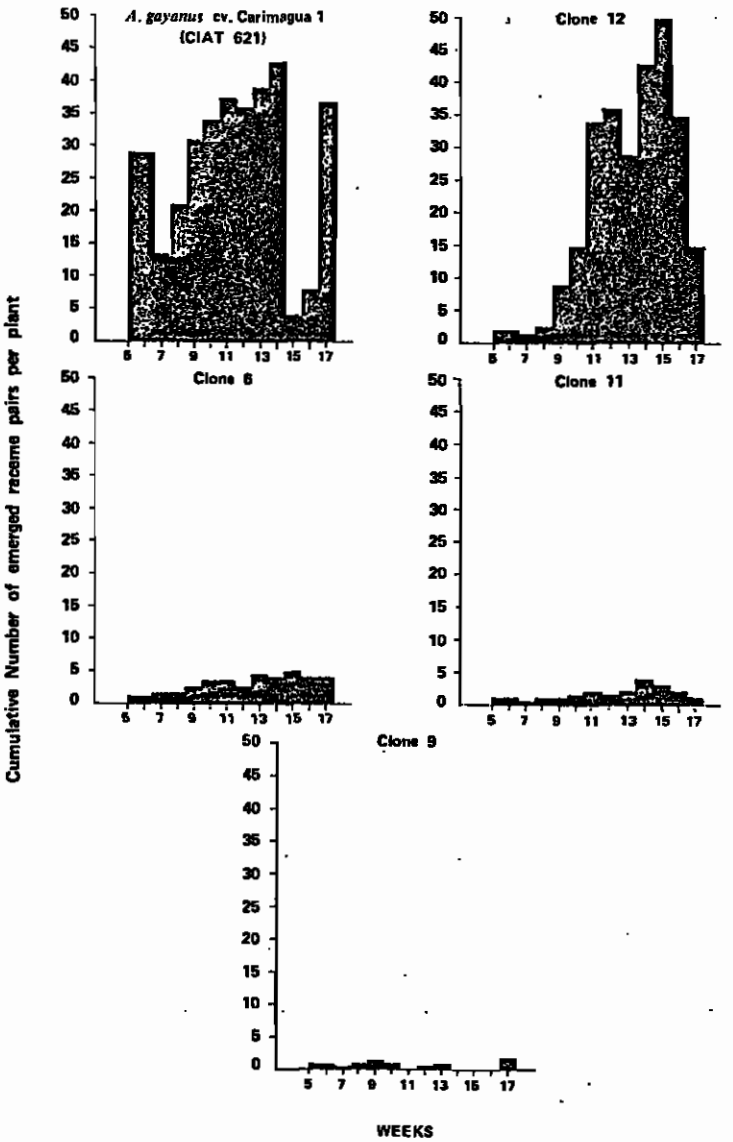

Fig. 1. Patterns of emergence of raceme pairs in selected late-flowering clones of A. gayanus and cv. Carimagua 1 over the 122-day observation period during the first semester.

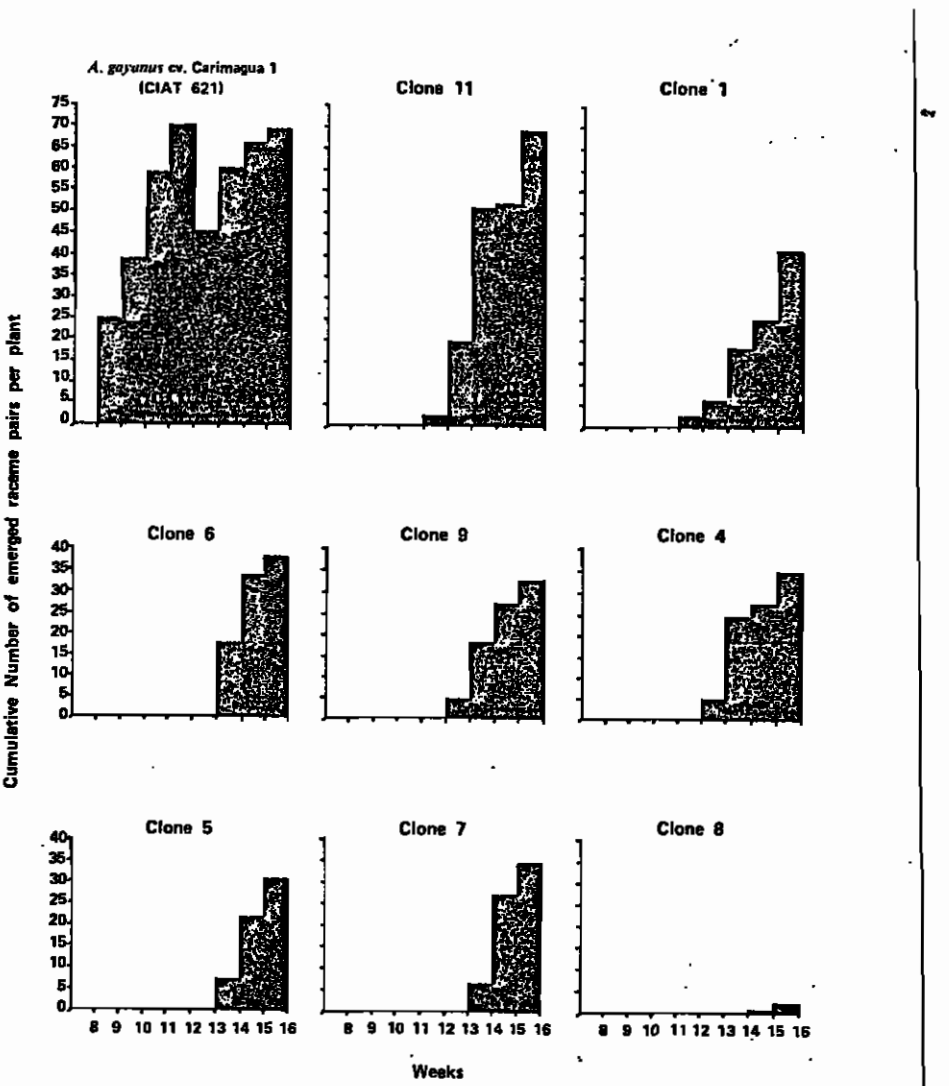

Fig. 2. Patterns of emergence of raceme pairs in selected late-flowering clones of A. gayanus and cv. Carimagua 1 over the 107-day observation period during the second semester.