Research Note

FIELD OBSERVATIONS ON THE FLOWERING BEHAVIOR PATTERN OF FOUR GRASS GENERA[1]

The development of the inflorescence has a marked effect on the seasonal production of the sward. It results in an increase in the size of existing shoots or tillers and is usually associated with reduced root growth and inhibition of new tillers. At the same time, flowering is associated with increased lignification and reduced digestibility. Even within the same climatic region, the photoperiod requirement, and hence the time of flowering, differs with cultivar. It has been found that exposure to photoperiods shorter than the critical minimum or to excessively high temperatures after the inflorescence is initiated may cause a reversion in the vegetative growth.[2]

Many studies have been conducted on the effect of the seasonal flowering development on the yield of gramineous crops such as sugarcane, sorghum, corn and rice.[3,4,5] Such studies emphasize the importance of knowing about the seasonal flowering behavior of the crops in order to establish the best adapted and most productive cultivars in a particular environment.

Few studies have been performed on the effect of the flowering behavior on forage grasses.[4] It is unknown to what extent the seasonal flowering pattern affects the persistence and production potential of many grass cultivars.

The objective of the present study was to observe the flowering behavior pattern of four grass genera and the effects of the degree of flowering in each of the six studied periods of the year. In general, it is more suitable for forage grasses to flower during long-day seasons (July-August, March-April and May-June) than during short-day seasons (September-October, November-December and January-February) in Puerto Rico. During the latter, the already lower grass growth rate is more affected by the additional stress of flowering than during the period of faster growth. However, the magnitude of the flowering stress on forage grasses must be defined to assess its real effect on the adaptive performance of the grasses.

To draw some simple observations on this point we conducted a field observation study on plants of four grass genera of the forage collection at the Corozal Substation. The following scale was used to designate the degree of flowering:

[1]Manuscript submitted to Editorial Board 11 April 1989.

[2]Spedding, C. R. W. and E. C. Diekmahns, 1972. Grasses and Legumes in British Agriculture. Grassland Research Institute, Hurley, Commonwealth Bureau of Pastures and Field Crops. Bull. 49 p. 27-8.

[3]Alexander, A. G., 1973. Sugarcane Physiology. A comprehensive study of the *Saccharum* source-to sink system. Elsevier Scientific Publishing Company. Amsterdam, London, New York p. 523-25.

[4]Garrity, D. P., E. T. Vidal and H. O. Toole, 1986. Manipulating panicle transpiration resistance to increase rice spikelet fertility during flowering stage water stress, *Crop Sci.* 26 (4): 789-95.

[5]Torres-Cardona, S., A. Sotomayor-Ríos y A. Quiles Belén, 1986. Relación del fotoperiodismo y el rendimiento del sorgo forrajero en Puerto Rico, Revista del Colegio de Agrónomos de Puerto Rico, abril-junio, p. 16-17.

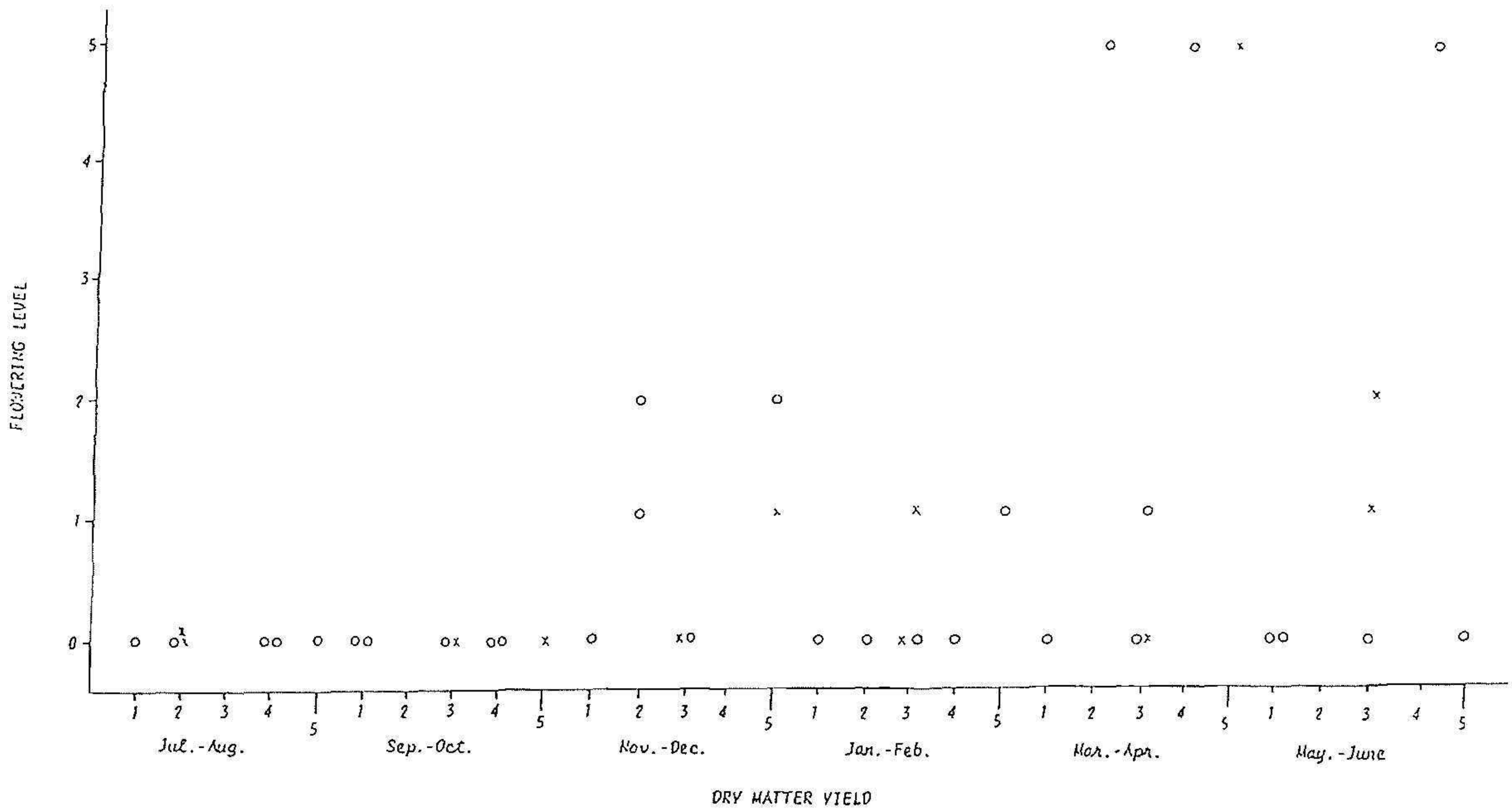

FIG. 1.— Seasonal relationship between flowering and dry matter accretion levels for *Cynodon* genera. X - *Cynodon dactylon*; 0 - *Cynodon plectostachyus*.

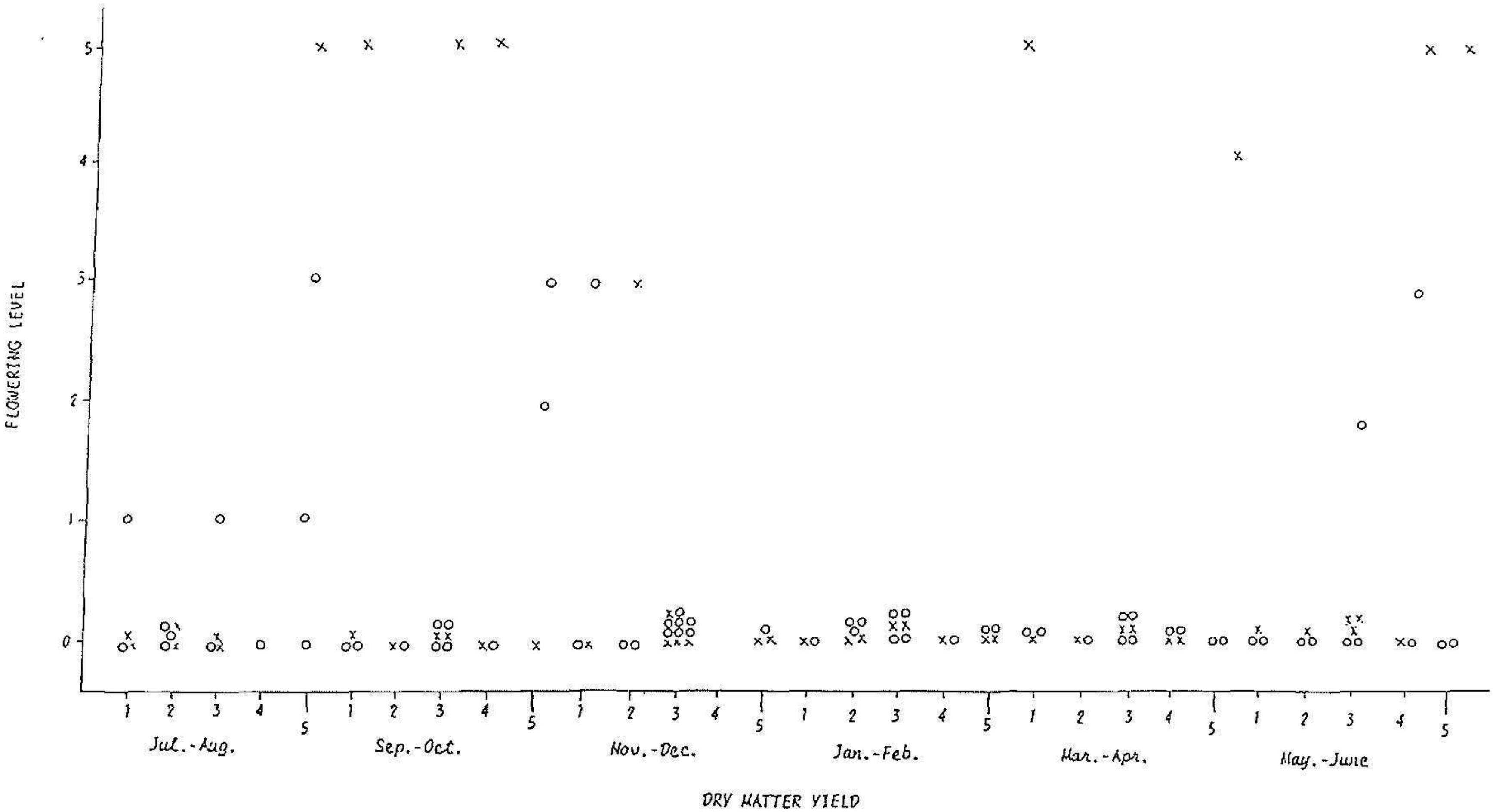

FIG. 2.—Seasonal relationship between flowering and dry matter accretion levels for *Hemarthria* genera X - *Hemarthria altissima*, diploid; 0 - *Hemarthria altissima*, tetraploid.

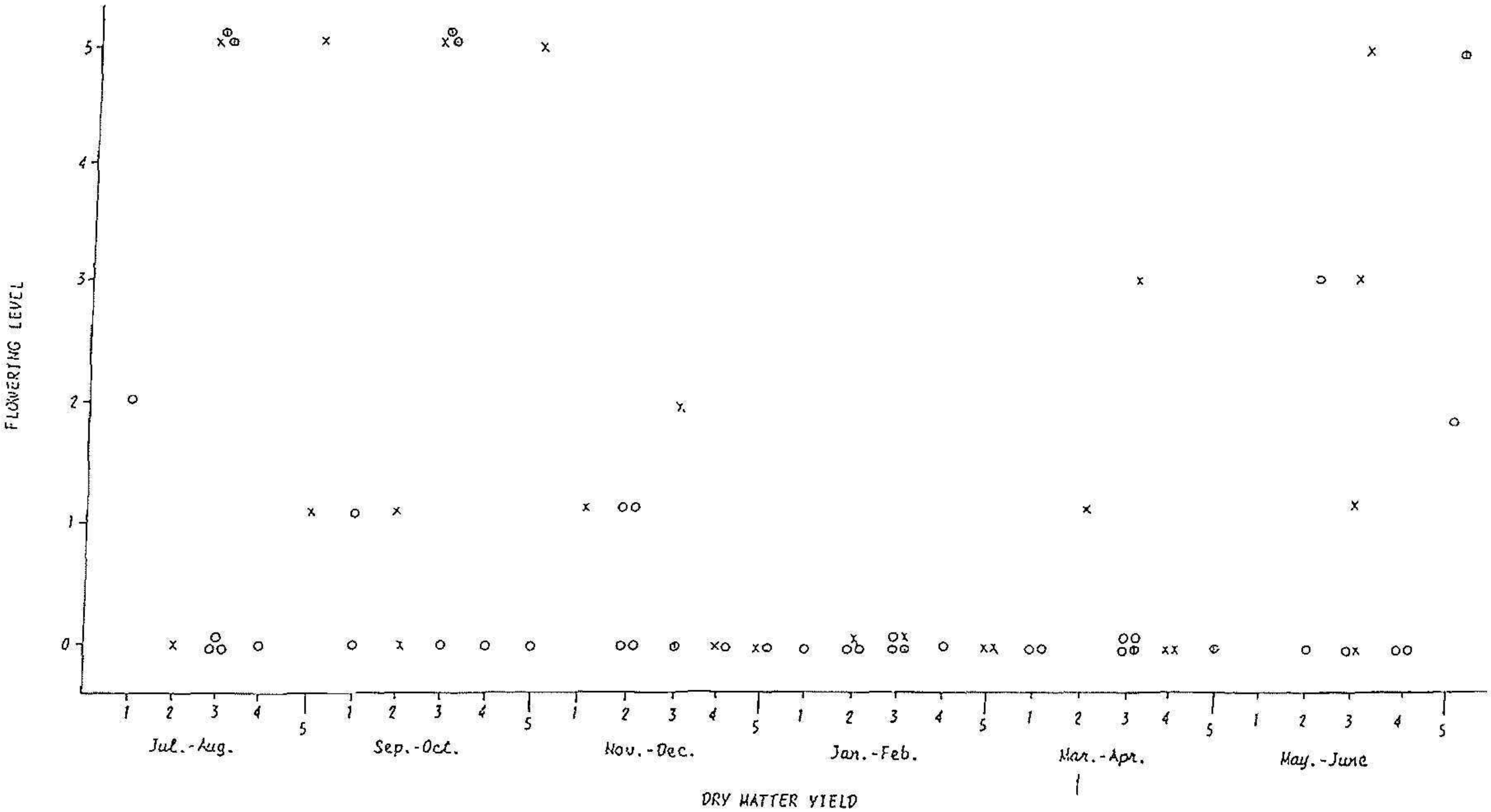

FIG. 3.—Season relationship between flowering and dry matter accretion level for *Brachiaria* genera. X - *Brachiaria brizantha*; 0 - *Brachiaria ruziziensis*; 0 - *Brachiaria decumbens*.

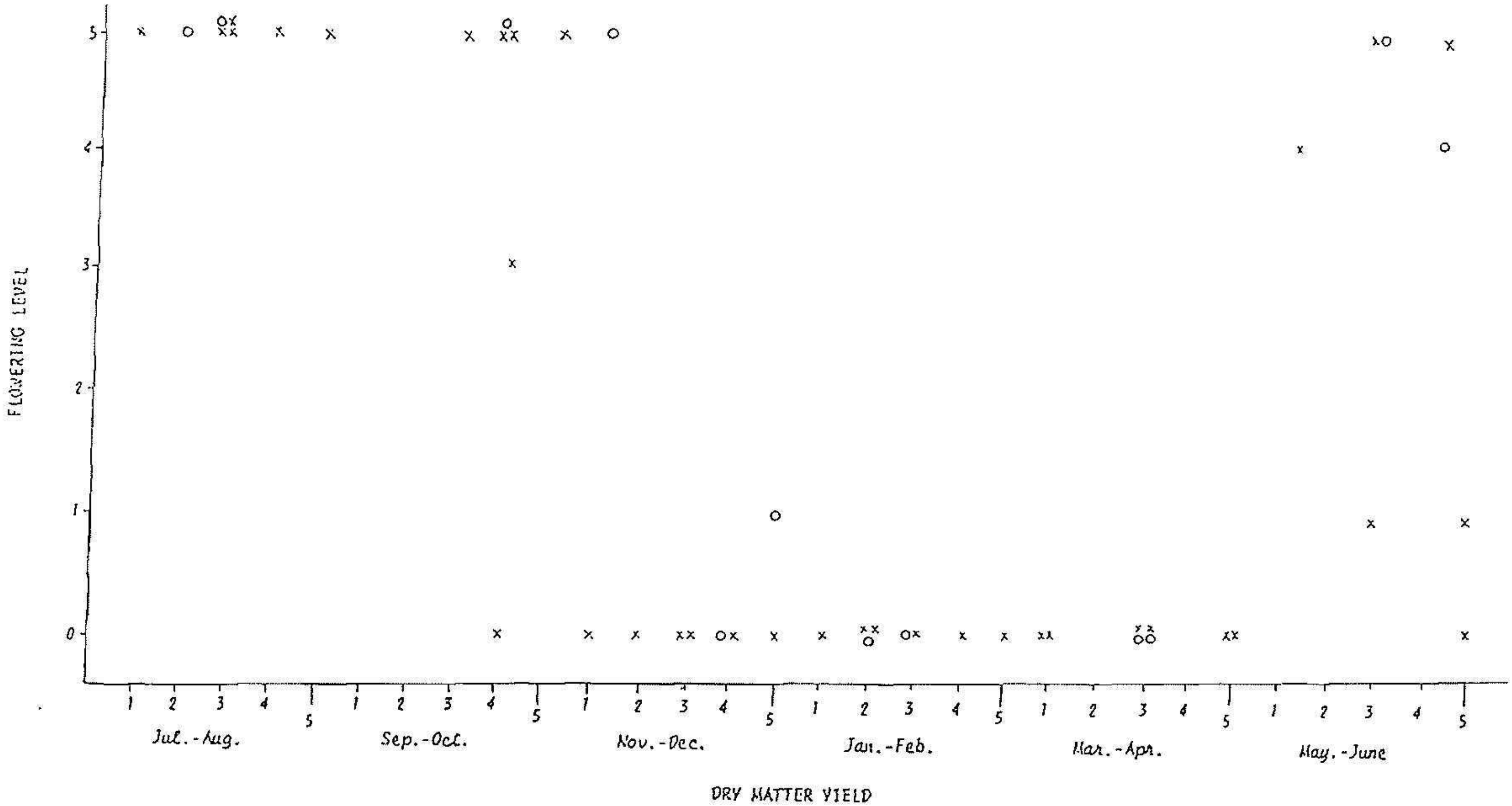

FIG. 4.—Seasonal relationship between flowering and dry matter accretion level for *Digitaria* cultivars. X - *Digitaria milanjiana*; 0 - *Digitaria eriantha*; 0 - *Brachiara decumbens*.

Flowering level	*Flowering percentages/plot*
0	0-10
1	10-20
2	20-30
3	30-40
4	40-50
5	50-60 or over

A 3 ft x 3 ft quadrat was used to establish the dry matter yield per plot of each cultivar at a harvest interval of 60 days during each of the six periods. The level of dry matter accretion during each period of the year was established according to the genera mean dry matter yields (GDMY) and their standard deviation (SD). The following relative scale was used to assign a value to each cultivar:

Dry matter accretion level	*GDMY ± SD*
1	*under* $\bar{X}$ − SD
2	$\bar{X}$ − SD
3	$\bar{X}$
4	$\bar{X}$ + SD
5	over $\bar{X}$ + SD

Figures 1, 2 and 3 show the seasonal flowering behavior of *Cynodon*, *Hemarthria* and *Brachiaria* genera. A majority of the cultivars including most of those of the *Cynodon* genera, the tetraploid *Hemarthria* and *Brachiaria brizantha* and *B. ruziziensis* presented low flowering levels (from 0 to 2 on the scale) during all six periods of observation. The low degree of flowering in these cultivars represents more energy directed toward forage development than for flowering, a suitable characteristic for any forage cultivar.

Among the *Cynodon* cultivars three out of seven presented high flowering levels during a period of lengthening daylight (March-April, fig. 1). Among the tetraploid *Hemarthria* cultivars, 2 out of 11 presented a medium degree of flowering during the periods of shortest days (November-December, fig. 2), whereas in the diploid *Hemarthria* most cultivars flowered during long days, but three out of seven presented high flowering levels during short days. Four out of ten *Brachiaria* cultivars (two *B. decumbens* and two *B. brizantha*) presented high flowering levels during both short day (July-August) and long day periods (September-October, fig. 3). These observations suggest that a detailed study of the profusely flowering cultivars may show an important effect of this characteristic on their agronomic and productive performance.

Figure 4 shows the flowering behavior pattern observed in the genus *Digitaria*. Most cultivars showed high flowering levels in July, August, September and October, and to a lesser extent, May and June. During the period of shortest days (November-December, January-February) all eight cultivars, except one, did not present floral development. During the May-June period, three cultivars showed low flowering levels and five cultivars high levels, but at this stage of the year flowering is less critical. Possibly, the flowering pattern of cultivars in this genus is less important than that in those genera, in which erratic flowering throughout the year was observed.

These preliminary data establish that the flowering pattern of different cultivars of the same genus and species of grasses can differ throughout the different periods of the year. Thus, the observation of the flowering patterns of different grasses as part of their agronomic evaluations might be useful in the selection of the most promising cultivars.

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