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Agronomic potential of stylo [*Stylosanthes guianensis* (Aubl.) Sw.] in Puerto Rico[1]

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ABSTRACT

Forty stylo accessions [*Stylosanthes guianensis* (Aubl.) Sw.] were evaluated in 1989-90 at the USDA-ARS Isabela farm for growth vigor and plant height at 90 and 120 d during the establishment period, and for dry matter yield (DMY), crude protein (CP) concentration, and in vitro dry matter digestibility (IVDMD) at one 120-d and four 60-d harvests. No significant differences were observed among the 20 and 32 accessions having a growth vigor index (GVI) of 4.0 to 5.0 at the 90- and 120-d harvests, respectively. Plant height (PHt) and GVI were highly correlated. Most of the accessions were classified as short-day plants. No DMY differences were observed among the 14 higher yielding accessions at the 120-d harvest nor among 17, 14, 2 and 11 higher yielding accessions at the first, second, third and fourth 60-d harvests, respectively. Across the 60-d harvests, the mean DMY of the 40 accessions was 1,563 kg/ha. CIAT 1102 had the highest value (2,710 kg/ha). Mean CP concentrations for the 120-d and four 60-d harvests were 17.3, 15.8, 16.2, 16.9 and 16.8%, respectively. For all harvests, the IVDMD of the accessions averaged 52.4%. Accession 1102 has good potential as a forage crop for protein banks, hay or grass-legume combinations and theoretically could produce 16 t/ha of DMY annually when harvested every 60 d.

Key words: growth vigor, plant height, dry matter yield, protein banks

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RESUMEN

Potencial agronómico de stylo [*Stylosanthes guianensis* (Aubl.) Sw.] en Puerto Rico

Se evaluaron 40 accesiones de Stylo [*Stylosanthes guianensis* (Aubl.) Sw.] en Puerto Rico en la finca Isabela del ARS durante 1989-90 para determinar el vigor y la altura de la planta a 90 y 120 días durante el período de establecimiento, y el rendimiento de materia seca (RMS), concentración de proteína cruda (PC) y digestibilidad aparente in vitro (DAIV) en un corte de 120 días y cuatro de 60 días. No se observaron diferencias significativas entre las mejores 20 y 32 accesiones con un índice de crecimiento y vigor (ICV) de 4.0 o más a los 90 y 120 días después de la siembra, respectivamente. La correlación entre altura de planta y ICV fue significativa a los 120 y 90 días. La mayoría de las accesiones fueron clasificadas como plantas de días cortos. No se observaron diferencias significativas entre las 14 accesiones superiores para rendimiento de materia seca (RMS) en el corte de 120 días ni entre las 17, 14, 2, y 11 accesiones superiores en el primer, segundo, tercer y cuarto corte de 60 días, respectivamente. El RMS de las accesiones a través de los cuatro cortes de 60 días fue 1,563 kg/ha. CIAT 1102 produjo el mejor RMS (2,710 kg/ha). La concentración de proteína cruda (PC) al corte de 120 d y los cuatro cortes de 60 d fue de 17.3, 15.8, 16.2, 16.9 y 16.8%, respectivamente. La DAIV de las accesiones a través de los cinco cortes fue de 52.4%. La accesión 1102 tiene un excelente potencial como forrajera en Puerto Rico con un RMS anual extrapolado de 16 t/ha, cosechada cada 60 días.

INTRODUCTION

The genus *Stylosanthes* belongs to the tribe Aeschynomeneae, family Leguminosae. Of the 25 genera and approximately 475 species in the Aeschynomeneae tribe, pasture legumes have been identified in the genera *Aeschynomene, Arachis, Stylosanthes,* and *Zornia* (Mannetje, 1984). Common stylo, *S. guianensis* var. *guianensis* (Aubl.) Sw., is used as a forage legume in many areas of the tropics and subtropics. Its presence has mostly been reported in acid soils with a pH range of 4.6 to 6.0 derived from acid sedimentary rock (Williams et al., 1984). *Stylosanthes is* distributed in Latin America throughout a wide range of latitudes and climatic zones (Williams et al., 1984) and has the potential to increase animal production in vast areas of acid, infertile soils, particularly those having Oxisol-Ultisol associations in the tropics of South America (Thomas, 1984). *Stylosanthes* species tolerate low levels of available phosphorus (Jones and de Freitas, 1970) and show good tolerance to high concentrations of aluminum and manganese (Thomas, 1984).

The main limitation in using *Stylosanthes* species as pasture material has been their susceptibility to anthracnose, a disease caused by the fungus *Colletotrichum gloeosporioides* (Penz.) Sacc., which can defoliate and kill the plant. However, Grof et al. (1993) reported that Venezuelan accessions of *S. capitata Vog.* and a binary mixture of *S.*

capitata-S. macrocephala Ferr. et Costa demonstrated field resistance to anthracnose in studies conducted in Brazil. A review of the diseases and pests of *Stylosanthes* was made by Lenné and Calderón (1984). One of the pests is the floral budworm (*Stegasta bosquella* Moschler). It feeds on the terminal branches prior to flowering and, once the plant has flowered, enters and damages the inflorescence (Calderón, 1982).

According to Bogdan (1977), annual dry herbage yields of stylo grown alone usually range from 2.5 to 10 t/ha but can be more than 15 t. Vélez-Santiago et al. (1981) reported a dry matter yield (DMY) as high as 10 t/ha and a crude protein (CP) concentration of 16.5% for cv Endeavour during its first 90 d of growth at Corozal, Puerto Rico. Vélez-Santiago and Arroyo-Aguilú (1984) compared six stylo cultivars in the humid mountain region of Puerto Rico. The highest yielder was fine stem stylo, which produced 18.5 t/ha in 395 days when harvested at 45-d intervals. The present study measured the growth vigor index (GVI) and plant height (PHt) at 90 and 120 d during establishment and days to flowering, total DMY, CP concentration and in vitro dry matter digestibility (IVDMD) of 40 stylo accessions at one 120-d and four 60-d cutting intervals (CI).

MATERIALS AND METHODS

The experiment was conducted at the USDA-ARS Isabela farm in northwestern Puerto Rico, 18.7°N, 67°W, at an elevation of 138 m. The soil at this site is an Oxisol (Typic Hapludox) with a pH of approximately 6.6. Preplanting tests indicated that the soil in the top 20 cm had 1.7% organic matter, 18 mg/kg of P and 13 $cmol_c$/kg of K. Land preparation consisted of plowing, harrowing and rototilling the soil three times before planting.

On 22 March 1989, seeds of 40 stylo accessions were sown in jiffy pots containing a mixture of soil, sand and promix in a 2:1:1 ratio. Prior to being planted in the pots, the seeds were scarified with sulfuric acid (40%) for eight minutes and then washed with tap water. After 47 days, the seedlings were field planted at 0.5 m intervals in rows 0.6 m apart. Plots measured 2×3 m with 3-m alleys separating each block. The experimental design was a randomized complete block replicated three times. Overhead irrigation was applied to all plots four times during the month of May.

At planting, all plots were fertilized with 22, 20 and 20 kg/ha of P, S and Mg, respectively. Potassium (41.5 kg/ha) was applied in three equal parts: one month after planting; after the 120-d harvest; and after the second 60-d harvest. Weeds were controlled manually and by applica-

tions of Bentazon[5] and Fusilade at the rates of 2.5 and 1.5 L/ha, respectively.

Five harvests were made: one at 120 days after planting (September 8th) and four at 60-d intervals thereafter (the 8th day of November, January, March, and May). At 90 d after planting, GVI ratings were made on the basis of the percentage of plant ground cover (PGC) and general vigor using a scale of 1 to 5 (1 = poor; 5 = excellent). This evaluation was repeated prior to the 120-d cutting. Plant height (from the ground to the apex of the superior leaf) was also measured 90 and 120 d after planting by using five plants selected at random from the middle of each plot This measurement was taken after recording the plot GVI. PGC was measured with a 1- × 1-m quadrant frame (Toledo and Shultze-Kraft, 1982). The number of days to flowering was calculated by subtracting the date of planting from the date when the first flowers appeared.

The plants were harvested at a 25-cm height with a side mower attached to a tractor. Yield estimates per plot were based on the amount of plant material within the 1- × 1-m quadrant frame. Subsamples were taken and oven dried to constant weight in the TARS chemical laboratory to determine DMY. IVDMD was determined with the two-stage technique of Tilley and Terry (1963).

A combined analysis of variance was made with accessions as the main plot and the 60-d harvest intervals as the subplot factor (Steel and Torrie, 1980). Separation of response variable means was accomplished by using Fisher's protected LSD ($P \leq 0.05$).

RESULTS AND DISCUSSION

Growth vigor and plant height

Table 1 shows the origin, growth pattern, GVI, PHt and growth per day of the 40 stylo accessions. Growth was erect, semierect, prostrate or semiprostrate. Sixty percent of the accessions had an erect growth pattern. The mean GVI was 4.0 at 90 d and 4.8 at 120 d. No significant differences were observed among the 20 accessions having a GVI of 4.0 or higher at 90 d and the 32 accessions with a GVI of 4.5 or higher at 120 d. Outstanding accessions having a GVI of 5.0 at 90 and 120 d were 136, 196, 1554, 1569, 1581, 1667, 1797, 1798, and 1800.

Plant height of the 40 stylos at 90 d averaged 35.6 cm. No significant differences were observed among the ten taller accessions with a height

[5]Trade names in this publication are used only to provide specific information. Mention of a trade name does not constitute an endorsement of materials by the USDA-ARS, nor is this mention a statement of preference over other materials.

TABLE 1.– *Origin, growth pattern, growth vigor index, plant height and growth per day of 40* Stylosanthes guianensis *accessions grown at Isabela, Puerto Rico, 1990.*

CIAT No.	Origin	Growth pattern[2]	Growth vigor index[1]		Plant height		Growth per day
			90 d	120 d	90 d	120 d	
					cm		
13	Mexico	E	3.7	5.0	38.7	63.1	0.8
15	Bolivia	E	4.0	4.0	37.9	70.6	1.1
24	Costa Rica	SE	1.7	4.0	17.3	33.4	0.5
30	Costa Rica	E	2.0	4.0	21.0	37.6	0.6
136	Meta, Colombia	E	5.0	5.0	43.6	69.4	0.9
184	Valle, Colombia	E	4.0	5.0	36.9	64.2	0.9
196	Apure, Venezuela	E	5.0	5.0	51.8	79.8	0.9
1102	Essequibo, Guyana	E	4.7	5.0	50.7	78.7	0.9
1280	Maranhao, Brazil	SP	4.0	5.0	35.3	48.4	0.4
1283	Maranhao, Brazil	E	4.0	5.0	38.3	48.1	0.3
1506	Anzoátegui, Venezuela	SP	3.0	5.0	28.3	51.0	0.8
1518	Anzoátegui, Venezuela	SE	3.7	4.0	30.9	38.3	0.2
1523	Monagas, Venezuela	SE	3.0	4.0	27.9	38.7	0.3
1552	Meta, Colombia	E	3.7	5.0	30.9	54.6	0.8
1554	Meta, Colombia	E	5.0	5.0	50.7	66.4	0.5
1563	Meta, Colombia	SP	4.7	5.0	41.3	76.7	1.2
1569	Meta, Colombia	E	5.0	5.0	48.1	85.1	1.2
1581	Tolima, Colombia	E	5.0	5.0	53.1	83.3	1.0
1597	Belize	E	4.7	5.0	43.1	76.0	1.1
1598	Belize	E	3.0	4.7	23.9	43.6	0.7
1600	Belize	P	1.7	3.7	20.4	33.2	0.4
1605	Belize	E	3.7	5.0	33.5	58.4	0.8
1609	Belize	P	3.0	4.7	25.7	39.6	0.5
1611	Belize	P	3.0	4.7	30.3	40.4	0.3
1659	Mato Grosso, Brazil	E	4.0	4.0	37.3	37.4	0.0
1667	Mato Grosso, Brazil	E	5.0	5.0	44.5	73.9	1.0
1797	Antioquia, Colombia	E	5.0	5.0	46.7	71.7	0.9
1798	Choco, Colombia	E	5.0	5.0	45.9	80.1	1.1
1799	Choco, Colombia	SE	4.7	5.0	44.1	73.7	1.0
1800	Choco, Colombia	E	5.0	5.0	45.9	72.9	0.9
1843	Cocle, Panama	E	4.0	5.0	32.3	48.6	0.5
1848	Los Santos, Panama	SP	1.7	4.7	19.1	39.8	0.7
1866	Chiriquí, Panama	SE	3.0	5.0	30.1	47.6	0.6
1870	Chiriquí, Panama	E	3.0	5.0	30.1	52.9	0.8

[1]On a 1 to 5 scale, 1 = poor; 5 = excellent.

[2]E = erect; P = prostrate; SP = semi-prostrate; SE = semi-erect.

TABLE 1.— *(Continued) Origin, growth pattern, growth vigor index, plant height and growth per day of 40* Stylosanthes guianensis *accessions grown at Isabela, Puerto Rico, 1990.*

CIAT No.	Origin	Growth pattern[2]	Growth vigor index[1]		Plant height		Growth per day
			90 d	120 d	90 d	120 d	
1871	Chiriquí, Panama	SP	3.7	5.0	29.1	51.3	0.7
1873	Chiriquí, Panama	P	2.7	4.0	22.6	35.2	0.4
2795	Monagas, Venezuela	SP	3.7	5.0	34.9	52.4	0.6
2816	Monagas, Venezuela	E	4.0	5.0	42.2	57.7	0.5
10136	CIAT selection	SE	2.3	4.0	21.9	31.9	0.3
34911	Australia	E	4.0	5.0	40.1	74.1	1.1

[1]On a 1 to 5 scale, 1 = poor; 5 = excellent.
[2]E = erect; P = prostrate; SP = semi-prostrate; SE = semi-erect.

of 44.1 to 53.1 cm. At the 120-d harvest, the mean plant height was 57.0 cm. There were no significant differences in height among the 10 taller accessions, which ranged from 73.7 to 85.1 cm. Most of these accessions were taller at both 90 and 120 d. The mean difference between plant height of the stylos at 90 and 120 d was 21.4 cm. This is equivalent to a growth rate of 0.71 cm/d or 21.4 cm/mo.

There was a highly significant correlation (P = 0.05) between PHt and GVI at both 90 (r = 0.90) and 120 d (r = 0.63) (Table 2). Thus the taller plants were also more vigorous. No correlation was found between the PGC and vigor. Apparently, plant height is a trait more suitable for use as an indicator of growth vigor for the evaluation of stylo germplasm during the establishment period.

TABLE 2.—*Correlation coefficients among plant height, ground cover and growth vigor index of 40* Stylosanthes guianensis *accessions at 90 and 120 days grown at Isabela, Puerto Rico.*

Variables	90 days		120 days	
	Ground cover	Growth vigor index	Ground cover	Growth vigor index
Plant height	0.16[NS]	0.90[**]	0.10[NS]	0.63[**]
Ground cover		0.12[NS]		0.06[NS]

NS = Not significant.
**Significant at the 0.01 probability level.

Days to flowering

The mean number of days from planting to flowering for the 40 accessions was 174, with a range of 56 to 213 (Figure 1). The accessions can be classified as short-day plants since 87.5% flowered from October to December at Isabela under a daylength of 12 h or less. Similar flowering results were obtained by Sotomayor-Ríos et al. (1990) with six stylos at Isabela. Accessions 13, 15, 184, 1280, 1283, and 10136, evaluated in monthly plantings from February to July 1989, responded to planting dates as the onset of flowering varied from 238 (February planting) to 113 d (July planting). When planted in February (short days) and July (long days), accession 15 took 105 and 70 d to flower, respectively.

Dry matter yield

The mean squares (MS) for accessions, harvests, and the accession × harvest interaction were significant (P = 0.01) for DMY. At the 120-d harvest (September 8th), no significant differences were found among the 14 accessions with higher DMY, which ranged from 3,640 to 5,380 kg/ha. Accession 1102, the highest producer, had a daily DMY equivalent to 44.8 kg/ha (Table 3).

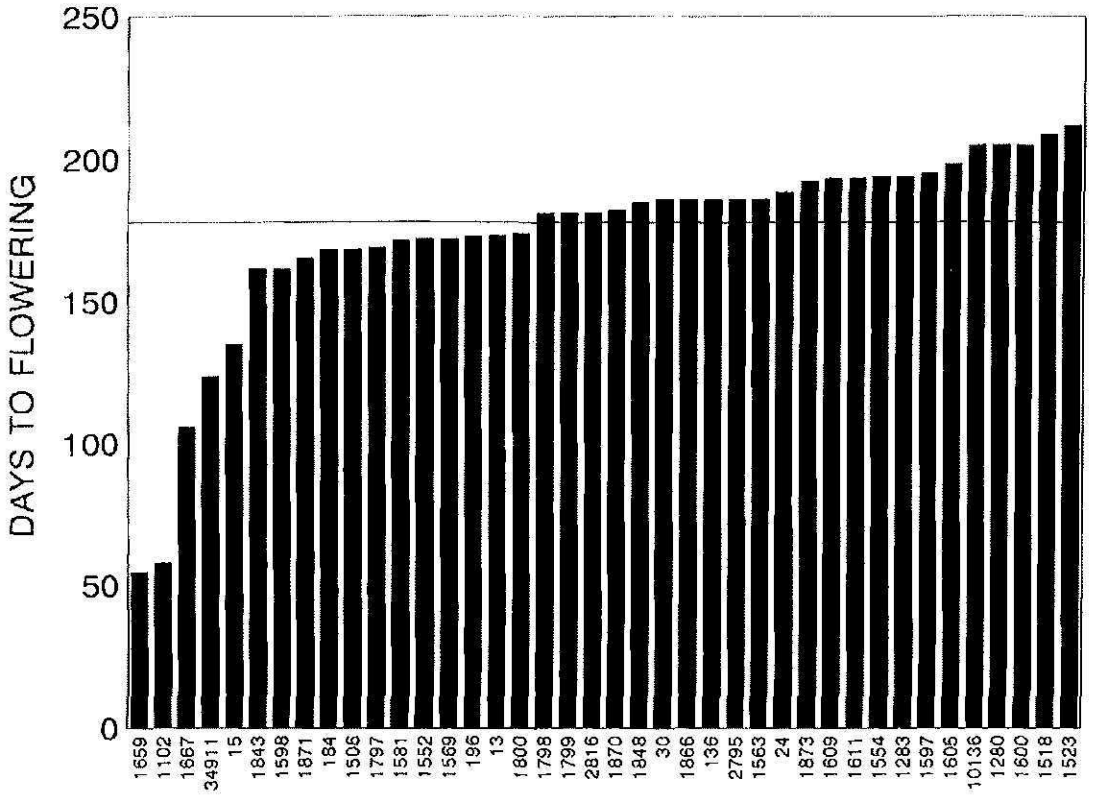

FIGURE 1. Days to flowering of 40 *Stylosanthes guianensis* accessions, Isabela, Puerto Rico, 1989-90.

TABLE 3.— *Dry matter yield of 40* Stylosanthes guianensis *accessions at five harvests at Isabela, Puerto Rico, 1989-90.*

Accession	Harvest (days)					
	120	1st 60	2nd 60	3rd 60	4th 60	Mean of 60 day harvests
	kg/ha					
13	4,050	2,240	1,240	1,970	2,160	1,900
15	4,190	2,860	1,070	2,110	1,850	1,970
24	1,330	2,400	430	560	870	1,070
30	1,230	2,920	1,060	1,530	1,160	1,670
136	3,840	2,900	1,980	2,160	1,510	2,140
184	4,260	2,340	770	1,120	1,360	1,400
196	4,960	3,340	1,910	1,140	1,420	1,950
1102	5,380	3,050	1,830	3,300	2,660	2,710
1280	1,400	2,090	520	2,350	1,910	1,702
1283	810	1,290	1,080	1,700	1,310	1,350
1506	2,050	2,910	1,170	960	1,400	1,610
1518	1,320	370	630	660	950	650
1523	1,500	1,740	1,520	1,190	1,190	1,410
1552	2,270	3,730	1,410	2,020	2,140	2,330
1554	3,050	3,110	1,150	1,030	1,670	1,740
1563	3,100	2,630	880	960	850	1,330
1569	5,040	2,760	990	1,320	2,060	1,780
1581	3,640	2,180	760	1,490	2,030	1,620
1597	3,870	2,360	1,170	870	740	1,290
1598	1,430	3,020	530	1,080	1,540	1,540
1600	1,060	2,020	290	160	580	760
1605	3,430	2,750	1,470	2,020	1,700	1,990
1609	1,450	2,550	1,480	1,240	810	1,520
1611	970	2,630	510	1,220	290	1,160
1659	870	250	630	306	460	412
1667	3,730	2,600	900	1,180	1,210	1,470
1797	4,120	3,170	1,160	1,900	1,290	1,880
1798	4,580	3,390	1,550	1,600	1,210	1,940
1799	2,930	3,020	1,320	2,110	830	1,820
1800	3,870	3,380	980	1,720	1,240	1,830
1843	2,360	2,400	1,160	950	480	1,250
1848	2,080	2,620	650	1,020	440	1,180
1866	1,620	3,270	2,070	1,920	1,050	2,080
1870	2,320	2,500	960	1,500	1,430	1,600
1871	3,590	2,020	1,290	1,130	1,960	1,600
1873	360	2,950	690	850	340	1,210
2795	1,670	2,300	1,350	1,420	870	1,490
2816	2,430	2,210	1,380	1,270	740	1,400

TABLE 3.– *(Continued) Dry matter yield of 40* Stylosanthes guianensis *accessions at five harvests at Isabela, Puerto Rico, 1989-90.*

	Harvest (days)					
Accession	120	1st 60	2nd 60	3rd 60	4th 60	Mean of 60 day harvests
10136	1,583	170	1,500	1,170	590	860
34911	4,200	2,420	1,320	1,700	2,130	1,890
Mean	2,695	2,470	1,120	1,402	1,260	1,563
LSD = 0.05	1,760	1,060	770	960	1,080	510

The mean DMY of the accessions at the first 60-d harvest (November 8th) was 2,470 kg/ha. There were no significant differences among the 17 higher yielding accessions, which had a DMY ranging from 2,750 to 3,730 kg/ha. Accession 1552, the highest producer, had a daily DMY equivalent to 62.2 kg/ha. At the second 60-d harvest (January 8th), the mean DMY of the accessions was 1,120 kg/ha. No significant differences were determined among the 14 higher yielding accessions, which had a DMY ranging from 1,320 to 2,070 kg/ha. These yields were the lowest of all the harvests and coincided with the short, dry, cool days of December and January at Isabela. At this harvest, accession 1866, the highest producer, had a daily DMY equivalent to 34.5 kg/ha. The mean DMY of the 40 accessions at the third 60-d harvest (March 8th) was 1,402 kg/ha. There was no significant difference between the DMY of the two top accessions, 1280 and 1102, which had yields of 2,350 and 3,300 kg/ha, respectively. At the fourth 60-d harvest (May 8th), mean DMY of the accessions was 1,260 kg/ha. No significant DMY differences were found among the 11 accessions with higher DMY, which ranged from 1,670 to 2,660 kg/ha. Accession 1102, the highest producer, had a daily DMY equivalent to 43.3 kg/ha.

The mean DMY of the accessions harvested every 60 d was 1,563 kg/ha. The highest producer, accession 1102, had a value of 2,710 kg/ha. By extrapolation, this accession would be capable of producing 16,445 kg/ha of DMY on a yearly basis.

Nutritive value

The MS for accession and harvests was significant (P = 0.01) for CP concentration. The mean CP concentration of the 40 accessions at the 120-d harvest was 17.3% (Table 4). Accessions 1598 and 1554 had the significantly highest CP concentrations (23.3%). Mean CP concentra-

TABLE 4.— *Crude protein concentration of 40* Stylosanthes guianensis *accessions at five harvests, Isabela, Puerto Rico, 1989-90.*

Accession	Harvest (days)					
	120	1st 60	2nd 60	3rd 60	4th 60	Mean of 60-day harvests
	%					
13	17.0	15.7	16.0	19.2	17.1	17.0
15	17.1	15.5	14.5	17.5	16.9	16.1
24	16.0	16.3	16.8	16.3	16.9	16.6
30	21.0	17.4	17.1	17.5	18.4	17.6
136	17.2	17.7	15.8	19.9	18.2	17.9
184	16.8	16.1	16.8	17.9	15.8	16.7
196	15.3	15.5	17.1	16.3	17.0	16.5
1102	15.1	15.1	17.0	17.0	16.3	16.4
1280	16.2	15.7	15.4	16.1	16.3	15.9
1283	15.6	14.9	16.1	15.3	16.7	15.8
1506	21.0	15.7	16.0	16.4	16.2	16.1
1518	15.1	14.0	15.2	13.8	15.8	14.7
1523	17.3	15.7	15.7	16.4	17.1	16.2
1552	18.5	14.5	15.8	17.9	16.4	16.1
1554	23.3	14.7	15.8	15.1	14.2	14.9
1563	15.9	16.1	16.2	17.4	17.0	16.6
1569	15.2	16.0	16.3	17.3	16.1	16.4
1581	16.3	13.9	16.4	16.7	15.5	15.8
1597	14.5	17.3	16.2	16.2	16.2	16.5
1598	23.3	17.0	15.9	19.8	20.6	18.3
1600	21.1	16.3	17.2	15.7	14.4	15.9
1605	15.8	15.5	16.3	16.2	16.1	16.0
1609	16.3	15.3	15.6	14.9	16.3	15.5
1611	18.7	14.6	14.0	14.8	14.7	14.8
1659	13.7	12.2	13.6	12.0	12.6	12.6
1667	17.3	15.5	16.5	16.8	16.3	16.3
1797	15.6	14.4	16.4	18.3	15.3	16.1
1798	18.8	15.1	16.6	17.2	16.6	16.4
1799	17.6	14.7	16.4	16.8	15.6	16.1
1800	16.6	14.2	15.7	17.9	17.4	16.3
1843	17.2	17.1	16.7	16.1	17.6	16.9
1848	17.2	18.1	16.9	17.1	18.3	17.6
1866	21.1	20.0	15.9	18.3	16.8	17.0
1870	18.3	15.9	17.4	18.3	17.2	17.2
1871	16.9	17.2	15.8	17.8	17.3	17.0
1873	19.7	16.5	17.1	15.4	17.0	16.5
2795	21.7	17.0	17.0	15.9	16.4	16.6
2816	17.4	17.5	16.1	17.9	18.2	17.4

TABLE 4.— *(Continued) Crude protein concentration of 40* Stylosanthes guianensis *accessions at five harvests, Isabela, Puerto Rico, 1989-90.*

	Harvest (days)					
Accession	120	1st 60	2nd 60	3rd 60	4th 60	Mean of 60-day harvests
10136	16.6	15.5	16.0	15.4	16.6	15.9
34911	15.0	17.5	16.6	18.8	18.7	17.2
Mean	17.3	15.8	16.2	16.9	16.8	16.4
LSD = 0.05	1.5	1.9	2.1	1.9	2.7	1.1

tion at the first 60-d harvest was 15.8%; accession 1866 had the highest value (20.0%). Mean CP concentration at the second 60-d harvest was 16.2%. No significant differences were found among the stylos for this trait, but accessions 15, 1611 and 1659 had somewhat lower concentrations. Mean CP concentration at the third 60-d harvest was 16.9%. No significant differences were determined among the 11 accessions which had higher concentrations, ranging from 17.9 to 19.9%. At the fourth 60-d harvest, the mean CP concentration was 16.8%. There were no significant differences among the top six accessions, which had CP concentration values ranging from 18.2 to 20.6%. These CP concentrations were, in many instances, superior to those reported by Valencia et al. (1996) in rhizoma perennial peanut (*Arachis glabrata* Benth.) harvested at the Isabela ARS farm.

There were differences (P = 0.01) in IVDMD among accessions and harvests. At the 120-d harvest, the mean IVDMD of the accessions was 52.7%. There were no significant differences among the six accessions having higher IVDMD, which ranged from 58.3 to 62.7% (Table 5). At the first 60-d harvest, the IVDMD mean of the accessions was 51.3%. No significant differences were found among the 14 accessions with higher IVDMD values ranging from 54.0 to 61.6%. At the second 60-d harvest, the mean of the accessions was 53.9% with no significant differences among 21 accessions having superior IVDMD values ranging from 54.2 to 63.2%. The mean IVDMD of the accessions at the third 60-d harvest was 53.8%. Among the six accessions with high IVDMD there were no significant differences, with values ranging from 60.2 to 65.1%. The mean IVDMD of the accessions at the fourth 60-d harvest was 50.4%, and no significant differences were found among the 13 accessions having levels of IVDMD above 51.5%. The mean IVDMD over four 60-d harvests was similar to that of the first 120-d harvest (52.7%). No significant differences were detected among the five highest ranking

TABLE 5.— In vitro *dry matter digestibility of 40* Stylosanthes guianensis *accessions at five harvests, Isabela, Puerto Rico, 1989-90.*

Accession	Harvest (days)					
	120	1st 60	2nd 60	3rd 60	4th 60	Mean of 60-day harvests
	%					
13	56.0	47.9	57.6	50.1	48.8	51.1
15	56.0	51.3	56.7	49.6	47.4	51.2
24	47.5	50.5	53.9	55.4	52.6	53.1
30	54.5	49.2	48.4	52.5	46.0	49.0
136	60.4	53.0	54.7	49.6	47.1	51.1
184	53.2	51.9	51.2	49.3	50.8	50.8
196	57.0	61.6	52.3	53.0	45.4	50.6
1102	51.2	54.8	55.1	49.5	50.4	52.5
1280	57.3	57.0	63.2	61.3	56.8	59.6
1283	56.9	58.4	58.3	61.4	57.8	59.0
1506	53.4	59.6	59.6	60.2	54.4	58.5
1518	62.6	57.0	63.2	65.1	58.9	60.8
1523	51.7	61.6	62.1	57.4	54.1	58.8
1552	44.7	55.5	55.8	49.7	50.5	52.9
1154	52.0	55.6	51.3	51.2	51.3	52.3
1563	57.3	54.0	57.6	51.7	50.9	53.6
1569	51.7	55.6	55.8	52.6	48.9	53.2
1581	58.3	56.9	49.2	46.3	47.9	49.4
1597	61.0	49.4	54.2	53.9	49.2	51.7
1598	62.7	48.6	56.2	49.8	47.5	50.5
1600	47.5	53.2	54.6	53.8	50.4	53.0
1605	46.6	52.9	52.4	53.2	50.9	53.4
1609	51.4	48.4	53.7	49.5	53.9	51.3
1611	51.5	54.5	55.3	56.1	52.3	54.5
1659	59.7	58.5	48.5	57.0	53.5	54.4
1667	50.6	48.6	50.4	49.5	52.5	50.2
1797	51.5	47.7	53.4	48.6	52.0	50.4
1798	48.9	47.2	54.2	52.6	51.6	51.4
1799	49.0	47.9	56.1	57.3	51.0	53.1
1800	49.5	48.9	46.9	47.9	46.2	47.4
1843	55.6	47.2	44.9	56.8	45.7	48.6
1848	48.2	47.9	51.6	56.8	47.9	51.1
1866	46.5	47.6	49.2	54.6	47.7	49.8
1870	50.8	46.5	54.8	51.9	51.8	51.3
1871	48.4	43.0	52.0	49.6	51.5	49.0
1873	48.3	51.4	47.2	55.1	47.7	50.6
2795	48.5	48.8	53.3	64.5	50.8	54.4
2816	49.3	45.3	54.6	58.4	49.0	51.8

TABLE 5.– *(Continued)* In vitro *dry matter digestibility of 40* Stylosanthes guianensis *accessions at five harvests, Isabela, Puerto Rico, 1989-90.*

	Harvest (days)					
Accession	120	1st 60	2nd 60	3rd 60	4th 60	Mean of 60-day harvests
10136	55.5	48.6	56.6	63.2	50.6	55.1
34911	47.4	42.4	48.0	47.6	45.2	45.8
Mean	52.7	51.3	53.9	53.8	50.4	52.4
LSD = 0.05	4.2	8.2	9.2	6.0	7.4	4.3

accessions with values ranging from 58.5 to 60.8%. Extreme variations in the IVDMD of stylo, from 20.0 to 70.0%, have been reported (Little et al., 1984). Kretschmer and Brolmann (1984) reported IVDMD values of 56.0 to 70.5%. Fifteen stylos evaluated in Puerto Rico on an Ultisol had mean IVDMD values which ranged from 47.4 to 67.2% (Arias-Pedraza et al., 1990). In Puerto Rico, also differences in IVDMD (P = 0.05) were noted between February and May but not between June and July plantings (Sotomayor-Ríos et al., 1990).

This study provides information on agronomic characteristics of 40 stylo accessions which could be useful in an initial breeding and selection program for this forage legume in Puerto Rico and similar areas. Wide differences were observed among the 40 accessions for most of the traits studied, especially for DMY, CP concentration and IVDMD. The mean DMY of accessions 1102 and 1552 at the four 60-d harvests was significantly higher than that of the other forage legumes, with 2,710 and 2,330 kg/ha, respectively (Table 3). Theoretically, stylo accession 1102 would have the capacity to produce 16,260 kg/ha annually and 45 kg/ha/d of dry matter. These values are lower than those reported by Valencia et al. (1996) for rhizoma perennial peanut accession 17097, which theoretically has the capacity to produce corresponding values of about 25,000 and 68.5 kg/ha of dry matter based on 6-wk cutting intervals. The mean CP concentration of the stylo accessions at the four 60-d harvests was 16.4% (Table 4). The means of accessions 30, 136, 1598, 1848, 1870, 2816, and 34911 were significantly higher than those of the remaining stylos and ranged from 17.2 to 18.3%. These CP values compare favorably with those reported by Valencia et al. (1996) for rhizoma perennial peanut harvested at 6-wk cutting intervals. The mean IVDMD of the 40 accessions was 52.4% (Table 5). Accessions 1280, 1283, 1506, 1518 and 1523 had significantly higher values, which ranged from 58.5 to 60.8%. These results compare favorably with those

reported by Valencia et al. (1996) for rhizoma perennial peanut harvested at 6-wk cutting intervals.

In this preliminary study, superior stylos in terms of yield and nutritive value were identified. These forage legumes deserve further testing in protein banks, grass/legume associations or as dried, conserved material to augment animal production in the tropics.

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