COMPARISON OF STYLO (*STYLOSANTHES GUIANENSIS* VAR GUIANENSIS) CULTIVARS IN THE MARKHAM VALLEY OF PAPUA NEW GUINEA

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ABSTRACT

Two new cultivars of the pasture legume, Stylosanthes guianensis *var. guianensis, Cook and Endeavour were compared with the cultivar Schofield in pure and mixed sward with grass under low (1,250 mm) and high (2,800 mm) rainfall conditions in the Markham Valley of Papua New Guinea. Performances of the three cultivars were similar and the differences between their dry matter yields were not significant. They combined well with the companion grasses and the mean percentage of legume in the dry matter was 48, 54 and 52 for Cook, Endeavour and Schofield respectively. All the three cultivars responded to the application of phosphorus and sulphur.*

INTRODUCTION

Stylosanthes guianensis var. guianensis has shown promise as a forage legume in many tropical and subtropical countries (Vivian 1959, Adegbola 1965, Humphreys 1969, Harding and Cameron 1972). Stylo is also grown in Papua New Guinea in both lowlands and highlands and shows considerable promise for oversowing into natural grasslands to improve their productivity for cattle grazing (Chadhokar 1977).

Although there is no recorded evidence, the Stylo cultivar found in Papua New Guinea is undoubtedly Schofield which was probably introduced from Australia during the early 1950s. Recently in Australia two new cultivars, Cook and Endeavour, have been released which were found superior to Schofield in Queensland (Harding and Cameron 1972). The new cultivars were introduced to Papua New Guinea in 1973 for trial first in the highlands. For further information on their performance in the year round hot and humid lowland environment, trials were conducted in the Markham Valley, under both low and high rainfall conditions, to compare the three cultivars in pure and mixed swards with grass. The results on dry matter yield are presented in this paper.

MATERIALS AND METHODS

Three experiments were conducted during 1974-76, two under low rainfall conditions (1,250 mm) at the Beef Cattle Research Centre Erap (45 km from Lae) and the third under high rainfall conditions (2,800 mm) at the Plant Industry Centre Bubia (15 km from Lae) in the Markham Valley. The soils at the first site were sandy loam with low fertility, while at the second site they were clay loam with moderate fertility. The rainfall during the growing season is available for Erap and is presented in *Figures 1* and *2*. There is little or no difference between day temperatures at both sites (average temperature at 3:00 pm about 29°C) but the humidity is higher at Bubia.

Experiment 1—Performance of Stylo cultivars in pure sward at Erap

Pure swards of Stylo cultivars were established in April 1974 with inoculated

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seed planted at 30 x 30 cm spacing in a randomised block design with four replicates. No fertilization was done during the experimental period. A uniform stand was obtained and dry matter yield was estimated by sampling every six weeks starting 70 days after planting. Four 50 x 50 cm quadrates were cut per plot from random positions at 15 cm height and the plots were cut back to the same height with bush knives. Samples were dried at 80°C for 48 hours before weighing.

Experiment 2—Performance of Stylo cultivars in a mixed sward at Erap

Stylo cultivars were planted in April 1974 in a mixed sward with a common grass *Paspalum plicatulum* var Rodds Bay in alternate rows at the same plant spacing as in Experiment 1. The experiment was conducted in a split plot design with four replicates with Stylos in main plots and fertilizer treatments in subplots. Stylos were planted with inoculated seed while the grass was planted from seedlings. The Stylos were slow to establish and the grass had to be topped off at 4 weeks after planting to avoid smothering of Stylos. Phosphorus as triple super and sulphur as sulphur powder were applied at 50 and 40 kg per ha respectively and were raked into the soil before planting. Dry matter yield was estimated 70 days after planting as in Experiment 1 and the samples were separated for botanical composition before drying.

Experiment 3—Performance of Stylo cultivars in a mixed sward at Bubia

Stylos with a common grass *Brachiaria dictyoneura* were established at the Plant Industry Centre Bubia in March 1975. Basal dressings of phosphorus, potash and sulphur at 50, 50 and 20 kg per ha respectively were applied before planting. Stylo seed and grass cuttings were planted at the same spacing as in Experiment 2 in a randomised block design with five replicates. Dry matter yield and botanical composition were estimated as in Experiment 2, starting 70 days after planting.

RESULTS

Experiment 1

The results on dry matter yields are presented in *Table 1* and *Figure 1*. No significant differences were obtained between the Stylo cultivars and their yields were comparable.

Experiment 2

In a mixed sward, although no significant differences were obtained between the Stylo cultivars, Cook gave the lowest yield of dry matter (*Table 2a*). Growth of Stylo cultivars appeared to have been influenced by rainfall variation (*Figure 2*). Endeavour gave higher yields following heavy rainfall (e.g. harvests 5, 7 and 8) and these differences were significant when the grouped data on various harvests were analysed according to rainfall variation. Percentages of legumes in the total dry matter averaged 43, 50 and 50 for Cook, Endeavour and Schofield respectively.

Table 1.—**Total dry matter yield of Stylo cultivars in pure sward at Erap over 22 months growing period**

Stylo cultivars	Dry matter yield (kg per ha)
Cook	21,623 a
Endeavour	19,389 a
Schofield	22,364 a

Values followed by the same letter do not differ at $P \leqslant 0.05$.

Figure 1. — **Dry matter yield of Stylo cultivars in a pure sward at Erap**

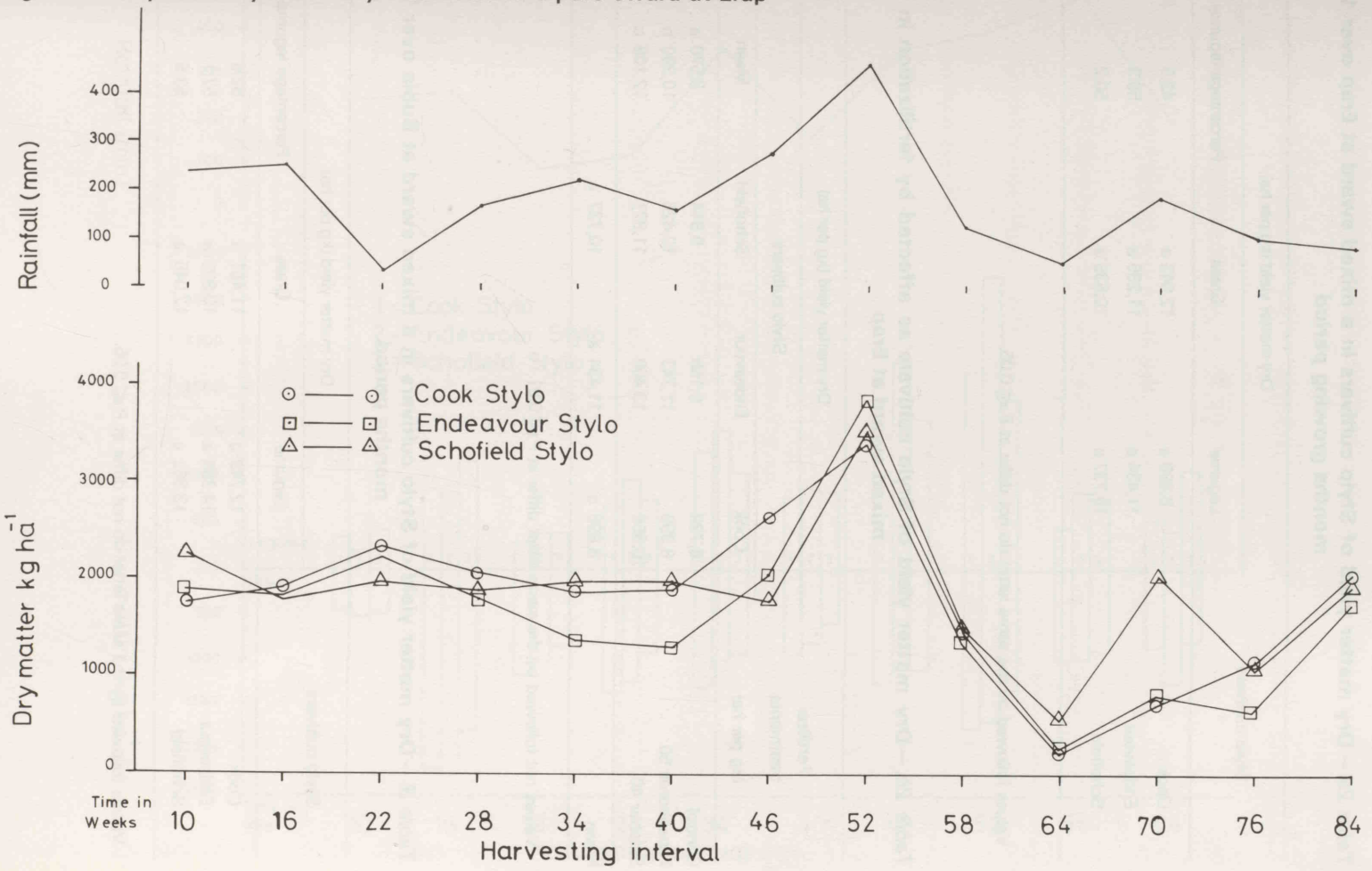


Table 2a. — **Dry matter yield of Stylo cultivars in a mixed sward at Erap over 17 months growing period**

Stylo cultivars	Dry matter yield (kg per ha)		
	Legume	Grass	Percentage legume
Cook	8,898 a	12,043 a	42.5
Endeavour	11,434 a	11,285 a	50.3
Schofield	10,737 a	10,639 a	50.2

Values followed by the same letter do not differ at $P \leq 0.05$.

Table 2b. — **Dry matter yield of Stylo cultivars as affected by fertilization in a mixed sward at Erap**

Fertilizer treatments (kg per ha)	Dry matter yield (kg per ha)			
	Stylo cultivars			
	Cook	Endeavour	Schofield	Mean
Control	6,738	9,158	9,814	8,570 a
Phosphorus 50	8,999	11,743	10,426	10,390 b
Sulphur 40	10,956	13,400	11,971	12,109 c
Mean	8,898 a	11,434 a	10,737 a	

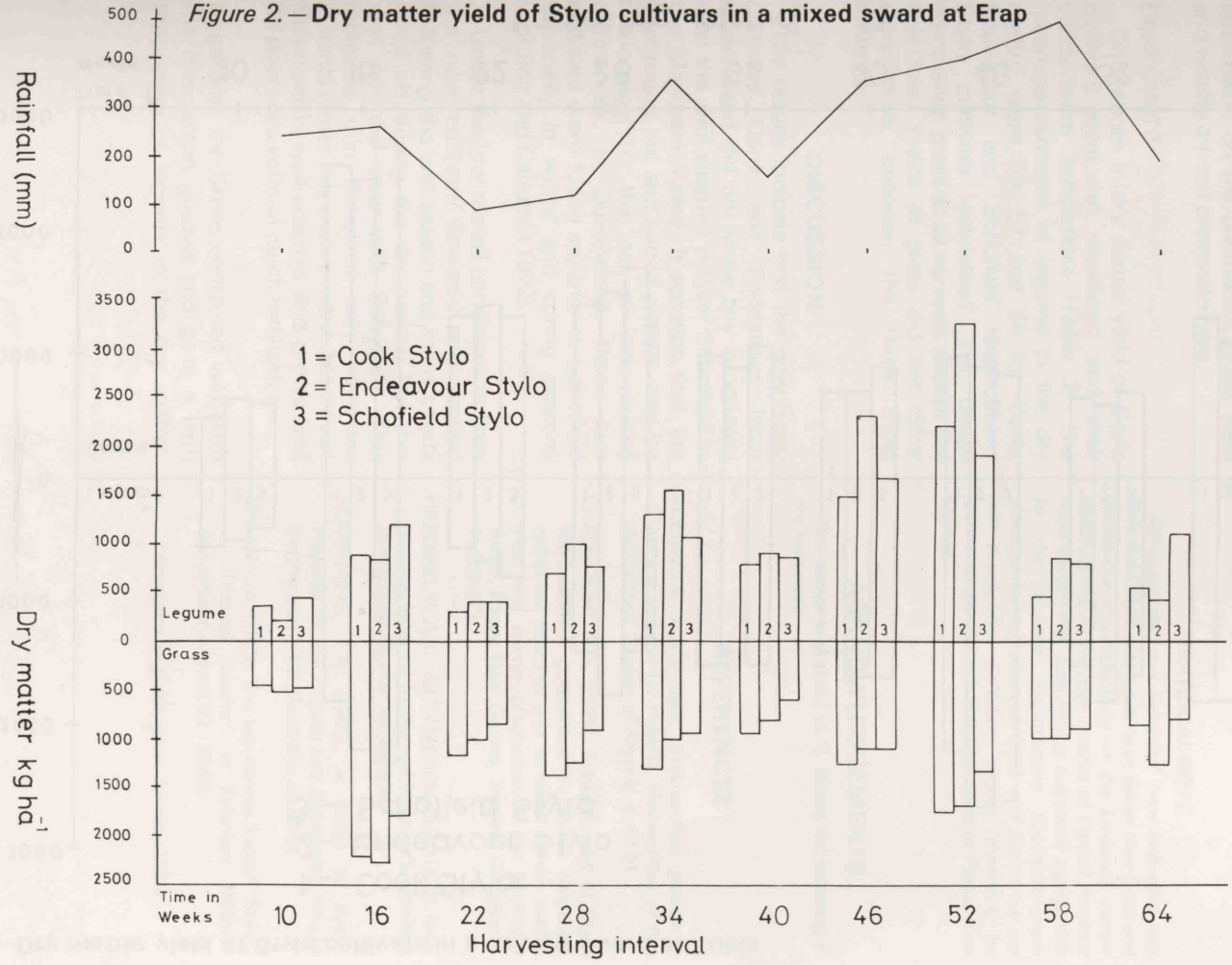
Values not followed by the same letter differ at $P \leq 0.01$

Table 3. — **Dry matter yield of Stylo cultivars in a mixed sward at Bubia over 16 months period**

Stylo cultivars	Dry matter yield (kg per ha)		
	Legume	Grass	Percentage legume
Cook	12,748 a	11,461 a	52.6
Endeavour	14,386 a	10,803 a	57.1
Schofield	13,862 a	12,045 a	53.5

Values followed by the same letter do not differ at $P \leq 0.05$.

Figure 2.—**Dry matter yield of Stylo cultivars in a mixed sward at Erap**



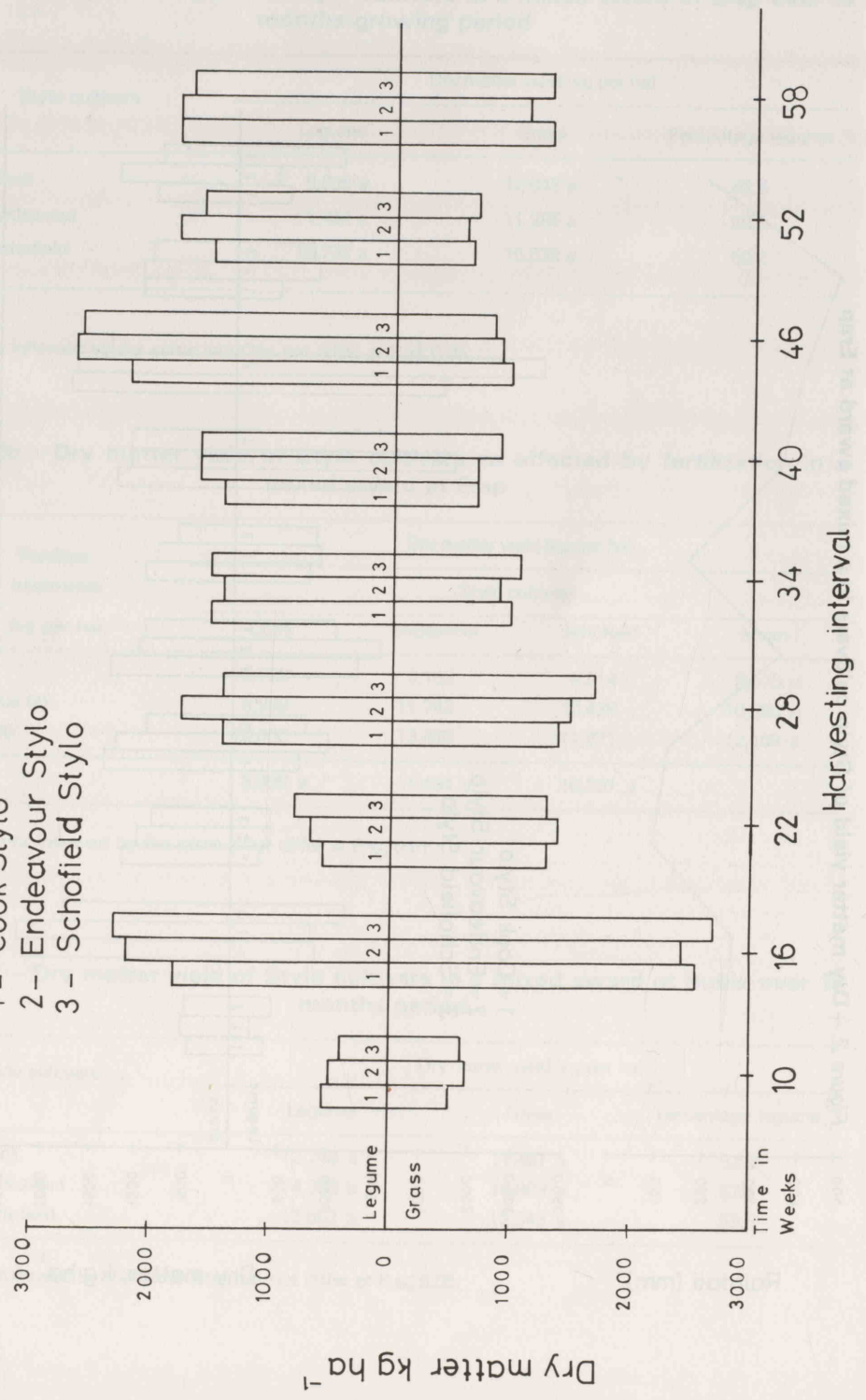


Figure 3.—**Dry matter yield of Stylo cultivars in a mixed sward at Bubia**

Application of phosphorus and sulphur gave a significant increase in the dry matter yield (*Table 2b*) but interaction between Stylo cultivars and fertilizer was not significant. There was no effect of fertilization on the companion grass yield and results are not presented here.

Experiment 3

Differences in dry matter yield of Stylo cultivars were not significant and their yields were comparable (*Table 3*). The mean percentages of legume in the dry matter were 53, 57 and 54 for Cook, Endeavour and Schofield respectively. Stylo cultivars outyielded the dense companion grass at all harvests except the first four. Yields of grass did not differ significantly between the three Stylo cultivars.

DISCUSSION

The results indicate that the new Stylo cultivars Cook and Endeavour from Queensland did not show any superiority over the well adapted cultivar Schofield in the Markham Valley. It appears that the year round hot and humid climate may be responsible for the lack of inter-varietal differences. In Queensland, these two cultivars were found superior to Schofield especially in winter and spring seasons (Harding and Cameron 1972).

Under the low rainfall conditions at Erap the new cultivars flowered and seeded following the wet season and many plants dried off during the dry period, but this was not the case with Schofield. This indicates that Schofield may be more suitable under this environment. Moreover, Schofield is well adapted and grows well on poor soils without much fertilization.

In general, the Stylos combined well with the companion grasses and gave a high proportion of legume in the dry matter. This indicates that there is a good potential for Stylo in some areas of the Markham Valley, however, further studies are warranted to measure its performance under grazing.

EDITORIAL NOTE

*Although the trial recorded here indicated that Schofield Stylo was equal to or better than Cook and Endeavour in productivity in the lowlands, recent observations in the Rigo District of Central Province have shown that Schofield is extremely susceptible to the disease anthracnose (*Colletotrichum gloeosporioides*), whereas Cook and Endeavour are less susceptible. Schofield cannot, therefore, be recommended for use in wetter areas of Papua New Guinea.*

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REFERENCES

ADEGBOLA, A.A. (1965). *Stylosanthes gracilia* a tropical legume for Nigeria. *Proceedings of the Agricultural Society of Nigeria,* 4: 57-61.

CHADHOKAR, P.A. (1977). Establishment of Stylo (*Stylosanthes guianensis*) in Kunai (*Imperata cylindrica*) pastures and its effect on dry matter yield and animal production in the Markham Valley, Papua New Guinea. *Tropical Grasslands,* 11:263-272.

HARDING, W.A.T. and CAMERON, D.G. (1972). New pastures legumes for the wet tropics. *Queensland Agricultural Journal*, 98:394-406.

HUMPHREYS, L.R. (1969). *A Guide to Better Pastures for the Tropics and Subtropics.* Wright Stephenson & Co., Australia. pp.59-61.

VIVIAN, L.A. (1959). The leguminous fodder "Stylo" or "Tropical Lucerne" in Kelantan. *Malayan Agricultural Journal*, 42:183-98.

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