Dry matter production of tropical grasses and legumes in Thailand

A total of fifty species or strains of tropical grasses and legumes was introduced and annual dry matter yields as well as seasonal distribution of yields were determined in 1973 and 1974 at the Forage Crop Station, Pakchong, in Thailand.

The species and strains tested in 1974 are listed in Table 1, together with information of source of seeds, amount of fertilizer applied, and number of cuttings practiced. In Table 2 annual dry matter yields in 1973 and 1974 are shown.

There are twenty species which yielded more than 20 ton/ha in 1974. Maximum dry matter yields were recorded with Napier grass in 1973 and 1974. At a high level of fertilizer application the yield of this species reached 75.6 ton/ha in 1974. Though this figure is slightly lower than the figures recorded in Puerto Rico and El Salvador[1], this is one of the highest record of dry matter yields in the tropical grassland throughout the world. Although the yield of Hybrid Napier grass was lower than that of Napier grass, it was ranked second and third highest producer in 1974 and 1973, respectively.

As a tall, erect type grass, Jaragua grass showed rather high yield. Among the group of bunch or semi-bunch type, species or strains which showed high yields were Buffel grass (Molopo), Guinea grass (Gatton panic), Blue panic grass, Colored Guinea grass (Komatipoot), Buffel grass (Common type), Rhodes grass (Gunson), Green panic grass, Colored Guinea grass (Kravirond) and Rhodes grass (Pioneer).

It is apparent that *Panicum* species including Guinea grass is one of high producers in the tropical grasses. Several *Panicum* species have been grown in the tropical and subtropical regions of the world, and the popularity of the species has been increasing in recent years, replacing some unpalatable species such as Rhodes grass. At Pakchong, Yoshiyama[2] and Ono[3] found that all *Panicum* species tested showed high dry matter production. It can be said that as a bunch or semi-bunch type of grasses, *Panicum* species are one of the most hopeful grasses in Thailand.

As to decumbent type of grasses, Signal grass (decumbent type) showed a good record of yield, although Signal grass (erect type) also gave a high yield, 42.9 ton/ha. Other decumbent grasses, Para grass and Alabang X, also exceeded 20 ton/ha. These decumbent grasses form a dense ground cover which protects soil from erosion, invasion of weeds and are resistant to frequent grazing. Once pasture of decumbent grasses is established, there will be a productive, persistent and easy-to-manage grassland. Although the maximum yield of dry matter was obtained by a tall, erect type of grass such as Napier grass, it is rather doubtful to grow such type of grass for animal grazing. When pastures for beef cattle grazing are considered, these decumbent grasses will be important in tropical regions.

All legumes showed rather low dry matter yield. None of them but Glycine exceeds 10 ton/ha. Further studies are needed to find high yielding species or strains and better management.

In general, high yielding species respond to high level of fertilizer. There are some species showing less or no response to fertilizer. Even in the high yielding species, some ones such as Buffel grass (Molopo) and Buffel grass (common type) showed less or sometimes negative response to high fertilizer application. Wilson, J. R.[4] stated that "the tropical grasses grow better than the temperate grasses at low nutrient combinations but the reverse was true for the high nutrient combination". Some important physiological differences between tropical and temperate grasses may exist. More work on this point is required.

The seasonal distribution of dry matter yield is shown in Fig. 1. There are two

Table 1. Species and strains tested

Plant materials	Obtained from	Fertilizer application (kg/ha)	Cuttings in 1974
Signal, Erect (*Brachiaria brizantha*)	P	240	6
Signal, Decumbent (*B. decumbens*)	P	240	6
Para grass (*B. mutica*)	P	240	6
Buffel grass; Molopo (*Cenchrus ciliaris*)	J	240	6
Buffel grass (*C. ciliaria*)	P	240	6
Rhodes grass, Gunson (*Chloris gayana*)	J	240	6
Rhodes grass, Pioneer (*C. gayana*)	J	240	6
Ribbed paspalum (*Paspalum malacophllum*)	J	240	6
Star grass (*Cynodon plectochyus*)	P	240	6
Alabang X (*Dichanthium aristatum*)	P	240	6
Pangola grass (*Digitaria decumbens*)	P	240	6
Weeping lovegrass, Ermelo (*Eragrostis curvula*)	J	240	6
Wilman's lovegrass (*E. superba*)	P	240	6
Jaragua grass (*Hyparrhenia rufa*)	P	240	6
Blue panic grass (*Panicum antidatale*)	J	240	6
Blue panic grass (*Panicum antidotale*)	P	240	6
Colord Guinea grass, Komatipoot (*Panicum coloratum*)	J	240	6
Colord Guinea grass, Kravirond Uganda (*P. coloratum*)	J	240	6
Dallis grass, Kyushu No. 4 (*Paspalum dilatatum*)	J	240	6
Browntop millet (*Paspalum plicatuium*)	J	240	6
Guinea grass, Gatton panic (*Panicum maximum*)	J	240	6
Guinea grass, Gatton panic (*P. maximum*)	P	240	6
Green panic (*Panicum maximum var. trichoglum*)	J	240	6
Scrobic grass (*Paspalum commersonii*)	P	240	6
Dallis grass, La B-230 (*Paspalum dilatatum*)	J	240	6
Brunswick grass (*Paspalum nicorae*)	J	240	6
Bahia grass, Nanpu (*Paspalum notatum*)	J	240	6
Biscuit grass (*Paspalum vaginatum*)	J	240	6
Hybrid Napier grass (*Pennisetum purpurcophoides*)	P	240	6
Napier grass (*Pennisetum purpureum*)	P	240	6
Nandi setaria (*Setaria sphacelata*)	J	240	6
Guatemala grass (*Tripsacum laxum*)	P	240	6
Centrosima (*Centrosima pubecens*)	J	240	6
Centrosima (*C. pubecens*)	P	240	6
Silver leaf desmodium (*Desmodium uncinatum*)	J	200	5
Dolichos lablab (*Dolichos lablab*)	P	200	5
Glycine (*Glycine wightii*)	P	240	6
Vasey grass (*Paspalum unvillei*)	J	240	6
Stylo (*Stylosanthes guyanensis*)	P	200	5
Siratro (*Phaseolus atropurpurreus*)	J	240	6
Siratro (*P. atropurpureus*)	P	240	6

Note: Seed source P : Pakchong
J : Japan
A : Australia

Fertilizer applied at high rate is indicated. Application at low level was also practiced (1/2 of high rate), but not shown in the Table.

Table 2. Annual dry matter yields in 1973 and 1974

	1973 ton/ha			1974 ton/ha		
	H	L	Av.	H	L	Av.
Napier grass	56.3	39.5	47.9	75.6	38.2	56.9
Hybrid Napier grass	34.3	31.1	32.7	47.9	38.6	43.2
Signal grass, Erect	23.1	13.0	18.1	51.5	34.4	42.9
Buffel grass, Molopo	14.4	17.6	16.0	38.9	36.5	37.7
Cuinea grass, Gatton panic P	20.8	12.5	16.7	36.9	29.3	33.1
Guinea grass, Gatton panic J	14.9	12.5	13.7	36.1	25.2	30.6
Blue panic grass P	12.9	6.7	9.8	41.2	19.7	30.5
Colored Guinea, Komatipoot	15.2	13.2	14.2	33.5	24.8	29.1
Buffel grass	9.0	7.0	8.0	30.7	27.2	28.9
Rhodes grass, Gunson	12.8	9.6	11.2	27.0	28.9	27.9
Green panic	14.6	8.4	11.5	33.2	21.7	27.5
Rhodes grass, Pioneer	13.9	8.7	11.3	26.0	27.1	26.6
Colored Guinea, Kravirond	13.0	11.2	12.1	27.5	23.7	25.6
Signal grass, Decumbent	24.0	21.7	22.9	27.9	22.6	25.2
Jaragua grass	10.6	10.5	10.6	24.9	23.2	24.0
Para grass	20.8	15.1	18.0	27.7	19.6	23.6
Alabang X	21.6	17.0	19.3	24.7	20.7	22.7
Willman's love grass	8.2	7.4	7.8	24.6	20.0	22.3
Brown top millet	18.4	11.3	14.9	24.8	17.1	21.0
Blue panic grass J	13.9	7.9	10.9	26.2	15.5	20.8
Vasey grass	8.3	4.5	6.4	22.7	14.3	18.5
Weeping love grass	6.1	5.7	5.9	17.4	16.3	16.9
Ribbed paspalum	12.9	7.0	10.0	18.1	13.1	15.6
Dallis grass, Kyushu No. 4	8.0	9.6	8.8	16.0	14.2	15.1
Dallis grass, La B-230	11.9	8.4	10.2	19.2	10.9	15.1
Guatemala grass	41.0	41.2	41.1	15.3	14.1	14.9
Star grass	8.7	12.9	10.8	16.1	12.0	14.0
Biscuit grass	11.6	7.7	9.7	15.6	11.1	13.4
Nandi setaria	8.1	11.3	9.7	10.3	13.9	12.1
*Glycine	7.7	8.5	8.1	11.4	9.9	10.7
Brunswick grass	4.5	4.1	4.3	14.1	7.0	10.6
Scrobic grass	12.9	15.1	14.0	8.0	11.1	9.5
Pangola grass	14.7	10.1	12.4	7.1	8.9	8.0
*Dolichos Lab lab	11.3	11.0	11.2	5.4	10.7	8.0
*Centrosima P	6.5	6.1	6.3	6.6	7.6	7.1
*Siratro P	8.1	6.9	7.5	6.0	7.2	6.6
*Siratro J	8.2	7.0	7.6	6.8	5.8	6.3
*Centrosima J	5.9	6.4	6.2	5.2	6.9	6.0
*Silver leaf desmodium	2.0	1.9	2.0	4.0	5.9	4.9
Bahia grass, Nanpu	2.5	2.5	2.5	4.4	4.1	4.3
*Stylo	7.8	7.2	7.5	3.8	3.9	3.9

Note: * indicates legume, H and L indicate high and low level of fertilizer application
Data of crops newly sown in 1974 are not included.

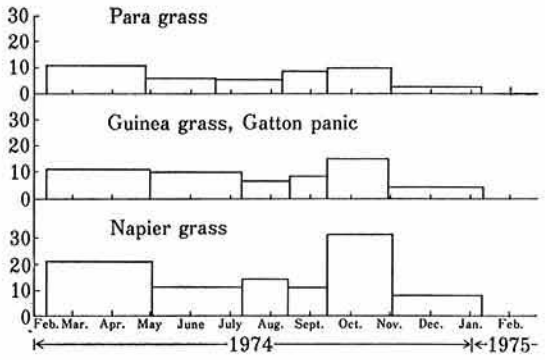

Fig. 1 Seasonal distribution of dry matter yield ($g/m^2/day$)

peaks in the dry matter yield in a year, namely March–April and September–October. As a typical example, data of Para grass, Guinea grass (Gatton panic) and Napier grass are shown in Fig. 1. Except few instances, the general pattern is similar for other species, and seems to be closely related to seasonal distribution of rainfall, suggesting an importance of irrigation to tropical grassland in developing animal industry.

In 1974, six times of cutting were carried out with majority of grasses. Except only few species such as *Dolichos lablab*, the regrowth of grasses and legumes were all fairly well showing no retarded regrowth by frequent cuttings. Apparently if water supply is enough, tropical grasses and legumes can fairly tolerate frequent cuttings.

1) Cooper, J. P.: *Herb. Abstr.* **40**: 1–15 (1970).
2) Yoshiyama, T.: Rept. to the N.R.C. of Thailand (1973).
3) Ono, S.: Rept. to the N.R.C. of Thailand (1974).
4) Wilson, J. R. & Haydock, K. P.: *Aust. J. Agr. Res.* **22**: 574–587 (1971).

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