

Table 4. Dry matter production from grass-legume swards at UBU, MUK and DET (Trial 1).

Treatment (Year)	Wet (97)			Dry (97-98)			Wet (98)			Dry (99)			Wet (99-00)			Dry (00)		
	G ²	L	T	G	G	L	T	G	G	G	G	G	G	G	G	G		
(t/ha) UBU ¹																		
Ruzi	9.4b ³	0.3bc	9.7bc	2.5d	22.6a	0.3c	22.9a	5.4a	9.5c	5.4a	9.5c	6.8a	6.8a	6.8a	6.8a	6.8a		
Signal	5.5c	2.2a	7.7cd	6.1a	20.3ab	0.7c	21.1ab	6.5a	9.6c	6.5a	9.6c	7.8a	7.8a	7.8a	7.8a	7.8a		
Jarra digit	6.1c	0.1c	6.2d	1.6d	16.7bc	1.8b	17.8bc	5.9a	10.3bc	5.9a	10.3bc	5.9a	5.9a	5.9a	5.9a	5.9a		
Ubon paspalum	10.2b	1.4ab	11.6ab	5.8ab	20.9a	0.2c	21.1ab	5.3a	12.9a	5.3a	12.9a	6.7a	6.7a	6.7a	6.7a	6.7a		
Plicatulum	13.4a	0.7bc	14.1a	5.2abc	16.2c	0.1c	16.3c	5.2a	12.4ab	5.2a	12.4ab	6.7a	6.7a	6.7a	6.7a	6.7a		
Purple guinea	5.1c	0.6bc	5.7d	3.5cd	23.6a	0.4c	24.0a	5.9a	10.6abc	5.9a	10.6abc	7.5a	7.5a	7.5a	7.5a	7.5a		
Splenda setaria	7.5bc	0.7bc	8.2cd	3.6bcd	22.7a	2.4a	25.1a	6.8a	9.9c	6.8a	9.9c	7.9a	7.9a	7.9a	7.9a	7.9a		
MUK ¹																		
Ruzi	12.4a	3.2b	15.7ab	4.9bc	19.1c	1.0b	20.1c	2.2dc	12.2b	2.2dc	12.2b	5.8c	5.8c	5.8c	5.8c	5.8c		
Signal	6.0b	5.8ab	11.8bc	7.7a	18.7c	0.8bc	19.5c	3.2bc	11.4b	3.2bc	11.4b	7.1b	7.1b	7.1b	7.1b	7.1b		
Jarra digit	5.4b	4.8ab	10.2c	5.0bc	22.3bc	0.5c	22.9bc	2.7cd	16.0ab	2.7cd	16.0ab	6.3bc	6.3bc	6.3bc	6.3bc	6.3bc		
Ubon paspalum	9.9ab	6.2a	16.1ab	7.0ab	26.3b	0.1c	26.4b	3.4b	17.5a	3.4b	17.5a	7.0b	7.0b	7.0b	7.0b	7.0b		
Plicatulum	13.6a	4.5ab	18.1a	4.5c	20.3c	0.1c	20.4c	2.3de	15.1ab	2.3de	15.1ab	4.7c	4.7c	4.7c	4.7c	4.7c		
Purple guinea	11.6a	6.8a	17.9a	7.6a	33.9a	1.1b	35.0a	4.2a	19.2a	4.2a	19.2a	12.4a	12.4a	12.4a	12.4a	12.4a		
Splenda setaria	8.6ab	5.1ab	13.7abc	3.5c	17.5c	2.1a	19.6c	1.7e	12.2b	1.7e	12.2b	4.7c	4.7c	4.7c	4.7c	4.7c		
DET ¹																		
Ruzi	5.6c	0.06b	5.66c	0.02b	— ⁴	—	—	—	—	—	—	—	—	—	—	—		
Signal	3.3c	1.7a	5.0c	0.7b	4.9b	0.4a	5.3b	6.8b	3.2bc	6.8b	3.2bc	0.4c	0.4c	0.4c	0.4c	0.4c		
Jarra digit	4.8c	0.05b	4.85c	0.04b	—	—	—	—	—	—	—	—	—	—	—	—		
Ubon paspalum	10.5ab	0.5b	11.0a	4.4b	14.6a	0.3a	14.9a	5.6b	10.2a	5.6b	10.2a	5.0a	5.0a	5.0a	5.0a	5.0a		
Plicatulum	13.0a	0.06b	13.06a	5.5a	13.9a	0.3a	14.2a	10.0a	6.1ab	10.0a	6.1ab	3.6b	3.6b	3.6b	3.6b	3.6b		
Purple guinea	5.7c	1.3ab	7.0bc	1.1b	2.5b	0.5a	3.0b	1.0c	1.3bc	1.0c	1.3bc	—	—	—	—	—		
Splenda setaria	9.6b	0.1b	9.7ab	4.5a	13.3a	0	13.3a	6.6b	9.6a	6.6b	9.6a	6.8a	6.8a	6.8a	6.8a	6.8a		

¹UBU = Ubon Ratchathani University Farm; MUK = Mukdahan Animal Nutrition Station; DET = Village in Det Udom district of Ubon Ratchathani Province.

²G = Grass; L = Legume; T = Total (G + L).

³Within columns and sites, means followed by a common letter are not significantly different at P=0.05 by Duncan's Multiple Range Test.

⁴Species not present.

plicatulum but at SAC, yield of Purple guinea was only half that of these 2 species. Tha Phra stylo died out in all plots at YAC and was present in plots at other sites only at the first sampling cut (Table 8). By the second dry season, it was no longer present in any plots at all sites.

The trials at SAC, YAC and UAC were terminated early in the second dry season following uncontrolled grazing or cutting. In the second dry season at UBU and YNS, Purple guinea produced higher dry matter yields than other species but these differences were significant only at UBU (Table 9).

Trial 3 — Evaluation of legumes

All legume species had achieved good plant densities at all sites at 6 weeks after sowing

(Table 10). Plant numbers of Llanos macro, Tha Phra stylo and Lee jointvetch were high at UBU.

In the first wet season, Lee American jointvetch at YAC produced 14 t/ha, nearly 3 times more than the second best legume, Llanos macro (Table 11). Llanos macro produced nearly twice the amount of dry matter of other legumes at UBU except for Lee jointvetch.

In the first dry season, Llanos macro and Tha Phra stylo were the best performing legumes at UBU and YNS, followed by Verano stylo (Table 11). At YAC, no dry season data were collected as all legume plots were heavily smothered with *Mimosa pudica*.

However, all legumes at YAC re-established from fallen seed in the second wet season. These new plants plus surviving plants grew well and

Table 5. Plant populations (6 weeks after sowing) of grass species and Tha Phra stylo at UBU, YNS, YAC, SAC and UAC (Trial 2).

Treatment	UBU ¹	YNS	YAC	SAC	UAC
(plants/m ²) Grass					
Ruzi	85c ²	95b	70bcd	61c	118b
Signal	43c	50b	20d	19c	46bc
Jarra digit	52c	47b	31d	25c	30c
Ubon paspalum	225b	228a	149ab	156a	232a
Plicatulum	351a	200a	188a	176a	270a
Purple guinea	85c	59b	45cd	54c	48bc
Splenda setaria	287ab	217a	122abc	111b	266a
Tha Phra stylo					
Ruzi	102a	69abc	50ab	67a	163ab
Signal	135a	113a	46ab	112a	237a
Jarra digit	150a	112ab	32b	78a	200ab
Ubon paspalum	144a	63bc	64ab	76a	131b
Plicatulum	168a	49c	39b	69a	122b
Purple guinea	125a	82abc	77a	63a	190ab
Splenda setaria	118a	99abc	43ab	92a	170ab

¹UBU = Ubon Ratchathani University Farm; YNS = Yasothon Animal Nutrition Station; YAC = Yasothon Agricultural Technology Farm; SAC = Sisaket Agricultural Technology College Farm; UAC = Ubon Ratchathani Agricultural Technology College Farm.

²Within columns and plant type, means followed by a common letter are not significantly different at P=0.05 by Duncan's Multiple Range Test.

Table 6. Dry matter production of grass species and Tha Phra stylo in the first wet season after planting at UBU, YNS, YAC, SAC and UAC (Trial 2).

Treatment	UBU ¹	YNS	YAC	SAC	UAC
(t/ha) Grass					
Ruzi	12.4ab ²	8.8abc	13.7a	3.4ab	6.8b
Signal	6.5bc	4.6cd	6.9b	0.6d	2.3cd
Jarra digit	4.6c	1.2d	4.2b	1.7cd	0.9d
Ubon paspalum	14.1a	9.8a	16.6a	4.4a	10.3a
Plicatulum	14.9a	9.2ab	13.4a	4.3a	9.7a
Purple guinea	13.5a	7.4abc	14.4a	2.1bc	5.0bc
Splenda setaria	9.3abc	5.0bcd	13.7a	2.2bc	6.3b
Tha Phra stylo					
Ruzi	0.87b	0.21b	0.06ab	0.38bc	0.05c
Signal	2.08a	0.68a	0.14ab	0.72a	1.44a
Jarra digit	1.81a	0.73a	0.05ab	0.17c	1.09ab
Ubon paspalum	0.79b	0.11b	0.09ab	0.34bc	0.34c
Plicatulum	0.63b	0.25b	0.03b	0.24c	0.29c
Purple guinea	1.94a	0.71a	0.24a	0.61ab	0.94b
Splenda setaria	1.15ab	0.32b	0.06ab	0.45abc	0.48c

¹UBU = Ubon Ratchathani University Farm; YNS = Yasothon Animal Nutrition Station; YAC = Yasothon Agricultural Technology Farm; SAC = Sisaket Agricultural Technology College Farm; UAC = Ubon Ratchathani Agricultural Technology College Farm.

²Within columns and plant type, means followed by a common letter are not significantly different at P=0.05 by Duncan's Multiple Range Test.

Table 7. Dry matter production of grass species and Tha Phra stylo in the first dry season after planting at UBU, YNS, YAC, SAC and UAC (Trial 2).

Treatment	UBU ¹	YNS	YAC	SAC	UAC
(t/ha) Grass					
Ruzi	3.2bc ²	4.6ab	3.2b	0.6b	2.6d
Signal	5.0ab	4.4ab	4.7a	0.2b	3.5bc
Jarra digit	2.9c	2.6b	0.8c	0.1b	1.0e
Ubon paspalum	4.5abc	4.4ab	5.0a	6.6a	4.9a
Plicatulum	4.8ab	3.7ab	5.0a	8.2a	3.8b
Purple guinea	5.5a	5.6ab	2.9b	0.7b	4.0b
Splenda setaria	3.4bc	6.7a	2.5b	6.2a	2.8cd
Tha Phra stylo					
Ruzi	0.86a	0.20a	— ³	1.23a	0.27a
Signal	0.98a	0.30a	0.03a	0.86a	0.23a
Jarra digit	1.01a	0.31a	0.09a	1.01a	0.30a
Ubon paspalum	0.20a	—	0.04a	0.97a	—
Plicatulum	0.20a	0.03a	0.03a	1.14a	—
Purple guinea	0.20a	0.53a	0.09a	0.47a	0.08a
Splenda setaria	0.31a	0.52a	0.06a	0.20a	0.12a

¹UBU = Ubon Ratchathani University Farm; YNS = Yasothon Animal Nutrition Station; YAC = Yasothon Agricultural Technology Farm; SAC = Sisaket Agricultural Technology College Farm; UAC = Ubon Ratchathani Agricultural Technology College Farm.

²Within columns and plant type, means followed by a common letter are not significantly different at P=0.05 by Duncan's Multiple Range Test.

³Species not present.

Table 8. Dry matter production of grass species and Tha Phra stylo in the second wet season after planting at UBU, YNS, YAC, SAC and UAC (Trial 2).

Treatment	UBU ¹	YNS	YAC	SAC	UAC
(t/ha) Grass					
Ruzi	14.4a ²	14.9ab	16.7cd	0.6d	20.1b
Signal	13.6a	12.3b	12.5d	2.4cd	18.5b
Jarra digit	14.7a	3.4c	12.7d	4.8c	19.4b
Ubon paspalum	16.4a	17.4a	22.5a	17.1a	22.6b
Plicatulum	17.9a	16.2a	20.3abc	15.9a	23.9b
Purple guinea	18.2a	17.3a	21.7a	8.1b	31.1a
Splenda setaria	18.6a	11.9b	17.3bcd	13.9a	20.4b
Tha Phra stylo					
Ruzi	0.47ab	0.12a	— ³	0.89ab	0.14a
Signal	0.29ab	—	—	1.15a	0.30a
Jarra digit	0.57a	0.12a	—	0.53ab	0.16a
Ubon paspalum	0.06b	—	—	0.12b	0.21a
Plicatulum	0.09ab	—	—	0.04b	—
Purple guinea	—	0.12a	—	0.55ab	0.27a
Splenda setaria	—	0.31a	—	0.09b	0.33a

¹UBU = Ubon Ratchathani University Farm; YNS = Yasothon Animal Nutrition Station; YAC = Yasothon Agricultural Technology Farm; SAC = Sisaket Agricultural Technology College Farm; UAC = Ubon Ratchathani Agricultural Technology College Farm.

²Within columns and plant type, means followed by a common letter are not significantly different at P=0.05 by Duncan's Multiple Range Test.

³Species not present.

Forage legumes and grasses on waterlogged sites in Thailand 29

Table 9. Dry matter production of grass species in the second dry season after planting at UBU and YNS (Trial 2).

Treatment	UBU ¹		YNS
			(t/ha)
Ruzi	10.3b ²		5.2b
Signal	11.9ab		8.8a
Jarra digit	8.6b		1.7c
Ubon paspalum	9.8b		7.2a
Plicatulum	10.4b		8.6a
Purple guinea	14.5a		9.3a
Splenda setaria	10.9b		7.8a

¹UBU = Ubon Ratchathani University Farm; YNS = Yasothon Animal Nutrition Station.²Within columns, means followed by a common letter are not significantly different at P=0.05 by Duncan's Multiple Range Test.

Table 10. Plant populations (6 weeks after sowing) of legume species at UBU, YNS and YAC (Trial 3).

Treatment	UBU ¹		YNS	YAC
			(plants/m ²)	
Verano stylo	86c ²		97a	46c
Tha Phra stylo	173b		119a	108b
Cavalcade centurion	40d		51a	29c
Calopo	36d		60a	22c
Llanos macro	171b		86a	178a
Puero	60cd		56a	14c
Lee jointvetch	221a		53a	89b

¹UBU = Ubon Ratchathani University Farm; YNS = Yasothon Animal Nutrition Station; YAC = Yasothon Agricultural Technology Farm.²Within columns, means followed by a common letter are not significantly different at P=0.05 by Duncan's Multiple Range Test.

Table 11. Dry matter production of legume species at UBU, YNS and YAC (Trial 3).

Treatment	First wet season			First dry season		Second wet season		
	UBU ¹	YNS	YAC	UBU	YNS	UBU	YNS	YAC
(t/ha)								
Verano stylo	3.7b ²	3.0a	3.9bc	1.3b	1.1ab	6.1a	0.6a	5.2a
Tha Phra stylo	3.4b	3.5a	3.9bc	3.7a	1.6a	7.1a	0.9a	2.5bc
Cavalcade	4.6b	1.8ab	4.0bc	0.4b	0.3b	0.8b	— ³	0.6cd
Calopo	4.4b	2.2ab	3.3bc	0.3b	0.1b	0.6b	0.2b	0.2d
Llanos macro	8.0a	3.3a	5.5b	4.6a	2.1a	1.9b	0.1b	3.2b
Puero	3.2b	0.2b	1.4c	0	—	0.2b	—	1.0cd
Lee jointvetch	5.3ab	2.5a	14.0a	1.7b	—	2.3b	0.1b	0.7cd

¹UBU = Ubon Ratchathani University Farm; YNS = Yasothon Animal Nutrition Station; YAC = Yasothon Agricultural Technology Farm.²Within columns, means followed by a common letter are not significantly different at P=0.05 by Duncan's Multiple Range Test.³Species not present

Verano stylo produced more than 5 t/ha DM (Table 11). At UBU, Verano stylo and Tha Phra stylo were very productive, producing 6 and 7 t/ha DM, respectively. Legumes at YNS were sparse and only 1 cut was taken at the end of the wet season.

In the second dry season, the trial at YAC was grazed and at YNS no legumes grew at all with two main weed species, *Melochia corchorifolia* and *Corchorus olitorius*, smothering the plots. At UBU, only Tha Phra stylo and Verano stylo grew, producing 4 and 0.6 t/ha, respectively.