



Government of the Union of Myanmar
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Effect of Chemical Fertilizer Application in Special Teak Plantation

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အထူးကျွန်းစိုက်ခင်းများတွင် ဓါတ်မြေဩဇာ ထည့်သွင်းခြင်းအကျိုးအာနိသင်ကို စမ်းသပ်ခြင်း

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အထူးကျွန်း စိုက်ခင်းများ တည်ထောင်ရာတွင် အထောက်အကူ ပြုစေနိုင်ရန်အတွက် ပဲခူးတိုင်း အုတ်တွင်းမြို့နယ် ခပေါင်းကြိုးဝိုင်း အကွက်အမှတ် (၁၆)၊ အုတ်ဖိုမြို့နယ် ဂမုံးကြိုးဝိုင်း အကွက်အမှတ် (၁)၊ ပေါက်ခေါင်းမြို့နယ် တောင်နဝင်းကြိုးဝိုင်း အကွက်အမှတ် (၁၁) နှင့် မန္တလေးတိုင်း ပျဉ်းမနားမြို့နယ် ကိုင်းကြိုးဝိုင်း အကွက်အမှတ် (၁၀) တို့တွင် စိုက်ပျိုးထားသည့် အထူးကျွန်း စိုက်ခင်းများတွင် ဓါတ်မြေဩဇာ စမ်းသပ်ခြင်း(၆)မျိုးဖြင့် စမ်းသပ်ခဲ့ပါသည်။ ၎င်းစမ်းသပ်ခြင်းတို့မှာ N:P₂O₅ 36:36, 62:31, 41:82 နှင့် P₂O₅ 82 နှင့် 36 Kg/ha အသီးသီးဖြစ်ပါသည်။ ၎င်းစမ်းသပ်ကွက်ပြုလုပ်သော မြေများမှာ P^H 5-6, နီက်တြိုဂျင် နှင့် ဖေါ့စဖေါ့ရပ် ပါဝင်မှုမှာ နည်း၍ မြေဆွေးဓါတ်ပါဝင်မှု အသင့်အတင့်ရှိပြီး မြေနုအကြမ်းမှာ Sandy loam နှင့် Sandy clay loam မြေအမျိုးအစားတို့ဖြစ်သည်။ ဖေါ့စဖေါ့ရပ် မြေဩဇာ တစ်မျိုးတည်း ထည့်သွင်းပါက အပင်ကြီးထွားနှုန်း ပိုမိုသော်လည်း Urea နှင့် ပူးတွဲထည့်ခြင်းလောက် သိသာထင်ရှားစွာ အပင်အမြင့်ကြီးထွားခြင်းကို မတွေ့ရပါ။ ဤမြေအမျိုးအစားများတွင် စမ်းသပ်သော မြေဩဇာ အချိုးများမှ N:P₂O₅ 41:82 Kg/ha (Urea = ၈၉. ၅ ဂရမ်နှင့် Triple Super Phosphate (T.S.P) ဂရမ်နှုံး) ထည့်သွင်းခြင်းသည် မည်သည့် မြေဩဇာမှ မထည့်သွင်းသော အပင်များထက် ပျမ်းမျှအားဖြင့် အပင်မြင့် ကြီးထွားနှုန်း ၂ဆခန့်ထိ ပိုလာသည်ကို တွေ့ရပါသည်။ သို့ဖြစ်ပါ၍ ကျွန်းစိုက်ခင်းများ၌ အပင်ငယ်စဉ်တွင် Urea ၈၉. ၅ ဂရမ်နှင့် T.super ၈၂. ၉ ဂရမ်နှုံး (၂)မျိုးရောစပ်၍ အသုံးပြုသင့်ပါသည်။

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Abstract

Six fertilizer treatments, consisting of control without fertilizer, 36-36, 62-31, 41-82 N and P_2O_5 Kg ha⁻¹, respectively, 82 Kg P_2O_5 ha⁻¹ and 36 Kg P_2O_5 ha⁻¹ with 4-replications were implemented at Khapaung Reserve Compartment No. 16 in Oak Twin Township, Gamone Reserve Compartment No.1 in Oakpho Township, Taungnawin Reserve Compartment No.11 in Paukkhong Township, Bago Division and Kaing Reserve Compartment No.10 in Pyinmana Township, Mandalay Division with the objective of providing fertilizer information for the establishment of special Teak plantations. The soil in the study areas, generally, are Sandy loam and Sandy clay loam with slightly acidic (P^H 5-6) conditions. Available Nitrogen and Phosphorus are relatively low while Organic matter contents are found to be rated as at medium level. Although plant growths were responded to Phosphorus fertilizer alone, it is much pronounced in the combination of Nitrogen and Phosphorus. Among the treatment, combination of N and P_2O_5 , 41 and 82 Kg ha⁻¹ (89.5gm Urea and 182.9gm Triple Super Phosphate per plant basis) increase plant height as much as twice over control without fertilizer. Thus it is advisable not to apply TSP alone but to utilize combination of Urea and T.S.P (41 NKg ha⁻¹ plus 82 Kg P_2O_5 ha⁻¹) at the young stage of special Teak plantation.

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APPENDICES

I	Physical and Chemical Properties of Soil in Khapaung Reserved Forest, Oak Twin
II	Physical and Chemical Properties of Soil in Gamone Reserved Forest, Oakpho
III	Physical and Chemical Properties of Soil in Taungnawin Reserved Forest, Paukkhong
IV	Physical and Chemical Properties of Soil in Kaing Reserved Forest, Pyinmana

1. Introduction

Normal Teak plantation was initiated since 1896, but large scale plantations were started in the early 80's, and special Teak plantation program was started in early 1998.

The forty years program of special Teak plantation with a 5 years duration each of 8 consecutive phase have been implementing at 20 plantation centres. Annual Teak plantation in each centre would be established as much as 405 ha with an objective of achieving total 140,100ha at the end of 1st phase in 20 plantation centres.

Some physical and Chemical Properties of natural Teak forest and old Teak plantation bearing forest area and Teak plantation area were performed in 1995 (Sann Lwin, Htin Kyaw, Win Lei Lei Than and Cho Cho Win-1995)

Since lower concentration of N and P were found in the most soil of Teak plantation, investigators were suggested to add fertilizer to promote the plant growth. Moreover very few information can be available so far regarding different fertilizer ratio for special Teak plantation. Therefore, this study was conducted in 1998 to provide certain message for special Teak plantation area.

2. Study Areas

Experiments were carried out in following 4 special Teak plantation area.

1. Khapaung Reserve compartment No.16 in Oak Twin Township, Bago Division.
2. Gamone Reserve compartment No.1 in Oakpho Township, Bago Division
3. Taungnawin Reserve compartment No.11 in Paukkhong Township, Bago Division
4. Kaing Reserve compartment No.10 in Pyinmana Township, Mandalay Division.

3. Materials and Methods

Experimental Design: The experiment consisting of 6 treatments with 4 replications was assigned as Randomized Complete Block design (RCBD). Total 49 plants were grown in each experimental unit (EU) with a spacing of 9' x 9'.

Treatments : Different ratio of fertilizer application were done at 1- 1½ months after planting (August, 1998). Different ratio and amount of fertilizers are described in following table.

Table (1) Different ratio and amount (gm/ plant) of fertilizer

Sr. No	Treatment	Amounts (gm/ plant)	
		Urea	TSP
1.	Control	-	-
2.	36 Kg N/ha + 36 Kg P ₂ O ₅ /ha	79.95	80.78
3.	62 Kg N/ha + 31 Kg P ₂ O ₅ /ha	136.76	69.9
4.	41 Kg N/ha + 82 Kg P ₂ O ₅ /ha	89.5	182.9
5.	82 Kg P ₂ O ₅ /ha	-	182.99
6.	36Kg P ₂ O ₅ /ha	-	80.7

Data collection: Survival plant counting and plant high measuring were made in Dec. 1998 and Jan. 2000. Soil samples collection were done before fertilizer application from each location tested. Collected soil samples were analysed at forest soil laboratory, Forest Research Institute to be recorded as site characterization.

4. Results and Discussion

The soils on which fertilizer experiment was conducted in Khapaung Reserve No.16, Oak Twin Township are Sandy clay loam and Clay loam with slightly acid reaction (p^H 4 – 5.5). Total N and Organic matter contents can be rated as high level while available soil P is found to be low in this area (Table 2).

In Oakpho, the soils from experimental site are Sandy loam and Sandy clay loam with slightly acid reaction (p^H 4.5 – 5.5). Total N, Organic matter and Exchangeable Ca contents are subjected as medium level, however available P is noted as low level for normal growth. (Table 2).

Dominant textural class of Sandy loam and sandy clay loam with p^H 5-6.0 are found in Paukkhong site. Total N and Organic matter are fairly contained in this soil but available P is recorded to be insufficient for normal growth.

The soils from Kaing Reserve compartment No.10, Pyinmana Township are Sandy loam and Sandy with slightly and condition (P^H 5-6). Total N and Organic matter contents are found to be low while very low soil P and exchangeable Ca are observed for Teak plantation in Kaing Reserve compartment No. 10. (Table 2).

The plant height (cm) as affected by different ratio of fertilizer conducting in Khapaung Reserve compartment No. 16, Oak Twin Township are shown in table (3). Plant growths are responsive to chemical fertilizer application in this site however plant heights are not significantly different between T_2 and T_3 . It is very unlikely to be responsive to Nitrogen up to 62 Kg N/ha with the presence of 31 Kg P_2O_5 /ha. Better plant growth can be anticipated by the increasing rate of P up to 82 Kg P_2O_5 /ha associated with N (T_1 – T_4). As high as 38% plant height moreover P alone (82 Kg P_2O_5 /ha) can be achieved by the application of 41 Kg N/ha + 82 Kg P_2O_5 /ha (1N:2P) by which 103% on the other hand, taller than control.

Average plant height (cm) data recorded from Gamone Reserve compartment No.1, Oakpho site is described in table (4). Since plant height from fertilizer treated plots are generally higher than control plot, it is likely to be responsive to chemical fertilizer application. Increasing rate of N cannot significantly enhanced plant height with presence of P (T_2 – T_3), however, better of N (T_2 – T_4). Combination of N and P (1N:2P) is contributed to increase plant height as much as 24% more with compare to P-alone (T_4 - T_6). Better growth of Teak as affected by the (1N:2P) is found to be as high as 42% plant height increase over control.

Plant height as affected by the fertilizer treatment in Taungnawin Reserve compartment No.11. Paukkhong are shown in table (5) with the association of P, Nitrogen fertilizer up to 62 Kg N/ha cannot contributed to attain better growth (T_2 – T_3). Apparently increase of plant height is attributed to increasing rate of P as height as 82 Kg P_2O_5 /ha associated with N (T_2 – T_4). Combination of N and P (41 Kg N/ha + 82 Kg P_2O_5 /ha) increase plant height by 72% as compared to P alone (82Kg P_2O_5 /ha). One hundred and forty two percents (142%) plant height increase over control was recorded by the application of 41KgN/ha plus 82Kg P_2O_5 /ha.

The plant heights (cm) as affected by different ratio of fertilizers conducting in Pyinmana Township are shown in table (6). Plant heights from fertilizers treated plots are not significantly different from control except treatment 4 (1N:2P) with presence

of P, better growth cannot be expected by increasing rate of N ($T_2 - T_3$). In a contrary, increasing rate of P with the presence of N enhances plant height by 55% ($T_2 - T_4$). Application of (1N:2P) gave better growth as much as 84% greater comparing (2P) alone ($T_4 - T_5$). One hundred and nineteen percents (119%) plant height increase over control was observed by the application of 41 Kg N/ha + 82 Kg P_2O_5 /ha (1N:2P).

Table (2) Physical and Chemical Properties of study Area

Sr. No	Township	Soil depth (cm)	p ^H	Total N%	Ava.P mg/100gm	Extractable Nutrients mg/100g				OM%	Texture			Textural classes
						K	Na	Ca	Mg		Sand %	Silt %	Clay %	
1.	Khapaung	0-10	4.06-5.81	0.03-0.12	0.008-0.92	2.22-33	0.6-35.6	30.0-252.0	22.2-106.0	2.53-7.38	21-68	18-36	10-49	Sandy Loam/ Loam
	Reserve compartment No. 16	40-50	4.77-6.02	0.01-0.09	0.028-0.52	3.0-39.6	0.8-41.2	18.0-98.0	19.0-360.0	1.61-7.64	17-55	3-38	16-44	Clay loam/ Clay/ Loam
	Oak Twin	80-90	4.1-5.71	0.01-0.11	0.024-1.24	3.2-41.2	0.8-31.2	30-102.0	23.0-92.0	2.3-7.82	18-68	14-46	15-49	Sandy clay loam/ Clay loam
2.	Gamone	0-10	4.62-5.86	0.02-0.11	0.01-0.382	2.8-14.4	2.8-11.4	21.6-88.0	11.2-5.2	3.16-6.99	30-80	5-57	2-33	Sandy Loam / Sandy clay loam
	Reserve compartment No. 1	40-50	4.62-5.86	0.02-0.11	0.01-0.382	2.8-14.4	21.6-88.0	22.8-94.0	12.0-760.0	1.53-5.83	20-72	7-63	8-41	Loam
	Oak Pho	80-90	4.91-5.89	0.02-0.09	0.006-1.0	1.0-12.0	2.2-14.2	25.2-80.0	2.2-84.0	0.189-4.84	19-67	9-53	12-68	Clay loam/ Sandy
3.	Taungnawin	0-10	4.93-6.6	0.02-0.11	0.026-1.58	0.8-9.0	1.0-8.0	10.0-158.0	16.2-60.0	1.98-5.58	1-57	1-57	4-32	clay loam
	Reserve compartment No. 11	40-50	5.0-6.53	0.01-0.09	0.01-1.06	0.6-8.6	1.0-6.6	16.0-138.0	10.8-192.0	0.79-4.13	1-54	1-54	1-42	Sandy loam/ Sandy clay loam
	Paukkhong	80-90	4.5-6.92	0.01-0.08	0.016-1.16	0.8-6.0	1.0-5.8	10.0-192.0	18.8-74.0	1.04-4.76	4-51	4-51	3-37	Sandy loam/ Sandy clay loam
4.	Kaing	0-10	5.07-6.31	0.02-0.017	0.019-0.54	3.6-14.2	2.2-6.0	7.6-66.0	3.2-16.2	1.08-10.73	7-24	7-24	1-14	Sandy clay loam/ Clay loam
	Reserve compartment No. 10	40-50	5.06-6.45	0.001-0.05	0.007-0.82	3.2-12.4	1.2-5.4	10.0-34.4	2.6-10.0	0.012-1.44	5-17	5-17	3-15	Loamy sand/Sand
	Pyinmana	80-90	5.19-6.22	0.001-0.05	0.008-0.112	3.6-12.8	1.4-6.4	8.6-41.2	3.8-19.6	0.002-1.86	3-23	3-23	1-26	Sandy loam/ Loamy sand
														Sandy loam/ Loam/ sand

**Table (3) Plant height (cm) as affected by different fertilizer application,
Oak Twin (January, 2000)**

Sr. No.	Treatments	Plant Height (cm)
1.	Control	121.67
2.	36Kg N + 36Kg P ₂ O ₅ /ha (1N:1P)	199.6
3.	62Kg N + 31Kg P ₂ O ₅ /ha (2N:1P)	203.91
4.	41Kg N + 82Kg P ₂ O ₅ /ha (1N:2P)	246.69
5.	82Kg P ₂ O ₅ /ha (2p)	178.3
6.	36Kg P ₂ O ₅ /ha (1p)	176.48
	F-Test	**
	C.V%	14.14
	L.S.D	40.01

**Table (4) Plant height (cm) as affected by different fertilizer application,
Oakpho (January, 2000)**

Sr. No.	Treatments	Plant Height (cm)
1.	Control	121.52
2.	36Kg N + 36Kg P ₂ O ₅ /ha (1N:1P)	150.91
3.	62Kg N + 31Kg P ₂ O ₅ /ha (2N:1P)	156.24
4.	41Kg N + 82Kg P ₂ O ₅ /ha (1N:2P)	173.16
5.	82Kg P ₂ O ₅ /ha (2p)	154.48
6.	36Kg P ₂ O ₅ /ha (1p)	140.06
	F-Test	*
	C.V%	10.94
	L.S.D	24.7

**Table (5) Plant height (cm) as affected by different fertilizer application,
Paukkhong (January, 2000)**

Sr. No.	Treatments	Plant Height (cm)
1.	Control	86.28
2.	36Kg N + 36Kg P ₂ O ₅ /ha (1N:1P)	111.0
3.	62Kg N + 31Kg P ₂ O ₅ /ha (2N:1P)	126.02
4.	41Kg N + 82Kg P ₂ O ₅ /ha (1N:2P)	205.88
5.	82Kg P ₂ O ₅ /ha (2p)	119.8
6.	36Kg P ₂ O ₅ /ha (1p)	160.7
	F-Test	*
	C.V%	30.21
	L.S.D	61.43

**Table (6) Plant height (cm) as affected by different fertilizer application,
Pyinmana (January, 2000)**

Sr. No.	Treatments	Plant Height (cm)
1.	Control	57.36
2.	36Kg N + 36Kg P ₂ O ₅ /ha (1N:1P)	80.63
3.	62Kg N + 31Kg P ₂ O ₅ /ha (2N:1P)	96.67
4.	41Kg N + 82Kg P ₂ O ₅ /ha (1N:2P)	125.56
5.	82Kg P ₂ O ₅ /ha (2p)	68.24
6.	36Kg P ₂ O ₅ /ha (1p)	69.35
	F-Test	*
	C.V%	31.55
	L.S.D	39.45

As Long as fertilizer P 31 to 36 Kg P₂ O₅ / ha was applied on two-years Teak plantation in all site tested, plant heights are not likely to be responsive to increasing rate of N from 36 to 62 Kg N/ha.

It is very similar with the finding of Bhee maianh-G and etall (1997). They stated that on Sandy loam soils, application of Urea (200 and 300 gm/plant) did not effect height of Teak tree significantly at any age measures.

The growth of Teak determined by plant height parameter might be differ in one site from another, depending on nutrient contents, soil texture, and moisture status. The mean plant height in all treatment at Kaing Reserve compartment No. 11 in Pyinmana is shorter than Khapaung Reserve Compartment No.16 Oak Twin site. As a most notable difference. Organic matter, Total-N, exchangeable Calcium, and moisture contents are obviously higher in Khapaung Reserve compartment No. 16 than Kaing Reserve compartment No.11.

Oak Twin Township

2 UTHK 1



Plate 1(a) Two years old Teak plantation at Khapaung Reserved Forest (Control)



Plate 1(b)

Two years old Teak
plantation at Khapaung
Reserved Forest
(1N:2P 123g)

Oakpho Township

23HK2



Plate 2(a) Two years old Teak plantation at Gamone
Reserved Forest(Control)



Plate 2(b) Two years old Teak plantation at Gamone
Reserved Forest(1N:2P 123g)

Paukkhong Township

2.UHK3



Plate 3(a) Two years old Teak plantation at Taungnawin
Reserved Forest(Control)



Plate 3(b) Two years old Teak plantation at Taungnawin
Reserved Forest(1N:2P 123g)

Pyinmana Township

2 UHK 4



Plate 4(a) Two years old Teak plantation at Kaing Reserved Forest(Control)



Plate 4(b) Two years old Teak plantation at Kaing Reserved Forest(1N:2P 123g)

Soil Profile in Study Area



2 UHK 5

Plate 5 (a)
Soil Profile in Khapaung
Reserved Forest,
Oak Twin Township



Plate 5 (b)
Soil Profile in Gamone
Reserved Forest,
Oak Pho Township



2 UHK 6

Plate 5(c)

Soil Profile in Taungnawin
Reserved Forest,
Paukkhong Twonship.



Plate 5(d)

Soil Profile in Kaing
Reserved Forest,
Pyinmana Twonship.

5. Conclusion

With an objective of providing certain fertilizer information for the special Teak plantation, effect of chemical fertilizer application and Teak consisting of 6 treatments with 4 replications were carried out on Sandy loam and Sandy clay loam soil with P^H 5-6 at 4 Teak plantation sites.

Since available soil P were generally low in the special Teak plantation sites, plant heights were apparently responded to either fertilizer P alone or increasing rate P associated with N. Combination of 41 Kg/ha and 82 Kg P_2O_5 / ha increase plant height as much as twice or more (42% - 142%) over control. Therefore, it is advisable not to use Triple Super Phosphate alone but to apply combination of Urea and TSP at the young stage of Teak plantation to accelerate plant growth.

Soil moisture status at the time of fertilizer application could be also influenced on the fertilizer responsiveness. By virtue of observing for only one year, it needs further investigation with emphasis on various fertilizer combinations at different moisture region to provide a conclusive information for special Teak plantation area.

Appendix I

Physical And Chemical Properties Of Soil In Khapaung Reserved Forest, Oak Twin Township

Depth (cm)	P ^H	Total N%	Ava.P%	Extractable Nutrients				O.M%	Texture			Remark
				K%	Na%	Ca%	Mg%		Sand	Silt%	Clay %	
0-10	4.13	0.0374	0.000008	0.0302	0.0052	0.060	0.0312	3.400	54	19	25	Sandy clay Loam
40-50	5.03	0.0204	0.000152	0.0130	0.0062	0.050	0.3600	3.090	43	24	30	Clay Loam
80-90	5.10	0.0726	0.000116	0.0102	0.1880	0.056	0.0540	2.300	63	14	15	Sandy Clay Loam
0-10	4.70	0.0336	0.000180	0.0068	0.0042	0.252	0.0304	5.450	65	18	13	Sandy Loam
40-50	5.07	0.0235	0.000064	0.0188	0.0050	0.088	0.0248	4.100	36	23	38	clay
80-90	5.36	0.0916	0.000072	0.0098	0.0016	0.054	0.0326	3.470	36	27	35	Clay Loam
0-10	4.45	0.0522	0.000094	0.0106	0.0054	0.070	0.0500	6.330	53	25	17	Sandy Loam
40-50	5.20	0.0144	0.000056	0.0116	0.0046	0.030	0.0500	1.610	54	11	32	Sandy Clay Loam
80-90	5.52	0.1003	0.000064	0.0134	0.0038	0.048	0.0440	2.920	48	22	25	Sandy Clay Loam
0-10	5.00	0.0419	0.000092	0.0192	0.0012	0.042	0.0500	4.610	65	19	11	Sandy Loam
40-50	5.22	0.0227	0.000028	0.0184	0.0008	0.066	0.0346	3.330	48	22	25	Sandy Clay Loam
80-90	5.36	0.0900	0.000076	0.0062	0.0016	0.032	0.0500	3.220	54	23	20	Sandy Clay Loam
0-10	4.90	0.0565	0.000190	0.0076	0.0020	0.074	0.0480	5.480	61	22	12	Sandy Loam
40-50	5.05	0.0215	0.000116	0.0232	0.0010	0.080	0.0740	4.050	39	25	31	Clay Loam
80-90	5.24	0.1079	0.000400	0.0064	0.0012	0.072	0.0560	3.620	46	25	25	Sandy Clay Loam
0-10	4.60	nil	0.000126	0.0056	0.0006	0.066	0.0780	5.360	68	18	12	Sandy Loam
40-50	5.31	0.0262	0.000070	0.0132	0.0008	0.074	0.0600	1.950	57	24	16	Sandy Loam
80-90	5.78	0.0186	0.000144	0.0066	0.0022	0.036	0.0820	3.550	53	26	19	Sandy Clay Loam
0-10	4.18	0.0987	0.000092	0.0038	0.0024	0.034	0.1060	7.350	39	34	23	Loam
40-50	4.93	0.0332	0.000048	0.0100	0.0016	0.056	0.0660	4.830	33	29	335	Clay Loam
80-90	4.12	0.0235	0.000116	0.0110	0.0018	0.078	0.0820	6.580	35	38	29	Clay Loam
0-10	4.64	nil	0.000092	0.0094	0.0020	0.034	0.0920	5.660	37	35	24	Clay Loam
40-50	4.94	0.0275	0.000098	0.0128	0.0010	0.064	0.0440	5.330	55	3	38	Sandy Loam
80-90	4.50	0.0198	0.000076	0.0048	0.0008	0.038	0.0480	5.820	29	30	36	Clay Loam
0-10	4.06	nil	0.000079	0.0116	0.0014	0.064	0.0600	4.810	51	28	18	Loam
40-50	5.77.	0.0324	0.000108	0.0162	0.0008	0.098	0.0440	6.070	39	30	29	Clay Loam
80-90	5.47	0.0237	0.000050	0.0080	0.0012	0.102	0.0820	4.390	38	30	29	Clay Loam

Depth (cm)	pH	Total N%	Ava.P%	Extractable Nutrients				O.M%	Texture			Remark
				K%	Na%	Ca%	Mg%		Sand	Silt%	Clay%	
0-10	4.57	nil	0.000182	0.0034	0.0014	0.116	0.0620	7.160	53	32	11	Sandy Loam
40-50	5.15	0.0336	0.000078	0.0136	0.0008	0.080	0.0700	4.350	27	30	38	Clay Loam
80-90	5.23	0.0269	0.000200	0.0070	0.0016	0.060	0.0820	3.180	28	30	38	Clay Loam
0-10	4.79	nil	0.000048	0.0064	0.0012	0.074	0.0780	3.670	21	36	40	Clay
40-50	5.01	0.0312	0.000054	0.0050	0.0020	0.094	0.0640	2.800	32	38	33	Clay Loam
80-90	5.11	0.0211	0.000132	0.0032	0.0022	0.056	0.0900	2.510	45	25	26	Loam
0-10	5.09	0.0850	0.000620	0.0022	0.0014	0.058	0.0220	2.840	44	24	28	Clay Loam
40-50	5.01	0.0619	0.000520	0.0396	0.0016	0.074	0.0320	2.990	45	26	27	Loam
80-90	5.10	0.0431	0.000082	0.0110	0.0018	0.066	0.0480	2.350	50	23	25	Sandy Clay Loam
0-10	5.14	0.0943	0.000216	0.0126	0.0024	0.082	0.0340	3.280	60	21	14	Sandy Loam
40-50	4.84	0.0603	0.000420	0.0036	0.0010	0.082	0.0312	2.570	40	27	29	Clay Loam
80-90	5.33	0.0372	0.000108	0.0166	0.0010	0.062	0.0248	2.960	38	24	34	Clay Loam
0-10	5.31	0.0848	0.000144	0.0330	0.0022	0.048	0.0260	3.200	53	27	16	Sandy Loam
40-50	5.11	0.0599	0.000156	0.0222	0.0420	0.026	0.0380	2.590	26	36	37	Clay Loam
80-90	5.23	0.0409	0.000116	0.0136	0.0020	0.054	0.0346	2.930	40	23	34	Clay Loam
0-10	5.15	0.0749	0.000182	0.0092	0.0016	0.044	0.0374	2.530	52	36	13	Sandy Loam
40-50	4.77	0.0537	0.000480	0.0208	0.0012	0.054	0.0190	2.180	54	7	38	Sandy Clay Loam
80-90	5.12	0.0281	0.000300	0.0092	0.0020	0.032	0.0230	2.520	28	24	43	Clay
0-10	5.81	0.1108	0.000028	0.0132	0.0024	0.046	0.0258	7.080	68	20	10	Sandy Loam
40-50	5.21	0.0719	0.000048	0.0130	0.0082	0.018	0.0268	3.420	38	23	38	Clay Loam
80-90	5.03	0.0366	0.000024	0.0138	0.0026	0.036	0.0290	5.230	34	23	39	Clay Loam
0-10	4.67	nil	0.000194	0.0078	0.0028	0.054	0.0500	4.430	15	36	49	Clay
40-50	5.12	0.00266	0.000240	0.0186	0.0028	0.040	0.0460	4.560	24	33	40	Clay
80-90	5.16	0.0217	0.000176	0.0090	0.0036	0.044	0.0480	5.990	18	46	40	Silty Clay Loam
0-10	4.78	0.0660	0.000030	0.0062	0.0030	0.058	0.0240	5.380	60	25	14	Sandy Loam
40-50	5.17	0.0617	0.000106	0.0030	0.0052	0.066	0.0280	5.630	35	30	31	Clay Loam
80-90	4.60	0.0399	0.000520	0.0034	0.0040	0.054	0.0320	7.200	40	32	24	Clay Loam

Depth (cm)	p ^H	Total N%	Ava.P%	Extractable Nutrients				O.M%	Texture			Remark
				K%	Na%	Ca%	Mg%		Sand	Silt%	Clay%	
0-10	4.80	0.0962	0.000038	0.0266	0.0232	0.082	0.0380	7.040	59	25	13	Sandy Loam
40-50	5.06	0.0694	0.000042	0.0062	0.0052	0.052	0.0340	6.320	31	29	37	Clay Loam
80-90	5.46	0.0374	0.001240	0.0164	0.0056	0.042	0.0400	8.450	49	-	25	Sandy Clay Loam
0-10	4.61	0.1123	0.000108	0.0144	0.0070	0.030	0.0240	7.280	59	28	10	Sany Loam
40-50	5.60	0.0931	0.000146	0.0228	0.0084	0.036	0.0300	7.640	19	33	44	Clay
80-90	5.19	0.0346	0.000242	0.0412	-	-	-	7.820	25	24	49	Clay
0-10	4.87	0.1127	0.000034	0.0166	0.0118	0.032	0.0320	7.160	59	27	12	Sandy Loam
40-50	5.96	0.0709	0.000102	0.0078	0.0156	0.030	0.0300	7.200	26	31	38	Loam
80-90	5.21	0.0488	0.000640	0.0308	0.0192	0.042	0.0420	8.180	37	29	32	Clay Loam
0-10	5.07	0.1234	0.000176	0.0092	0.2100	0.048	0.0480	7.040	55	30	11	Sandy Loam
40-50	5.78	0.0601	0.000094	0.0144	0.0278	0.048	0.0460	6.140	26	33	39	Loam
80-90	5.36	0.0384	0.000680	0.0248	0.0312	0.064	0.0640	7.240	28	36	35	Clay Loam
0-10	5.04	0.1108	0.000780	0.0222	0.0356	0.032	0.0320	7.380	56	21	19	Sandy Clay Loam
40-50	5.48	0.0565	0.000090	0.0130	0.0412	0.036	0.0360	3.380	19	41	38	Silty Clay Loam
80-90	5.26	0.0498	0.000138	0.0168	0.0440	0.062	0.0620	3.040	23	31	41	Clay
0-10	4.84	0.1046	0.000138	0.0122	0.0024	0.064	0.0640	5.320	49	33	16	Loam
40-50	6.02	0.0632	0.000620	0.0118	0.0032	0.042	0.0420	2.860	17	38	40	Clay
80-90	5.20	0.0436	0.000260	0.0098	0.0038	0.092	0.0920	2.560	35	33	30	Clay Loam
A ₁	5.06	0.1217	0.000004	0.0124	0.054	0.040	0.0400	4.790	62	19	16	Sandy Loam
A ₂	5.41	0.0832	0.000013	0.0066	0.0064	0.046	0.0460	5.280	46	25	29	Sandy Clay Loam
A ₃	5.02	0.0408	0.000016	0.0036	0.0068	0.032	0.0320	2.940	40	27	29	Clay Loam

APPENDIX II

Physical And Chemical Properties Of Soil In Khapaung Reserved Forest, Oak Twin Township

Depth (cm)	p ^H	Total N%	Ava.P%	Extractable Nutrients				O.M%	Texture			Remark
				K%	Na%	Ca%	Mg%		Sand	Silt%	Clay%	
0-10	5.21	0.0910	0.000056	0.0128	0.0058	0.080	0.0520	5.610	46	24	25	Sandy Clay Loam
40-50	5.11	0.0710	0.000016	0.0086	0.0040	0.088	0.0760	3.260	20	34	41	Clay
80-90	5.12	0.0481	0.000016	0.0090	0.0042	0.080	0.0840	3.720	60	27	53	Clay
0-10	4.91	0.0735	0.000094	0.0144	0.0036	0.062	0.0260	3.880	76	13	12	Sandy Loam
40-50	4.99	0.0415	0.000046	0.0066	0.0010	0.004	0.0320	2.070	57	16	23	Sandy Clay Loam
80-90	5.25	0.0378	0.000026	0.0062	0.0142	0.052	0.0340	2.390	57	17	27	Sandy Clay Loam
0-10	4.83	Trace	0.000098	0.0070	0.0026	0.068	0.0220	3.850	70	5	21	Sandy Clay Loam
40-50	4.88	0.0609	0.000046	0.0058	0.0024	0.0340	0.0280	2.330	56	18	22	Sandy Clay Loam
80-90	5.00	0.0512	0.000024	0.0044	0.0022	0.042	0.0340	2.230	55	18	25	Sandy Clay Loam
0-10	5.09	0.0984	0.000038	0.0102	0.0042	0.052	0.0360	3.160	45	28	23	Loam
40-50	5.10	0.0869	Trace	0.0052	0.0054	0.052	0.0740	4.320	27	34	37	Clay Loam
80-90	5.37	0.0613	Trace	0.0004	0.0034	0.078	0.0088	3.700	26	35	36	Clay Loam
0-10	4.59	0.0925	0.000382	0.0074	0.0046	0.052	0.0320	5.250	57	29	9	Sandy Loam
40-50	5.53	0.0714	0.000036	0.0004	0.0026	0.050	0.0360	3.000	47	38	10	Loam
80-90	5.78	0.0450	0.000032	0.0052	0.0022	0.046	0.0400	2.870	51	29	22	Loam
0-10	4.72	0.0962	0.000036	0.0054	0.0028	0.032	0.0320	5.420	55	36	9	Sandy Loam
40-50	5.71	0.0772	0.000038	0.0036	0.0046	0.040	0.0360	2.680	47	37	17	Loam
80-90	5.27	0.0493	0.000034	0.0036	0.0038	0.042	0.0420	2.930	44	35	22	Loam
0-10	4.72	0.0995	0.000122	0.0072	0.0050	0.036	0.0320	4.670	50	34	11	Loam
40-50	5.27	0.0561	0.000022	0.0052	0.0054	0.034	0.0420	3.090	72	7	26	Sandy Clay Loam
80-90	5.21	0.0382	0.000006	0.0044	0.0042	0.030	0.0500	4.890	1	53	26	Silty Clay Loam
0-10	4.88	0.01077	0.000176	0.0070	0.0057	0.026	0.0340	5.400	962	32	8	Sandy Loam
40-50	5.44	0.0448	0.000008	0.0054	0.0096	0.040	0.0540	2.830	41	36	21	Loam
80-90	5.11	0.0336	0.000020	0.0046	0.0064	0.026	0.0440	3.310	32	34	33	Clay Loam
0-10	4.79	0.1127	0.000176	0.0142	0.0068	0.022	0.0340	5.770	56	33	8	Sandy Loam
40-50	5.28	0.0611	0.000036	0.0100	0.0026	0.048	0.0380	2.680	44	37	22	Clay Loam
80-90	5.46	0.0468	0.000014	0.0120	0.0048	0.038	0.0400	2.800	56	14	28	Clay Loam

Depth (cm)	P ^H	Total N%	Ava.P%	Extractable Nutrients				O.M%	Texture			Remark
				K%	Na%	Ca%	Mg%		Sand	Silt%	Clay%	
0-10	4.93	0.0982	0.000116	0.0088	0.0030	0.030	0.0180	6.220	58	31	10	Sandy Loam
40-50	5.21	0.0677	0.000280	0.0052	0.0122	0.028	0.0240	5.830	35	40	26	Loam
80-90	5.41	0.0359	0.000380	0.0090	0.0066	0.040	0.0380	2.900	24	45	30	Clay Loam
0-10	5.04	0.0712	0.000032	0.0096	0.0056	0.046	0.0200	4.780	49	28	28	Sandy Clay Loam
40-50	5.21	0.0545	0.000090	0.0126	0.0144	0.046	0.0160	3.130	36	55	8	Silt Loam
80-90	5.40	0.0289	0.000010	0.0102	0.0068	0.052	0.0280	3.100	67	13	23	Sandy Clay Loam
0-10	5.02	0.0186	0.000126	0.0076	0.0094	0.042	0.0180	6.990	59	7	33	Sandy Clay Loam
40-50	5.27	0.0169	0.000182	0.0042	0.0028	0.042	0.0300	3.180	48	17	31	Sandy Clay Loam
80-90	5.52	0.0151	0.000036	0.0068	0.0052	0.038	0.0280	3.260	20	9	68	Clay
0-10	5.15	0.0949	0.000032	0.0112	0.0042	0.062	0.0200	5.530	80	13	2	Loamy Sand
40-50	5.43	0.0617	0.000028	0.0068	0.0050	0.072	0.0180	3.150	70	14	11	Sandy Loam
80-90	5.57	0.0454	0.000018	0.0062	0.0030	0.054	0.0440	4.780	42	46	14	Loam
0-10	4.87	0.0991	0.000092	0.0068	0.0070	0.022	0.0140	3.480	61	21	16	Sandy Loam
40-50	5.19	0.0823	0.000050	0.0044	0.0009	0.030	0.0160	2.130	72	13	18	Sandy Loam
80-90	5.24	0.0710	0.000030	0.0056	0.0080	0.034	0.0160	0.189	65	14	23	Sandy Clay Loam
0-10	4.92	0.0514	0.000052	0.0062	0.0114	0.024	0.0160	3.600	55	20	25	Sandy Clay Loam
40-50	5.30	0.0415	0.000162	0.0052	0.0040	0.023	0.0160	3.200	20	63	14	Silt Loam
80-90	5.37	0.0376	0.000008	0.0024	0.126	0.025	0.0220	2.450	67	17	12	Sandy Clay Loam
0-10	5.14	Trace	0.000142	0.0034	0.0092	0.026	0.0160	5.470	48	22	27	Sandy Clay Loam
40-50	5.18	0.0629	0.000016	0.0036	0.0064	0.022	0.0220	2.300	60	19	17	Sandy Clay Loam
80-90	5.10	0.0417	0.000050	0.0066	0.0920	0.025	0.0284	1.960	55	33	17	Sandy Loam
0-10	5.18	0.0487	0.000024	0.0028	0.0046	0.060	0.0300	5.240	61	11	27	Sandy Clay Loam
40-50	5.73	0.0469	0.000024	0.0034	0.0186	0.070	0.0440	3.840	67	9	21	Sandy Clay Loam
80-90	5.89	0.0336	0.000010	0.0036	0.0112	0.078	0.0540	3.420	26	34	39	Clay Loam
0-10	4.82	Trace	0.000010	0.0054	0.0064	0.050	0.0126	3.460	74	13	9	Sandy Loam
40-50	5.16	0.0493	0.000014	0.0012	0.0072	0.048	0.0138	2.540	55	28	13	Sandy Loam
80-90	5.19	0.0279	0.000014	0.0012	0.0092	0.052	0.0120	2.300	61	16	18	Sandy Clay Loam

Depth (cm)	pH	Total N%	Ava.P%	Extractable Nutrients				O.M%	Texture			Remark
				K%	Na%	Ca%	Mg%		Sand	Silt%	Clay%	
0-10	5.37	0.0671	0.000012	0.0102	0.0062	0.060	0.0112	3.810	69	15	15	Sandy Loam
40-50	5.02	0.0663	0.000036	0.0050	0.0074	0.066	0.0120	1.970	56	22	27	Sandy Clay Loam
80-90	5.47	0.0411	0.000024	0.0010	0.0062	0.070	0.0120	2.600	46	22	30	Sandy Clay Loam
0-10	4.81	0.0726	0.000294	0.0074	0.0070	0.084	0.0120	3.920	59	29	9	Sandy Loam
40-50	5.74	0.0629	0.000044	0.0038	0.0046	0.042	0.0120	1.700	62	18	15	Sandy Loam
80-90	5.27	0.0469	0.000050	0.0028	0.0042	0.078	0.0110	1.690	51	33	14	Sandy Loam
0-10	5.86	0.0728	0.000132	0.0122	0.0034	0.070	0.0160	3.690	79	11	9	Sandy Loam
40-50	5.08	0.0399	0.000052	0.0070	0.0042	0.062	0.0240	2.180	36	35	31	Clay Loam
80-90	5.35	0.0361	0.000100	0.0044	0.0048	0.056	0.0410	1.670	59	11	26	Sandy Clay Loam
0-10	4.62	0.0634	0.000220	0.0066	0.0038	0.066	0.0400	3.99	66	15	14	Sandy Loam
40-50	5.00	0.0528	0.000098	0.0032	0.0034	0.070	0.0160	2.220	60	15	29	Sandy Clay Loam
80-90	5.09	0.0349	0.000012	0.0022	0.0052	0.068	0.0220	2.640	39	25	37	Clay Loam
0-10	5.30	0.0621	0.000300	0.0066	0.0054	0.078	0.0126	3.160	30	57	8	Silt Loam
40-50	5.55	0.0446	0.000106	0.0050	0.0042	0.094	0.0282	2.390	39	17	41	Clay
80-90	4.94	0.0291	0.000082	0.0038	0.0056	0.088	0.0146	1.940	42	35	21	Loam
0-10	4.91	0.0518	0.000170	0.0056	0.0004	0.088	0.0162	3.430	61	19	16	Sandy Loam
40-50	4.88	0.0419	0.000088	0.0044	0.0004	0.092	0.0118	1.530	59	21	15	Sandy Loam
80-90	5.29	0.0292	0.000088	0.0034	0.0062	0.066	0.0224	2.240	42	22	28	Clay Loam
A ₁	5.82	0.0902	0.000290	0.0054	0.0068	0.046	0.0250	4.680	65	23	18	Sandy Clay Loam
A ₂	6.37	0.0774	0.000004	0.0022	0.0066	0.048	0.0360	4.010	55	18	26	Sandy Clay Loam
A ₃	6.19	0.0510	0.000110	0.0032	0.0070	0.042	0.0022	3.820	55	21	23	Sandy Clay Loam

Appendix III

Physical And Chemical Properties Of Soil In Taungnawin Reserved Forest, Paukkhong Township

Depth (cm)	pH	Total N%	Ava.P%	Extractable Nutrients				O.M%	Texture			Remark
				K%	Na%	Ca%	Mg%		Sand	Silt%	Clay%	
0-10	5.45	0.0469	0.000066	0.0040	0.0032	0.066	0.024	2.400	76	6	15	Sandy Loam
40-50	5.42	0.0466	0.000120	0.0028	0.0030	0.034	0.027	2.240	77	1	19	Sandy Clay Loam
80-90	4.50	0.0415	0.000062	0.0026	0.0058	0.052	0.025	2.020	72	4	19	Sandy Clay Loam
0-10	5.28	Trace	0.000082	0.0056	0.0028	0.022	0.021	2.380	62	30	12	Sandy Loam
40-50	5.57	0.0527	0.000079	0.0062	0.0036	0.024	0.029	1.960	64	18	20	Sandy Loam
80-90	5.65	0.0360	0.000110	0.0022	0.0014	0.034	0.027	1.990	72	9	20	Sandy Loam
0-10	5.25	0.0522	0.000026	0.0026	0.0060	0.026	0.016	2.670	86	1	13	Loamy Sand
40-50	5.47	0.0411	0.000120	0.0026	0.0020	0.022	0.192	1.550	68	12	24	Sandy Clay Loam
80-90	5.67	0.0240	0.000032	0.0020	0.0012	0.022	0.050	1.270	60	14	28	Sandy Clay Loam
0-10	5.29	0.0547	0.0000028	0.0032	0.0080	0.026	0.018	2.850	79	13	13	Loamy Sand
40-50	5.60	0.0454	0.0000012	0.0006	0.0016	0.030	0.046	1.190	55	27	21	Sandy Loam
80-90	5.66	0.0341	0.000016	0.0032	0.0022	0.046	0.054	1.120	46	30	24	Loam
0-10	5.72	0.0468	0.000380	0.0048	0.0022	0.058	0.019	2.400	67	21	11	Sandy Loam
40-50	5.00	0.0430	0.000038	0.0042	0.0018	0.086	0.028	0.790	59	24	19	Sandy Loam
80-90	5.89	0.0364	0.000044	0.0034	0.0038	0.010	0.019	1.040	45	33	20	Loam
0-10	5.61	0.0466	0.000370	0.0068	0.0016	0.096	0.020	2.440	68	22	11	Sandy Loam
40-50	5.97	0.0458	0.000130	0.0058	0.0034	0.080	0.027	1.020	48	28	20	Loam
80-90	8.62	0.0228	0.000110	0.0030	0.0032	0.046	0.028	1.180	53	24	21	Sandy Clay Loam
0-10	5.81	0.0943	0.000078	0.0076	0.0024	0.560	0.060	5.580	51	25	24	Sandy Clay Loam
40-50	5.38	0.0547	0.000050	0.0016	0.0066	0.044	0.070	2.990	36	30	36	Clay Loam
80-90	5.55	0.0516	0.000018	0.0020	0.0052	0.026	0.052	2.490	42	23	33	Clay Loam
0-10	4.93	0.0609	0.000140	0.0026	0.0026	0.036	0.025	3.620	58	20	19	Sandy Loam
40-50	5.02	0.0554	0.000110	0.0060	0.0044	0.042	0.039	1.720	79	13	9	Loamy Sand
80-90	5.22	0.0403	0.000150	0.0050	0.0038	0.048	0.035	2.270	74	13	11	Sandy Loam
0-10	5.32	0.0625	0.000076	0.0066	0.0026	0.052	0.033	4.000	68	17	12	Sandy Loam
40-50	5.25	0.0294	0.000094	0.0044	0.0058	0.052	0.011	1.440	79	12	8	Loamy Sand
80-90	5.45	0.0263	0.000150	0.0012	0.0056	0.054	0.034	1.970	77	15	9	Sandy Loam

Depth (cm)	pH	Total N%	Ava.P%	Extractable Nutrients				O.M%	Texture			Remark
				K%	Na%	Ca%	Mg%		Sand	Silt%	Clay%	
0-10	6.06	0.1020	0.000250	0.0040	0.0034	0.092	0.0308	1.980	73	20	9	Sandy Loam
40-50	5.35	0.0356	0.000260	0.0030	0.0046	0.046	0.0308	2.140	51	23	23	Sandy Clay Loam
80-90	5.78	0.0306	0.000260	0.0060	0.0052	0.044	0.0314	2.730	54	26	19	Sandy Loam
0-10	6.50	Trace	0.000076	0.0058	0.0060	0.028	0.0440	2.510	50	25	22	Sandy Clay Loam
40-50	5.50	0.0485	0.000024	0.0002	0.0042	0.032	0.0740	2.190	36	27	36	Clay Loam
80-90	6.95	0.0329	0.000016	0.0024	0.0046	0.018	0.0660	2.420	37	26	34	Clay Loam
0-10	6.30	0.1057	0.000780	0.0070	0.0012	0.040	0.0026	3.610	65	23	8	Sandy Loam
40-50	6.02	0.0894	0.000010	0.0046	0.0030	0.038	0.0326	3.260	51	22	22	Sandy Clay Loam
80-90	5.92	0.0433	0.000026	0.0034	0.0022	0.044	0.2620	3.090	52	25	21	Sandy Clay Loam
0-10	4.93	0.0706	0.000940	0.0080	0.0036	0.010	0.2700	4.760	35	40	26	Loam
40-50	6.04	0.0254	0.000064	0.0034	0.0026	0.086	0.0580	3.970	13	54	32	Silty Clay Loam
80-90	5.64	0.0173	0.000062	0.0030	0.0030	0.088	0.0740	3.960	47	17	35	Sandy Clay Loam
0-10	6.13	0.0875	0.001020	0.0070	0.0016	0.104	0.0320	2.740	30	47	21	Loam
40-50	5.52	0.0801	0.000082	0.0030	0.0010	0.098	0.0600	2.910	17	52	28	Silty Clay Loam
80-90	5.44	0.0766	0.000050	0.0026	0.0032	0.094	0.0700	2.950	12	51	36	Silty Clay Loam
0-10	6.16	0.0611	0.001580	0.0048	0.0022	0.046	0.0290	2.710	62	18	15	Sandy Loam
40-50	5.66	0.0463	0.000090	0.0034	0.0034	0.114	0.0266	2.390	52	51	1	Silty
80-90	5.60	0.0409	0.000360	0.0008	0.0026	0.092	0.0390	3.070	60	18	18	Sandy Loam
0-10	6.17	0.0596	0.001520	0.0026	0.0014	0.094	0.0284	2.650	64	22	16	Sandy Loam
40-50	5.61	0.0516	0.000090	0.0044	0.0060	0.072	0.0222	2.740	69	23	7	Sandy Loam
80-90	6.94	0.0126	0.000900		0.0036	0.080	0.3980	3.080	37	37	30	Clay Loam
0-10	9.12	0.0848	0.000062	0.0046	0.0014	0.096	0.0334	2.430	23	57	15	Silty Loam
40-50	5.93	0.0700	0.000038	0.0006	0.0022	0.102	0.0580	2.670	23	39	35	Clay Loam
80-90	6.41	0.0669	0.000980	0.0014	0.0018	0.056	0.0660	2.680	87	7	3	Loamy Sand
0-10	6.18	0.0352	0.000064	0.0046	0.0010	0.084	0.0220	2.510	17	55	32	Silty Clay Loam
40-50	6.53	0.0654	0.000068	0.0012	0.0018	0.0460	0.0640	2.780	38	18	42	Clay Loam
80-90	6.35	0.0572	0.000350	0.0022	0.0010	.076	0.0580	2.590	45	34	17	Loam

Depth (cm)	pH	Total N%	Ava.P%	Extractable Nutrients				O.M%	Texture			Remark
				K%	Na%	Ca%	Mg%		Sand	Silt%	Clay%	
0-10	6.02	0.0417	0.000066	0.0090	0.0012	0.070	0.0332	2.740	60	25	20	Sandy Loam
40-50	5.86	0.0334	0.000080	0.0024	0.0020	0.058	0.0520	2.910	31	38	32	Clay Loam
80-90	6.58	0.0264	0.000840	0.0044	0.0040	0.138	0.0520	2.950	34	33	29	Clay Loam
0-10	6.33	0.0407	0.001160	0.0008	0.0026	0.088	0.0282	2.710	59	28	17	Sandy Loam
40-50	5.83	0.0392	0.001060	0.0018	0.0022	0.016	0.0394	2.390	52	30	19	Sandy Loam
80-90	5.76	0.0241	0.000520	0.0022	0.0028	0.062	0.0284	3.070	50	28	21	Loam
0-10	6.09	0.0440	0.000120	0.0024	0.0022	0.144	0.02680	2.650	61	21	22	Sandy Clay Loam
40-50	6.55	0.0413	0.000520	0.0042	0.0034	0.134	0.0400	2.740	47	18	33	Sandy Clay Loam
80-90	6.82	0.0223	0.000440	0.0036	0.0038	0.014	0.0500	3.060	28	33	37	Clay Loam
0-10	6.16	Trace	0.001360	0.0016	0.0018	0.166	0.0240	2.430	73	18	4	Sandy Loam
40-50	5.96	0.0275	0.000190	0.0086	0.0024	0.032	0.0160	2.670	62	18	19	Sandy Loam
80-90	5.91	0.0109	0.000920	0.0030	0.0034	0.032	0.0440	2.680	47	23	27	Sandy Clay Loam
0-10	6.23	Trace	0.001180	0.0026	0.0024	0.158	0.0236	2.510	65	23	8	Sandy Loam
40-50	6.13	0.0485	0.000920	0.0010	0.0032	0.136	0.0284	2.780	61	18	18	Sandy Clay Loam
80-90	6.12	0.0371	0.000052	0.0038	0.0034	0.192	0.0384	2.590	56	22	18	Sandy Clay Loam
0-10	6.60	0.0283	0.000360	0.0030	0.0042	0.128	0.0400	2.630	43	23	29	Clay Loam
40-50	6.07	0.0138	0.000096	0.0056	0.0028	0.138	0.0242	2.440	61	18	17	Sandy loam
80-90	6.92	0.0118	0.001600	0.0016	0.0010	0.078	0.0500	1.530	41	29	27	Clay Loam
A ₁	8.06	0.0729	0.000046	0.0038	0.0048	0.152	0.0360	2.600	54	24	22	Sandy Clay Loam
A ₂	7.25	0.0631	0.000189	0.0082	0.0022	0.108	0.0500	3.060	51	34	15	Loam
A ₃	7.83	0.0415	0.000192	0.0040	0.0016	0.150	0.0320	3.580	55	24	24	Sandy Clay Loam

Appendix IV

Physical And Chemical Properties Of Soil In Kaing Reserved Forest, Pyinmana Township

Depth (cm)	P ^H	Total N%	Ava.P%	Extractable Nutrients				O.M%	Texture			Remark
				K%	Na%	Ca%	Mg%		Sand	Silt%	Clay%	
0-10	5.50	0.0202	0.000058	0.0066	0.0046	0.0276	0.0058	1.820	82	9	8	Loamy Sand
40-50	5.90	0.0201	0.000015	0.0064	0.0041	0.0164	0.0044	0.670	79	12	12	Sandy Loam
80-90	5.86	0.0120	0.000017	0.0098	0.0040	0.0128	0.0068	0.740	74	11	15	Sandy Loam
0-10	5.14	0.0535	0.000056	0.0086	0.0060	0.0210	0.0072	10.730	75	14	7	Sandy Loam
40-50	5.69	0.0298	0.000013	0.0080	0.0054	0.0108	0.0028	0.570	73	14	9	Sandy Loam
80-90	5.53	0.0281	0.000009	0.0116	0.0058	0.0172	0.0048	0.460	70	18	9	Sandy Loam
0-10	5.28	0.0751	0.000138	0.0142	0.0040	0.0660	0.0162	3.500	75	15	7	Sandy Loam
40-50	5.13	0.0492	0.000013	0.0124	0.0042	0.0218	0.0036	0.630	75	18	11	Sandy Loam
80-90	5.37	0.0244	0.000009	0.0116	0.0044	0.0202	0.0040	0.820	63	16	18	Sandy Loam
0-10	5.40	0.0475	0.000126	0.0106	0.0044	0.0076	0.0094	1.080	78	12	6	Loamy Sand
40-50	5.69	0.0351	0.000022	0.0034	0.0054	0.0114	0.0028	0.040	84	10	5	Loamy Sand
80-90	5.66	0.0342	0.000013	0.0054	0.0064	0.0346	0.0024	0.550	75	11	9	Sandy Loam
0-10	5.37	0.0190	0.000052	0.0066	0.0052	0.0248	0.0052	1.500	77	11	7	Loamy Sand
40-50	5.40	0.0014	0.000012	0.0046	0.0046	0.0268	0.0028	0.670	72	10	13	Sandy Loam
80-90	5.20	0.0012	0.000120	0.0060	0.0046	0.0188	0.0040	0.830	66	10	19	Sandy Loam
0-10	5.39	0.0433	0.000071	0.0084	0.0038	0.0340	0.0056	2.350	77	19	3	Loamy Sand
40-50	5.46	0.0384	0.000014	0.0046	0.0052	0.0188	0.0040	0.460	75	13	11	Sandy Loam
80-90	5.53	0.0271	0.000030	0.0128	0.0046	0.0198	0.0106	0.410	72	3	26	Sandy Clay Loam
0-10	6.14	0.0580	0.000236	0.0076	0.0052	0.0680	0.0028	2.170	79	8	8	Loamy Sand
40-50	6.45	0.0432	0.000069	0.0082	0.0046	0.0216	0.0050	0.230	76	17	6	Loamy Sand
80-90	6.22	0.0349	0.000580	0.0064	0.0046	0.0086	0.0076	0.210	82	12	2	Loamy Sand
0-10	5.46	0.0549	0.000173	0.0068	0.0038	0.0382	0.0036	1.870	76	18	2	Loamy Sand
40-50	5.67	0.0482	0.000044	0.0044	0.0036	0.0260	0.0064	0.400	68	22	5	Sandy Loam
80-90	5.31	0.0360	0.000026	0.0036	0.0046	0.0280	0.0058	0.430	90	4	10	Loamy Sand
0-10	5.01	0.0629	0.000076	0.0034	0.0040	0.0320	0.0052	2.510	75	24	3	Loamy Sand
40-50	5.33	0.0438	0.000028	0.0052	0.0038	0.0270	0.0100	0.500	81	21	3	Loamy Sand
80-90	5.26	0.0371	0.000022	0.0060	0.0036	0.0258	0.0046	0.230	89	5	7	Loamy Sand

Depth (cm)	pH	Total N%	Ava.P%	Extractable Nutrients				O.M%	Texture			Remark
				K%	Na%	Ca%	Mg%		Sand	Silt%	Clay%	
0-10	5.47	0.0675	0.000062	0.0076	0.0036	0.0440	0.0102	2.810	76	18	2	Loamy Sand
40-50	5.95	0.0453	0.000027	0.0066	0.0036	0.0266	0.0038	0.180	77	20	1	Loamy Sand
80-90	5.64	0.0431	0.000730	0.0090	0.0034	0.0312	0.0078	0.140	67	23	5	Sandy Loam
0-10	5.20	0.0570	0.000048	0.0036	0.0040	0.0414	0.0080	2.300	73	20	1	Loamy Sand
40-50	5.57	0.0359	0.000035	0.0048	0.0046	0.0176	0.0036	0.820	76	16	4	Loamy Sand
80-90	5.37	0.0229	0.000032	0.0080	0.0048	0.0146	0.0196	0.002	85	15	1	Loamy Sand
0-10	5.46	0.0448	0.000072	0.0044	0.0050	0.0192	0.0038	1.340	86	7	6	Loamy Sand
40-50	5.72	0.0328	0.000024	0.0040	0.0054	0.0138	0.0026	0.170	90	11	3	Loamy Sand
80-90	5.99	0.0198	0.000030	0.0080	0.0052	0.0110	0.0052	0.150	86	9	2	Sand
0-10	5.21	0.0487	0.000019	0.0060	0.0026	0.0298	0.0038	2.000	74	18	2	Loamy Sand
40-50	5.86	0.0293	0.000020	0.0050	0.0012	0.1440	0.0058	0.140	78	13	8	Loamy Sand
80-90	5.48	0.0209	0.000016	0.0082	0.0014	0.0140	0.0062	0.160	78	21	5	Sandy Loam
0-10	5.10	0.0510	0.000034	0.0070	0.0030	0.0204	0.0088	1.860	69	19	9	Sandy Loam
40-50	5.42	0.0334	0.000040	0.0072	0.0030	0.0344	0.0032	0.110	76	15	8	Sandy Loam
80-90	5.34	0.0297	0.000018	0.0094	0.0024	0.0162	0.0060	0.260	69	10	16	Sandy Loam
0-10	5.57	0.0654	0.000121	0.0112	0.0032	0.0440	0.0132	2.940	85	11	3	Loamy Sand
40-50	6.06	0.0295	0.000024	0.0076	0.0026	0.0174	0.0058	0.020	81	13	5	Loamy Sand
80-90	5.71	0.0266	0.000300	0.0062	0.0026	0.0142	0.0066	0.080	74	12	9	Sandy Loam
0-10	5.44	0.0314	0.000096	0.0098	0.0024	0.0232	0.0074	1.870	77	13	4	Loamy Sand
40-50	4.72	0.0128	0.000019	0.0034	0.0020	0.0132	0.0038	0.470	77	14	6	Loamy Sand
80-90	5.72	0.0081	0.000014	0.0034	0.0024	0.0148	0.0046	0.520	81	12	11	Sandy Loam
0-10	5.33	0.0367	0.000920	0.0074	0.0026	0.0226	0.0098	1.560	83	9	4	Loamy Sand
40-50	5.06	0.0233	0.000026	0.0048	0.0024	0.0152	0.0042	0.230	86	8	4	Sand
80-90	5.06	0.0211	0.000028	0.0038	0.0032	0.0144	0.0050	0.370	81	6	10	Loamy Sand
0-10	5.29	0.0340	0.000060	0.0070	0.0036	0.0162	0.0058	1.450	85	8	6	Loamy Sand
40-50	5.46	0.0173	0.000026	0.0060	0.0038	0.0110	0.0038	0.380	81	14	8	Loamy Sand
80-90	5.10	0.0122	0.000032	0.0044	0.0020	0.0412	0.0054	0.360	76	11	8	Loamy Sand

Depth (cm)	pH	Total N%	Ava.P%	Extractable Nutrients				O.M%	Texture			Remark
				K%	Na%	Ca%	Mg%		Sand	Silt%	Clay%	
0-10	6.07	0.0557	0.000540	0.0100	0.0040	0.0120	0.0196	2.670	79	13	5	Loamy Sand
40-50	5.78	0.0277	0.000039	0.0094	0.0016	0.0100	0.0032	0.040	75	17	3	Loamy Sand
80-90	5.63	0.0246	0.000050	0.0052	0.0024	0.0094	0.0038	0.080	78	9	13	Sandy Loam
0-10	6.31	Trace	0.000056	0.0054	0.0022	0.0262	0.0114	2.310	75	14	7	Loamy Sand
40-50	5.64	0.0409	0.000028	0.0032	0.0026	0.0124	0.0048	0.012	82	7	9	Loamy Sand
80-90	5.43	0.0301	0.000112	0.0030	0.0036	0.0126	0.0068	0.270	71	21	5	Sandy Loam
0-10	5.74	0.0409	0.000028	0.0066	0.0038	0.0228	0.0068	2.190	90	9	3	Sand
40-50	5.76	0.0357	0.000036	0.0064	0.0042	0.0210	0.0054	0.500	78	5	15	Sandy Loam
80-90	5.19	0.0171	0.000030	0.0098	0.0044	0.0120	0.0064	0.320	71	15	9	Sandy Loam
0-10	5.25	0.0505	0.000006	0.0086	0.0044	0.0230	0.0096	2.460	76	4	15	Sandy Loam
40-50	6.02	0.0442	0.000082	0.0080	0.0052	0.0136	0.0060	0.120	84	15	5	Loamy Sand
80-90	5.85	0.0531	0.000040	0.0116	0.0048	0.0106	0.0044	0.080	69	13	14	Sandy Loam
0-10	5.34	Trace	0.000104	0.0142	0.0050	0.0172	0.0084	1.700	82	10	4	Loam Sand
40-50	5.91	0.0555	0.000054	0.0124	0.0046	0.0102	0.0058	0.100	78	8	18	Sandy Loam
80-90	5.49	0.0241	0.000026	0.0116	0.0034	0.0096	0.0074	0.170	79	8	14	Sandy Loam
0-10	6.30	0.0396	0.000340	0.0106	0.0032	0.0244	0.0150	2.200	77	17	7	Sandy Loam
40-50	5.68	0.0264	0.000036	0.0034	0.0034	0.0096	0.0036	1.000	72	13	11	Sandy Loam
80-90	5.88	0.0237	0.000020	0.0054	0.0036	0.0086	0.0046	0.460	71	10	16	Sandy Loam
A ₁	6.05	0.0590	0.000035	0.0066	0.0040	0.0202	0.0092	2.030	74	10	14	Sandy Loam
A ₂	5.98	0.5610	0.000070	0.0046	0.0034	0.0118	0.0064	1.440	73	12	16	Sandy Loam
A ₃	5.63	0.0435	0.000008	0.0066	0.0030	0.0100	0.0068	1.860	64	10	25	Sandy Clay Loam

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