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PROGRESS REPORT No. 3

FIBER FARMING THROUGH WEED UTILIZATION

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PROJECT PROFILE

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PROGRESS REPORT NO.3

FIBER FARMING THROUGH WEED UTILIZATION
July - December 1987

I. STATUS

This report covered the work done during the period of July to December 1987, concerning the final results of clones selection study and fiber properties investigation. The remaining tasks are fabric weaving and its economic evaluation, assessing the appropriate technology for weaving process, and the experimental trials for Rux plant evaluation.

There are two separate sets of report, first this progress interim report, and second, the detailed report of the Giant Milkweed clone selection. The progress report would highlight the works which were carried during period covered, the abstract of the clone selection study, the fiber property studies of its strength, micronaire, effective length, the study of dyeing methods, and the experimental trials of Rux plant selection and management. Selected clones from the selection study were used as seedlings for the next investigation. Experimental sites are re-evaluated and be selected, as well as the experimental design. Selected Rux seedlings were planted in four new sites. There were 12-15 samples in each location and data are being observed and recorded. The details of the clone selection study are objectives, methodology, results, discussion, and recommendation.

II. WORKS TO BE REPORTED

2.1 Rux Plant Selection Study

The 1st phase of Rux plant selection study can be summarized as follows:

The objectives of this study are to investigate and survey of *Calotropir gigantea* R.Br.or Giant Milkwweed or Rux, and to conduct the experiments for selecting the superior clones of Rux using yield and growth rate as indicators. Rux's stems and seeds have been collected from all five physiographic regions of the country namely -- mountainous and valley in the north,northeastern highland,low land in central plain, mountaineous and lowland on east coast of Thailand, and southern peninsula. Rux's seedling are germinated by stem cutting for the total of 120 samples.

Rux's seedlings are preliminary selected for each region according to their ecotypes. Then seedlings are grouped and be planted according to their localities in various stations around the country. They are located at Lumpang Province, Khon Kaen Province, Burirum Province, Nakorn Prathom Province, Cha Cheong Sao Province, and Chumporn Province. Split plot design in Randomized Block Design system (RBD) with 3 replications are used as main plots with 2 levels of treatment -- high and low inputs. In each location, random of 6 from 8 trees in each row are planned to be recorded as the experimental data representatives.

Data are recorded after planting for 6 weeks, and for every 2 weeks from Dec.1985-Dec.1986. The recorded variables are height and width of canopy, numbers of inflorescence per tree, numbers of pod per tree, width and length of pod, fresh pod weight, fiber weight per pod. Then the annual total yield and growth rate can be obtained in which Duncan's New Multiple Range Test is applied to compare all variables of each clone. Analysis of Variance is also introduced to determine the variables' average and their differences among clones and treatments in each replication of split plot design in RBD.

From the study results, suitable clones were selected as follows;

Northern region (Lumpang Station): 4 clones, N7, N13, N3, and N6 were selected from 15 samples with 109.75,-74.72, 57.72, and 50.08 pods/tree/year respectively. All of these four northern's clones have average tree size between 228-302 cm. in height and 208-298 cm. crown width (Figure 1).

Northeastern region (Kon Kaen Station): NE37, NE38 and NE29 were selected with 33, 36, and 30 pods/tree/year. Although NE37 has numbers of pod lower than NE38 but it has the highest numbers of inflorescence and fiber weight/pod (Figure 2).

Central region (Salaya Station): C10 is the highest in both yield and growth (Figure 3).

Eastern region (Khao Hin Sorn Station): E1, E6, and E2 were selected from the total of 8 samples (Figure 4).

Southern region (Chumporn Station): only S7 which can be selected from Chumporn Station (Figure 5).

The total of 12 clones were selected from this study and they would be used as seedlings for the next experiment -- Management Trials.

2.2 Fiber Property Studies

2.2.1 Objective

Properties of fibers may be categorized as physical, chemical, biological, and microscopic (Evelyn E. Stout, 1970). Each of the various kinds of properties is effected by all the others, so that it is customary to consider fiber characteristics in relation to one or more categories.

Generally, the principle physical properties for fiber are length, strength and fineness. These properties are related to because they will affect the yarn-making process and yarn quality .

The main objective of Rux fiber properties study is to evaluate the characteristics of Rux fiber for yarn spinning purpose. The following properties has been studied;

FIGURE 1

TOTAL YIELD OF MILKWEED IN LAMPANG

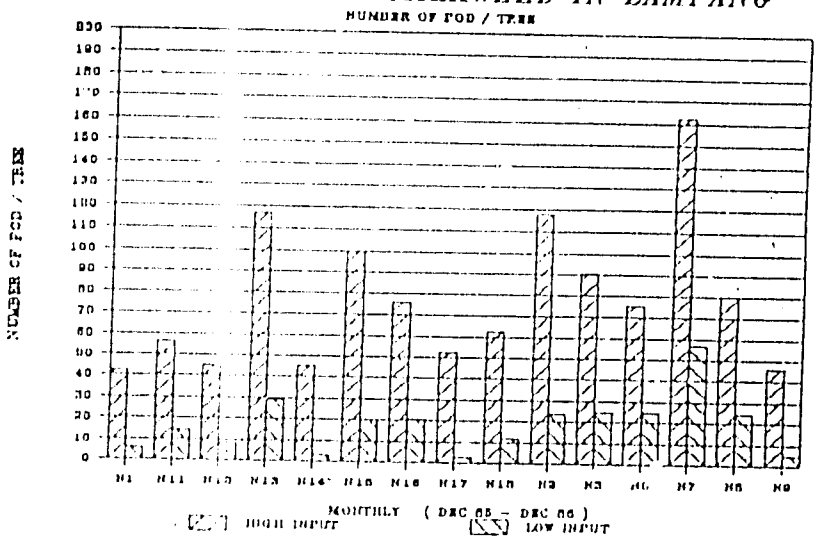


FIGURE 2

TOTAL YIELD OF MILKWEED IN KHON KAEN

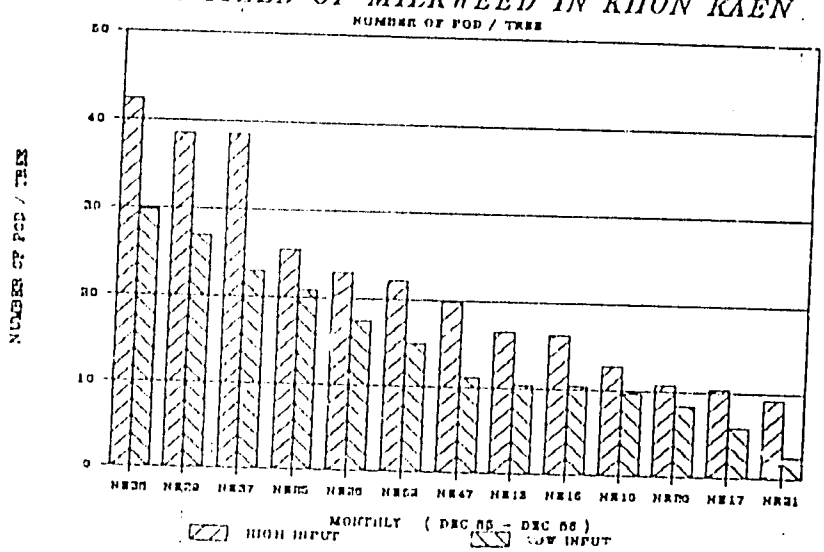


FIGURE 3

TOTAL YIELD OF MILKWEED IN SALAYA

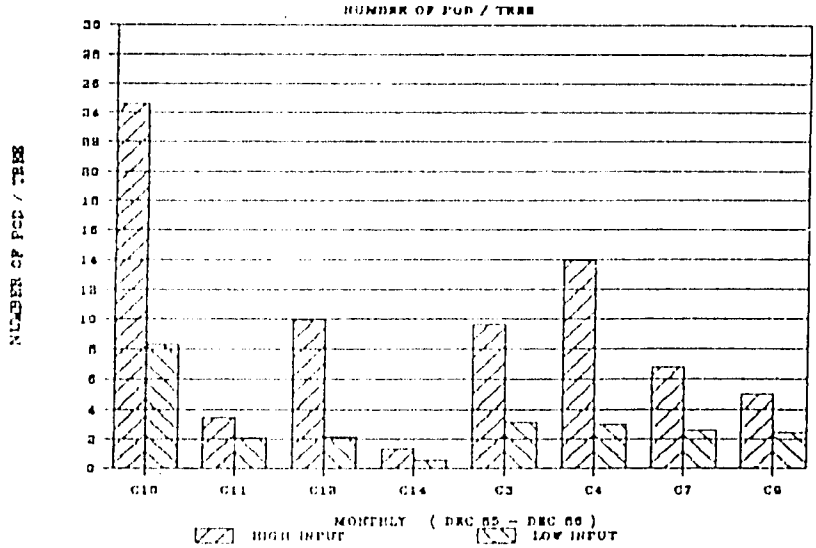


FIGURE 4

TOTAL YIELD OF MILKWEED (KHAO HIN SORN)

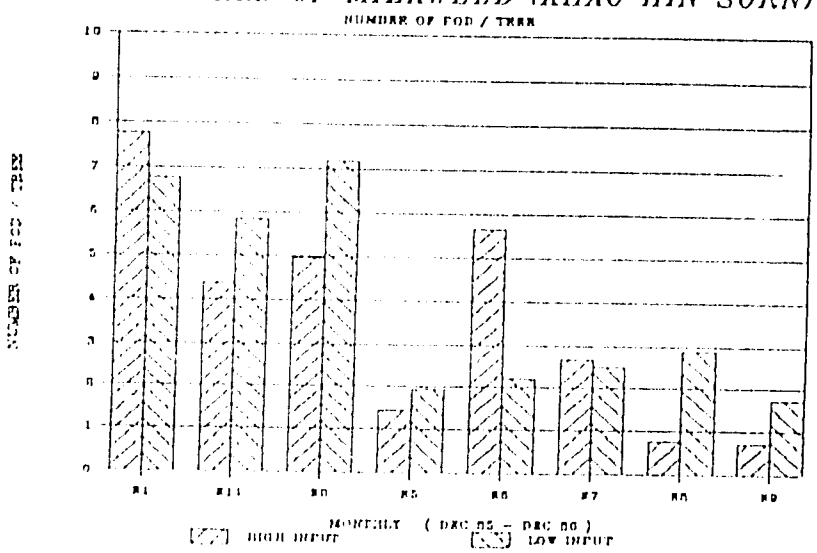
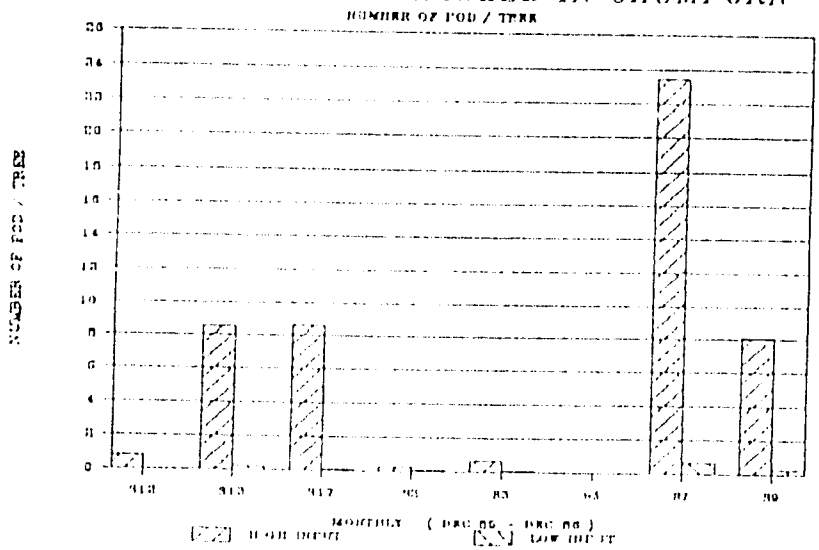


FIGURE 5

TOTAL YIELD OF MILKWEED IN CHUMPORN



(a) Physical properties

- Staple length (effective length, maximum length, and percentage of short fiber)
- Fiber strength (Pressley index and Tensile strength)
- Fiber fineness (Micronaire)

(b) Chemical property

- Color absorbing test

The results and methodologies are updated from the previous report and be described below.

2.2.2 Methodologies

(a) Physical properties

The methodologies will follow "Cotton's Properties Testing " (Lord, 1961) for the staple length test, fiber strength, and fiber fineness.

Fiber length

Using "Comb Sorter Method" to measure the available length of Rux fiber, which include effective length, maximum length, and percentage of short fiber.

Table 1 Effective length Standard (Cotton)

Unit : inches

Less than 1.10	Short
1.10 - 1.24	Medium
1.25 - 1.39	Long
More than 1.39	Very Long

Table 2 Staple length Standard (Cotton)
Unit : inches

1.00 or Less than 1.00	Short
1.03 - 1.06	Medium
1.13 - 1.25	Long
More than 1.25	Very Long

Fiber strength

Fiber strength is one of the important factor in yarn spinning. Samples were tested with Stelometer and data were interpreted to Pressley index and be converted to Tensile strength in $lb/inch^2$.

$$\text{PRESSLEY INDEX} = \frac{\text{Breaking load in pound}}{\text{Bundle weight in mg}}$$

TENSILE STRENGTH = (Pressley index x 10.81)-0.12

Table 3 Fiber Strength Standard (Cotton)
Unit : lb/in"

Less than 66000	Not strong
66000 - 75000	Fairly
76000 - 85000	Medium
86000 - 95000	Strong
More than 95000	Very strong

Fiber fineness

Using WIRA Cotton fineness meter to measure the fineness in Micronaire unit or mg/inch

Table 4 Micronaire Standard (Cotton)
Unit:Equivalence = mg/inch

Less than 3	Very fine
3.0 - 3.9	Fine
4.0 - 4.9	Medium
5.0 - 5.9	Coarse
6.0 or more	Very Coarse

Color absorbing

Rux fiber from low and high input are dyed with chemical pigments using the following processes:

- Scouring and bleaching to purify Rux fiber.
- Dyeing with 4 methods -- Direct dye, Reactive dye, Vat dye, and Sulfur dye.
- Fastness test using Thailand Industrial Standard Fastness test (TIS Vol.3, 1975)

2.2.3 Results and Discussion

Table 5 and 6 illustrated the physical properties from high and low input treatment Rux fiber. All numbers are mean values from 10 selected samples. Table 6 summarizes their physical properties of length, strength and fineness.

The effective length of Rux fiber length from each clone varied from Medium to Long (1.10 - 1.39 inches) except the fiber from NE38, C10, and S7 reached Very Long length. There were about 25 % of short fiber presented in the selected samples. Conversely, data can be interpreted that they are about 75 % of fiber are suitable for yarn spinning.

Fiber strength test results are classified into 4 groups (Table 7). Most of fiber strength varied between Strong to Medium. These are excluded NE45, NE4, C10, E1, E6, and E2 in which their fiber strengths are low caused from fiber immaturity during harvesting period.

Furthermore, with approximate limits for yarn spinning, it can be concluded that Rux fiber can be spun into yarn between number 2.8 to 13 tex. (Table 8), and the properties are not significantly diferent between high input and low input.

Table 5 High Input Fiber Properties

CLONE	EFFECTIVE LENGTH	MAXIMUM FIBER LENGTH	% SHORT FIBER	PRESSLEY INDEX	TENSILE STRENGTH	MICRONAIRE
N6	1.29	1.35	27.44	7302.57	78940.80	4.57
N7	1.20	1.26	25.38	6545.77	70759.64	4.37
N8	1.40	1.48	26.93	7347.03	79421.07	4.45
N15	1.32	1.37	18.17	6849.46	74087.47	4.42
NE37	1.39	1.40	26.11	8580.12	90588.86	4.28
NE38	1.36	1.44	27.81	8657.15	93583.65	4.09
NE29	1.41	1.52	31.47	7929.17	85714.17	5.10
C10	1.32	1.37	22.15	6830.70	73839.76	4.21
E1	1.29	1.31	23.25	6632.67	76199.22	4.09
E6	1.23	1.26	27.10	6958.62	78189.58	4.32
E2	1.29	1.30	23.75	6806.84	73489.80	4.23
S7	1.56	1.57	23.86	7742.46	83695.87	4.63

Table 6 Low Input Fiber Properties

CLONE	EFFECTIVE LENGTH	MAXIMUM FIBER LENGTH	% SHORT FIBER	PRESSLEY INDEX	TENSILE STRENGTH	MICRONAIRE
N6	1.37	1.36	27.44	7245.33	78321.90	4.42
N7	1.34	1.36	25.38	7476.21	80817.69	4.21
N3	1.32	1.37	26.93	7245.33	78321.90	4.41
N13	1.40	1.48	23.96	7171.69	77525.90	4.33
NE37	1.36	1.44	26.79	8548.92	92413.68	4.41
NE38	1.44	1.53	27.15	8580.42	92754.23	4.21
NE29	1.32	1.32	27.11	8319.99	89938.82	4.23
C10	1.50	1.56	21.11	6112.42	66075.22	4.31
E1	1.27	1.29	22.20	6996.74	75634.59	4.31
E6	1.23	1.24	26.75	6489.74	70154.04	3.87
E2	1.29	1.30	24.56	7009.88	75776.71	4.42
S7	1.56	1.57	23.86	7742.46	83695.00	4.39

'AVERAGE VALUE'

HIGH INPUT	1.31	1.37	24.75	7143.02	77745.90	4.32
LOW INPUT	1.34	1.39	24.65	7196.97	77798.50	4.20
TOTAL	1.33	1.38	24.70	7169.99	77772.20	4.26

Table 7 Summary of Box fiber properties

CLONE	EFFECTIVE LENGTH	MAXIMUM FIBER LENGTH	FIBER STRENGTH	FIBER FINENESS
N6	Long	Very long	Medium	Medium
N7	Long	Very long	Medium	Medium
N3	Long	Very long	Medium	Medium
N13	Long	Very long	Medium	Medium
NE37	Long	Very long	Strong	Medium
NE38	Very long	Very long	Strong	Medium
NE29	Long	Very long	Strong	Medium
C10	Very long	Very long	Fairly	Medium
E1	Long	Very long	Fairly	Medium
E6	Medium	Long	Fairly	Medium
E2	Long	Very long	Fairly	Medium
S7	Very long	Very long	Medium	Medium

Table 8 Approximate limits for yarn spinning

Staple length (inches)	Fineness	Tex (yarn Number)
0.25	2.20	42
0.25	2.40	34
0.88	2.60	28
0.88	3.00	23
1.03	3.40	17
1.13	3.80	13
1.19	4.20	10
1.25	4.60	7.6
1.38	5.00	6.4
1.38	5.50	5
1.50	6.00	4
1.50	8.00	2.8

2.3 Management Trials

2.3.1 Objectives

The main objectives of this study are to evaluate the suitable management scheme for Rux farming and to determine the fiber production cost.

2.3.2 Methodology

The experimental methodology followed the previous Rux plant selection study by investigating growth, yield, and fiber properties in each treatment ---high, medium and low inputs. Farm management costs including labor, materials, land, etc. will be recorded and be used to determine fiber unit cost.

2.3.3 Workdone

a) Seedlings

Rux plants from the selection study are used for seedlings by stem-cutting method. The selected clones are as follows;

Table 9 Selected clones

PART	EXPERIMENTAL SITES	CLONES SELECTION
1	LAMPANG	N6 N7 N3 N13
2	KHON KAEN	NE37 NE38 NE29
3	SALAYA	C10
4	KHAO HIN SORN	E1 E6 E2
5	CHUMPHON	S7
Total		12 clones

b) Experimental design

Experimental plot is designed by assigning the whole area as main plot with 3 levels of treatment: high input, medium and low input. A sub-plot contain selected clones, using 5 samples for one selected clone, and each sample represents a replication.

The 4 selected sites are at Salaya, Lampang, Khon Kaen, and Khao Hin Sorn. They are all prepared for;

1. Land preparation includes ploughing, harrowing, and leveling)

2. Lime Requirement Control for pH = 6 in high and medium input.

3. Dimension of 45 x 42 m.

4. Hole drilling for the size of 0.30 x 0.30 x 0.30 m., and spacing 3 m.

5. Fertilizer: high input plot use 120 grams/tree and 60 grams/tree in medium input.

6. Insecticide: high input plot use Furadan 1 gram/tree and 0.5 gram/tree in medium input.

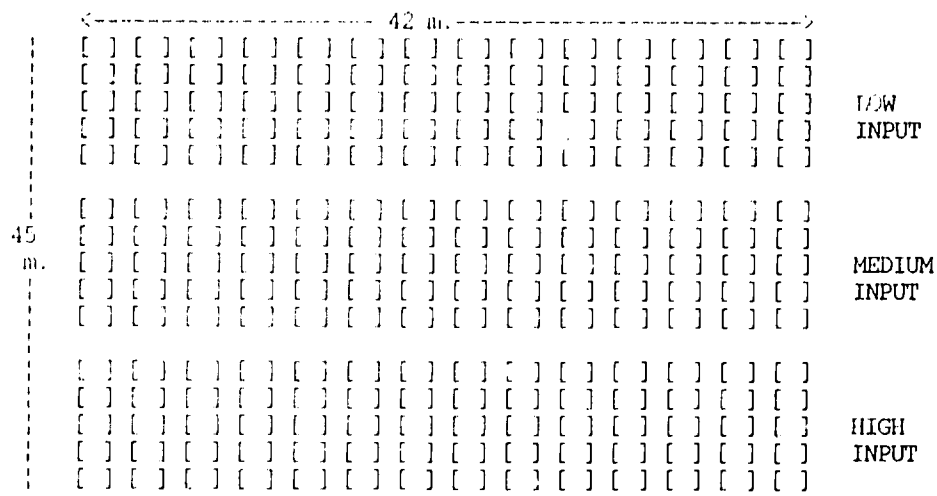


Figure 6: EXPERIMENTAL PLOT LAYOUT

c) Management trials and record schedule

Table 10 Experimental plot management

PROCEDURE DESCRIPTION	HIGH INPUT	MEDIUM INPUT	LOW INPUT
1. Fertilizer quantity frequency	13-13-21 120 grams/tree 3 months	60 grams/tree 3 months	
2. Pesticide/ Insecticide	twice a month	when necessary	
3. Weeding Control	Manual and herbicide weed control	Manual and herbicide weed control	no weed control
4. Watering	2 times/week in very dry period	1 time/week in very dry period	watering when plants show sign of wilting
5. Ploughing	3 months/time	3 months/time	
6. Mulching	If the soil condition is sandy, it need to be mulching in drying period to reduce dehydration.		

After planting for 6 weeks, data will be recorded weekly from July 1987-July 1988. Three from five trees will be selected randomly in each row for data recording. The followings are parameters to be recorded:

PLANT GROWTH

- Width and Height : 1 time/month

NUMBER OF INFLORESCENCE PER TREE

- 1 time/week

NUMBER OF PODS/TREE

- 1 time/2 weeks

PRODUCTION

- Measuring pod size
- Weighting fresh pod and fiber.

III. NEXT REPORT

The next report will cover the workdone on yarn properties, dying and weaving techniques, and the economic evaluation of fabric.

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Appendix A

AVERAGE

STATION : CHUMPORN PHYSICAL PROPERTIES OF RUX FIBER

INPUT : HIGH

	CLONE	EFFECTIVE LENGTH	MAXIMUM FIBER LENGTH	% SHORT FIBER	PRESSLEY INDEX	TENSILE STRENGTH	MICRONAIRE
	S2	1.51	1.53	21.93	[illegible]	[illegible]	4.13
	S9	1.49	1.51	28.21	8324.66	89988.80	4.23
	S3	1.29	1.37	24.64	6154.50	66530.02	4.54
	S17	1.35	1.35	22.16	8466.74	91525.36	4.45
*1	S7	1.61	1.64	26.04	8568.49	91003.42	4.63
	S12	1.47	1.51	24.97	8150.56	87620.94	4.61
	S13	1.37	1.42	19.[illegible]	[illegible]	74051.46	4.33
	S5	1.25	1.31	20.27	7263.78	78521.33	4.41

AVERAGE

STATION : CHUMPORN PHYSICAL PROPERTIES OF RUX FIBER

INPUT : LOW

	CLONE	EFFECTIVE LENGTH	MAXIMUM FIBER LENGTH	% SHORT FIBER	PRESSLEY INDEX	TENSILE STRENGTH	MICRONAIRE
	S2	1.61	1.63	23.25	8324.66	89988.80	4.38
	S9	1.44	1.47	24.99	7700.49	83242.17	4.46
	S3	1.32	1.36	20.45	6914.64	74747.09	4.43
	S17	1.39	1.41	24.33	7324.48	79177.51	4.57
*1	S7	1.56	1.57	23.86	7742.46	83695.87	4.39
	S12	1.54	1.58	25.21	8256.77	89255.56	4.77
	S13	1.29	1.32	26.99	7866.32	85034.80	4.68
	S5	1.27	1.32	21.35	7936.76	85796.26	4.39

AVERAGE VALUE

HIGH INPUT	1.42	1.46	23.49	7783.67	83877.78	4.42
LOW INPUT	1.43	1.46	24.01	7758.32	83867.26	4.51
TOTAL	1.42	1.46	23.75	7770.99	83872.52	4.46

AVERAGE

STATION : KHAO HIN SORN PHYSICAL PROPERTIES OF RUX FIBER

INPUT : HIGH

	CLONE	EFFECTIVE LENGTH	MAXIMUM FIBER LENGTH	% SHORT FIBER	PRESSLEY INDEX	TENSILE STRENGTH	MICRONAIRE
	E5	1.33	1.25	22.15	7120.83	76976.08	4.10
	E7	1.24	1.27	21.40	6934.55	74897.59	3.97
	E9	1.27	1.29	25.75	6902.55	74616.46	3.88
*3	E2	1.33	1.30	23.75	6606.54	73489.30	4.23
	E8	1.19	1.19	24.33	6439.56	69492.69	4.36
*2	E6	1.23	1.26	27.10	6353.52	73189.58	4.32
	E11	1.27	1.28	23.55	6516.13	70439.79	4.21
*1	E1	1.29	1.31	23.35	6632.67	76133.22	4.09

AVERAGE

STATION : KHAO HIN SORN PHYSICAL PROPERTIES OF RUX FIBER

INPUT : LOW

	CLONE	EFFECTIVE LENGTH	MAXIMUM FIBER LENGTH	% SHORT FIBER	PRESSLEY INDEX	TENSILE STRENGTH	MICRONAIRE
	E5	1.22	1.23	21.13	6665.50	72054.03	4.41
	E7	1.24	1.27	22.65	7234.12	78200.75	4.39
	E9	1.26	1.27	25.70	6947.69	75514.37	4.23
*3	E2	1.23	1.30	24.56	7303.38	75776.71	4.42
	E8	1.15	1.20	25.32	6657.16	71563.77	4.10
*2	E6	1.23	1.24	26.75	6459.74	70154.04	3.87
	E11	1.27	1.29	24.59	7255.57	78432.64	4.17
*1	E1	1.27	1.29	22.20	6996.74	75634.59	4.31

AVERAGE VALUE						
HIGH INPUT	1.25	1.27	23.91	6786.85	74287.64	4.15
LOW INPUT	1.25	1.26	24.10	6911.36	74716.36	4.24
TOTAL	1.25	1.26	24.01	6849.41	74502.00	4.19

AVERAGE

STATION : KON KAEN PHYSICAL PROPERTIES OF RUX FIBER

INPUT : HIGH

	CLONE	EFFECTIVE LENGTH	MAXIMUM FIBER LENGTH	% SHORT FIBER	PRESSLEY INDEX	TENSILE STRENGTH	MICRONAIRE
	NE25	1.36	1.41	25.77	7642.7[illegible]	82817.56	4.57
	NE20	1.29	1.37	24.16	5555.54	60055.31	4.34
	NE52	1.44	1.52	2[illegible].97	8367.54	90452.99	4.27
*2	NE38	1.36	1.44	27.81	8657.15	93583.65	4.09
	NE17	1.38	1.45	23.19	6734.12	72795.60	4.11
	NE47	1.25	1.34	25.22	5811.81	85256.04	4.35
	NE10	1.30	1.53	29.46	7113.04	76891.78	4.32
	NE13	1.33	1.41	23.81	7959.89	86046.05	4.44
	NE16	1.47	1.57	27.15	7379.28	79769.92	4.51
	NE26	1.46	1.53	28.08	7862.73	84996.15	5.10
*1	NE37	1.39	1.43	26.11	8380.12	90588.86	4.28
	NE21	1.27	1.37	23.75	6615.69	71515.53	4.36
*3	NE29	1.41	1.52	31.47	7929.17	85714.17	5.10

AVERAGE

STATION : KON KAEN PHYSICAL PROPERTIES OF RUX FIBER

INPUT : LOW

	CLONE	EFFECTIVE LENGTH	MAXIMUM FIBER LENGTH	% SHORT FIBER	PRESSLEY INDEX	TENSILE STRENGTH	MICRONAIRE
	NE25	1.31	1.39	26.90	6943.05	75054.20	4.03
	NE20	1.42	1.55	27.54	8614.52	93122.69	4.35
	NE52	1.48	1.58	27.14	8674.96	93776.16	4.51
*2	NE38	1.44	1.53	27.15	8580.42	92754.23	4.21
	NE17	1.34	1.43	25.61	7788.42	84192.70	4.43
	NE47	1.29	1.37	26.35	8292.05	89636.36	4.21
	NE10	1.46	1.54	26.44	8546.91	92391.98	4.27
	NE13	1.25	1.33	27.79	8798.36	95110.15	4.31
	NE16	1.28	1.34	21.05	6321.59	86710.02	4.45
	NE26	1.42	1.52	29.51	7408.64	80087.27	4.32
*1	NE37	1.36	1.44	26.79	8548.92	92413.68	4.41
	NE21	1.27	1.38	25.89	7291.94	61800.76	4.62
*3	NE29	1.27	1.32	27.11	8319.99	89938.82	4.23

AVERAGE VALUE

HIGH INPUT	1.36	1.45	26.15	7385.29	81560.28	4.45
LOW INPUT	1.35	1.44	26.71	8009.98	86691.46	4.33
TOTAL	1.36	1.45	26.43	7697.64	84125.87	4.39

AVERAGE

STATION . SALAYA PHYSICAL PROPERTIES OF RUX FIBER

INPUT : HIGH

	CLONE	EFFECTIVE LENGTH	MAXIMUM FIBER LENGTH	% SHORT FIBER	PRESSLEY INDEX	TENSILE STRENGTH	MICRONAIRE
	C3	1.52	1.53	21.11	7218.06	78027.14	4.11
*1	C10	1.32	1.37	22.15	6830.70	73839.76	4.21
	C11	1.27	1.30	21.45	5983.95	64686.46	4.32
	C14	1.48	1.52	19.53	6002.13	65855.77	4.47
	C7	1.52	1.56	21.35	7735.18	83617.15	4.33
	C12	1.33	1.48	22.37	6899.57	74534.28	4.61
	C4	1.58	1.59	23.38	7909.77	85504.60	4.37
	C9	1.39	1.44	22.32	5683.72	61508.00	4.54

AVERAGE

STATION : SALAYA PHYSICAL PROPERTIES OF RUX FIBER

INPUT : LOW

	CLONE	EFFECTIVE LENGTH	MAXIMUM FIBER LENGTH	% SHORT FIBER	PRESSLEY INDEX	TENSILE STRENGTH	MICRONAIRE
	C3	1.55	1.80	22.07	6593.77	71268.36	4.22
*1	C10	1.50	1.56	21.11	6112.42	66075.22	4.31
	C11	1.58	1.60	19.35	6398.03	69162.60	4.57
	C14	1.52	1.59	19.41	7618.04	82350.77	4.30
	C7	1.39	1.70	24.70	6446.73	69689.07	4.42
	C12	1.39	1.48	23.42	6998.05	75648.84	4.44
	C4	1.48	1.50	23.61	6164.34	66636.34	4.01
	C9	1.46	1.50	21.21	6735.98	72815.86	4.19

AVERAGE VALUE

HIGH INPUT	1.43	1.47	21.77	6794.89	73452.90	4.37
LOW INPUT	1.48	1.59	21.86	6633.42	71705.88	4.31
TOTAL	1.46	1.53	21.81	6714.15	72579.39	4.34

AVERAGE

STATION : LAMPANG — PHYSICAL PROPERTIES OF RUY FIBER

INPUT : HIGH

	CLONE	EFFECTIVE LENGTH	MAXIMUM FIBER LENGTH	% SHORT FIBER	PRESSLEY INDEX	TENSILE STRENGTH	MICRONAIRE
	N9	1.36	1.30	26.72	7193.52	76853.63	4.32
*1	N6	1.25	1.35	27.44	7302.57	73949.83	4.57
	N18	1.50	1.61	27.87	6142.86	66404.17	4.40
	N11	1.37	1.43	18.73	7562.78	81753.54	4.53
*2	N7	1.20	1.29	25.36	6545.77	70759.64	4.27
*4	N13	1.32	1.37	18.17	6849.46	74057.47	4.42
	N12	1.36	1.41	17.93	7574.02	81874.98	4.39
	N15	1.48	1.52	21.35	8362.39	90337.32	4.14
	N1	1.23	1.29	19.16	7662.45	81651.56	4.11
	N17	1.32	1.13	17.33	7554.30	81667.28	4.33
	N14	1.48	1.54	21.85	7049.04	76280.45	4.73
	N16	1.36	1.41	29.22	8223.95	88300.87	4.87
*3	N3	1.40	1.47	26.33	7347.02	73421.07	4.45
	N2	1.25	1.35	19.96	6351.76	75155.14	4.21
	N8	1.36	1.43	24.60	7627.11	82448.98	4.37

AVERAGE

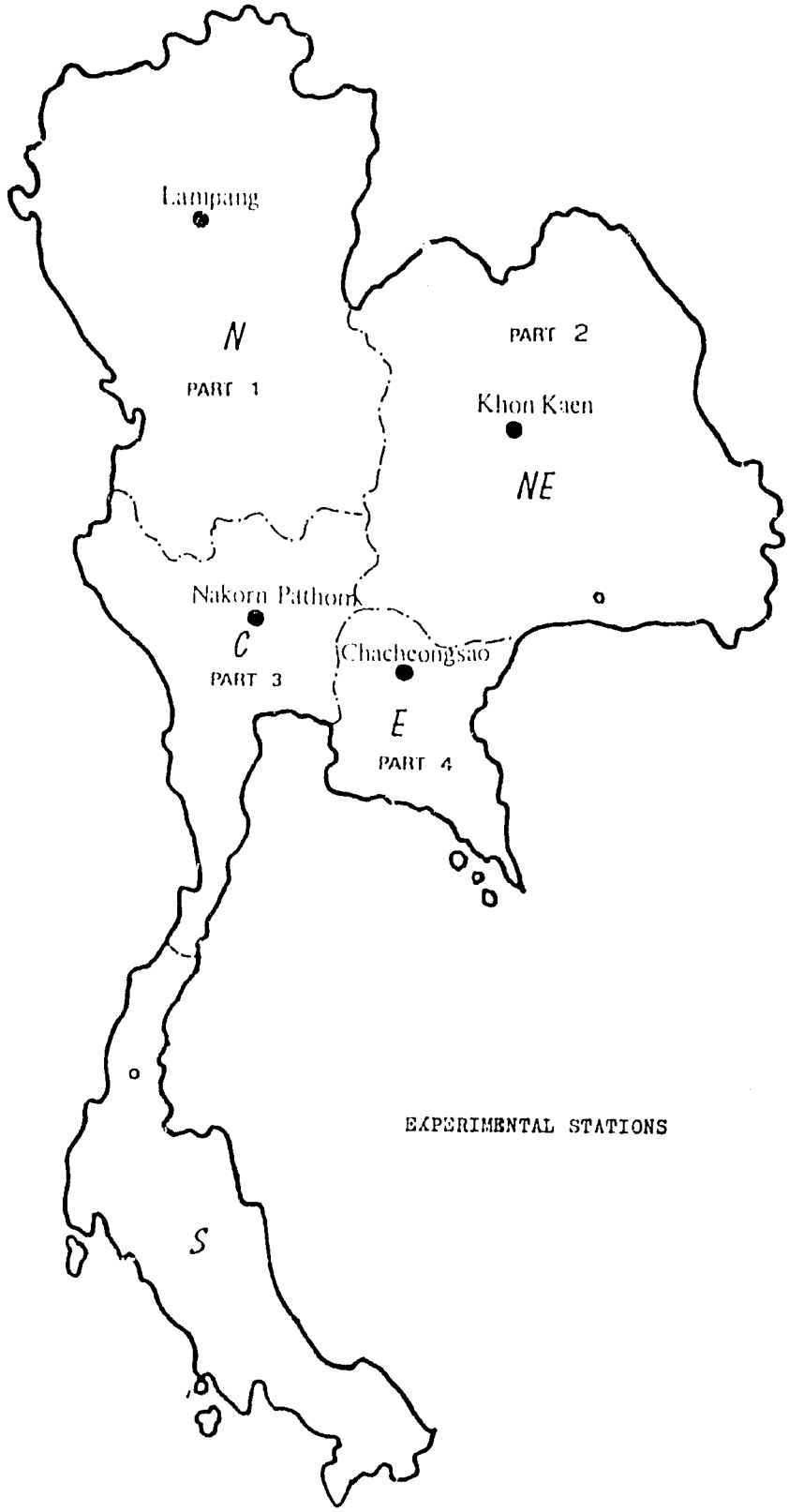
STATION : LAMPANG — PHYSICAL PROPERTIES OF RUY FIBER

INPUT : LOW

	CLONE	EFFECTIVE LENGTH	MAXIMUM FIBER LENGTH	% SHORT FIBER	PRESSLEY INDEX	TENSILE STRENGTH	MICRONAIRE
	N9	1.18	1.51	19.75	7763.25	83920.65	4.11
*1	N6	1.27	1.49	23.44	7245.33	79321.96	4.42
	N18	1.50	1.55	21.36	7745.19	83724.73	4.32
	N11	1.21	1.27	19.82	6313.27	74732.41	4.11
*2	N7	1.34	1.42	25.36	7476.21	80917.69	4.21
*4	N13	1.40	1.48	23.96	7171.69	77525.90	4.33
	N12	1.31	1.37	23.59	6791.71	73418.29	4.53
	N15	1.34	1.23	21.34	6504.09	70322.62	4.08
	N1	1.13	1.39	19.16	7138.83	77710.07	4.17
	N17	1.26	1.33	21.70	7405.13	80047.81	4.53
	N14	1.23	1.34	22.48	7893.66	85330.35	4.19
	N16	1.41	1.46	27.92	7936.84	84716.15	4.21
*3	N3	1.33	1.55	26.33	7245.33	78521.90	4.41
	N2	1.37	1.45	19.76	7079.49	76530.96	4.23
	N8	1.44	1.57	22.96	7953.44	86064.66	4.07

AVERAGE VALUE						
HIGH INPUT	1.35	1.39	21.89	7324.38	79109.16	4.42
LOW INPUT	1.31	1.44	22.96	7348.25	79433.74	4.26
TOTAL	1.33	1.42	22.42	7336.32	79268.45	4.34

Appendix B



EXPERIMENTAL STATIONS

LUMPANG STATION

KHON KAEN STATION

SALAYA STATION

KHAO HIN SORN STATION