



Study on Knowledge Extension
Model of Good Chemical Fertilizer
with Organic Fertilizer Application for
Increase Sericulture Productivity

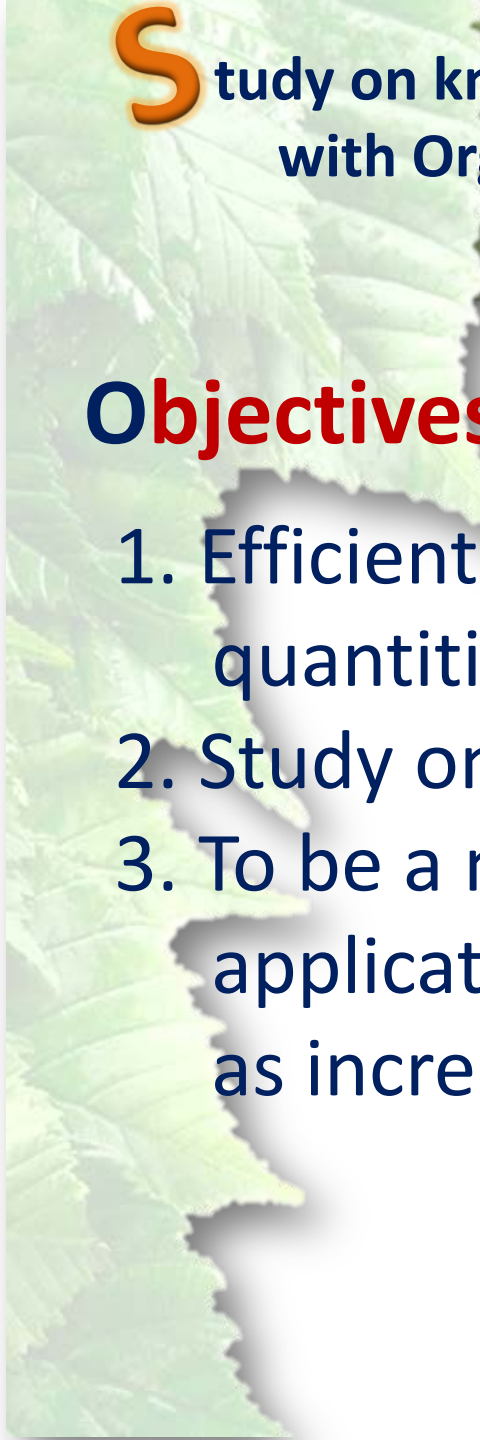
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Study on knowledge Extension Model of Good Chemical Fertilizer with Organic Fertilizer Application for Increase Sericulture Productivity

Objectives

1. Efficient fertilizer application and benefit for quantities and quality of mulberry and silk yarn
2. Study on sericulture database
3. To be a model of the best practice for fertilizer application to sericulture productivity increase, as increasing of farmers' income



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Tools and Methods

Tools

- Sakhol Nakorn mulberry variety
- Nang Lai silkworm variety
- chemical fertilizer
- organic fertilizer
- soil collection kit
- Silk rearing room and silk rearing tools
- Hand reel equipment

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Methods

1. Select area of 2-year mulberry plantation

2. The experimental design was laid out as Randomized complete block design RCBD consists of 5 treatments with 4 replicates. The treatments comprised as following:

Treatment 1 : 0-0-0 (Control)

Treatment 2 : 30-15-15 kg/rai of N-P₂O₅-K₂O

Treatment 3 : 30-15-15 kg/rai of N-P₂O₅-K₂O + organic fertilizer **1 ton/rai/year**

Treatment 4 : 30-15-15 kg/rai of N-P₂O₅-K₂O + farm yard manure **2 tones/rai/year**

Treatment 5 : 30-15-15 kg/rai of N-P₂O₅-K₂O + farm yard manure **4 tones/rai/year**

3. The study consisted of 2 activities, as the following;

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Activity1: Study on Knowledge Extension Model of Good Chemical Fertilizer with Organic Fertilizer Application at Queen Sirikit Sericulture Centers in Roi-Et and Chaiyaphum Province, follow as;

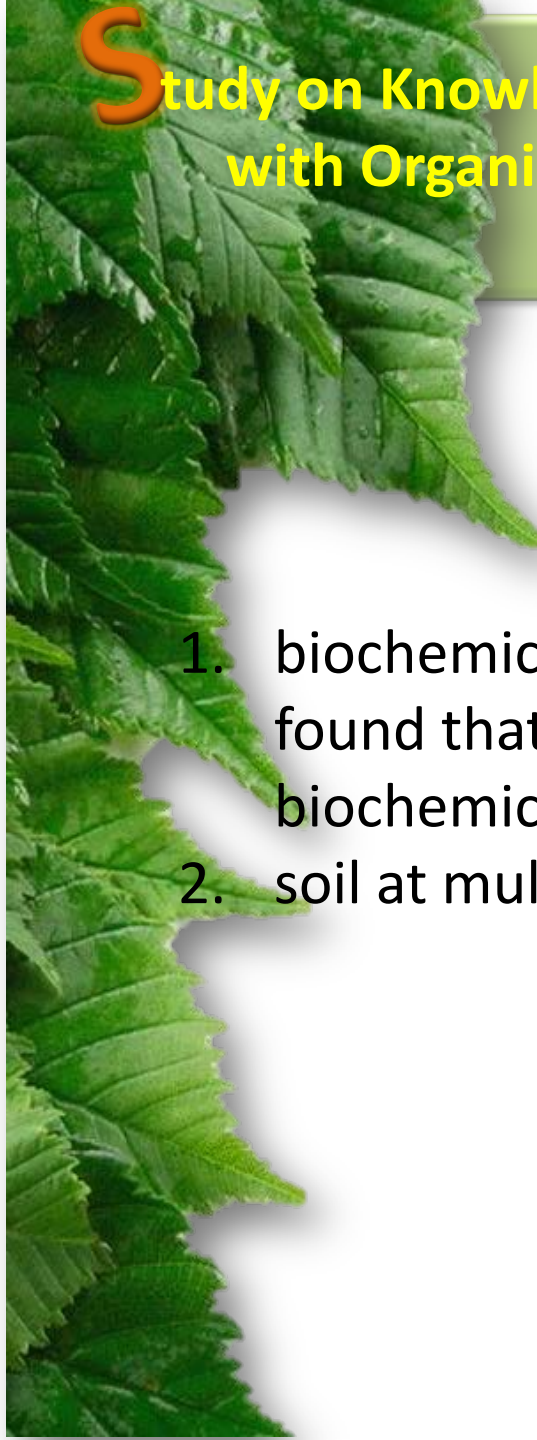
- 1) randomly collected soil from both centers
- 2) applied the fertilizer by chemical fertilizer 2 times and organic fertilizer 1 time
- 3) reared 2 crops of silkworm by feeding the worm with experimental mulberry leaf
- 4) recorded the data as followings
 - (1) physical data: soil, rain quantity, humidity, temperature
 - (2) agriculture data
 - : mulberry data; leaf productivity
 - : silk data; cocoon silk yarn production
- 5) analyzed data
- 6) results

Remark: 1 rai = 0.4 acre or 0.16 hectre

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Activity 2: Study of Knowledge Extension Model of Good Chemical Fertilizer with Organic Fertilizer at farm level, follow as;

- 1) selected farmers in Roi-et and Chaiyaphum Province
- 2) examine the farmer about Model of Good Chemical Fertilizer with Organic Fertilizer (Activity1)
- 3) analyzed information and data from the farm
- 4) evaluated farmer's satisfactory



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R Result and Suggestion

1. biochemical analysis of the manure used in the experiments found that manure used in each Centers had different biochemical characteristics (table1)
2. soil at mulberry block analysis in both Center (table2)

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Table 1 The chemical analysis of the organic

qualification	Sericulture Center Roi-et	Sericulture Center Chaiyaphum
pH (1:10)	8.30	7.71
conductivity (dS/m)	5.15	3.30
Total Nitrogen (%)	1.09	1.19
Total Phosphorus (% P ₂ O ₅)	0.73	1.15
Total Potassium (% K ₂ O)	2.27	1.87
Total Calcium (% Ca)	0.83	1.21
Total Magnesium (% Mg)	0.36	0.41
Total Sulfur (% S)	0.19	0.13

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Table 2 The chemical analysis of soil before planting (Sericulture Center Roiet and Sericulture Center Chaiyaphum)

Qualification Chaiyaphum	Sericulture Center Roiet	Sericulture Center
pH (1:1)	5.87 Moderately acid	6.16 Slightly acid
conductivity (dS/m) (1:5)	0.023 Not salty	0.51 Not salty
Organic matter (%)	0.05 Very low	0.86 Low level
Avail. P ₂ O ₅ (mg.kg.)	6.15 Low level	11.6 Medium level
Potassium (K ₂ O) (mg.kg.)	32 Low level	48 Low level
Soil characteristics	Sandy loam	Sandy loam



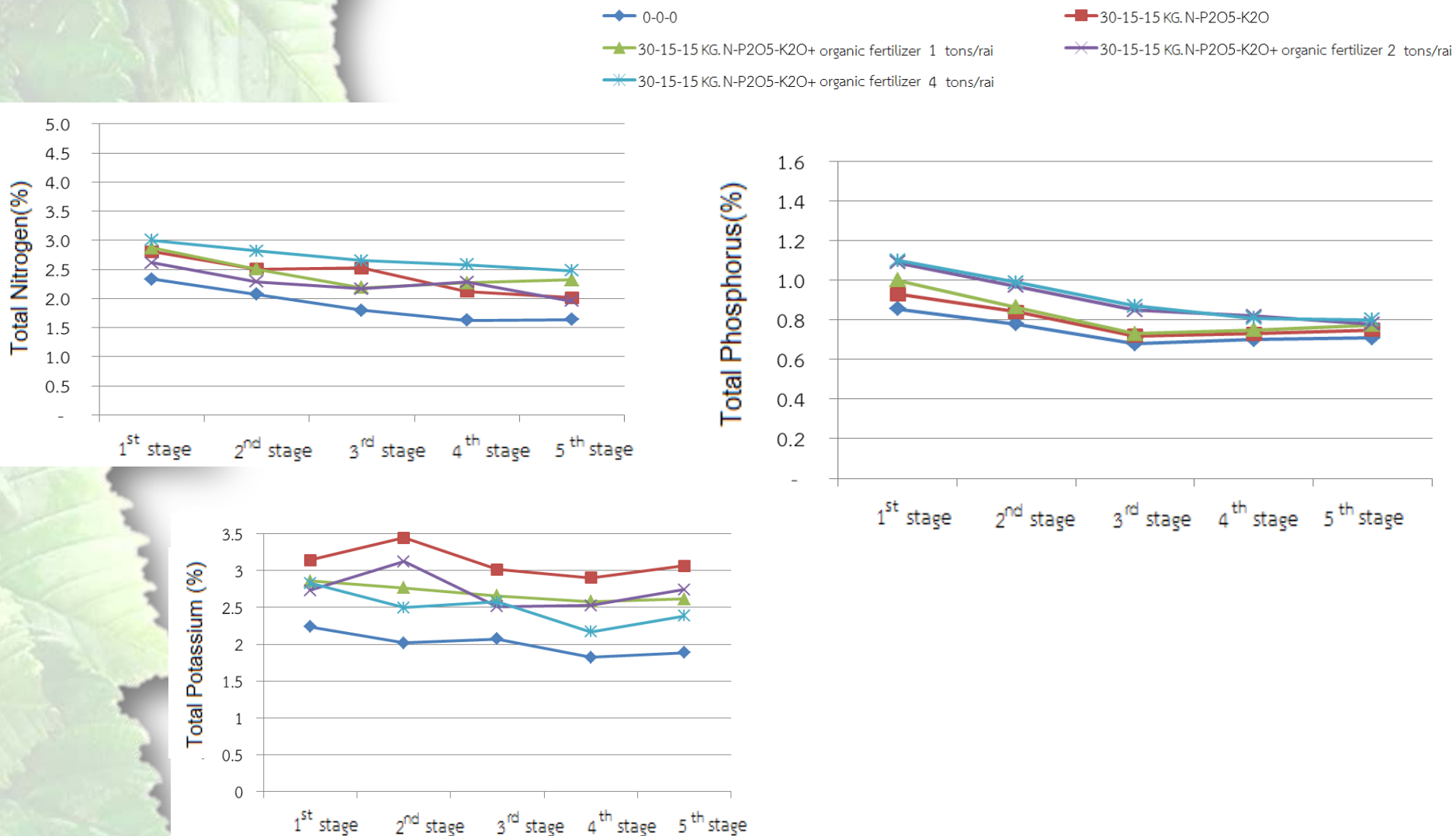
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R Result and Suggestion

3. result of chemical and organic fertilizer application per plant nutrition (nitrogen, phosphorus, potassium) in mulberry leaf and productivity of mulberry and silkworm
 - 3.1 plant nutrition in mulberry leaf collected from all experiments in Roi-et and Chaiyaphum Center to feed silkworm in first, second and third stages, higher than leaf for silkworm in fourth – fifth stage (figure 1.2)
 - 3.2 productivity of mulberry and silkworm There was non significant differences (table 3), the cocoon and silk yarn productivity was in the same development; all experiments showed non-significant difference. (table 5,6) However, because of the weather and humidity during February – April was not appropriate (table 4 fig. 3,4)

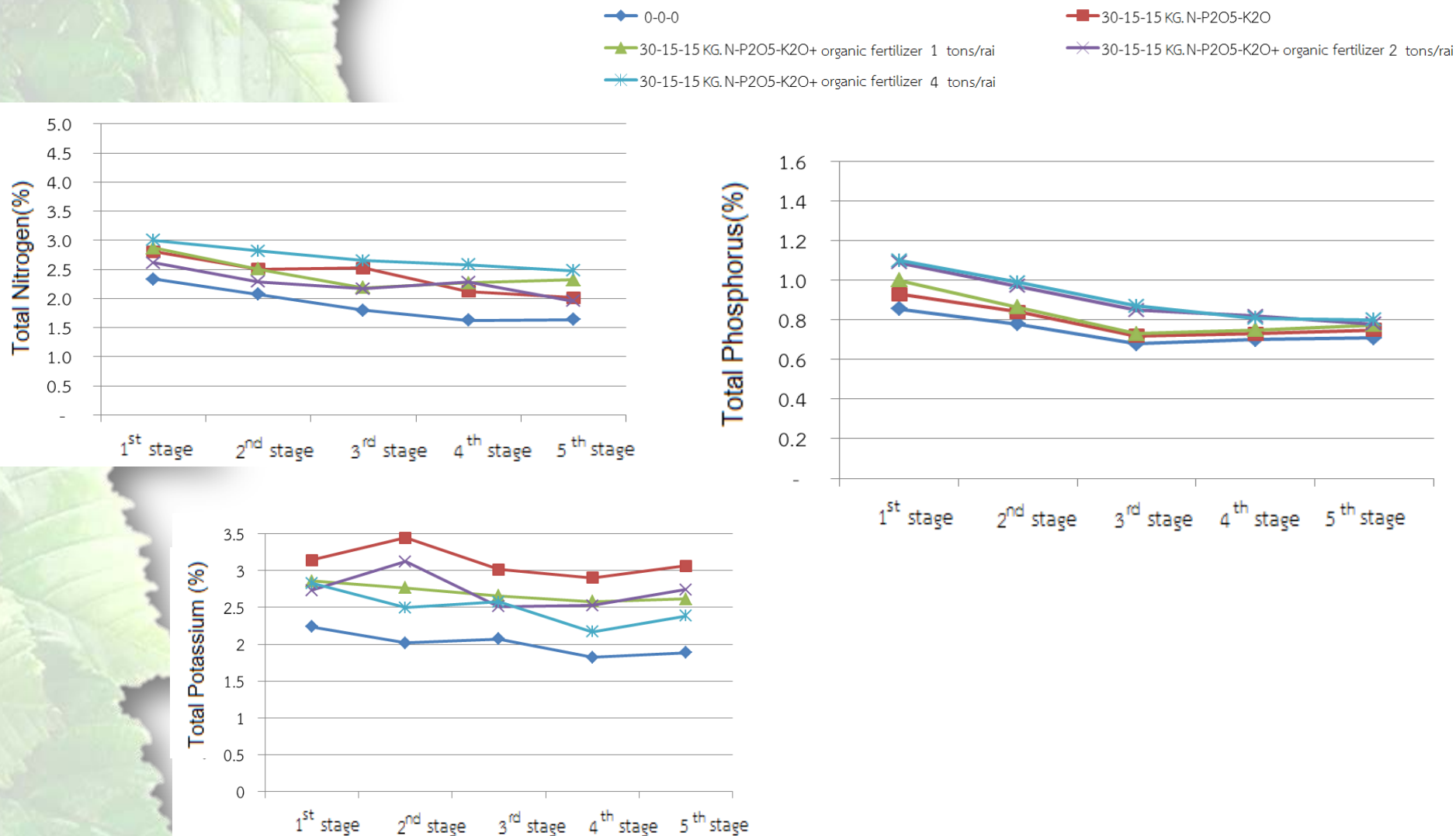
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Figure 1 Nutrient content in mulberry leaves (Nitrogen, Phosphorus, Potassium) are used for silkworms rearing ages 1 to 5. (Sericulture Center Roiet)



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Figure 1 Nutrient content in mulberry leaves (Nitrogen, Phosphorus, Potassium) are used for silkworms rearing ages 1 to 5. (Sericulture Center Roiet)



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Table 3 Effects of fertilizer with manure per weight of mulberry year 1 (2013) and year 2 (2014) of Sericulture Center Roiet and Sericulture Center Chaiyaphum

Treatment	Sericulture Center Roiet		Sericulture Center Chaiyaphum	
	Year 1	Year 2	Year 1	Year 2
0-0-0	635.90b	508.52b	366.09b	305.75b
30-15-15 kg. (N-P ₂ O ₅ -K ₂ O)	724.58ab	809.75a	534.01a	594.58a
30-15-15 kg. (N-P ₂ O ₅ -K ₂ O) + manure 1 ton/0.4 acre	795.67ab	744.43ab	430.475a	550.58a
30-15-15 kg. (N-P ₂ O ₅ -K ₂ O) + manure 2 ton/0.4 acre	807.70a	779.12a	430.75a	537.92ab
30-15-15 kg. (N-P ₂ O ₅ -K ₂ O) + manure 4 ton/0.4 acre	797.58ab	719.45a	305.45ab	548.67ab
F-test	*	*	*	*
%CV	31.47	29.54	51.74	44.27

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Table 4 Period of silkworm rearing 4 time of Sericulture Center Roiet and Sericulture Center Chaiyaphum

Location	Year	1 Time		2 Times	
		Date/Month	Number of the day	Date/Month	Number of the day
Sericulture Center Roiet	2013	March 18-April 10	24	July 20-August 9	21
	2014	February 20-March 11	20	July 26-August 14	20
Sericulture Center Chaiyaphum	2013	May 29-June 17	20	September 22-October 10	19
	2014	February 21-March 10	18	July 18-August 4	18

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Table 5 Cocoon yield and silk production (per 0.4 g eggs silkworm) Sericulture Center Roiet

Treatment	Cocoon yield (g)				Silk production (g)			
	Year 1		Year 2		Year 1		Year 2	
	1 time	2 times	3rd	4 th	1 time	2 times	3rd	4 th
0-0-0	114.28a	345.50	185.44	237.29	9.49b	31.41	16.19	20.72b
30-15-15 kg. (N-P ₂ O ₅ -K ₂ O)	132.60ab	382.75	213.90	298.00	11.51ab	34.80	18.68	26.03a
30-15-15 kg. (N-P ₂ O ₅ -K ₂ O) + manure 1 ton/0.4 acre	143.33ab	374.50	243.71	248.13	12.48ab	34.05	21.28	21.67a
30-15-15 kg. (N-P ₂ O ₅ -K ₂ O) + manure 2 ton/0.4 acre	131.43ab	370.50	204.04	260.13	11.40ab	33.68	17.82	22.72a
30-15-15 kg. (N-P ₂ O ₅ -K ₂ O) + manure 4 ton/0.4 acre	110.35b	358.50	223.13	251.76	14.39a	32.59	19.49	21.99ab
F-test	*	ns	ns	ns	*	ns	ns	*
%CV	22.06	6.57	21.50	11.38	23.07	6.57	21.51	11.38

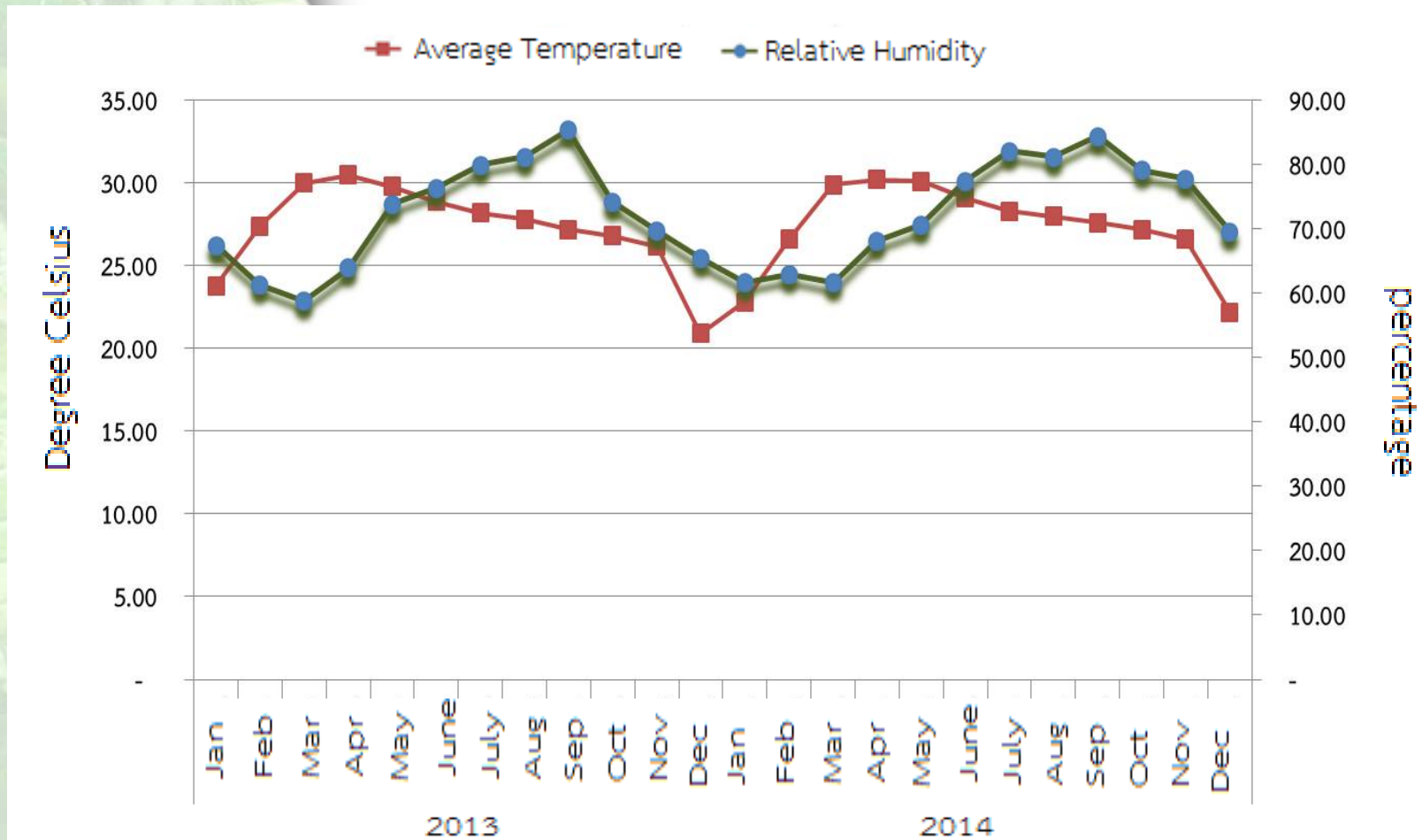
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Table 6 Cocoon yield and silk production (per 0.4 g eggs silkworm) Sericulture Center Chaiyaphum

Treatment	Cocoon yield (g)				Silk production (g)			
	Year 1		Year 2		Year 1		Year 2	
	1 time	2 times	3rd	4 th	1 time	2 times	3rd	4 th
0-0-0	252.30	246.85b	199.88	240.01b	22.25a	21.80	16.17b	19.42b
30-15-15 kg. (N-P ₂ O ₅ -K ₂ O)	252.05	244.00b	294.22	267.65a	20.89b	22.85	23.80a	21.65a
30-15-15 kg. (N-P ₂ O ₅ -K ₂ O) + manure 1 ton/0.4 acre	253.63	248.60ab	231.51	251.12a	22.29a	22.93	18.73ab	20.32ab
30-15-15 kg. (N-P ₂ O ₅ -K ₂ O) + manure 2 ton/0.4 acre	251.68	249.58ab	228.24	261.57a	22.33a	22.65	18.47ab	21.16ab
30-15-15 kg. (N-P ₂ O ₅ -K ₂ O) + manure 4 ton/0.4 acre	251.20	254.33a	236.97	256.19a	22.29a	23.40	19.17ab	20.73ab
F-test	ns	*	ns	**	*	ns	*	*
%CV	11.4	19.2	20.76	6.35	4.32	5.17	20.76	6.35

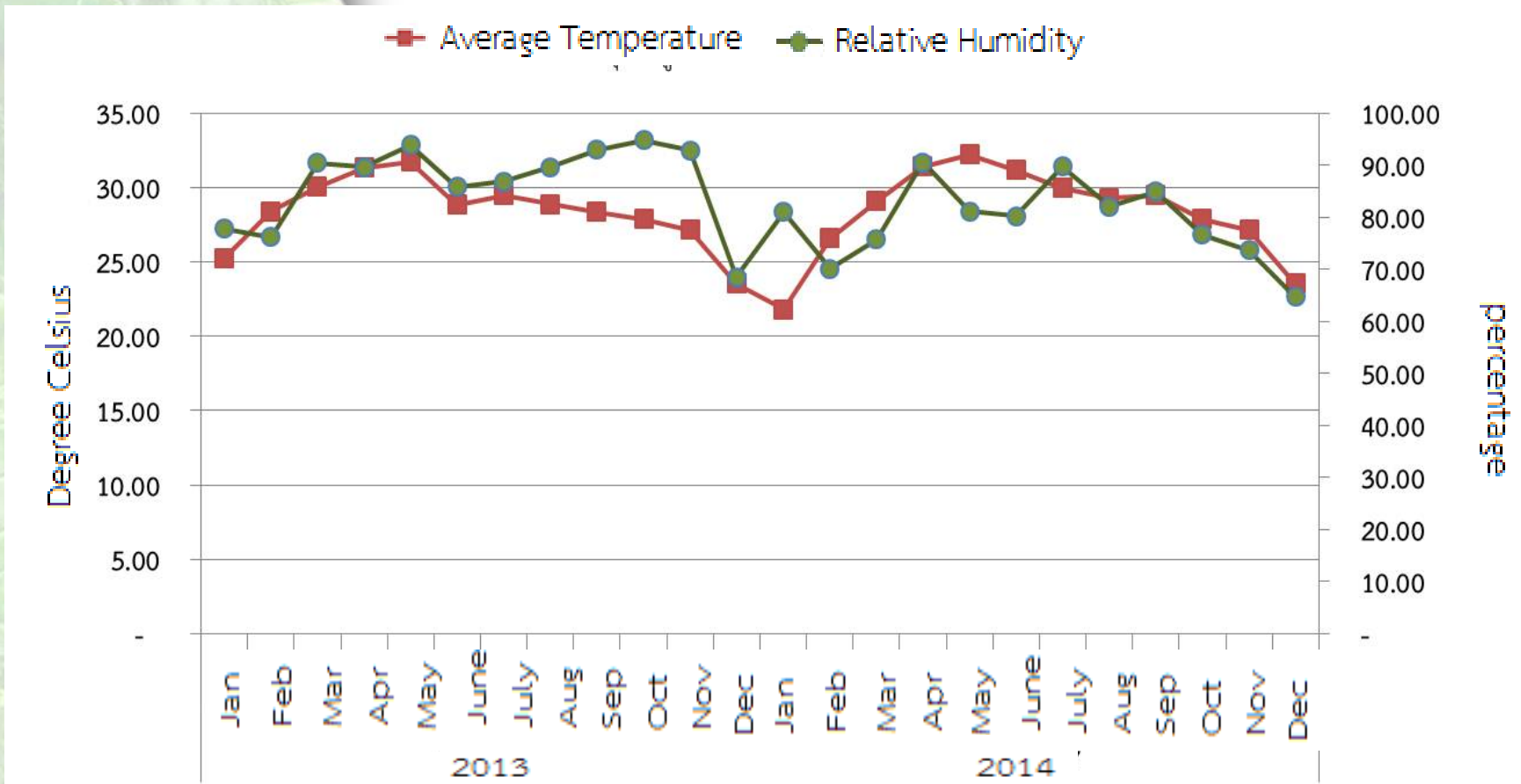
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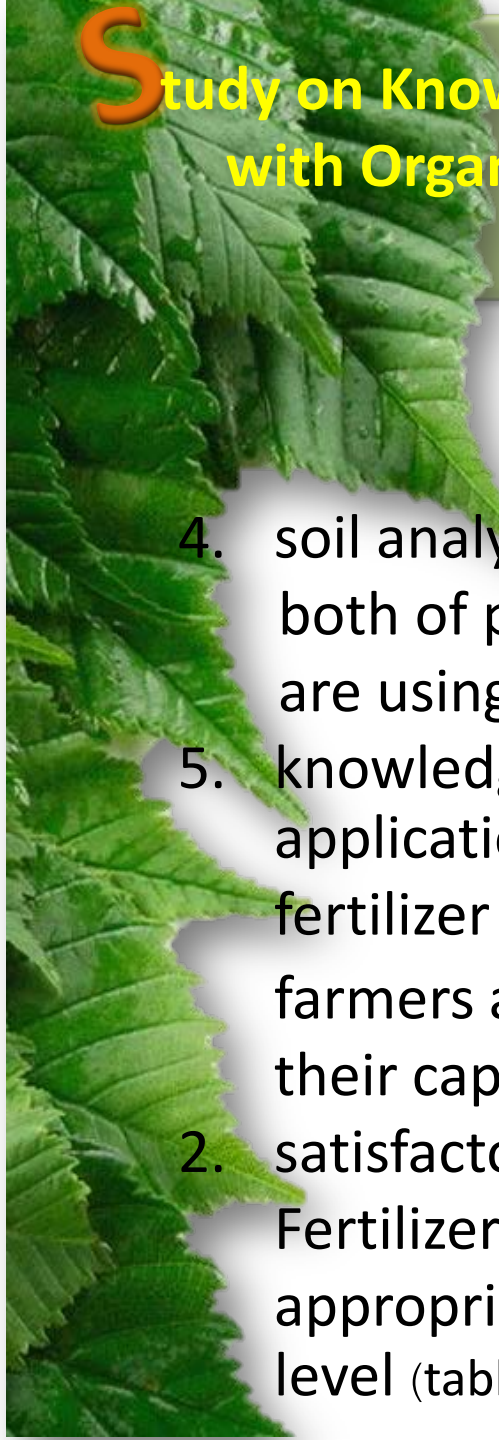
Figure 3 Average temperature and humidity of Roiet. (2013 and 2014)



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Figure 4 Average temperature and humidity of Chaiyaphum. (2013 and 2014)





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R Result and Suggestion

4. soil analysis after chemical and organic fertilizer application both of percent Phosphorus and exchangeable potassium are using more (table 8,9)
5. knowledge extension of good chemical and organic fertilizer application, 30-15-15 kilogram per rai of $N-P_2O_5-K_2O$ + organic fertilizer 1 ton per rai per year, to farmers to farmers was that farmers accepted the principle to action and could decrease their capital
2. satisfactory of famers toward Model of Good Chemical Fertilizer with Organic Fertilizer Application was good and appropriate for increasing sericulture productivity in farmer level (table 7).

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Table 8 The chemical analysis of the soil after application (Sericulture Center Roiet)

Treatment	pH	O.M (%)	Avail.P ₂ O ₅ (mg.kg.)	K ₂ O (mg.kg.)
30-15-15 kg. (N-P ₂ O ₅ -K ₂ O) + manure 1 ton/0.4 acre	6.96	0.64	28.85	71.50
30-15-15 kg. (N-P ₂ O ₅ -K ₂ O) + manure 2 ton/0.4 acre	5.92	0.64	15.60	62.00
30-15-15 kg. (N-P ₂ O ₅ -K ₂ O) + manure 4 ton/0.4 acre	6.95	0.75	17.45	73.00
F-test	ns	ns	ns	ns
%CV	2.66	15.57	59.44	20.29

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Table 9 The chemical analysis of the soil after application (Sericulture Center Chaiyaphum)

Treatment	pH	O.M (%)	Avail.P ₂ O ₅ (mg.kg.)	K ₂ O (mg.kg.)
30-15-15 kg. (N-P ₂ O ₅ -K ₂ O) + manure 1 ton/0.4 acre	6.96	1.04	42.35	81.00
30-15-15 kg. (N-P ₂ O ₅ -K ₂ O) + manure 2 ton/0.4 acre	7.07	1.21	39.10	74.50
30-15-15 kg. (N-P ₂ O ₅ -K ₂ O) + manure 4 ton/0.4 acre	7.45	1.19	40.10	75.00
F-test	ns	ns	ns	ns
%CV	5.61	23.81	23.98	16.88

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Table 7 The mean and standard deviation. Satisfaction levels of silk to master knowledge of farmers Chaiyaphum and Roiet

Complacency	\bar{x}	SD	Interpretation
Knowledge of fertilizer	3.83	0.751	Very satisfied
Silkworm rearing	3.41	0.605	Very satisfied
Total	3.62	0.678	Very satisfied



Suggestion

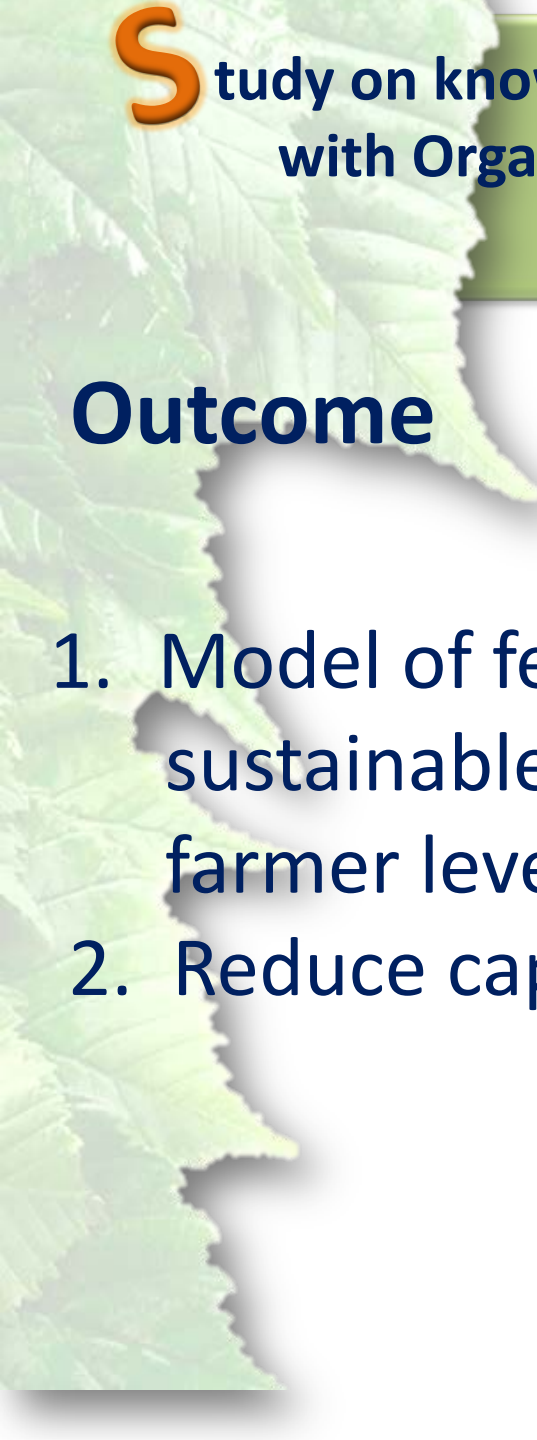
- Chemical property of organic fertilizer could have an effect on productivity of mulberry and silk
- An appropriate climate could affect on silkworm rearing and result of the experiment

Conclusions

- To use fertilizers at a suitable rate could increase nutrients of mulberry leaves which benefit to both young and mature silkworms in order to get good quantity and quality productivity
- To use chemical fertilizer combined with organic fertilizer at a suitable rate could give the most benefit to farmers
- To use chemical fertilizer combined with organic fertilizer could not only increase nutrients of soil but also improve soil characteristics

D Discussion

- Chemical analysis of soil is needed before conducting experiment related to fertilizer, soil, water and sericulture products
- Water is related to fertilizer; therefore planning on utilization of water and fertilizer is important to acquire the best result
- Database is needed for planning experiment to support an efficient researches
- Applied researches should be conducted in order to improve the efficient of researches of National level



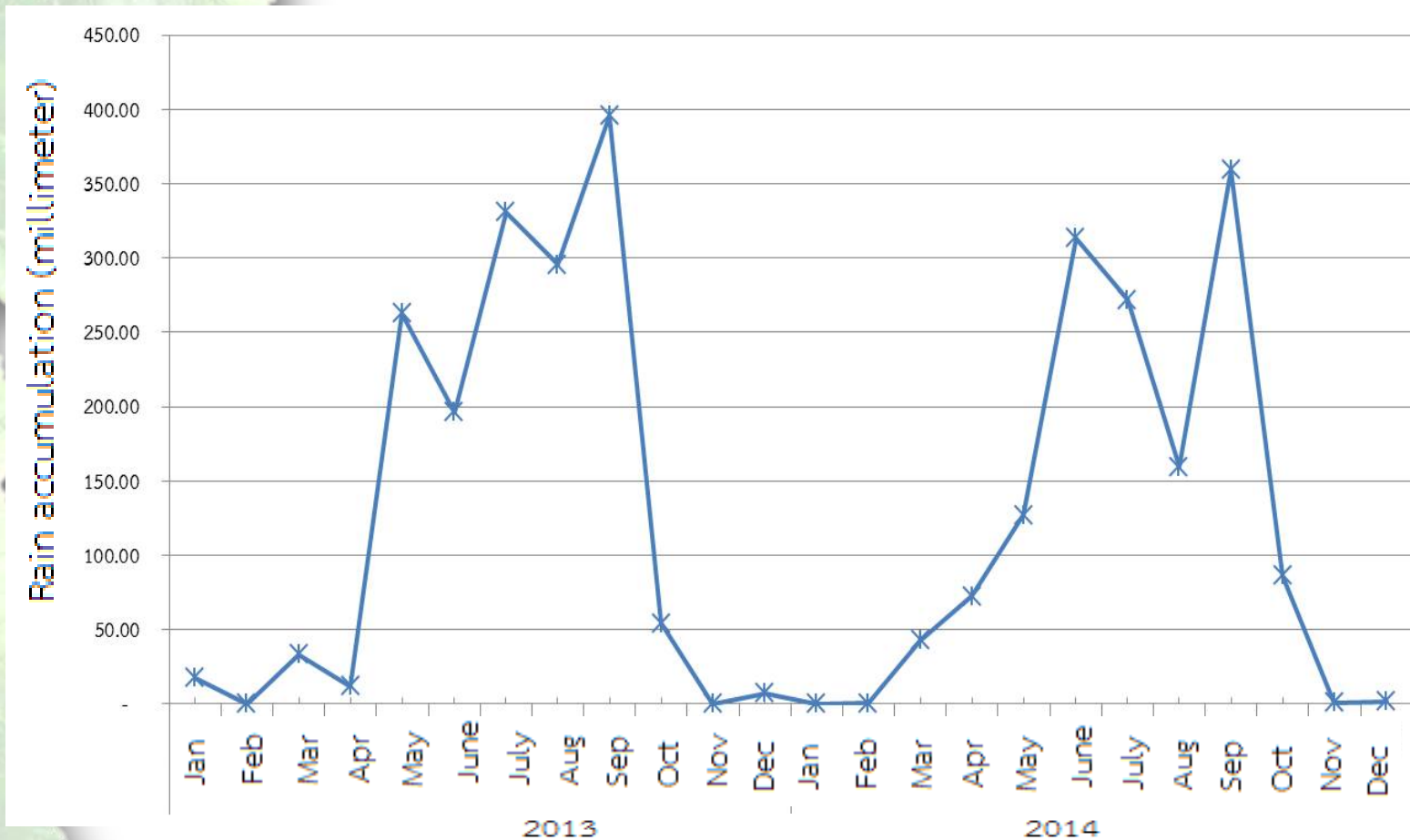
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Outcome

1. Model of fertilizer using technology for sustainable mulberry and silk yarn production at farmer level.
2. Reduce capital cost at farm level

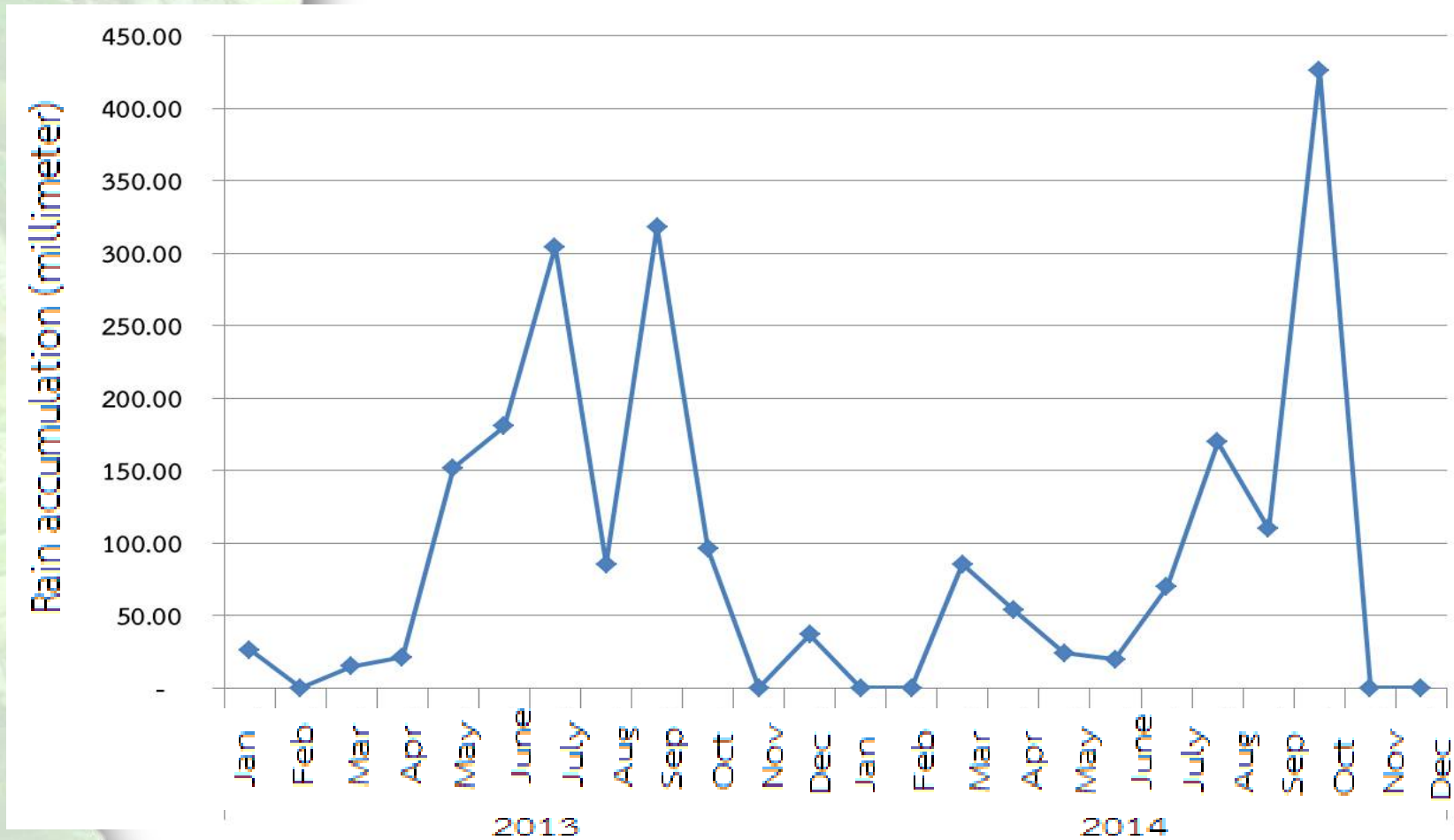
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Figure 5 Rainfall accumulation of Roiet. (2013 and 2014)



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Figure 6 Rainfall accumulation of Chaiyaphum. (2013 and 2014)



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Thank you for your
attention