Contract No. 53-32 U4-4-241

SEMI-ANNUAL REPORT (APRIL-SEPTEMBER 1985)

DEVELOPMENT OF CUT FLOWER INDUSTRY IN THE HIGHLANDS TO REPLACE OPIUM BASED AGRICULTURE

INVESTIGATORS

Mrs. Oradee	SAHAVACHARIN	Project Leader
Mr. Sangtham	KOMKRIS	Co-Worker
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Mr. Sutep	ANURAKCHINA	Field Assistant
Mrs. Vandee	SURIYAWONG	Field Assistant
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Miss Ponpimol	CHAIMALA	Field Assistant
Miss Sermsiri	EIAMFANG	Research Assistant

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SUMMARY

This report deals with the study on cut flower extention at Inthanon in the year 1984 resulted that Mr. Leng earned the highest income of 12, 541.50 Baht from growing carnation. Mr. Padu was second received the income of 12,305.90 Baht from growing gypsophilla and Mrs. Lear earned the lowest income of 236.50 Baht from growing statice.

The second part deals with gladiolus growing extension at Tung Luang in the year 1984, including 48 growing families. A total of 24,000 corms and 60 liters of cormels were distibuted. A total harvest was 32,724 spikes. The total net income received by the growers was 91,262.81 Baht. Mr.Tao received maximum repaid of 7,457 Baht whereas Mrs. Waler received minimum repaid of 120 Baht. Besides cut flowers 16,800 corms and 19,000 cormels were obtained.

The last part deals with the experiment on lily cultivation at Doi Inthanon. The elegans lilies cultivars Bellona, Chinook, Golden Melody, Yellow Blaze, Enchantment, Fire Cracker, Ladykiller, Mont Blanc, Sterling Star, and Red Night were recommended to be grown as cut flowers. Connecticut King was good for potted plant. The speciosum lily cultivars Rubrum and Uchida should not be used as cut flowers.

INTRODUCTION

Since Thailand has been importing cut flowers from the Netherlands and Japan for many years. The trend in imports is increasing every year. In the year 1983, the value of cut flower imports was about 3,800,000 Baht.

Carnation, tulip, chrysanthemum, lily, gerbera, and alstroemeria were the most popular imported cut flowers. In the meantime, research on some aspects of cut flower production on the highlands such as carnation, chrysanthemum, gladiolus, gypsophila, statice and gerbera had been done during the past years, and had already proved that they have very high potential to substitute opium production. But the cut flower production is still limited due to many problems, such as cultivation technique for high quality and year-round production, disease, postharvest handling and marketing. These problems should be solved before going into cut flower industry.

The Royal Project in cooperation with the Highland Agriculture Project of Kasetsart University has been carrying out research on the development of cut flower industry in the highlands to replace opium based agriculture. The project was started in November 1984, supported by U.S.D.A. for the amount of $ 31,400 for the first year, and $ 15,000 for the second year. Plan of work has been set as follows :

1. Survey the quantity of various cut flowers species presently imported into Thailand and develop strategies for producing these on similar species of comparable market demand.

2. Select cultivars of varicus cut flower species which produce well in the highlands paying particular attention to the simplicity of growing and marketing.

3. Maintain pathogen-free stocks of cut flowers through tissue culture and multiply for use by hilltribe growers.

4. Train hilltribe growers in the cultural practices and techniques for growing and marketing cut flowers. Develop extension publications, training aids, and selected materials to facilitate technology transfer.

5. Evaluate market potentials and assist hilltribes in marketing cut flowers.

CUT FLOWER EXTENSION AT INTHANON, 1984

ABSTRACT

The cut flower extension at Inthanon for the year 1984 resulted that Mr.Leng, a Mong, carned the highest at 12, 641.50 Baht. Most of his income came from carnation. Mr.Padu,a Karen, was second and received the income of 12,305.90 Baht, mostly from gypsophila. Mrs. Lear earned the lowest 236.50 Baht. It could be ascertained that the most successful cut flowers were gypsophila, carnation and Briza maxima.

INTRODUCTION

The research project on cut flower production in Inthanon area was located at Khun Klang Village, Amphoe Chom Thong, Chiang Mai province, at an altitude of 1,200 meter above sea level. The work was begun in 1982 by growing various imported varieties of temperate flower plants. The varieties exhibiting good potential for production in the upland area of Thailand were selected such as carnation, statice, chrysanthemum, gypsophila, iris, etc. The quality of flowers could be comparable to and competitive with those from its origin. Each year large volume of those flowers is being imported to fulfil the demand of customers who are particular with such exalted beauty, undeterred by such high cost and marked-up prices. From the above experiments,

some cut-flowers were introduced into the Bangkok market. They earned good price and attracted a large demand which could not be met by the limited capacity of the research project.

Dr. Oradee Sahavacharin saw that the cultivation land could be expanded to meet such market demand; consequently extension activities were earnestly expanded among hilltribe growers in 1984 to help better their living standard.

OBJECTIVES

1. To train the hilltribe growers the art of floriculture.

2. To enable the hilltribe families to earn greater income.

3. To encourage these people to make the optimum use of their land.

PROCEDURES

1. Survey on hilltribe growers who might have interest in growing flowers in Khun Klang, Mae Klang Luang and Ang Kha Noi villages.

2. Group the interested hilltribe growers and conduct soil survey on their existing land.

grower of Ban Khun Klang village joined the Project making a total of 12 growers for 1984.

2. The Project prepared carnation plantlets for cooperating growers; and the growers germinated annual flower plants by themselves.

3. The growers prepared the plot of 1 metre width and variable length. The Project provided the cutting,corm and seedlings; and the Project officer helped supervise the cultivation.

4. After planting, the officer paid visits to give instruction on the fertilizer and pesticides application and other necessary care.

5. Growers cut their flowers and delivered them to the Project office where the grading and packaging were done. As for gypsophila the growers assembled the product at a grading and packaging house and did their own packaging. For the grass flowers the growers must cut them fresh, cleaned, tied them up in bundle and hanged them for drying under the roof. After drying these are sold later to the Project.

6. The Project paid the grower in monthly instalments, renumerating from the amount of flowers delivered.

7. The Project deducted from the payment the cost of fertilizer and pesticides as supplied to the growers.

8. The Marketing Section notified the Project of the flower price of each sale and charged 20% for the marketing service.

9. After harvest the Project recollected all the stocks especially carnation, gypsophila, iris and gladiolus for further propagation.

SUMMARY

The extension activity of temperate cut flower growing at the Inthanon Research and Extension Project was initiated in 1984. Some cooperating growers earned more than others; some required corrections on particular problems, however, the overall activities could be summed up as satisfactory. The Project recruited a total of 12 cooperating hilltribe growers; two opted out, leaving 10 growers who remained to the end of season. Each grower delivered their products to the Project six batches and received the net return as follows

1.	Mr. Léng	12,641.50	Bht.
2.	Mr. Padu	12,305.90	Bht.
3.	Mr. Junu	7,662.20	Bht.
4.	Mr. Du Hae	4,893.84	Bht.
5.	Mr. Kamu	4,394.90	Bht.
6.	Mr. Kammun	3,035.04	Bht.
7.	Mr. Sor Dee	2,833.50	Bht.

8.	Mr. Wan	1,975.52	Bht.
9.	Mr. Bai	1,672.00	Bht.
10.	Mrs. Lear	236.50	Bht.

The total payment was 51,650.90 Baht. The Project made a deduction to pay for the fertilizer and pesticide costs as actually used by growers and gave the net return to each grower as shown in Table 1. The payments were calculated from the following rates.

carnation	1.60-4.00	Bht/flower
statice	24.00-30.00	Bht/kg.(fresh)
gypsophila	20.00-30.00	Bht/bundle(200g.)
iris	2.40	Bht/flower
gladiolus	0.60-0.80	Bht/spike
Briza maxima	400-500	Bht/kg.(dry)
Lagurus ovatus	500	Bht/kg.(dry)

From the above result it was evident that Mr. Leng, a Mong, earned the highest at 12,641.50 Bht. Most of his income came from carnation. Mr. Padu, a Karen, was second and received the income of 12,305.90 Bht, mostly from gypsophila. Mrs. Lear earned the lowest--236.50 Bht. It could be ascertained that the most successful cut flowers were gypsophila, carnation and Briza maxima. The hilltribe growers were satisfied with the flower plants and the price offered though they could have improved much more on care and handling. These growers had not yet recognized the potential value of flower growing.

From the result of this work, it could be anticipated that the hilltribe growers could appreciate the flower growing more. The problems incurred would pave the way for effective corrections in the following year.

PROBLEMS

This research and extension project was conducted within the Royal Project area of Inthanon. It involved growers of two tribes -- Mong and Karen -- which differ significantly in their custom and way of living. The Mongs build their houses on the upper elevation and grow opium poppy. The Royal Project has persuaded them to cease poppy growing and introduced several new plants as a potential replacement. Presently, Mong people grow various kinds of plants, both vegetables and fruits, which provide yields all through the year. The Karens normally settle at the lower elevation and grow rice as their main crop. When the Project introduced the cut flower growing in the Inthanon Royal Project area, the officer was faced with the following problems:

1. The Inthanon Royal Project provided the hilltribes with several kinds of plants including strawberry, vegetable and cut flower. When any grower met any difficulty in cut flower growing, he conveniently preferred to abandon it and instead concentrate on other crops.

2. The officer failed to take adequately the follow-up activities especially at the initial stage. When a grower felt he could not properly take care of the flower plants, he simply turned to other crops. Moreover, each grew several kinds of plants; the labor therefore became inadequate and the plot was neglected. For example, Mr. Kai, a Mong, grew flowers and other crops; he neglected the flowers and concentrated on other crops when the officer did not follow-up.

3. The growers did not have sufficient skill in growing flowers as it was their first experience. Moreover, the flowers need some 4-5 months of care before yielding during which the growers would earn no income. This lack period rather discouraged the growers, causing them to turn to other earnings.

4. The tradition becomes an important problem. The Karens have many other economic and cultural activities -- rice growing season, rice harvesting, wedding, house warming -- during which they spend a lot of time and absolutely neglect other chores. For example, during the rice harvesting season, late October to November, and the rice growing season, late May to early July, all members of the family must work on paddy fields, and there was no one available for other crops. During this first year, the officer prepared seedlings for growing during October to November, the Karen could not give any time because it was during their rice harvest. By the time they

could start growing, the seedling were already too old and stunted. The yield then was rather poor, especially aster and statice. In Jaunary to February, the carnation seedlings were distributed to Karen growers. Carnation could yield almost throughout the year. But the growers left the plots unintended as it was entering the rice growing season. Moreover, following the rice harvest there would be housewarming and wedding parties which drew the Karen away from the cut flower plots for quite an extended period. Sometimes roaming hogs rummaged the plants as in case of Mr.Junu which was reflected in a very small income.

RECOMMENDATION

The Inthanon Floriculture Research and Extension Project began their extension activities in 1984 covering three villages -- Khun Klang, Ang Kha Noi, and Mae Klang Luang. The Mong and Karen in those villages showed varying attitude and enthusiasm towards new technology and new crops. The Mong has courage to invest and to take risk, while the Karen is normally rather reserved. Today Mongs grow fruit trees, strawberry, vegetables and flowers which earn them greater income than the opium poppy. With their diligence the Mongs' living standard are much more improved. On the contrary, Karens live a simpler and poorer life; they manifest a lack of enthusiasm and rather prefer to ignore any new technology. Karens

grow rice only enough for their own consumption. When the Royal Project introduced new crops in order to help improve their living and income, they simply would not accept. Moreover, their labor was curtailed due to several of their traditional activities especially in early rainy season, early cold season and during the hot season. However, a trend is evident that some progressive Karens would listen more to the advice of extension officers.

The recommended extension strategy for the following year is to get the Mongs to grow flowers which require special care with long production period such as carnation. As for the Karens, annual plants are to be introduced after harvesting as they would not be busy in the rice field and should be able to give the best attention to their flower plots. The most appropriate time is late August or early October so as to allow them to finish growing flowers before their rice harvesting time, and to harvest the flowers prior to the start of rice growing season. Besides, care should be exercised to select appropriate varieties which could grow well in the highland. It is imperative to ascertain that growers would get the maximum benefit.

From the extension work conducted this year, the hilltribe growers probably gain more knowledge and improved skill in cut flower growing. Flowers require less land and give more cash turnover, but need consistent care in order to obtain high quality product the

extension should therefore be confined to fewer varieties of flowers. The growing area must be appropriate with the available family labor so that they could give maximum attention for quality production.

It is expected that in the following year the hilltribe growers would appreciate the importance of flower growing and could produce improved quality products.

Figure 1. Hilltribe grower is harvesting carnation flowers at Ban Khun Klang village.

Figure 2. Hilltribe grower brings their flowers to the Inthanon Floriculture Research and Extension Project for grading and packaging.

Table 2. Payment made to flower growers at the Inthanon Royal Project, 1984.

No.	Name	Total sale (Baht)	Fertilizer & pesticides expense deducted (Baht)	Payment to growers (Baht)
1	Mr. Leng	13,075.50	434.00	12,641.50
2	Mr. Junu	9,269.20	1,607.00	7,662.20
3	Mr. Padu	13,919.90	1,607.00	12,305.90
4	Mr. Duhae	6,022.20	1,128.36	4,893.84
5	Mr. Kammun	3,748.40	713.36	3,035.04
6	Mr. Wan	2,492.20	516.68	1,975.52
7	Mr. Kamu	4,529.90	135.00	4,394.90
8	Mr. Sor Dee	2,933.50	100.00	2,833.50
9	Mr. Bai	1,772.00	100.00	1,672.00
10	Mrs. Lear	236.50	-	236.50
	Total	57,992.30	6,341.40	51,650.90

Table 3. Income from cut flowers grown under the extension activities of the Inthanon Royal Project, 1984.

Name	Carnation	Gypsophila	Statice	Gladiolus	Iris	Aster	Helichrysun	Briza maxima	Lagurus ovatus	Total
Mr. Lang	13,039.50	-	36.00	-	-	-	-	-	-	13,075.50
Mr. Junu	570.00	4,318.00	1,355.40	1,070.80	-	-	-	1,830.00	125.00	9,269.20
Mr. Padu	1,317.50	5,252.00	-	-	3,568.40	-	-	3,650.00	125.00	13,912.90
Mr. Duhae	-	5,277.00	517.20	-	-	32.00	72.00	124.00	-	6,022.20
Mr. Kammun	-	3,662.00	86.40	-	-	-	-	-	-	3,748.40
Mr. Wan	-	2,119.00	373.20	-	-	-	-	-	-	2,492.20
Mr. Kamu	317,90	4,212.00	-	-	-	-	-	-	-	4,529.90
Mr. Sor Dee	1,733.50	1,200.00	-	-	-	-	-	-	-	2,933.50
Mr. Bai	1,772.00	-	-	-	-	-	-	-	-	1,772.00
Mrs Lear	-	-	236.50	-	-	-	-	-	-	236.50
Total	18,750.40	26,040.00	2,604.70	1,070.80	3,568.40	32.00	72.00	5,604.00	250.00	57,992.30

Table 4. Types and volume of cut flowers grown by hilltribes under the extension activities of the Inthanon Royal Project, 1984.

No.	Name	Flowers	No.of plants	Planting area	Yield	Amount (Baht)
1	Mr. Kai	carnation	2,500	1 ngarn	-	-
2	Mr. Chalermchai	carnation	2,500	1 ngarn	-	-
3	Mr. Leng	carnation	2,500	1 ngarn	5,144 a	13,039.50
		statice	250	50 m^2	1.2 b	36.00
4	Mr. Junu	carnation	2,600	1 ngarn	210 a	570.00
		gladiolus	3,200	35 m^2	1,847 c	1,070.80
		gypsophila	560	1 ngarn	175 d	4,318.00
		statice	231	50 m^2	49.38 b	1,355.40
		Briza maxima	820	1/2 ngarn	4.55 b	1,830.00
		Lagurus ovatus	122	10 m^2	250 g	125.00
5	Mr. Padu	carnation	2,000	1 ngarn	672 a	1,317.50
		iris	4,200	50 m^2	1,487 a	3,568.40
		aster	658	1 ngarn	-	-
		gypsophila	465	1/2 ngarn	239 d	5,252.00
		Briza maxima	205	30 m^2	8.35 b	3,650.00
		Lagurus	80	5 m^2	250 g	125.00
6	Mr. Duhae	gypsophila	470	1/2 ngarn	200.5 d	5,277.00
		statice	400	1/2 ngarn	19.92 b	517.20
		aster	360	50 m^2	16 d	32.00
		Briza maxima	140	30 m^2	310 g	32.00
		helichrysum	135	10 m^2	600 a	72.00

Table 4 (cont.)

No.	Name	Flowers	No.of plants	Planting area	Yield	Amount (Baht)
7	Mr. Kammun	gypsophila	798	1/2 ngarn	149 d	3,662.00
		statice	220	15 m^2	3.4 b	86.40
		aster	317	70 m^2	-	-
8	Mr. Wan	statice	500	30 m^2	12.44 b	373.20
		gypsophila	960	1/2 ngarn	80.5 d	2,119.00
9	Mr. Kamu	carnation	700	1/2 ngarn	207 a	317.90
		gypsophila	450	1 ngarn	186 d	4,212.00
10	Mr. Sor Dee	carnation	500	1/2 ngarn	925 a	1,733.50
		gypsophila	100	100 m^2	50 d	1,200.00
11	Mr. Bai	carnation	1,500	1/2 ngarn	992 a	1,772.00
12	Mrs. Lear	statice	112	30 m^2	9.05 b	236.50

a number of flowers b kilogram

c spike d bunch of 200 g.

Table 5. Summary of the extension activities of the Inthanon Royal Project on temperate flower growing, 1984.

No.	Types	No.of plants	Planting area	Yield	Income (Baht)
1	gypsophila	3,338	1.06 rai	1,080 d[1/]	26,040.00
2	carnation	9,800	4.50 rai	8,150 a	18,750.40
3	Briza maxima	1,165	260.00 m^2	13.21 b	5,604.00
4	iris	4,200	50.00 m^2	1,487 a	3,568..0
5	statice	1,713	375.00 m^2	95.39 b	2,604.70
6	gladiolus	3,200	35.00 m^2	1,847 c	1,070.80
7	Lagurus ovatus	202	130.00 m^2	500 g	250.00
8	helichrysum	135	10.00 m^2	600 a	72.00
9	aster	1,335	260.00 m^2	16 d	32.00

a number of flowers

b kilogram

c spike

d bunch of 200 g.

Table 6 . Income per family of the hilltribes under the flower growing extension activities of the Inthanon Royal Project, 1984.

No.	Name	Tribe	Family labor (head)	Plants	Annual income (Baht)
1	Mr. Leng	Karen	2	strawberry/ vegetable	36,308.75
2	Mr. Junu	Karen	5	rice/vegetable	640.00
3	Mr. Padu	Karen	1	vegetable	4,362.00
4	Mr. Duhae	Karen	3	rice/vegetable	1,247.00
5	Mr. Kammun	Karen	2	rice/vegetable	3,000.00
6	Mr. Wan	Karen	2	rice/vegetable	3,764.00
7	Mr. Kamu	Karen	2	rice/vegetable	4,000.00
8	Mr. Sor Dee	Karen	3	rice/vegetable	4,000.00
9	Mr. Bai	Karen	3	rice/vegetable	1,670.00
10	Mrs. Lear	Mong	1	strawberry	1,367.00

Remarks Rice growing limited for family consumption only

Table 7. Distribution of fertilizer and pesticides, extension activities of the Inthanon Royal Project, August 1984 - March 1985.

Name	Fertilizer & pesticides	Amount used	Price/unit (Baht)	Value (Baht)
Mr. Junu	Bifolan	1.0 bottle	45.00	45.00
	Benlate	1.0 pack	35.00	35.00
	sevin	1.5 pack	20.00	30.00
	Terraclor	0.5 bottle	160.00	80.00
	Othocide	0.5 can	270.00	135.00
	Arcopaul	1.5 bottle	30.00	45.00
	Phosdrin	0.5 bottle	130.00	65.00
	Nuvacron	0.5 bottle	220.00	110.00
	Posse	0.5 bottle	35.00	17.50
	15-15-15	62.5 kg.	6.00	375.00
	21-0-0	62.5 kg.	6.80	425.00
	13-13-21	25.0 kg.	3.30	82.50
	12-24-12	25.0 kg.	6.48	162.00
	Total	1,607.00 Baht		

Table 7. (cont.)

Name	Fertilizer & pesticides	Amount used	Price/unit (Baht)	Value (Baht)
Mr. Padu	Bifolan	1.0 bottle	45.00	45.00
	Benlate	1.0 pack	35.00	35.00
	Sevin	1.5 pack	20.00	30.00
	Terraclor	0.5 bottle	160.00	80.00
	Orthocide	0.5 can	270.00	135.00
	Arcopaul	1.5 bottle	30.00	45.00
	Phosdrin	0.5 bottle	130.00	65.00
	Nuvacron	0.5 bottle	220.00	110.00
	Posse	0.5 bottle	35.00	17.50
	15-15-15	62.5 kg.	6.00	375.00
	21-0-0	62.5 kg.	6.80	425.00
	13-13-21	25.0 kg.	3.30	82.50
	12-24-12	25.0 kg.	6.48	162.00
	Total	1,607.00 Baht		

Table 7. (cont.)

Name	Fertilizer & pesticides	Amount used	Price/unit (Baht)	Value (Baht)
Mr. Duhae	Benlate	1.0 pack	35.00	35.00
	Sevin	1.0 pack	20.00	20.00
	Bifolan	1/3 pack	30.00	10.00
	Vidate - L	0.5 bottle	140.00	70.00
	Phosdrin	1.0 bottle	130.00	130.00
	Asodrin	1.0 bottle	220.00	220.00
	Arcopaul	0.5 bottle	30.00	15.00
	13-13-21	17.0 kg.	6.00	102.00
	12-24-12	17.0 kg.	6.80	115.60
	21-0-0	42.0 kg.	3.30	138.60
	15-15-15	42.0 kg.	6.48	272.16
	Total	1,128.36 Baht		

Table 7. (cont.)

Name	Fertilizer & pesticides	Amount used	Price/unit (Baht)	Value (Baht)
Mr. Kammun	Bifolan	1/3 bottle	45.00	15.00
	Benlate	1.0 pack	35.00	35.00
	Sevin	1.0 pack	20.00	20.00
	Arcopaul	1/2 bottle	30.00	15.00
	13-13-21	17.0 kg.	6.00	102.00
	12-24-12	17.0 kg.	6.80	115.60
	21-0 -0	42.0 kg.	3.30	138.60
	15-15-15	42.0 kg.	6.48	272.16
	Total	713.36 Baht		
Mr. Wan	Bifolan	1/3 bottle	30.00	10.00
	Sevin	1.0 pack	20.00	20.00
	Benlate	1.0 pack	35.00	35.00
	Vidate - L	1/2 bottle	140.00	70.00
	Lannate	1.2 can	540.00	270.00
	13-13-21	17.0 kg.	6.00	102.00
	12-24-12	17.0 kg.	6.80	115.60
	21-0-0	42.00 kg.	3.30	138.60
	15-15-15	42.00 kg.	6.48	272.16
	Total	1,033.36 Baht		

Table 7. (cont.)

Name	Fertilizer & pesticides	Amount used	Price/unit (Baht)	Value (Baht)
Mr. Leng	Bifolan	2.0 bottle	45.00	90.00
	Ambush	1.0 bottle	200.00	200.00
	15-15-15	10.0 kg	6.60	66.00
	21-0-0	10.0 kg	3.30	33.00
	Total	434.00 Baht		
Mr. Kamu	Sevin	1.0 pack	20.00	20.00
	Benlate	1.0 pack	35.00	35.00
	Bifolan	1.0 bottle	45.00	45.00
	Posse	1.0 bottle	35.00	35.00
	Total	135.00 Baht		
Mr. Sor Dee	Sevin	1.0 pack	20.00	20.00
	Benlate	1.0 pack	35.00	35.00
	Bifolan	1.0 bottle	45.00	45.00
	Total	100.00 Baht		
Mr. Bai	Benlate	1.0 pack	35.00	35.00
	Sevin	1.0 pack	20.00	20.00
	Bifolan	1.0 bottle	45.00	45.00
	Total	100.00 Baht		

GLADIOLUS GROWING EXTENSION AT TUNG LUANG, 1984

ABSTRACT

The gladiolus growing extension at Tung Luang in 1984 including 48 growing families. A total of 24,000 corms and 60 liters of cormels were distributed . A total harvest was 32,724 spikes. The total net income received by growers was 91,262.81 Baht. Mr. Tao received maximum repaid of 7,457 Baht whereas Mrs. Waler received minimum repaid of 120 Baht. Besides cut flowers 16,800 corms and 19,000 cormels were obtained for the next year extension.

INTRODUCTION

The Tung Luang Extension Center is located in Huay Tong village, Tambon Maewin, Amphoe San Pathong, Chiang Mai, some 82 km. away from the city center. Its altitude is 1,040 meters above sea level; it is surrounded by nine Karen villages. The research work on growing gladiolus for cut flower was conducted at this Center in 1981, it showed a very good potential. The extension work was therefore started among the Karen hilltribes since 1982 . This has drawn much interest among hilltribe growers as gladiolus is easy to grow and care. In 1984 the extension activities were expanded to cover four villages namely Huay Tong, E-Kang, Kao-Leeb and Nong Tao.

The cultivars used include Friendship, Hunting Song, Spic & Span, Rose Supreme and Deciso . The results indicate that hilltribe growers could earn better income and improve upon their living by gladiolus growing. Moreover, these people have gained better skill and knowledges in cultivation practice and handling of cut flowers.

OBJECTIVES

1. To enable the hilltribe farmers to learn the method of gladiolus growing and handling.

2. To enable the hilltribe families to earn better income from growing and selling gladiolus as cut flower .

PROCEDURES

1. Survey the interest of hilltribe families.

2. Organize them in groups to do gladiolus cultivation on the allocated plots of land.

3. The plot preparation is to be done by interested growers.

4. The gladiolus corms are to be distributed to those growers with instruction on growing and handling method.

5. The cut flower products are to be collected and assembled at the Marketing Section of the Royal Project which handles the sale.

6. The Center will deduct 20% of each sale to cover the expenses on fertilizer, pesticides and corms.

RESULTS

1. The Center recruited 48 hilltribe grower families.

2. The Center distributed three batches of gladiolus corms as follows:

- First batch on April 1, 1984, of which 13,000 corms were distributed to 24 growers at Huay Tong, i.e. 541 corms per family.
- Second batch on April 17, 1984, of which 7,000 corms were distributed to 9 growers at Huay Tong.
- Third batch on May 1, 1984, of which 4,000 corms were distributed to one grower at the Huay E-Kang. In addition, 60 liters of commels were distributed to two growers at Huay E-Kang, six growers at Ban Huay Khao Leeb and four growers at Ban Wong Tao to produce corms and cut flowers for sale.

3. Seven days before planting time, the growers prepared the plots by applying lime and manure, then planted as supervised by the extension officers.

4. Following planting the extension officers paid regular visits to advise on fertilizer application, spraying of pesticides and other necessary techniques.

5. As the flowering began, the growers were taught how to apply the stick and strap on the stem of each spike to prevent them from lodging. Upon the bloom of the first flower (appearance of flower), each spike would be cut, preferably in the morning, and sent to the Center for packaging. The officer kept a record on the number of spikes sent in by each grower, and also instructed the growers on flower grading according to quality -- A, B, C and D. After packaging the flowers were delivered to the Marketing Section of the Royal Project in Chiang Mai for further distribution.

6. The Marketing Section paid the farmers in instalments according to frequency of delivery which was about every 15 days.

7. The Center collected 20% of each payment for the expense on fertilizer, pesticides and corms.

PROBLEMS

1. The hilltribe growers have not yet acquired sufficient skill in cultivation, care and packaging. The officers had to advise them repeatedly of possible problems and the market requirements for good quality product with minimum damage.

2. Some of gladiolus were infected by the Fusarium spp. showing the symptom of yellow leaf and rotted leaf base. The plant pathologist of the Royal Project recommended spraying the infected plant stem with a fungicide called Benlate to stop any spreading of infection to healthy plants. Next, the grower must dig out and discard the infected plants and surrounding soil.

3. The thrip destroyed the gladiolus by sucking the sap on the flower that it became brown and withered. The Royal Project entomologist recommended spraying with a chemical -- Tokuthion, Posse or Mesurol -- every 3-4 days beginning one day after emergence of the inflorescence.

SUMMARY

The Tung Luang Extension Center has conducted the extension activities for gladiolus growing since 1984, covering 48 grower families. The total of 24,000 corms and 60 liters of commels were distributed. The total harvest was 32,724 spikes, of which 31,310 spikes were sold under grading follows:

Grade A : 6,620

Grade B : 9,550

Grade C : 15,140

The extent of damage incurred during transportation was 4.32%. The total amount of payment to growers was 113,460.10 Baht, inclusive of the 20% deduction by the Center amounting to 22,197.29 Baht as payments for fertilizer and pesticides. The net income received by hilltribe growers was 91,262.81 Baht. The grower who earned the highest from gladiolus growing was Mr. Tao, 7,457 Baht; second was Mr. Kor Kha, 6,729.50 Baht; the least earner was Mr. Waler, 120.38 Baht. The average payback to growers was as follows:

Grade A : 5 Baht/spike

Grade B : 3.96 Baht/spike

Grade C : 2.82 Baht/spike

After flower cutting, there were 16,800 corms harvested plus 19,000 commels, totaling 35,800.

Table 8. Number of growers, expense on fertilizer, pesticides, corms, and payment ot growers growing gladiolus at the Tung Luang Extension Center, Amphoe San Pathong, Chiang Mai Province.

Name	No.of flowers (spikes)	Payment (Baht)	Fertilizer, pesticides, corms (Baht)	Net income (Baht)
1. Mr. Kor Kha	2,204	8,411.84	1,682.34	6,729.50
2. Mrs. Chee Nge	718	2,795.27	528.71	2,266.56
3. Mrs. Khang Thu	543	2,147.75	395.81	1,751.94
4. Mrs. Prong Yae	605	2,337.44	465.03	1,872.41
5. Mrs. Buppho	608	2,348.52	464.08	1,884.44
6. Mrs. Chini	388	1,517.39	294.43	1,222.96
7. Mr. Ler Heuy	674	2,618.74	520.87	2,097.87
8. Mr. Pu Hae	600	2,342.17	448.62	1,893.55
9. Mrs. Prong Ngae	775	3,011.72	592.89	2,418.83
10. Ms. Kor Hae	449	1,760.17	335.24	1,424.93
11. Mr. Bor Hae	455	1,770.48	341.20	1,429.28
12. Ms. Ek Nge	502	1,979.31	373.27	1,605.54
13. Ms. Wilai	761	3,008.09	594.95	2,413.14
14. Mrs. Ker Ber	392	1,516.25	268.01	1,248.24
15. Mr. Ni Bho	567	2,223.43	429.18	1,794.25
16. Mr. Kler Ti	704	2,783.23	541.72	2,241.51
17. Mrs. Lor Bae	1,756	6,972.92	1,377.52	5,593.45

Table 8. (Cont.)

Name	No. of flowers (spikes)	Payment (Baht)	Fertilizer, pesticides, corms (Baht)	Net income (Baht)
18. Mr. Ya E	492	1,972.92	394.57	1,578.35
19. Mrs. Ya Shi	535	2,047.27	382.01	1,665.26
20. Mr. Khi Kha	624	2,455.18	480.49	1,974.69
21. Mr. Kler Por	597	2,381.75	476.33	1,905.42
22. Ms. Ban Yen	857	3,199.48	614.47	2,585.01
23. Mr. Nor Pae	111	484.03	96.80	387.23
24. Mr. Nor Ti	143	560.19	112.03	448.16
25. Mrs. Kaew	330	1,261.60	239.64	1,021.96
26. Mrs. Nor Lashi	842	3,194.29	638.83	2,555.46
27. Mr. Wa Ler	41	150.47	30.09	120.38
28. Mrs. Nor E	1,073	4,175.83	835.15	3,340.68
29. Mrs. Ta	996	3,899.59	766.53	3,133.01
30. Mr. Du Shi	774	3,087.30	559.21	2,528.09
31. Mr. Ler Pho	1,143	4,419.52	883.89	3,535.63
32. Mr. Dee Toh	331	1,202.68	225.90	976.78
33. Mr. Er Ter	967	3,661.68	732.47	2,929.27
34. Mrs. Tiam	228	765.36	135.52	629.84
35. Mrs. Kham	328	1,176.19	194.89	981.30
36. Mrs. Tun	223	788.32	137.33	650.99

Table 8. (Cont.)

Name	No. of flowers (spikes)	Payment (Baht)	Fertilizer, pesticides, corms (Baht)	Net income (Baht)
37. Mr. Amnard	903	3,272.19	654.23	2,616.96
38. Mr. Reng	1,587	2,795.85	559.17	2,236.68
39. Mr. Inton	364	1,156.04	231.20	924.84
40. Mr. Tao	2,768	9,321.24	1,864.24	7,457.00
41. Mr. Chae Hae	53	186.03	37.20	148.83
42. Mr. Khao Per	67	235.17	47.03	188.14
43. Mr. Chu Hae	205	639.75	127.96	511.79
44. Mr. Chi Por	47	164.91	32.99	131.92
45. Mr. Kuang	3,296	4,994.00	998.80	3,995.20
46. Mrs. Ae Khae	53	145.75	29.15	116.60
47. Mrs. Pulu	45	123.75	24.75	99.00
Total	32,724	113,460.10	22,197.29	91,262.81

Table 9. Volume of gladiolus sale and payment to the Center by the Marketing Section of the Royal Project.

Delivery period	Grade A (spikes)	Grade B (spikes)	Grade C (spikes)	Total (spikes)	Value (Baht)
26-31 May 84	220	440	220	880	2,992
1-10 June 84	690	710	500	1,900	7,925
11-20 June 84	1,420	2,100	800	4,320	17,776
21-30 June 84	1,190	1,850	516	3,556	16,934
1-10 July 84	970	1,120	970	3,060	12,240
10-20 July 84	1,240	1,280	1,210	3,730	17,420
21-31 July 84	270	630	1,530	2,430	9,036
1-10 August 84	240	360	950	1,550	5,859
21-29 August 84	380	980	5,204	6,564	15,786
31 Aug - 12 Sep. 84	-	80	3,240	3,320	7,443
Total	6,620	9,550	15,140	31,310	113,411

Remarks Average payment by the Marketing Section:

Grade A : 5.00 Baht/spike

Grade B : 3.96 Baht/spike

Grade C : 2.82 Baht/spike

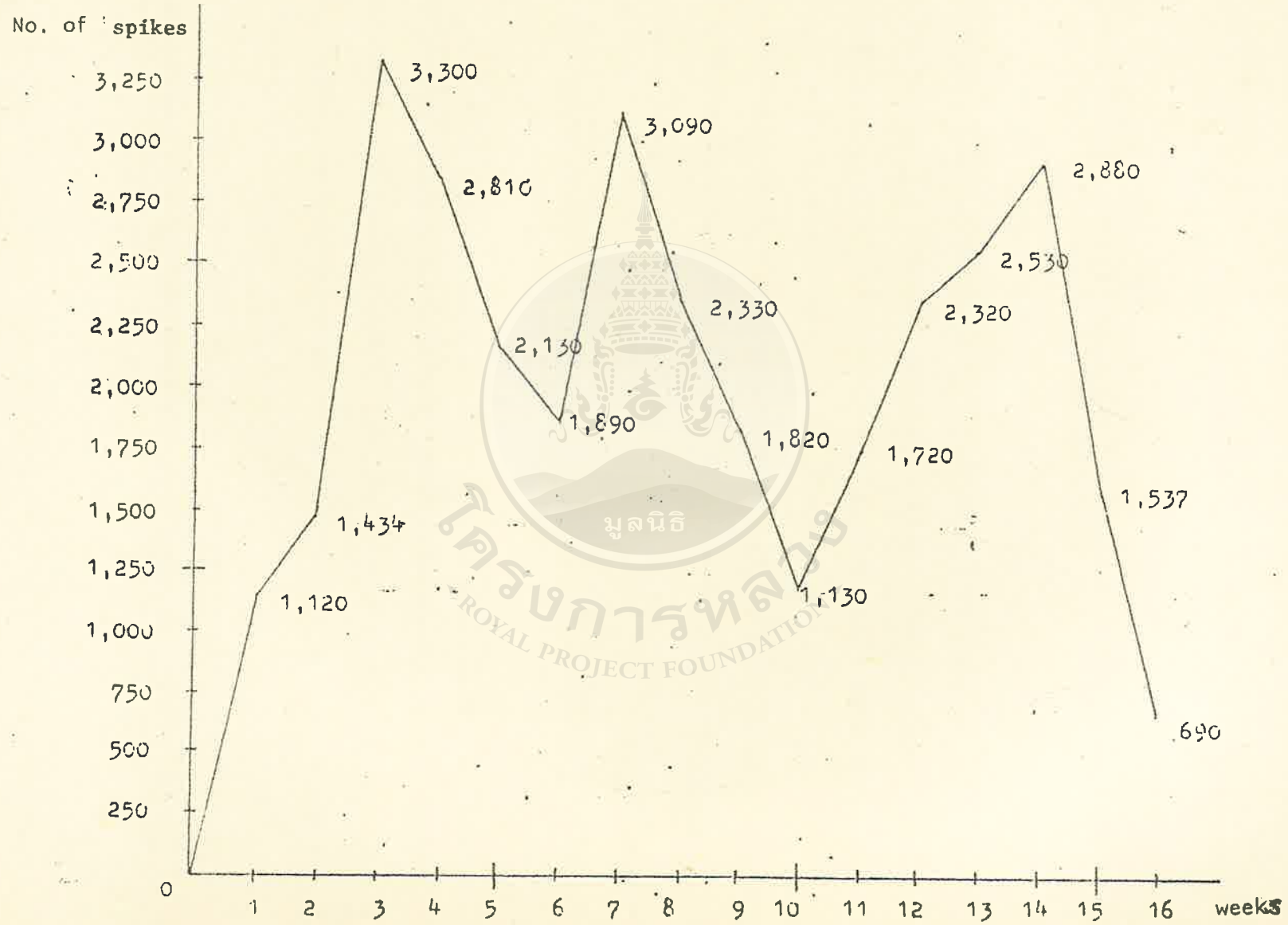
Standard classification by the Royal Project is as follows

Grade A : 10-12 color flora, 100-120 c.m. stem length

Grade B : 8-10 color flora, 80-100 c.m. stem length

Grade C : 6-8 color flora, 60-80 c.m. stem length

Figure 3. Volume of gladiolus flowers cut per week from 3 batches of corms distributed in 1984.



EXPERIMENT ON LILY CULTIVATION AT DOI INTHANON

ABSTRACT

Lilium elegans cultivars Bellona, Chinook, Connecticut King, Golden Melody, Yellow Blaze, Enchantment, Fire Cracker, Ladykiller, Mont Blanc, Sterling Star, and Red Night were cultivated at Doi Inthanon in December 1984. After flowering, they can be divided into 4 groups according to the colors of the flowers— yellow, orange, white and red. All cultivars tested can be used as cut flower, except Connecticut King which had too short a stem. Lilium speciosum cultivars Rubrum and Uchida should not be used as cut flowers.

INTRODUCTION

With financial support from U.S.D.A., Floriculture Research, Royal Project conducted a research on "the development of cut flower industry on the highlands". Many temperate bulbs-gladiolus, lily, freesia., amaryllis, alstroemeria, liatris etc. were introduced for planting and studying the adaptation on the highlands of Chiang Mai. Lily is one of the most popular cut flowers, because of its peculiar flower form and very beautiful and fragrance.

For this study, 13 cultivars of lily , 5 bulbs each were ordered from Walter Blom & Zom B.V., the Netherlands as follow:

Lilium elegans cultivars.

Bellona	Chinook	Connecticut King
Enchantment	Fire Cracker	Golden Melody
Lady killer	Mont Blanc	Red Night
Sterling Star	Yellow Blaze	

Lilium speciosum cultivars.

Rubrum	Uchida

They were planted on December 22, 1984 at Floriculture Research Station at Doi Inthanon(elevation 1,200 meters), Khun Klang Village, Chomthong District, Chiang Mai.

OBJECTIVE

1. To evaluate the adaptation of each lily cultivar to highlands.

2. To select the profitable lily cultivars for cut flower production on the highlands.

METHODS

Each bulbs of 13 lily cultivars was planted at 2.5 inches depth in a 12 inch diameter pot, filled with soil mixture consists of soil, sand, rice hull ash, animal manure, peanut hull at ratio of 1:1:1:1:1. These potted lilies were kept in plastic-roof house to protect from the rain and watering every two days in the morning and evening. About one month later, when new leaves appeared, 1 teaspoon of 26-0-0 fertilizer was applied per pot. After 2 months, 12-24-12 fertilizer was applied instead. Liquid fertilizer (Bifolan) added to pesticides and fungicides was applied weekly. Some pesticides and fungicides used were as follow:

Fungicides e.g. Zineb, Captan, Dithane M-45

Pesticides e.g. Azodrin, Lannate, Posse, Malathion

Sticker or surfactance

DISEASES AND PESTS

1. Bulb Rot. Bulb rot caused by certain bacteria. The infected bulb showed stem-wilt and turn yellow, the base of scale turn black and rot.

2. Aphids. Usual sucked off sap from young shoot and young flower but not serious.

3. Leaf and shoot burn. It caused by application of too high concentration of Malathion.

RESULTS

The 11 elegans lily cultivars can be divided into 4 groups according to the color of flower. The rest 2 speciosum cultivars are not included.

1. Yellow flowers group

   Bellona

   Chinook

   Connecticut King

   Golden Melody

   Yellow Blaze

2. Orange flowers group

   Enchantment

   Fire Cracker

   Lady killer

3. White flowers group

   Mont Blanc

   Sterling Star

4. Red flowers group

   Red Night

For the yellow flowers group, the earliest flowering time (71 days) was Bellona while Yellow Flaze was the latest (90 days). Connecticut King had the biggest flowers size but least number of flowers per plant and had the shortest spike. Recommendation is that Connecticut King is appropriated for potted plant and the rest four cultivars for cut flowers.

For Orange flowers group, all cultivars had similar flowers shape, size and spike length. The average flowers diameter was 9-12 centimeters and spike length of 30 centimeters. The disadvantage of Fire Cracker was fewer flowers per spike.

For the white color group, there were no differences between Mont Blac and Sterling Star.

Considering the red flowers group, red Night was the only one cultivar tested and was recommended as cut flowers.

Lily flowers from the research could be sold in Bangkok market 20-30 Baht per spike. It was shown that elegans lily can be grown as cut flowers on the highlands. At present the research team are multiplying the selected cultivars of elegans lily using tissue culture technique.

After the flowers has been cut, one to three aerial bulbils were produced on the leaf axil. These bulbils can be used as propagation materials for the next year crop either by planting directly or divided into small scales and use as an explant for tissue culture.

The speciosum lily took at least 6 months to bloom, therefore it is not recommended to grow as cut flowers on the highlands.

Figure 4. *Lilium elegans* 'Chinook'

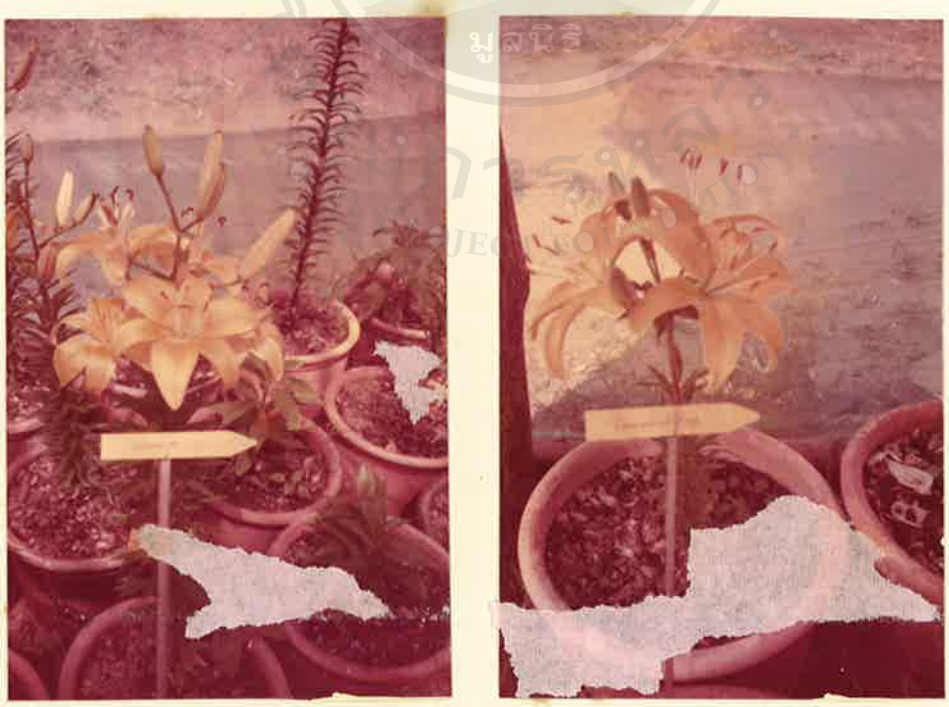


Figure 5. Lilium elegans 'Golden Melody' (Left) and 'Connecticut King' (right)

Figure 6. Lilium elegans 'Bellona' (left) and 'Yellow Blaze' (right)

Figure 7. Lilium elegans 'Enchantment' (left) and 'Fire Cracker' (right)

Figure 8. Lilium elegans 'Lady Killer' (left) and 'Red Night' (right)

Figure 9. Lilium elegans 'Stering Star' (left) and 'Mont Blanc' (right)

Table 11. Flowering of lily planted at Floriculture Research, Royal Project, Doi Inthanon. Year 1984.

Lily cultivars	Flower bud visible 1/ (days)	Flower fully open 2/ (days)	No.of flowers per plant	Flower diameter (cm.)	Spike length (cm.)
elegans var.					
Bellona	40	71	9	12.4	35.8
Chinook	68	80	6	10.8	29.6
Connecticut King	77	80	4	17.7	16.5
Golden Melody	83	87	9	12.5	48.3
Yellow Blaze	70	90	7	-	-
Enchantment	42	75	12	10.4	32.1
Fire Cracker	42	72	2	12.42	32.5
Lady killer	21	74	10	9.07	28.3
Mont Blanc	42	74	7	12.8	34.0
Sterling Star	11	79	6	12.3	28.3
Red Night	42	73	7	13.6	49.1
speciosum var.					
Rubrum	155	195	4	13.2	29.7
Uchida	147	177	4	12.4	29.4

1/ Days from planting to flower bud visible

2/ Days from planting to fully open of first flower

Table 10. Growth of lily planted at Floriculture Research, Royal Project, Doi Inthanon. Year 1984.

Lily cultivars	2 / 2 / 85		16 / 2 / 85		2 / 3 / 85		16 / 3 / 85	
	Width (cm.)	Height (cm.)	Width (cm.)	Height (cm.)	Width (cm.)	Height (cm.)	Width (cm.)	Height (cm.)
L. elegans								
Bellona	10.2	24.8	11.0	42.2	12.4	49.4	6.1	47.4
Chinook	5.8	19.8	5.8	38.2	10.3	57.0	8.4	55.6
Connecticut King	3.9	6.5	4.0	15.1	8.9	23.0	7.3	28.0
Golden Melody	7.9	12.1	9.6	29.6	10.8	47.6	7.2	58.2
Yellow Blaze	8.9	20.2	11.0	31.2	14.5	46.4	10.1	56.0
Enchantment	9.6	21.6	9.2	39.2	10.8	53.0	15.2	57.6
Fire Cracker	5.2	20.7	5.6	35.2	7.3	41.6	6.0	42.8
Ladykiller	10.3	17.7	10.0	33.0	15.9	43.2	10.5	54.4
Mont Blanc	6.8	19.8	6.7	35.4	7.9	47.8	13.9	46.4
Sterling Star	6.8	15.8	7.6	33.2	6.9	54.2	3.8	44.0
Red Night	8.4	29.2	9.2	51.0	20.4	56.6	7.7	61.3
L. speciosum var.								
Rubrum	3.0	12.0	6.2	14.0	8.4	11.5	14.6	19.9
Uchida	2.3	8.0	9.4	14.6	15.9	26.8	15.9	39.5

Planting date-22/12/1984