Contraet No. 53-32 U4-4-241

SEMI-ANNUAL REPORT (SEPTEMBER 1984-March 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
Mrs. Nopmanee	TOPOONYANONT	Co-Worker
Mr. Sutep	ANURAKCHINA	Field Assistant
Miss Vandee	SAECHUA	Field Assistant
Mr. Teerapan	TOTEERAGUL	Field Assistant
Mr. Anan	BOONMEE	Field Assistant
Mr. Vichien	CHAIBOONCHOO	Field Assistant
Mr. Vichien	INLOKFONG	Field Assistant
Mr. Chaiyasit	CHANYAVAT	Field Assistant
Miss Ponpimol	CHIMALA	Field Assistant
Miss Sermsiri	EIAMFANG	Research Assistant

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CONTENTS

SUMMARY

This report deals with the study on planting dates of Doi Kham at Huayleuk Floriculture Research, Royal Project. Doi Kham chrysanthemum cuttings were planted at different months from May to August 1984. No matter when the planting dates was, it flowered in Mid October to Late November. The most suitable date for planting should be July 1, because flowers obtained from this planting date will be larger and stem length still much longer than the market standard.

The second part deals with extension project of growing chrysanthemum at Huayleuk in the year 1984. There were 9 families in the project. Seven of which were local villagers and 2 were Mong hilltribesmen. Mr. Nibhond Polpim received maximum repaid of 7,793.96 bahts from growing 1,200 plants in the area of 400 sq.m. within 5 months.

The last part deals with comparison of eight gladiolus varieties at five different locations, Doi Pui Research Station, Tung Luang Agricultural Extension Center, Tung Rerng Agricultural Extension Center, Mok Jam Royal Development Project and Huay Pong Floriculture Research, Royal Project. Selected varieties of gladiolus which should be multiplied were L'Amour, Sancerre, Apollo, Magic eye, Posaidon. The varieties which should not be multiplied were Nirvana, Olympia and Evening Song.

INTRODUCTION

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.

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 are the most popular 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.

plan of work are 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 various 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 markeing cut flowers.

A STUDY ON PLANTING DATES OF DOI KHAM CHRYSANTHEMUM AT HUAYLEUK FLORICULTURE RESEARCH, ROYAL PROJECT

SUMMARY

Doi Kham chrysanthemum cuttings were planted at Huayleuk Floriculture Research, Royal Project at different months from May to August 1984. No matter when the planting dates was, it flowered in Mid October to late November. But the flower stem decreased as the planting date was delayed. Low temperature improved flower quality, especially color and size. The most suitable date for planting should be July 1, because flowers obtained from this planting date will be larger and stem length still much longer than the market standard.

INTRODUCTION

The Huayleuk Floriculture Research, Royal Project, located at KM 95 Chiang Mai - Fang Road, Pingkong, Chiang Down, Chiang Mai, is about 600 meters above sea level. The project first started working on flower research on May 13, 1983. In August 1983 Doi Kham chrysanthemum cuttings from Inthanon Floriculture Research, Royal Project were brought in and planted for preliminary trial at Huayleuk. The crop flowered in November with large and good quality flowers but experienced severe leaf blight disease. Another crop planted in February 1984 was able to produce flower buds, but the buds remained close all the time. After 2 successive unsuccessful trials, there was an urgent need to find out the most suitable date for planting Doi Kham chrysanthemum at Huayleuk Floriculture Research, Royal Project.

OBJECTIVE

The objective of this study was to find the most suitable date for planting Doi Kham chrysanthemum at Huayleuk Village, Chiang Down, Chieng Mai.

MATERIALS AND METHODS

1. Planting date. Eight different planting dates were chosen as follow. May 10, 1984; July 1, 1984; July 10, 1984; July 24, 1984; August 1, 1984; August 6, 1984; August 15, 1984; August 30, 1984.

2. Cutting preparation. The shoots used as cuttings were 3-4 inches long. Some lower leaves of the cuttings were removed before dipping them in Dithane M-45 for 5-10 minutes. In order to obtain fast and even rooting, dip the cut ends with Seradix No. 1 after removing them from the fungicide solution and being well air-dried. The cuttings were brought to root in a 1 : 1 mixture of sand and burned rice husk. Within 20 days the cuttings had vigorous roots and were ready for transplant.

3. Bed preparation. A growing bed was 1 meter wide. Weed control was done by hand after throughly turning the soil with hoe. Before planting, animal manure and peanut hull were well mixed into the soil.

4. Planting. The cuttings were planted at 25 x 25 centimeter spacing.

5. General culture.

5.1 Watering. Watering was done by furrow irrigation.

5.2 Fertilizer and chemical application. When the crop was 20 days old, water the crop with urea solution. Afterward 15-15-15 fertilizer was side dressed monthly and when the crop initiated flower bud, top dressing between bases of the plants with 12-24-12 fertilizer. In addition liquid fertilizer was added to pesticides and fungicides which was applied every week.

5.3 Pinching. After the chrysanthemum recovered from transplanting, the shoot apex was pinched to have only 3-4 pairs of leaves on the stems. The crop produced many new lateral shoots after pinching. Allow only 3 helthy shoots to form flower buds.

5.4 Disbudding. All lateral buds on the stems were removed including small flower buds surrounding the terminal bud to obtain one large flower on each stem.

5.5 Staking. Staking was done when the crop was 1-2 months old or when the crop's height reached 20-30 centimeters by placing holes at each corner and at the middle of the growing bed. Between poles wires were interwoven to support the plants.

6. Disease and pest control. *Phyllosticta* leaf blight, Japanese rust, termites, thrips, and aphids were the main pests found in growing Doi Kham chrysanthemum at Huayleuk Floriculture Research, Royal Project.

6.1 Diseases

6.1.2 Phylosticta leaf blight. The *Phyllosticta* leaf blight caused by *Phyllosticta* sp. spread rapidly during frequent raining. The disease attacked mostly mature leaves on lower half of stem. The attacked leaves had brown wound circled with yellow rind. The leaves consequently died when completely dried. Plastic sheets streched over growing bed and weekly sprays of Daconil or Difolatan could significantly lessen the damage of this disease.

6.1.2 Japanese rust. The Japanese rust caused by *Puccinia* always spreaded late in the rainy season, from late October to February when the air was moist and the temperature was low. The attacked leaves showed swollen yellow spots all over the upperside. Prevention was accomplished by spraying the crop with Plantwax or Baleton everyweek.

6.2 Insects :

6.2.1 Termites. Termites fed on the chrysanthemum's roots, causing the crop to die back. This insect was controlled by spraying Cumifoss 40% between rows of the crop.

6.2.2 Thrips. Thrips spreaded rapidly during flowering time particularly when there was little rain in November and December. The thrips sucked off sap from flower petals. The attacked flowers could not open perfectly as a normal one could. The flowers showed swurling and whiter petals. If severely attacked, the outer rays of petals would dried out. The control was a 3-4 day-interval spray of Poss.

6.2.3 Aphids. The usual symptom of aphid's attack were curly leaves and stunt plants. The crop was sprayed with Azodrin everyweek to control the insect.

7. Flower cutting. At the flowering time, each day flowers at 1/3 open stage were cut in the evening. Remove 1/3 lower leaves of the flower stem before steeping in water for 1 night.

8. Packing. To retain maximum freshness, individual flower stem was wrapped at its basal end with Chrysal-soaked cotton wool. Each box contained 50 stems, alternately placed into with 25 flower heads on opposite side.

RESULTS

Doi Kham chrysanthemum planted at different dates performed differently as follow :

1. Growing period. The May 10 crop was ready for flower cutting in 168 days after planting while the July 1, July 10, July 24,

August 1, August 6, August 15, and August 30 crops were ready in 120, 125, 127, 110, 109, 105 and 95 days after planting, respectively. The result shown in Table 2 indicated that the May 10 crop had longest growing period. The growing period of the May 10 crop was 48, 43, 41, 58, 59, 63 and 73 days longer than those of the other crops.

2. Flower size.

2.1 Flower diameter. The flowers obtained from May 10 planting were smallest when compared with the other planting dates. The May 10 flower diameter was 10.95 centimeters. Diameter of flowers obtained from July 1, July 10, July 24, August 1, August 6, August 15, and August 30 plantings were 12.12, 11.38, 11.69, 11.43, 11.80, 11.78 and 11.95 centimeters, respectively (table 2).

2.2 Flower stem length : Stem length of flowers cut from the May 10 planting was 104 centimeters which was the longest and 7.3, 35.6, 37.0, 43.8, 44.1, 45.71 and 51.1 centimeters longer than those from the July 1, July 10, July 24, August 1, August 6, August 15, and August 30 plantings, respectively. (Table 2).

DISCUSSION

From the results it may conclude that because it had longer growing period, the May 10 Doi Kham chrysanthemum grew very tall and produced as long as 104 centimeter flower stems. The flower stem decreased as the planting date was delayed because the growing period was also shortened. The longer the planting date was delayed, the shorter the stems would be produced. As shown in Table 1 no matter when the planting date is, Doi Kham chrysanthemum will always flower in mid October to late November, certainly with different size. Low temperature profoundly improved flower quality, especially color and size, e.g. brighter color and larger size. The chrysanthemum planted on July 1, 10, 24 will form flower buds in September and the flowers will open early in November. The crop planted on August 1, 6, 15, 30 will form flower buds in October and the buds will open in Mid November. Since mean minimum temperature in October and November are 17.96^{o} and 15.30^{o}C respectively, the chrysanthemum planted in July and August will produce larger flowers than in May due to the effect of low temperature on flower bud growth in October and November.

Therefore the most suitable date for planting Doi Kham chrysanthemum should be July 1 because flowers obtained from this planting date will be larger and stem length of the flowers still much longer than the market standard which set at 60 centimeters. The other suitable dates are July 24 and August 1. However, if one wants to plant the crop at the latter 2 dates, it is wise to start 3 weeks after the first crop because flower cutting period of the July 10 crop lasts for 3 weeks as shown in Figure 1.

Table 1. Planting date, bud forming date, color showing date, flower opening date, and flower cutting date of Doi Kham chrysanthemum at Huayleuk Village, Chiang Down, Chieng Mai.

Planting date	Bud forming date	Color showing date	Flower opening date	Flower cutting date
10 May 84	20 Aug 84	28 Sep 84	10 Oct 84	25 Oct 84
1 July 84	1 Sep 84	3 Oct 84	15 Oct 84	29 Oct 84
10 July 84	17 Sep 84	15 Oct 84	2 Nov 84	12 Nov 84
24 July 84	29 Sep 84	25 Oct 84	13 Nov 84	18 Nov 84
1 Aug 84	3 Oct 84	1 Nov 84	15 Nov 84	19 Nov 84
6 Aug 84	5 Oct 84	28 Oct 84	20 Nov 84	23 Nov 84
15 Aug 84	10 Oct 84	7 Nov 84	26 Nov 84	28 Nov 84
30 Aug 84	20 Oct 84	10 Nov 84	21 Nov 84	3 Dec 84

Table 2. Days from planting to bud forming, planting to flower opening, planting to cutting, and flower sizes of Doi Kham chrysanthemum.

Planting date	Days from planting to bud forming (a)	Days from planting to flower opening (b)	Days from planting to cutting (c)	Flower diameter (cm)	Stem length (cm)
10 May 84	102	152	168	10.95	104.0
1 July 84	62	106	120	12.12	96.7
10 July 84	69	115	125	11.38	68.4
24 Jul 84	67	122	127	11.69	67.0
1 Aug 84	63	106	110	11.43	60.2
6 Aug 84	60	106	109	11.80	59.9
15 Aug 84	56	103	105	11.78	58.9
30 Aug 84	51	84	95	11.95	53.0

(a) 2 mm. size

(b) color showing

(c) 1/3 open

Table 3. Monthly temperature and relative humidity in 1984-1985 at Huayleuk Floriculture Research Royal Project, Chiang Down, Chiang Mai.

Month	Temperature °C					Relative Humidity		
	Max Ave	Min Ave	Avg	Max	Min	Max	Min	Avg
May 84	33.03	20.32	26.68	38	18	91	53	72.0
June 84	31.17	23.00	27.09	33	21	92	55	73.5
July 84	30.78	20.84	25.81	33	20	91	55	73.0
Aug 84	30.54	21.25	25.89	34	20	91	64	77.5
Sept 84	31.03	19.96	25.49	34	18	92	54	73.0
Oct 84	29.67	17.96	23.82	32	11	91	40	65.5
Nov 84	30.03	15.30	22.67	35	11	91	51	71.0
Dec 84	28.77	11.83	20.28	31	8	68	50	59.0
Jan 85	30.09	10.74	20.42	32	7	-	-	-
Feb 85	31.82	11.06	21.44	34	5	73	67	70.0

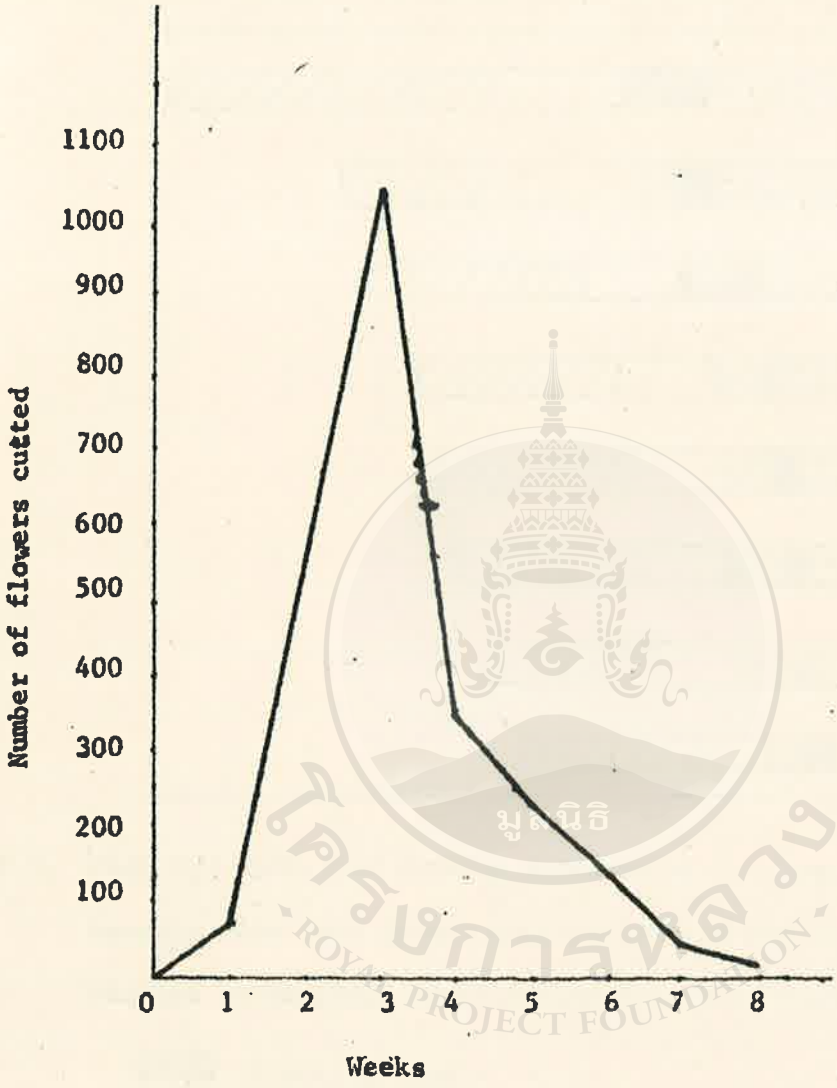

Figure 1, Flower yield of Doi Kham chrysanthemum weekly cut at Huayleuk Floriculture Research, Royal Project, Chiang Down, Chiang Mai. (From the total of 1,200 plants).

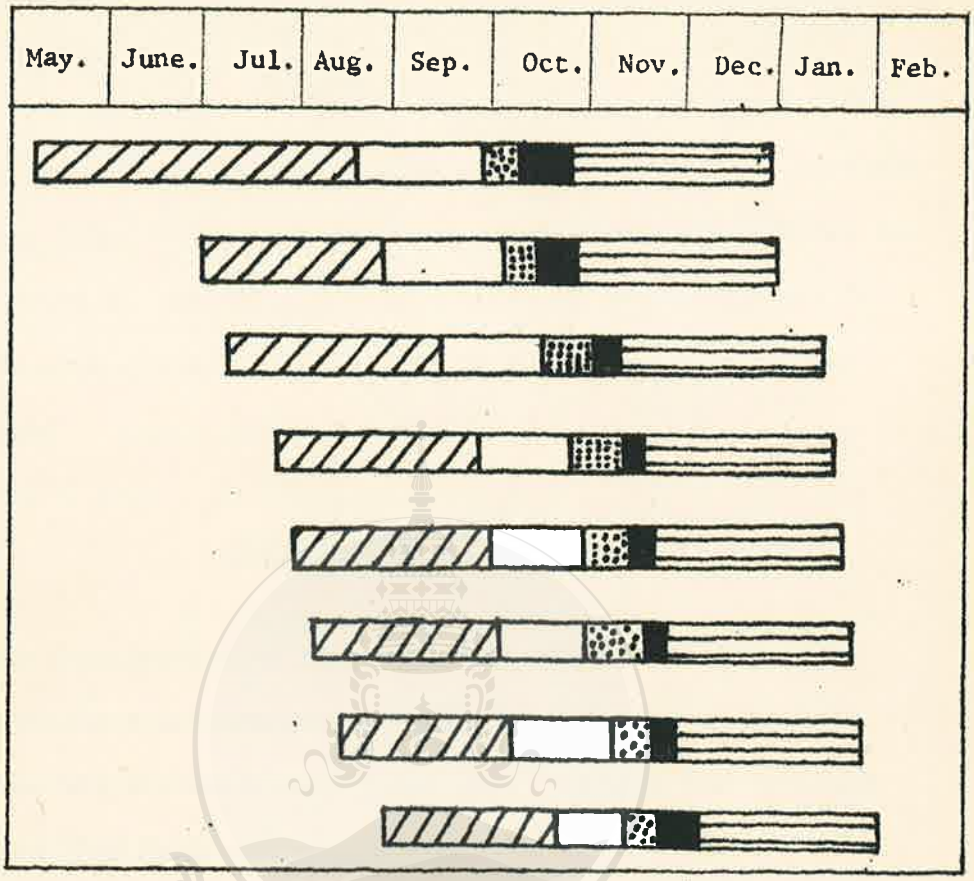

Figure 2. Planting date, bud forming date, color showing date, flower opening date, and flower cutting date of Doi Kham chrysanthemum planted at Huayleuk Floriculture Research, Royal Project.

Planting date

Bud forming date

Color showing date

Flower opening date

Flower cutting date

CHRYSANTHEMUM GROWING EXTENSION PROJECT AT HUAYLEUK

SUMMARY

The 1984 chrysanthemum growing extension project at Huayleuk Village, Chiang Down, Chiang Mai paid the total of 39,370.44 bahts to 9 contracted growers. Mr.Nibhond Polpim received maximum repaid of 7,793.96 bahts from growing 1,200 plants in the area of 400 sq. m. within 5 months.

INTRODUCTION

From a collection of chrysanthemum introduced from Japan in 1981 at Inthanon Floriculture Research, Royal Project, Jomthong, Chiang Mai, the big yellow-flower "Yaminosaki" variety was selected and later named 'Doi Kham' chrysanthemum. The selected 'Doi Kham' variety grew very well and produced big flowers which could be sold at the price of as high as 10 baht/flower stem. Following the expansion of growing area at Inthanon Floriculture Research, Royal Project, the crop was seriously damaged by Japanese rust disease. It was difficult to control the disease because at the Inthanon altitude (1,200 m.) the relative humidity and the temperature were really high, and cold-humid environment just favored the spreading of the disease. However, when planted at lower altitude at Huayleuk, Chiang Down, which was 600 m. high, there was some incidence of Japanese rust disease but less severely the chrysanthemum still produced good-quality flowers. As a result, the chrysanthemum growing extension project was set up to help increase Huayleuk villager's income.

OBJECTIVES

The objectives of the chrysanthemum growing exyension project were :.

(1) To teach Huayleuk villagers learn how to correctly plant and culture chrysanthemum as a cut flower.

(2) To promote Huayleuk villagers to earn additional income from growing chrysanthemum as a cut flower.

PROCEDURES

(1) A survey was made tc assess interests in growing the chrysanthemum as a cut flower among the people of Huayleuk village, Chiang Down, Chiang Mai.

(2) Gathering perspective growers who wanted to join the project in growing the chrysanthemum on their own land.

(3) A 400 sq. m. demonstration plot was set up at the Huayluek Floriculture Research, Royal Project.

(4) Cuttings and close supervision on general culture were supplied to the growers.

(5) All flowers produced were marketed by the project.

(6) The project paid money to the growers after the cost of fertilizer, pesticides, and packing material were deducted.

(7) Collecting data on general growth, flower production, and other problems to be used as guidelines for next year promotion.

RESULTS

(1) The Huayleuk Floriculture Research Royal Project, made contracts to 9 growers, 7 of which were local villagers and 2 were Mong hilltribesmen.

(2) The project supplied 'Doi Kham' chrysanthemum cuttings to the contracted growers on 3 consecutive dates. On July 1, 1984, each of the 3 contracted growers received 1,200 cuttings. On August 1, 1984, each of the other 2 growers received 1,200 cuttings. And on August 15, 1984, each of the remaining 2 growers received 500 cuttings (Tables 1 and 2).

(3) After receiving the cuttings, the contracted growers planted the chrysanthemum on 1 m.-wide beds under close supervision of the project's staff.

(4) The project's staff made frequent visits to the contracted growers' places to recommend fertilizing, pesticide application, and other general cares on chrysanthemum growing.

(5) Flowers cut in the evening were steeped in water for 1 night prior to being packed at the project the next morning. Numbers of flower stems were recorded accordingly to quality. Grade A flowers were

outcome rather poor.

(3) The contracted growers planted other vegetables the same time as they planted chrysanthemum (table 3). Time and care had to be shared between the chrysanthemum and the vegetables. Growing flower was not hard work but very intensive which needed constant care and tender.

(4) The contracted growers secretly sold cuttings and flowers to other persons, resulting in difficulties in planning and controlling the extension project next year.

RECOMMENDATIONS

The chrysanthemum growing extension project at Huayleuk village was first launched in 1984. Usually the major income of the people came from vegetable growing as shown in table 4. When first introduced to growing chrysanthemum as a cut flower, because the contracted growers had little experiences on the crop and did not realized the importance of growing the crop, it was hard for the project's staff in notifying the growers to take care of their growing beds. Sometimes when the growers did not work hard enough on their crop or when they were behind their schedules, the staff had to hire additional labor to help them. It was found that those who paid lesser care to their chrysanthemum received much lesser income than those who work harder on the crop. For example, Mr. Nibhond Polpin could earn as much as 7,793.96 bahts while Mr. Pun Sarntuayn earned

marketed in Bangkok, others marketed in Chiang Mai and Lampang.

(6) The project paid the contracted growers with 2 instalments. The first instalment included only the flowers cut by the end of November (table 5). The second instalment included the flowers cut during December 1984 to January 1985 (tables 6 and 7).

(7) The contracted growers received repaid money after it was deducted for pesticice, fertilizer, additional labor, and packing cost as shown in tables 5, 6 and 7.

(8) The price used in calculating repaid money was 3 bahts/stem from Grade A flowers and 1.50 bahts/stem for other-grade flowers.

PROBLEMS in EXTENSION

(1) The contracted growers did not quite understand general culture of the crop because it was their first trial. Offentimes the project's staff had to notify them to pay more attention to the crop. When there was a tendency of failure resulted from unability of the contracted growers to keep up with their schedules, it was necessary to recruit additional labor to help them in order to prevent potential loss.

(2) The contracted growers did not realize the possibility of growing flower as a means of earning income because it took quite a long time to produce such a crop. The growers did not give enough care to the crop until it started forming flower buds, making the

only 542.52 bahts from planting the same number of cuttings in the size of area (e.g. 1,200 cuttings in 400 sq.m.).

The promotion of growing chrysanthemum as a cut flower at Huayleuk village this year was quite successful. The contracted growers were really satisfied with the income they received bacause they could earn more and get large amonut of money at the same time from growing chrysanthemum than from other crops planted in equal area. Eventhough they were lack of experiences, they still were able to make quite high income. It was expected that they could earn even more from next year growing because they would become acquainted with all necessary experiences needed in planting chrysanthemum. Because those who did not join the project this year realized the possibility and importance of growing chrysanthemum as a cut flower, it was expected that more families would participate in the project next year too.

Based on this year experiences, it was recommended that for next yeat promotion of growing chrysanthemum as a cut flower, one family would be allowed to plant only 1,044.40 cuttings / 2.2 labors.

CONCLUSIONS of the EXTENSION WORK

1. There were 9 families in the project. Seven of which were local villagers and 2 were Mong hilltribesmen.

2. Total planting area was 2 rais. On the average, it was 0.2 rai/family (1 rai = 1,600 sq.m.)

3. Total production was 17,145 flower stems. It was 1,900 stems/family.

4. Production cost totaled 7,289.05 bahts or 811/family.

5. Total sale was 46,669.50 bahts. It was 5,685.00 bahts/family.

6. Total net income was 39,370.44 bahts. It was 4,374.49 bahts/family.

Table 1. Planting date, days from planting to flower bud forming, days from bud forming to flower opening, and days from planting to cutting.

Grower's name	Planting date	Days from planting to bud forming	Days from bud forming to opening	Days from planting to cutting
1. Mr.Toh Gunthasound	July 1,1984	62	59	121
2. Mr.Pun Sarntuayn	July 1,1084	65	59	121
3. Mr.Videsh Numsiri	July 10,1984	69	62	131
4. Mr.Norh Jinda	July 24,1984	67	53	117
5. Mr.Nibhond Polpin	Aug. 1,1984	64	47	111
6. Mr.Somboon Chaiyasith	Aug. 6,1984	52	53	105
7. Mr.Terng Pook-Keaw	Aug.14,1984	50	57	107
8. Mr.Chang Saelee	Aug. 6,1984	60	45	105
9. Mr.Su Laojang	Aug.15,1984	56	49	105

Table 2. Labor force in the family of contracted grower.

Grower's name	Number of labor in family		Total	Number of cuttings planted
	male	female		
1. Mr.Toh Gunthasound	2	0	2	1,200
2. Mr.Pun Sarmtuayn	1	0	1	1,200
3. Mr. Videsh Numsiri	1	1	2	1,200
4. Mr.Norh Jinda	2	1	3	1,200
5. Mr.Nibhond Polpin	1	2	3	1,200
6. Mr.Somboon Chaiyasith	1	1	2	1,200
7. Mr.Terng Pook-Keaw	1	1	2	1,200
8. Mr.Chang Saelee	1	2	3	500
9. Mr.Su Laojang	1	1	2	500
Total 9 growers	11	9	20	9,400
Average	1.2	1	2.2	1,044.4

Table 3. The contracted grower's name and kinds of other crops planted at the same when planting chrysanthemum.

Grower's name	Race	Other crops
1. Mr.Toh Gunthasound	Thai	Soybean, corn, cabbage, upland rice, garlic, peanut, chinese cabbage, lettuce, eggplant, pepper
2. Mr.Pun Sarmtuayn	Thai	Garlic, cabbage, pepper
3. Mr.Videsh Nunsiri	Thai	Shallot, garlic, lettuce, cabbage, Japanese,cucumber
4. Mr.Norh Jinda	Thai	Peanut, tobacco, cabbage, chinese cabbage, rice, lettuce, garlic
5. Mr.Nibhond Polpin	Thai	Soybean, corn, lettuce, beet, leek, brussel sprout, Japanese cucumber, eggplant, brocolli, garlic
6. Mr.Somboon Chaiyasith	Thai	Cotton, shallot, garlic
7. Mr.Terng Pook-Keaw	Thai	Tobacco, cauliflower, chinese cabbage, lettuce, garlic
8. Mr.Chang Saelee	Mong	-
9. Mr.Su Laojang	Mong	Lettuce, cabbage

Table 4. Numbers of chrysanthemum flower stems weekly cut for sale at Huayleuk Village during October 1984 - January 1985.

Grower's name	Cutting date										Total
	Oct.	November				December				Jan.	
	4th. wk.	1st. wk.	2nd. wk.	3rd. wk.	4th. wk.	1st. wk.	2ng. wk.	3rd, wk.	4th. wk.	1st. wk.	
1. Mr.Toh Gunthasound	25	273	584	250	429	147	100	40	41	0	2,889
2. Mr.Pun Sarmtuayn	11	50	298	77	-	-	-	-	-	-	436
3. Mr.Videsh Nunsiri	-	63	788	369	203	47	43	-	-	-	1,513
4. Mr.Norh Jinda	-	-	31	389	1,328	470	232	183	116	67	2,816
5. Mr.Nibgond Polpim	-	-	-	103	682	1,100	465	360	186	123	3,019
6. Mr.Somboon Chaiyasith	-	-	-	32	712	1,051	477	209	235	79	2,795
7. Mr.Terng Pook-Keaw	-	-	-	196	528	892	252	100	57	27	2,052
8. Mr.Chang Saelee	-	-	-	-	22	161	271	199	67	59	779
9. Mr.Su Laojang	-	-	-	-	-	148	352	233	89	24	846
Total	36	386	2,701	1,416	3,904	4,016	2,192	1,324	791	379	17,145

Table 5. Flower production and the money repaid to the contracted chrysanthemum growers at Huayleuk village. First payment from October 29 - November 30, 1984.

Grower's name	Numbers of flower		Value (baht)	Production cost			Amount repaid (baht)
	Grade A[a]	Other[b] grade		Fertilizer & Pesticide	Packing	Labor[c]	
1. Mr.Toh	2,189	372	7,125.00	621.63	437.80	-	6,065.50
2. Mr.Pun	273	163	1,063.50	398.88	54.60	67.50	542.50
3. Mr.Videsh	760	663	3,274.50	464.15	152.00	33.75	2,624.25
4. Mr.Norh	1,152	596	4,350.00	640.45	230.00	28.13	3,451.50
5. Mr.Nibhond	714	71	2,248.50	656.20	142.80	-	1,449.50
6. Mr.Somboon	740	4	2,226.00	679.45	148.00	-	1,398.50
7. Mr.Terng	487	237	1,816.50	645.55	97.40	-	1,073.50
8. Mr.Chang	-	-	-	-	-	-	-
9. Mr.Su	-	-	-	-	-	-	-
Total	6,315	2,106	22,104.00	4,106.31	1,262.60	129.38	16,605.25

[a] Grade A flowers repaid at 3 baht/stem, other grade flowers at 1.50 baht/stem.

[b] Packing cost included winding material such as cotton wool, rubber band, and 3 x 5" plastic bags. Only grade A flowers were deducted for packing cost at 0.20 baht/stem.

[c] Labor cost added to the production cost only when additional labor was hired to help in the contracted grower's field.

Table 6. Flower production and the money repaid to contracted chrysanthemum growers at Huayleuk village. Second payment from December 17, 1984 to January 7,1985.

Grower's name	Numbers of flower stem		Value (baht)	Fertilizer & Pesticide cost	Amount repaid (baht)
	Grade A	Other grades			
1. Mr.Toh	260	68	882.00	129.80	752.20
2. Mr.Pun	0	0	0	0	0
3. Mr.Videsh	45	45	202.50	0	202.50
4. Mr.Norh	897	171	2,947.50	76.80	2,870.70
5. Mr.Nibhond	2,066	168	6,450.00	105.54	6,344.46
6. Mr.Somboon	1,901	150	5,928.00	139.64	5,788.36
7. Mr.Terng	1,085	243	3,619.50	137.20	3,482.30
8. Mr.Chang	818	28	2,496.00	910.54	1,585.46
9. Mr.Su	581	198	2,040.00	301.25	1,738.75
Total	7,653	1,071	24,565.50	1800.77	22,764.73

Table 7. A summary of the Promotion of Growing Chrysanthemum as a Cut Flower at Huayleuk Village, Chiang Dow, Chiang Mai, 1984. (July 1984-January 1985)

Grower's name	Number of plants	Number of flower stems			Value (baht)	Production cost (baht)				Amount repaid (baht)
		Grade A	Other grades	Total		Fertilizer Pesticide	Labour	Packing	Total	
1. Mr.Toh Gunthasound	1,200	2,449	440	2,889	8,007.00	751.43	-	437.80	1,189.28	6,817.77
2. Mr.Pun Sarmtuayn	1,200	273	163	436	1,063.50	398.88	67.50	54.60	520.98	542.52
3. Mr.Videsh Nunsiri	1,200	805	708	1,513	3,477.00	464.15	33.75	152.00	649.90	2,827.10
4. Mr.Norh Jinda	1,200	2,049	767	2,816	2,297.50	717.25	28.13	230.00	975.38	6,322.12
5. Mr.Nibhond Polpin	1,200	2,780	239	3,019	8,698.50	761.74	-	142.80	904.54	7,793.96
6. Mr.Somboon Chaiyasith	1,200	2,641	154	2,795	8,154.00	819.09	-	148.00	967.09	7,186.91
7. Mr.Terng Piik-Keaw	1,200	1,572	480	2,052	5,436.00	782.75	-	97.40	880.15	4,555.85
8. Mr.Chang Saelee	500	581	198	779	2,040.00	301.25	-	-	301.25	1,738.75
9. Mr.Su Loajang	500	818	28	846	2,496.00	910.54	-	-	910.54	1,585.46
Total	9,400	13,968	3,177	17,145	46,669.50	5,907.07	129.38	1,262.60	7,299.05	39,370.44

Comparison of Eight Gladiolus Varieties at Different Altitudes

Locations : 1. Doi Pui Research Station

2. Tung Luang Agricultural Extension Center

3. Tung Rerng Agricultural Extension Center

4. Mok Jam Royal Development Project.

5. Huay Pong Floriculture Research Royal Project

SUMMARY

The selected varieties of gladiolus which should be multiplied were L'Amour, Sancerre Apollo, Magic eye, Poisaidon. The varieties which should not be multiplied were Nirvana, Olympia and Evening Song.

INTRODUCTION

Gladiolus is one of the most important cut-flowers grown in the North because it adapts very well to northern climate. It is a cash crop, producing high flower yield in a short period of time. Gladiolus is very suitable for use as a substitute crop in opium replacement programs because growing gladiolus is very simple, requiring only little skill and less care. In 1983 when the Project promoted them to produce flowers and corms at Tung Luang and Gaenoi Agricultural Extension Centers, the hilltribesmen were well aware of the possibility of growing gladiolus as a means of earning additional income. However, due to the limit stock of corm and number of color, the price of flower sold was rather low. Therefor, the working group on highland flower

research and extension of the Royal Project ordered 8 new gladiolus varieties from Holland and planted all the imported corms at 5 different altitudes to study general growth and select the most suitable varieties for use in future extension programs.

MATERIAL AND METHODS

Materials

1. Corms of 8 gladiolus varieties, 3 x 4 cm. measure.
2. 15-15-15 and 13-13-21 fertilizers.
3. Azodrin and Dithane-M-45 pesticides.

Methods

1. In an area of 320 sq.m., 64 growing beds with a 1 x 5 m^2 measure were prepared.
2. The spacing used in planting was 10 x 10 cm., and the planting depth was 2 cm.
3. Animal manure and 15-15-15 fertilizer were first applied at the time of bed preparation. The second application of 15-15-15 fertilizer was done 45 days after the first application. After cutting flower, 13-13-21 fertilizer was applied twice at one-month interval.
4. The gladiolus plants were sprayed with a mixture of Azodrin and Dighane-M-45 everyweek.

Data Collection : The data was recorded and shown in attached tables.

Result of the study : As shown in attached details.

DISCUSSION

1. There were white bands on leaves of the gladiolus, particularly of Olympia and Apollo varieties. The symptom was very similar to that of virus diseases. The real cause was still unknown but the plant pathology section had already sent infected plants to great Britain for diagnosis.

2. The flower colors were not as beautiful as they should be. Some varieties, such as Evening Song, did not even flower. Furthermore, it was found that there were corms having colors other than specified in the order mixed in the imported corms.

3. Data collection and recording at different locations were not the same because the staff did not understand the same standards and rules used. Errors made it hard to conclude the study.

CONCLUSION

Based on the attached result, the conclusion can be made into 2 categories, the suitable varieties and the suitable altitudes

1. The suitable varieties : Flower quality, such as stem stiffness, flower arrangement, and vase life, of gladiolus from highest to lowest was listed as follow :

The most suitable varieties which should be multiplied were : 1. L'Amour (Figure 1)

2. Sancerre (Figure 2)

3. Apollo (Figure 3)

4. Magic Eye (Figure 4)

5. Posaidon

The varieties which should not be multiplied were :

1. Nirvana (Figure 5)

2. Olympia

The variety which did not produce flower was :

1. Evening Song

2. The suitable altitudes. It was found that planting gladiolus at latitudes from 1000-1200 m. resulted in better flower quality, corm and cormel multiplying rates than at lower altitudes.

However, the gladiolus planted at altitudes lower than 1000 m. were earlier in producing flower.

Figure 1. Gladiolus var. L'Amour

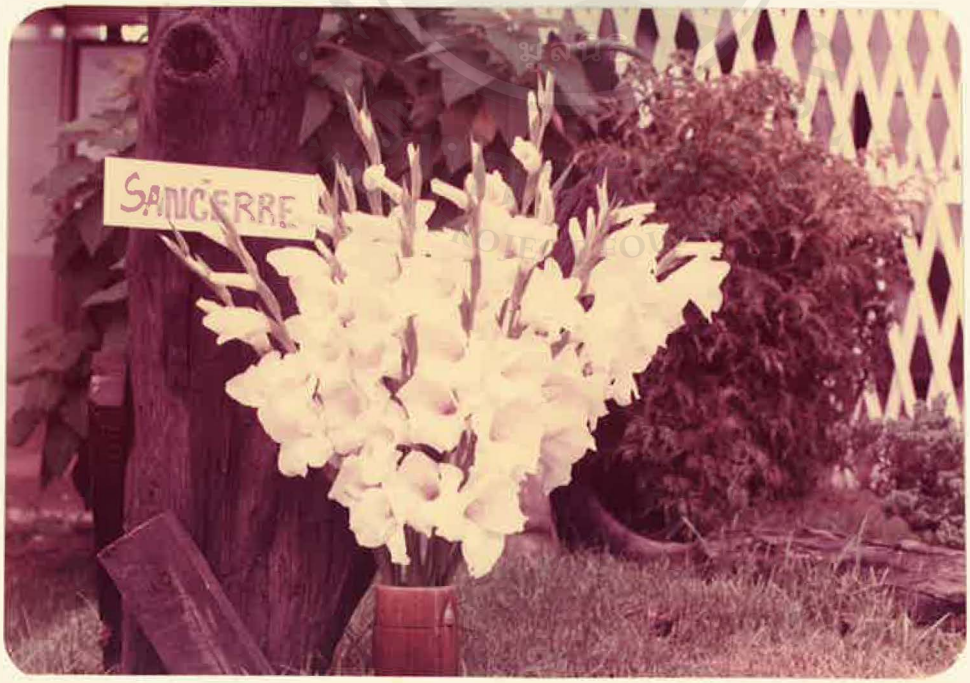

Figure 2. Gladiolus var. Sancerre

Figure 3. Gladiolus var. Apollo

Figure 4. Gladiolus var. Magic Eye

Figure 5. Gladiolus var. Nirvana

Table 1. Planting area and cost of production at each location

No	Location	Planting area (m^2)	No. of planted corm (corms)	Total cost (bahts)	Remark
1	Tung Rerng Agricultural Extension Center	40	4,000	7,880	research
2	Doi Pui Research Station	40	4,000	11,750	research
3	Huay Pong Floriculture Research, Royal Project	40	4,000	7,880	research
4	Tung Luang Agricultural Extension Center	40	4,000	680	extension
5	Mok Jam Royal Development Project	160	16,000	2,720	extension
	Total	320	32,000	30,910	

Table 2. Comparison of growth of 8 gladiolus varieties at Doi Pui Research Station Planting date 16 July 1984.

Data	Variety							
	Sancerre	L'Amour	Apollo	Nirvana	Olympia	Posaidon	Magic Eye	Evening Song
From planting to emerging (days)	3	3	3	3	3	3	3	3
From planting to flowering (days)	77	78	64	63	72	72	69	-
From flowering to flower opening (days)	9	11	10	-	10	10	7	-
From flower opening to fading (days)	-	-	-	-	-	-	-	-
Number of flower per stem (flowers)	-	-	-	-	-	-	-	-
Leaf lenght (cm)	79.4	65.8	69.4	56.0	51.4	53.8	54.9	61.6
Leaf width (cm)	2.76	1.86	1.2	1.54	2.46	1.5	1.78	1.46
Number of leaf	8	8	6	6	6	6	6	-
From planting to corm digging (days)	211	211	211	211	211	211	211	211

[a] The plant did not flower

Table 3. Comparison of growth of 8 gladiolus varieties at Tung Luang Agricultural Extension Center. Planting date 5 Jyly 1984.

Data	Variety							
	Sancerre	L'Amour	Apollo	Nirvana	Olympia	Posaidon	Magic Eye	Evening Song[a]
From planting to emerging (days)	4	4	4	4	4	4	4	4
From planting to flowering (days)	101	100	96	93	93	83	103	-
From flowering to flower opening (days)	5	7	9	8	8	8	8	-
From flower opening to fading (days)	6	7	6	6	5	8	6	-
Number of flower per stem	8	5	10	5	7	7	8	-
Leaf lenght (cm)	59.3	31.56	38.4	26.9	40.29	37.7	50.7	40.6
Leaf width (cm)	1.57	1.0	1.62	2.06	1.1	2.0	1.17	1.74
Number of leaf	7	6	6	7	6	7	6	-
From planting to corm digging (days)	204	204	204	204	204	204	204	204

[a] The plant did not flower

Table 4. Comparison of growth of 8 gladiolus varieties at Mok Jam Royal Development Project. Planting date 23 July 1984.

Data	Variety							
	Sancerre	L'Amour	Apollo	Nirvana	Olympia	Posaidon	Magic Eye	Evening Song[a]
From planting to emerging (days)	7	7	7	7	6	7	7	7
From planting to flowering (days)	73	60	57	-	55	59	57	-
From flowering to flower opening (days)	12	7	13	-	10	12	12	-
From flower opening to fading(days)	8	8	6	-	7	7	7	-
Number of flower per stem	8	7	7	-	9	8	8	-
Leaf lenght (cm)	41.8	41.2	40.6	67.8	92.8	54.2	63.1	41.7
Leaf width (cm)	5.4	2.50	2.42	2.49	2.33	2.7	2.75	2.6
Number of leaf	8	8	8	-	8	8	8	-
From planting to corm digging (days)	175	175	176	174	175	175	176	175

[a] The plant did not flower

able 5. Comparison of growth of 8 gladiolus varieties at Tung Reng Agricultural Extension Center. Planting date Jyly 1984

Data	Variety							
	Sancerre	L'Amour	Apollo	Nirvana	Olympia	Posaidon	Magic Eye	Evening Song[a]
rom planting to emerging (days)	5	3	3	3	4	5	3	3
rom planting to flowering(days)	81	73	65	-	68	62	57	-
rom flowering to flower opening (days)	8	8	9	-	12	9	6	-
rom flower opening to fading (days)	7	5	6	-	7	7	7	-
umber of flower per stem	9	6	10	-	9	7	8	-
eaf lenght (cm)	76.4	57.1	47.6	51.7	54.8	61.2	54	54.7
eaf width (cm)	3.4	2.5	1.7	2.1	2.8	2.1	2.5	2.35
umber of leaf	8	8	8	8	8	8	8	-
rom planting to corm digging (days)	123	123	123	123	123	125	123	123

[a] The plant did not flower

Table 6. Comparison of growth of 8 gladiolus varieties at Huay Pong Floriculture Research Royal Project. Planting date July 1984.

Data	Variety							
	Sancerre	L'Amour	Apollo	Nirvana	Olympia	Posaidon	Magic Eye	Evening Song[a]
rom planting to emerging (days)	5	6	5	5	6	6	5	4
rom planting to flowering (days)	70	72	60	63	65	70	61	-
rom flowering to flower opening (days)	4	4	4	4	4	3	3	-
rom flower opening to fading(days)	6	5	4	6	4	4	7	-
umber of flower per stem	5	6	9	8	8	8	10	-
eaf lenght (cm)	96.9	57.8	69.4	47.5	53.1	68.8	49.3	67.5
eaf width (cm)	4.8	3.76	3.73	3.79	3.79	4.07	3,43	4.18
umber of leaf	8	8	6	6	6	6	6	-
rom planting to corm digging (days)	216	215	218	203	205	206	202	217

[a] The plant did not flower

Table 7. Number of planted corms and number of harvested corms and cormels at Doi Pui Research Station.

Variety	Number of planted corms (corms)	Total number of harvested						Cormel (liters)
		Jumbo 1/	1 2/	2 3/	3 4/	small corms 5/	Total	
Sancerre	510	-	26	290	118	-	434	8.5
L'Amour	500	4	-	182	236	-	422	4.0
Apollo	480	-	-	132	307	-	439	6
Nirvana	450	-	-	147	236	-	383	4.5
Olympia	513	-	-	72	191	-	263	5.5
Poseidon	504	-	-	28	410	-	438	2.5
Magic Eye	503	5	27	150	226	-	408	6.5
Evening Song	500	-	9	246	208	-	463	7
Total	3,960	9	62	1,247	1,932	-	3,250	44.5

Remark 1. Jumbo, the diameter was larger than 2" 2. No. 1, the diameter was $1\frac{1}{2}$ - 2"

3. No. 2, the diameter was $1\frac{1}{4}$ - $1\frac{1}{2}$" 4. No. 3, the diameter was 1 - $1\frac{1}{4}$"

5. Small corms, the diameter was smaller than 1"

Table 8. Number of planted corms and number of harvested corms and cormels at Tung Luang Agricultural Extension Center.

Variety	Number of planted corms (corms)	Total number of harvested						Cormel (liters)
		Jumbo[1]	1[2]	2[3]	3[4]	Small corms[5]	Total	
Sancerre	500	-	31	141	248	24	444	-2
L'Amour	500	-	5	46	290	32	373	-1
Apollo	500	-	-	-	400	29	429	-25
Nirvana	500	-	-	-	320	49	369	-1
Olympia	500	-	-	88	234	38	360	-2
Posaidon	500	-	-	-	378	35	413	-15
Magic Eye	500	-	6	32	306	44	388	-15
Evening Song	500	-	-	76	361	25	462	-2
Total	4,000	-	42	383	2,537	276	3,238	13.5

Remark 1. Jumbo, the diameter was larger than 2" 2. No. 1, the diameter was $1\frac{1}{2}$ - 2"

3. No. 2, the diameter was $1\frac{1}{4}$ - $1\frac{1}{2}$" 4. No. 3, the diameter was 1-$1\frac{1}{4}$"

5. Small corms, the diameter was smaller than 1"

Table 9. Number of planted corms and number of harvested corms and cormels at Mok Jam Royal Development Project

Variety	Number of planted corms (corms)	Total number of harvested						
		Jumbo 1/	1 2/	2 3/	3 4/	Small corms 5/	Total	Cormel (liters)
Sancerre	2,000	-	31	666	538	-	1,235	5.0
L'Amour	2,000	-	115	685	538	98	1,436	9.2
Apollo	2,400	-	-	-	1,120	928	2,048	11.8
Nirvana	1,400	-	-	-	200	405	605	12.0
Olympia	2,000	-	-	130	510	325	965	11.8
Posaidon	2,700	-	-	395	450	398	1,243	11.6
Magic Eye	2,000	-	14	234	620	600	1,468	11.2
Evening Song	1,500	-	-	267	525	403	1,195	10.4
Total	16,000	-	160	2,377	4,501	3,157	10,195	83.0

Remark 1. Jumbo, the diameter was larger than 2" 2. No. 1, the diameter was $1\frac{1}{2}$ - 2"

3. No. 2, the diameter was $1\frac{1}{4}$ - $1\frac{1}{2}$" 4. No. 3, the diameter was 1-$1\frac{1}{4}$"

5. Small corms, the diameter was smaller than 1"

Table 10. Number of planted corms and number of harvested corms and cormels per plant at Tung Rerng Agricultural Extension Center[1/]

Variety	Number of planted corms (corms)	Total number of harvested						Cormel (liters)
		Jumbo[2/]	1[3/]	2[4/]	3[5/]	Small corms[6/]	Total	
Sancerre	500	-	-	-	-	-	400	-
L'Amour	500	-	-	-	-	-	269	-
Apollo	500	-	-	-	-	-	485	-
Nirvana	500	-	-	-	-	-	447	-
Olympia	500	-	-	-	-	-	474	-
Posaidon	500	-	-	-	-	-	482	-
Magic Eye	500	-	-	-	-	-	445	-
Evening Song	500	-	-	-	-	-	441	-
Total	4,000	-	-	-	-	-	3,463	-

Remark 1. Total number of harvested corms and cormels was not available because Professor Suebsak Nawajinda took all corms and cormels to stose in cool storage at Kasetsart University.

2. Jumbo, the diameter larger than 2"

3. No. 1, the diameter was $1\frac{1}{2}$ - 2"

4. No. 2, the diameter was $1\frac{1}{4}$ - $1\frac{1}{2}$"

5. No. 3, the diameter was 1 - $1\frac{1}{4}$"

6. Small corms, the diameter was smaller than 1"

Table 11. Number of planted corms and number of harvested corms and cormels at Huay Pong Floriculture Research, Royal Project.

Variety	Number of planted Corms (Corms)	Total number of harvested						
		Jumbo 1/	1 2/	2 3/	3 4/	Small Corms 5/	Total	Cormel (liters)
Sancerre	500	-	-	422	-	-	422	2
L'Amour	500	-	-	-	360	-	360	0.8
Apollo	500	-	-	-	370	-	370	0.7
Nirvana	500	-	-	-	355	-	355	0.5
Olympia	500	-	-	-	276	-	276	1
Posaidon	500	-	-	-	404	-	404	0.75
Magic Eye	500	-	-	-	266	-	266	0.50
Evening Song	500	-	-	-	390	-	390	0.8
Total	4,000	-	-	422	2,421	-	2,843	7.05

Remark 1. Jumbo, the diameter larger than 2"
2. No. 1, the diameter was $1\frac{1}{2}$ - 2"
3. No. 2, the diameter was $1\frac{1}{4}$ - $1\frac{1}{2}$"
4. No. 3, the diameter was 1 - $1\frac{1}{4}$"
5. Small corms, the diameter was smaller than 1"

Table 12. Comparision of 8 gladiolus varieties planted at 5 altitudes

1. Sancerre. (Flower color : white)

Location	Altitude (m)	Vegetative growth rate				Flower growth rate		Corm growth rate			
		Leaf lenght (cm)	Leaf width (cm)	Number of leaf at flower-ing	Days from planting to flower-ing	Days from planting to flower-ing	Number of flower per Stem (in flores-cence)	%mature corms (harves-table corms)	Corm Multiply-ing rate	Cormel Multiply-ing rate	Days from planting to corm harvesti
Doi Pui Research Station	1,200	79.4	2.76	8	3	77	7	85	2.88	162	211
Tung Luang Agricultural Extension Center	1,040	59.3	1.57	7	4	101	8	88.8	2.56	97	204
Mok Jam Royal Development Project	500	41.8	5.4	8	7	73	8	61.75	1.86	33	175
Tung Rerng Agricultural Extension Center	670	76.4	3.4	8	5	81	9	80.00	1.75	48	123
Huay Pong Floriculture Research Royal Project	800	96.9	4.8	8	5	70	5	84.4	3.11	39	216
Average	-	70.76	3.59	7.8	4.8	80.4	7.4	79.99	2.43	63.8	185.8

Table 13. Comparision of 8 gladiolus varieties planted at 5 altitudes

2. L'Amour (Flower Color : Light pink)

Location	Altitude (m)	Vegetative growth rate				Flower growth rate		Corm growth rate			
		Leaf lenght (cm)	Leaf width (cm)	Number of leaf at flower-ing	Days from planting to flowering	Days from planting to flower-ing	Number of flower per stem (in florescence)	% mature corms (harves-table corms)	Corm Multiply-ing rate	Cormel Multiply-ing rate	Days from planting to corm harvesting
Doi Pui Research Station	1,200	65.8	1.86	8	3	78	6	84.4	3.37	78	211
Tung Luang Agricultural Extension Center	1,040	31.56	1.0	6	4	100	5	74.6	2.95	22	204
Mok Jam Royal Development Project	500	41.2	2.5	8	7	60	7	71.8	3.48	53	175
Tung Rerng Agricultural Extension Center	670	57.1	2.5	8	3	73	6	57.8	2.53	32	123
Huay Pong Floriculture Research Royal Project	800	57.8	3.76	8	6	72	6	72	2.86	18	215
Average	-	50.69	2.32	7.6	4.6	76.6	6	72.12	3.04	40.6	185.6

Table 14. Comparision of 8 gladiolus varieties planted at 5 altitudes

3. Apollo (Flower color : Pink with yellow lip)

Location	Altitude (m)	Vegetative growth rate				Flower growth rate		Corm growth rate			
		Leaf lenght (cm)	Leaf width (cm)	Number of leaf at flower-ing	Days from planting to flowering	Days from planting to flowering	Number of flower per stem (in flores cence)	% mature corms (harves-table corms)	Corm Multiply-ing rate	Cormel Multiply-ing rate	Days from planting to corm harvesti
Doi Pui Research Station	1,200	69.4	1.5	6	3	64	7	63.96	3.2	112	211
Tung Luang Agriculture Extension Center	1,040	38.4	1.62	6	4	96	10	85.8	2.8	48	204
Mok Jam Royal Development Project	500	40.6	2.42	8	7	57	7	85.2	2.47	48	176
Tung Rerng Agricultural Extension Center	670	47.6	1.7	8	3	65	10	97.0	2.86	37.6	123
Huay Pong Floriculture Research Royal Project	800	69.4	3.73	6	5	60	9	74	2.86	16	218
Average	-	53.08	2.2	6.8	4.4	68.4	8.6	81.19	2.84	52.32	

Table 15. Comparision of 8 gladiolus varieties planted at 5 altitudes

4 Nirvana (Flower color : Pink dot with white and with red Lip).

Location	Attitude (m)	Vegetative growth rate				Flower growth rate		Corm growth rate			
		Leaf lenght (cm)	Leaf width (cm)	Number of leaf at flowering	Days from planting to flowering	Days from planting to flowering	Number of flower per stem (in flo- res cence)	% mature corms (harves- table corms)	Corm Multiply- ing rate	Cormel Multiply- ing rate	Days from planting to corm harvestin
Doi Pui Research Station	1,200	56.0	2	6	3	63	5	85.1	3.2	97	211
Tung Luang Agriculture Extension Center	1,040	26.9	2.06	7	4	93	5	73.8	2.8	22	204
Mok Jam Royal Development Project	500	67.8	2.49	-	7	-	-	43.21	2.47	164	174
Tung Reng Agricultural Extension Center	670	51.7	2.1	-	3	-	-	89.4	2.37	37	123
Huay Pong Floriculture Research Royal Project	800	47.5	3.79	6	5	63	8	71	2.86	12	203
Average	-	49.98	2.49	6.3	4.4	73	6	72.5	2.74	66.4	183

Table 16. Comparision of 8 gladiolus varieties planted at 5 altitudes

5 Olympia (Flower color : Red with yellow Lip)

Location	Altitude (m)	Vegetative growth rate				Flower growth rate		Corm growth rate			
		Leaf lenght (cm)	Leaf width (cm)	Number of leaf at flowering	Days from planting to flowering	Days from planting to flowering	Number of flower per stem (in florescence)	%mature corms (harvestable corms)	Corm Multiplying rate	Cormel Multiplying rate	Days from planting to corm harvesting
Doi Pui Research Station	1,200	51.4	2.46	6	3	72	-	51.27	3.14	173	211
Tung Luang Agricultural Extension Center	1,040	40.29	2	6	4	93	7	72	3.05	-46	204
Mok Jam Royal Development Project	500	92.8	2.33	8	6	55	9	48.25	2.72	101	175
Tung Reng Agricultural Extension Center	670	54.8	2.8	8	4	68	9	94.80	3.06	31	123
Huay Pong Floriculture Research Royal Project	800	53.1	3.79	6	6	65	8	55.2	2.86	30	205
Average	-	58.48	2.68	6.8	4.6	70.6	8.25	64.30	2.97	76.2	183.6

Table 17. Comparision of 8 gladiolus varieties planted at 5 altitudes

6 Posaidon (Flower color : Pink with red Lip)

Location	Altitude (m)	Vegetative growth rate				Flower growth rate		Corm growth rate			
		Leaf lenght (cm)	Leaf width (cm)	Number of leaf at flowering	Days from planting to flowering	Days from planting to flowering	Number of flower per stem (in flores - cence)	% mature corms (harves- table corms)	Corm Multiply- ing rate	Cormel Multiply- ing rate	Days from planting to corm harvesting
Doi Pui Research Station	1,200	53.8	2	6	3	72	-	86.9	2.93	47	211
Tung Luang Agricultural Extension Center	1,040	37.7	2.0	7	4	83	7	82.9	2.78	30	204
Mok Jam Royal Development Project	500	54.2	2.7	8	7	59	8	46.0	2.95	77	175
Tung Rerng Agricultural Extension Center	670	61.2	2.1	8	5	62	7	96.4	2.15	44	125
Huay Pong Floriculture Research Royal Project	800	68.8	4.07	6	6	70	8	80.8	2.86	15	206
Average	-	55.14	2.57	7	5	69.2	7.5	78.6	2.73	42.6	184.2

Table 18. Comparision of 8 gladiolus varieties planted at 5 altitudes

7. Magic Eye (Flower color : Orange with red lip)

Location	Altitude (m)	Vegetative growth rate				Flower growth rate		Corm growth rate			
		Leaf lenght (cm)	Leaf width (cm)	Number of leaf at flowering	Days from planting to flowering	Days from planting to flowering	Number of flower per stem (in florescence)	%mature corms (harvestable corms)	Corm Multiplying rate	Cormel Multiplying rate	Days from planting to corm harvesting
Doi Pui Research Station	1,200	54.9	2	6	3	69	6	81.1	3.42	131	211
Tung Luang Agricultural Extension Center	1,040	50.7	1.17	6	4	103	8	68.8	2.83	-32	204
Mok Jam Royal Development Project	500	63.1	2.75	8	7	57	8	73.4	2.26	63	176
Tung Rerng Agricultural Extension Center	670	54	2.5	8	3	57	8	89.0	3.13	35	123
Huay Pong Floriculture Research Royal Project	800	49.3	3.43	6	5	61	10	53.2	2.86	16	202
Average	-	54.4	2.37	6.8	4.4	69.4	8	73.1	2.9	55.4	183.2

Table 19. Comparision of 8 gladiolus varieties planted at 5 altitudes

8 Evening Song

Location	Altitude (m)	Vegetative growth rate				Flower growth rate		Corm growth rate			
		Leaf lenght (cm)	Leaf width (cm)	Number of leaf at flowering	Days from planting to flowering	Days from planting to flowering	Number of flower per stem (in flo-res-cence)	% mature corms (harves-table corms)	Corm Multiply-ing rate	Cormel Multiply-ing rate	Days from planting to corm harvesti
Doi Pui Research Station	1,200	61.6	1.5	-	3	-	-	92.6	3.5	125	211
Tung Luang Agricultural Extension Center	1,040	40.6	1.76	-	4	-	-	92.4	3.0	36	204
Mok Jam Royal Development Project	500	41.7	2.6	-	7	-	-	79.7	2.82	72	175
Tung Rerng Agricultural Extension Center	670	54.7	2.35	-	3	-	-	88.2	2.90	16	123
Huay Pong Floriculture Research Royal Project	800	67.5	4.18	-	4	-	-	78.0	2.90	17	217
Average	-	53.22	2.48	-	4.2	-	-	86.18	3.02	53.2	186