

STUDIES ON THE KEEPING QUALITY OF CUT FLOWERS

III Storage conditions of the cut flower of *Lilium longiflorum*
THUNB. cv. "Georgia"

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切花の品質保持に関する研究

III テッポウユリ "ジョージア" の切花の貯蔵条件

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The present experiments were performed to study the effect of floral preservative Kagawa solution (KS) and storage conditions on the vase life and quality of the cut flowers of *Lilium longiflorum* THUNB. cv. "Georgia". The following results were obtained.

- (1) Vase life of the cut lily was greatly affected by the storage temperature. Temperature effective for keeping quality of the cut flowers was 0 and 5°C; 10°C was not recommendable.
- (2) The use of KS immediately after the harvest was effective to prolong the vase life and normal elongation of flower buds.
- (3) Growth of tight flower buds was disturbed by dry storage and the flowers were inferior in quality as compared to those grown under the normal condition.

テッポウユリ "ジョージア" を材料として、花の発達段階が5つの切花について切花保存液 Kagawa solution (KS) の効果と、あわせて貯蔵方法について検討した結果、以下のことが明らかとなった。

- (1) 貯蔵後の切花の日持は貯蔵温度に大きく左右され、0, 5°C は効果的であるが 10°C は劣った。
- (2) 採花後 KS に連続して挿すと、日持は長くなり、つぼみも大きくなった。
- (3) 乾燥状態で貯蔵すると、つぼみの生長が妨げられ、開いた花は見劣のする小さい花であった。

Introduction

In the previous paper⁽³⁾, a floral preservative Kagawa solution (KS), which was based on the solution devised by Larson and Scholes⁽⁴⁾, was shown to be effective for improving the quality of cut carnation.

The present experiments were performed in order to elucidate the effectiveness of KS on the prolonging of the vase life and improving of the quality of cut flower of *Lilium longiflorum* THUNB. cv. "Georgia". The suitable storage conditions were also examined.

Materials and Methods

Lilium longiflorum THUNB. cv. "Georgia" grown in a plastic house was used as plant materials. Number of buds was limited and three buds per plant were allowed to grow. Flowers or flower buds with 70 cm stem were harvested on December 1, 1973, and classified into 5 groups according to the floral developmental stage as follows;

- I: The first and second flowers opened.
- II: Only the first flower opened.

Table 1. Combination of the storage conditions and post-storage conditions of the cut flowers of lily cv. "Georgia"

Lot	Storage condition		Post-storage condition	
	Solution	Temperature (°C)	Temperature (°C)	Solution
A	KS*	0	RT*	DW*
B	KS	0	20	DW
C	KS	5	RT	DW
D	KS	5	20	DW
E	KS	10	RT	DW
F	KS	10	20	DW
G	DW	0	RT	DW
H	DW	0	20	DW
I	DW	5	RT	DW
J	DW	5	20	DW
K	DW	10	RT	DW
L	DW	10	20	DW
M	DS	0	RT	DW
N	DS	0	20	DW
O	DS	5	RT	DW
P	DS	5	20	DW
Q	DS	10	RT	DW
R	DS	10	20	DW
S	—	—	RT	KS
T	—	—	20	KS
U	—	—	RT	DW
V	—	—	20	DW

* KS: Floral preservative Kagawa solution, DW: Deionized water, DS: Dry storage, RT: Room temperature

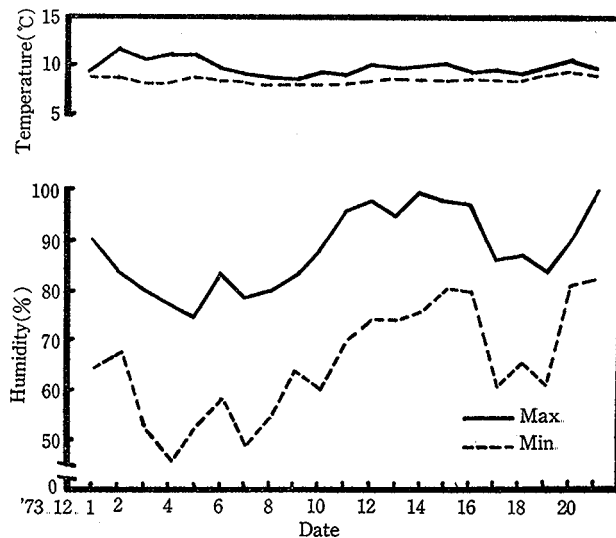


Fig. 1. Temperature and humidity at room temperature condition during the experimental period.

Developmental stage III: The first flower bud ranges from 14.1 to 15 cm in length and is white in color.

IV: The first flower bud ranges from 13.1 to 14 cm long and is light green in color.

V: The first flower bud ranges from 12.1 to 13 cm long and is still green in color.

Five cut flowers were used for each experiments. Stem cut-ends of lilies were placed in KS or deionized water or kept under the dry condition, and stored at 0, 5 and 10°C for 7 days (Table 1). After the storage, stems were cut off from 5 cm-portion of the basal ends and leaves on approximately 15 cm of the basal part were defoliated by hand. All cut-ends of lilies were then soaked in deionized water, and the vase life and quality of flowers were investigated at 20°C and room temperature (Fig. 1). The number of days to the first sign of petal wilting of the first flower was referred as vase life. The length of third flower bud on the day before anthesis was referred as the length of flower bud.

Results and Discussion

Vase life was greatly affected by storage temperature, and it was kept longer at low temperature. When flowers were stored at 0°C and then placed at room temperature, there was a little difference in vase life among the treatments. The vase life of young buds was longer than that of advanced ones, but there was no difference among III,

Table 2. Effects of the various combination on the vase life of the cut flowers of lily cv. "Georgia" at room temperature

Stage	KS				DW				DS				av. of storage	Not stored		
	A	C	E	av.	G	I	K	av.	M	O	Q	av.		S	U	av.
I	6	6	2	4.7	7	5	1	4.3	7	3	4	4.7	4.6	14	5	9.5
II	8	10	6	8.0	8	8	5	7.0	7	4	3	4.7	6.6	15	12	13.5
III	11 (10)	10	6	9.0 (8.7)	8 (7)	8	5	7.0 (6.6)	9 (8)	9 (8)	4	7.3 (6.7)	7.8 (7.3)	18 (16)	15 (14)	16.5 (15.0)
IV	11 (10)	10 (9)	8	9.7 (9.0)	8 (7)	9 (8)	6	7.7 (7.0)	11 (10)	9 (8)	6	8.7 (8.0)	8.7 (8.0)	18 (16)	10 (8)	14.0 (12.0)
V	11 (7)	11 (8)	11 (8)	11.0 (7.7)	11 (7)	8 (6)	6	8.3 (6.3)	11 (8)	11 (10)	6	9.3 (8.0)	9.6 (7.3)	20 (14)	14 (10)	17.0 (12.0)
av.	9.4 (8.2)	9.4 (8.6)	6.6 (5.6)		8.4 (7.2)	7.6 (7.0)	4.6		9.0 (8.0)	7.2 (6.6)	4.6			17.0 (15.0)	11.2 (9.2)	

(): Days after the anthesis

Table 3. Effects of the various combination on the vase life of the cut flowers of lily cv. "Georgia" at 20°C

Stage	KS				DW				DS				av. of storage	Not stored		
	B	D	F	av.	H	J	L	av.	N	P	R	av.		T	V	av.
I	0	0	0	0	1	0	1	0.7	1	2	0	1.0	0.6	4	4	4.0
II	4	5	3	4	2	4	0	2.0	3	3	0	2.0	2.7	7	5	6.0
III	5 (4)	6	4	5	5	5	2	4.0	4 (3)	4	3	3.7 (3.3)	4.2 (4.0)	9	7	8.0
IV	7 (6)	6 (5)	4	5.7 (5.0)	5	5	2	4.0	4	5 (0)	3	4.0 (2.3)	4.6 (3.8)	9 (8)	7 (6)	8.0 (7.0)
V	7 (4)	6 (5)	3	5.3 (4.0)	7 (4)	5 (4)	3	5.0 (3.7)	6 (3)	5 (3)	5	5.3 (3.7)	5.2 (3.8)	10 (9)	8 (6)	9.0 (7.5)
av.	4.6 (3.6)	4.6 (4.2)	2.8		4.0 (3.4)	3.8 (3.9)	1.6		3.6 (2.8)	3.8 (2.4)	2.2			7.8 (7.4)	6.2 (5.6)	

(): Days after the anthesis

IV and V stages in respect to the days after anthesis. The vase life of cut lilies placed in KS immediately after the harvest was 17 days, while that placed in deionized water was 11.2 days (Table 2).

The vase life of cut lilies at 20°C was shorter than that at room temperature in all lots, but there was the same tendency among each lots at room temperature (Table 3).

Lilies of unstored and placed continuously in KS attained the maximum fresh weight 13 days after the beginning of the experiment at room temperature, but those that placed in deionized water attained it 5 days after and the increasing rate of fresh weight was about 1/3 of treated ones with KS. Fresh weight of unstored flowers at 20°C was slightly increased in both solution (Fig. 2).

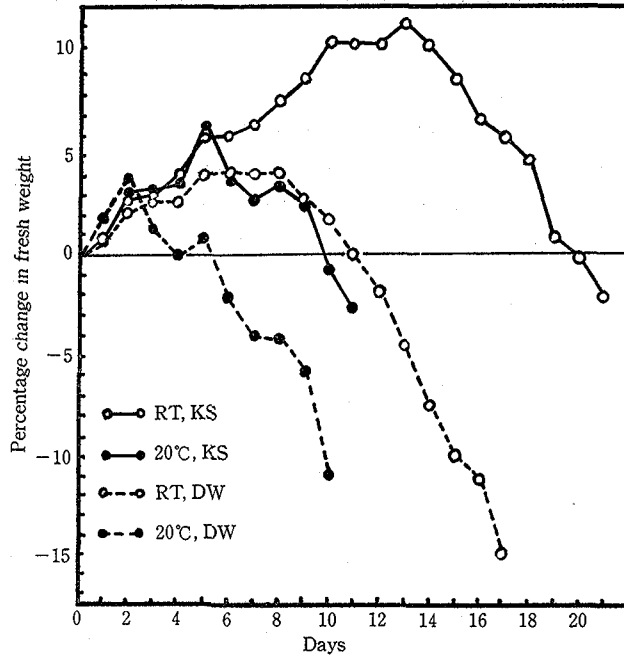


Fig. 2. Weight change of the cut flowers of lily "Georgia" at 20°C and room temperature.

RT: Room temperature, KS: Kagawa solution, DW: Deionized water

There was no difference in increasing rate of fresh weight among each lot of storage conditions.

In the case of investigation at room temperature, flower bud length were greatly affected by the treatment with

Table 4. Effects of the various combination on the flower bud length of the cut flowers of lily cv. "Georgia" at room temperature

Stage	KS				DW				DS				av. of storage	Not stored		
	A	C	E	av.	G	I	K	av.	M	O	Q	av.		S	U	av.
I	14.8	15.4	15.0	15.1	15.3	14.7	16.0	15.3	13.5	14.8	14.9	14.4	14.9	16.0	14.9	15.5
II	15.5	15.0	15.5	15.3	15.4	15.0	15.5	15.3	14.0	13.4	11.7	13.0	14.6	15.4	13.5	14.5
III	15.6	15.0	15.0	15.2	15.0	15.0	15.0	15.0	14.5	15.0	13.6	14.4	14.9	16.3	15.1	15.7
IV	14.6	15.2	15.0	14.9	14.2	15.0	14.2	14.5	14.0	13.2	13.8	13.7	14.4	15.0	14.9	15.0
V	15.4	15.0	14.5	15.0	13.6	15.0	13.0	13.9	13.0	14.2	13.3	13.5	14.1	16.0	15.0	15.5
av.	15.2	15.1	15.0		14.7	14.9	14.8		13.8	14.1	13.5			15.7	14.7	

KS and deionized water during the storage, but not by dry storage. Both solution did not increase the flower bud length in advanced stage I and II, but KS was effective on improvement of flowers at stage III to V (Table 4).

The results shown in the above indicate that, cut flowers of stage III to V are suitable for the cold storage with preservative solution and 0°C is recommended for the storage in the cool season, but 0 and 5°C are seems to be desirable in the warm season.

Cut flowers of lily cv. "Enchantment" could be prolonged the vase life by the treatment with a solution of the preservative compound AAdural AK (30 g/l) for 24–48 hours at a temperature above 10°C⁽¹⁾. However, it seems that 10°C is unsuitable for long term storage even though the cut flowers were stored with preservatives. Many kinds of flowers can be stored at dry condition⁽²⁾, if young or tight buds of lilies, however, are stored at dry condition they bloomed without elongation of bud length at harvest, and such flowers may be inferior to those harvested at flowering stage.

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