# Forcing Precooled Tulips

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This report indicates the possibility of precooling tulips right in the bag rather than the laborious method of potting and burying out of doors. There is a varietal difference as is indicated by the results in the tables.

#### Introduction

The modern trend in flower growing is to reduce costs of production while still presenting a superior product to the consumer. Labor is a major cost of production. Forcing tulips often involved much labor in filling flats with soil, planting in flats, burying flats outdoors, digging flats in cold weather and bringing them into the greenhouse, forcing the plants into bloom, harvesting the flowers, and then removing the flats. If some of this hand work were eliminated tulips could be a more profitable crop.

Experimental work at the Laboratory for Bulb Investigation at Lisse, Holland (1) has shown the possibility of precooling dry tulip bulbs at 41°F for 9-12 weeks, planting them in ground beds, and forcing them into flower in 6-8 weeks using a soil temperature of 55°F. The length of the forcing period depended on variety, prior treatment, and forcing temperature.

What does this mean to the grower? This method would make it possible for precooled bulbs to be planted in a bench in a 50-58°F greenhouse, flowered in 6-8 weeks and then be followed by another crop of tulips or what ever fits into the crop rotation.

The growing of precooled tulips has been tried experimentally at the Cornell Ornamentals Research Laboratory and at several other locations the past 2 seasons and the results were very encouraging.

# Precooling Experiments at Farmingdale 1964-65

For the grower who may be interested in a quick crop of tulips from precooled bulbs the results at Farmingdale may be of interest. The results in 1963-64 with precooled bulbs received from Holland were encouraging enough so that a similar test was made in 1964-65. Because of occasional shipping difficulties at the docks in New York, it was decided to compare the forcings of tulips precooled in Holland with those precooled on Long Island.

Tulip bulbs of 10 varieties (Table 1) were precooled in Holland at 41° and shipped in cold storage to New York or were sent to the Cornell Ornamentals Research Laboratory for the 41° precooling period. The case of unprepared tulips "OL" arrived from Holland on October 15, 1964 and were put into 41° storage upon arrival. On January 4 the first lot of precooled bulbs "A" arrived from Holland. The second case of bulbs "B" arrived on January 8. Deliveries were delayed by labor difficulties at the docks.

Lots "OL" and "A" were planted on January 4 in standard 3 inch deep flats of soil in a 58°F greenhouse. They were planted in 3 replicates of 15 bulbs with 2 lots of 15 bulbs to a flat with flats randomly distributed on several benches in the greenhouse. Replicas of "OL" and "A" were in the same flats and benches but replicas of "B" which were planted on January 9 were in flats on adjacent benches. All bulbs looked normal and healthy when planted.

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Table 1. Tulip varieties used in precooling experiment.

Variety	
Apeldoorn	
Bellona	
Karel Doorman	
K & M's Triumph	
Lustige Witwe	
Paris	
Paul Richter	
Pax	
Preludium	
Van der Eerden	

Data were taken at time of flowering to compare varieties and treatments for suitability for forcing. Records were made for each plant of date of bloom, length of stem on day of flowering, length of stem on third or fourth day of flowering, diameter of flower before opening and when fully opened and condition of roots. The average results for the 3 replicates are shown in Tables 2-11. Table 12 shows the number of days to flowering for the 10 varieties. In all cases "OL" refers to bulbs precooled at the Ornamentals Laboratory on Long Island, "A" refers to the precooled lot received from Holland on January 4 and "B" refers to the lot received on January 8, 1965.

Table 2. Apeldoorn

	OL	Α	В
Date 1st bloom*	2/17		
Date last bloom	2/26	_	
Number of flowers	14	0	0
Stem length 1st day	15″	_	
Stem length 3rd or 4th day	18″	—	—
Fl. width 1st day	1.5″		
Fl. width 3rd or 4th day	2.5″		
Number with good roots	15	13	12
fair roots	0	0	2
poor roots	0	2	1

\*All averages of 3 replicates of 15 bulbs planted.

Table 3. Bellona

OL	A	В
2/10	2/13	2/11
2/26	2/24	2/22
14	14	14
13″	12″	13″
w 15″	15″	16″
1″	1″	ĭ″
2″	2″	2."
$12^{-12}$	11	12
2	1	1
2	3	$\overline{2}$
	OL 2/10 2/26 14 13" y 15" 1" 2" 12 2 2	OL A   2/10 2/13   2/26 2/24   14 14   13" 12"   1y 15"   2" 2"   12 11   2 3

\*All averages of 3 replicates of 15 bulbs planted.

In our experiment Apeldoorn precooled on Long Island forced very well giving 14 flowers out of each replicate of 15 bulbs; however, the bulbs precooled in Holland made good roots but the tops made very little growth. The other varieties did not show this great difference between place of precooling treatment.

Table 4. Karel Doorman

•	OL	A	В
Date 1st bloom	2/17	2/18	2/11
Date last bloom	2/24	2/25	2/21
Number of flowers	12	7	10
Stem length 1st day	15″	14″	14″
Stem length 3rd or 4th da	av 18″	17″	17″
Fl. width 1st day	1.5″	1.5″	2″
Fl. width 3rd or 4th day	21/2"	21/2"	21/2"
Number with good roots	13	11	12
fair roots	1	1	1
poor roots	1	3	2

\*All averages of 3 replicates of 15 bulbs planted.

Table 5. K & M's Triumph

	OL	A	В
Date 1st bloom*	2/13	2/18	2/15
Date last bloom	2/24	2/26	2/23
Number of flowers	7	8	2
Stem length 1st day	15″	14″	14″
Stem length 3rd or 4th day	17″	16″	16″
Fl. width 1st day	1″	1″	-ī″
Fl. width 3rd or 4th day	1.5″	2″	1.5″
Number with good roots	13	10	10
fair roots	2	3	3
poor roots	0	2	ĩ

\*All averages of 3 replicates of 15 bulbs planted.

Table 6. Lustige Witwe

	OL	A	В
Duto lat bloom#	2/10	9,10	
Date last bloom	2/10	2/10	2/9
Number of flowers	2720	2720	2/1/
Stem lognth lot dou	19/	14	15
Stem length 3rd or 4th day	15	11	11
Fl. width 1st day	1″	1″	ביי קר
Fl. width 3rd or 4th day	1.5″	1.5″	1.5″
Number with good roots	13	14	12
fair roots	0	1	3
poor roots	1	0	0

\*All averages of 3 replicates of 15 bulbs planted.

Table 7. Paris

OL	Α	В
2/18	2/19	2/19
3/5	3/ 5	3/4
13	8	9
12″	12″	12"
ay 16″	15″	15″
1″	1″	
2″	2″	2."
13	10	10
1	1	2
1	4	3
	OL 2/18 3/ 5 13 12" ay 16" 1" 2" 13 1 1	OL A   2/18 2/19   3/5 3/5   13 8   12" 12"   ay 16"   1" 1"   2" 2"   13 10   1 1   1 4

\*All averages of 3 replicates of 15 bulbs planted.

Bellona flowered well and had good root growth but was short. Karl Doorman flowered fairly well but the flowers are too floppy to be salable. K & M's Triumph did not flower adequately from any treatment and was very poor from treatment "B" with only 2 flowers. Lustige Witwe may not produce tall, very large flowers but it produced well as in the previous year and the flowers were very (continued on page 3)

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long lasting after cutting. The flowers from variety Paris were of very good quality but the average production of 8 and 9 flowers from 15 bulbs precooled in Holland was not satisfactory compared to 13 flowers from 15 bulbs precooled on Long Island. Paul Richter produced a high percentage of reasonably good flowers. Pax produced good flowers but like Paris was low on production from

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Date 1st bloom*	2/12	2/10	2/10	
Date last bloom	2/24	2/19	2/18	
Number of flowers	14	12	14	
Stem length 1st day	13″	14″	13″	
Stem length 3rd or 4th day	; 16″	17″	15″	
Fl. width 1st day	1″	1.5″	1″	
Fl. width 3rd or 4th day	2″	2″	2″	
Number with good roots	15	13	14	
fair roots	0	1	0	
poor roots	0	1	1	
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#### Table 8. Paul Richter

\*All averages of 3 replicates of 15 bulbs planted.

## Table 9. Pax

	OL	А	В
Date 1st bloom*	2/13	2/11	2/10
Date last bloom	2/22	2/19	2/19
Number of flowers	13	8	9
Stem length 1st day	13″	13″	12″
Stem length 3rd or 4th d	av 15″	15″	14″
Fl. width 1st day	", <u>"</u> "	-ī″	1″
Fl. width 3rd or 4th day	1.5″	1.5″	1.5″
Number with good roots	13	9	8
fair roots	1	i	2
poor roots	1	$\overline{4}$	4

\*All averages of 3 replicates of 15 bulbs planted.

## Table 10. Preludium

	OL	А	В
Date 1st bloom*	2/10	2/10	2/9
Date last bloom	2/22	2/21	2/19
Number of flowers	12	13	11
Stem length 1st day	14″	13″	13″
Stem length 3rd or 4th d	av 17″	16″	16″
Fl. width 1st day	1.5″	1.5″	1″
Fl width 3rd or 4th day	2″	2″	2″
Number with good roots	13	13	11
fair roots	1	1	2
poor roots	ī	1	2

\*All averages of 3 replicates of 15 bulbs planted.

# Table 11. Van der Eerden

	OL	A	В
Date 1st bloom* 2	2/15	2/15	2/12
Date last bloom 2	2/25	2724	2/22
Number of flowers	8	10	9
Stem length 1st day	18″	17″	16″
Stem length 3rd or 4th day	20″	20″	18″
Fl. width 3rd or 4th day	2″	2"	1.5″
Number with good roots	9	9	8
fair roots	2	1	1
poor roots	3	4	6

\*All averages of 3 replicates of 15 bulbs planted.

Holland precooled bulbs. Preludium forced well. Van der Eerden was tall but the flowers were not bright enough in color or large enough and the percentage flowering was not adequate.

A similar test is being carried out in 1965-66 with the same varieties. Also small lots of many other varieties are being precooled and forced in benches and in pots to find varieties suitable for bench and pot culture.

Variety	First	Days to Flower Last	Average
Apeldoorn	38	50	44
Bellona	35	53	44
Karel Doorman	39	51	45
K & M's Triumph	40	52	46
Lustige Witwe	36	47	41
Pax	36	48	42
Paul Richter	35	47	41
Paris	43	59	51
Preludium	35	48	41
Van der Eerden	38	53	45

Table 12. Average\* days to flower at 58°F.

\*Averages are of all replicates all treatments for a variety.

#### Grower Trials in 1965-66

Encouraged by results in Holland and in the U.S.A., a large scale experiment is being carried out in the U.S. in 1965-66. Tulips grown in Holland were shipped to the Cornell Ornamentals Research Laboratory on Long Island where they were given the 41°F storage treatment. They were removed from storage and shipped to forcers on November 30. The bulbs should have been planted upon arrival. Too long a delay at high temperature from the time of precooling to planting can cause damage to rooting or withering of flowers during forcing. It will be interesting to see how the precooled tupils force after shipping and forcing under normal commercial conditions. The data taken by the growers is very important for the success of the experiment.

### Reference

 Slootweg, A.F.G. and P. Hoogeterp. 1965. A few suggestions for experimental application of the 5°C. (41°F.) treatment of tulip bulbs. Report from the Laboratory for Bulb Investigation, Lisse, Netherlands. Translated by H. M. Biekart.