

Studies on Production of Nursery Stock in Tree Peony (1)

Effects of Bud Position of Scion, Binding Material,
Time, Cultivar and Temperature after
Grafting on Graft-take of
Grafted Tree Peony

Noriaki AOKI* and Ikuo INOUE*

ボタンの苗生産に関する研究 (1)

接ぎ木における接ぎ穂の部位, 結束材料, 時期, 品種および温度が活着に及ぼす影響

青木 宣明 ・ 井上威久雄

Summary

This study was undertaken to clarify the effect of bud position of scion, binding material, time, cultivar and temperature after grafting on graft-take of grafted tree peony.

The percentages of graft-take were not affected by bud positions or cultivars, and those in all plots were 100% or near 100%.

In grafting at the last 10 days of August, the percentages of graft-take in both polyvinyl tape plot and flax string one were near 100%.

In grafting from the last 10 days of August to the last 10 days of September, the percentages of graft-take were about 90% in all plots, regardless places heeled in after grafting. In the first 10 days of November, the percentage of graft-take in thermostatic room plot was about 90%, but in the case of outdoor plot was under 50%.

In grafting carried out at the last 10 days of August and the middle 10 days of September, the percentages of all plots were in range of 80% to 90%, regardless cultivars or places heeled in after grafting. However, the percentages of graft-take in grafting at the last 10 days of August and in heeling in thermostatic room tended to be equal or slightly high, as compared with those in grafting at the middle 10 days of September and in heeling at outdoor, respectively.

Introduction

Tree peony is the flower of Shimane Prefecture. In Yatsuka-cho(it is called Daikon Island and well-known in Japan and abroad for its tree peony culture), the shipping of cut flowers and pot flowers is rapidly increasing. However, recent stock production tends to be constant or slightly decreasing, and the kinds of cultivars are also gradually decreasing.

The reason is that grafted nursery stock producers have used for themselves a plenty of stocks for forcing since the recent organization of a guild for tree

* Experimental Farm, Faculty of Agriculture, Shimane University, Matsue 690-11, Japan

peony forcing in Yatsuka-cho, and that only cultivars suitable for December shipping(1, 2, 3) or those with good growth and development after graft-take has been grafted, while production of non-suitable or poor growth cultivars has been rare. Furthermore, the time of grafting(grafting in autumn equinoctial week is said to be proper and, practically, it is also carried out) overlap with digging and shipping time of ginseng and tree peony plants. So plants producers sometimes miss grafting time.

As cultivation on grafting has been carried out depending on experiential technique, there is no report on grafting.

In this paper, the effects of bud position of scion, binding material, time, cultivar and temperature after grafting on graft-take are dealt with.

Materials and Methods

This study was carried out at Experimental Farm, Faculty of Agriculture, Shimane University from 1990 to 1991.

[1990]

Four- or 5- year-old herbaceous peonies(wild type) after seeding were dugged and then washed in water at 26 August. Stocks with 2.0~2.5cm root diameter were selected and they were prepared for 10~15cm length and 30~40g weight.

Experiment 1.

Effect of bud position on graft-take.

The substantial current shoots of 'Hanakisoi', 'Shimanofuji' and 'Shimadaijin' were used for scion. Bud position of scion was numbered from upper side. Whittle grafting was used and grafting was carried out at 30 August. The number of grafted nursery stocks differed from one plot to another, ranging from 8 to 28. Polyvinyl tapes were used for binding grafting position.

Experiment 2.

Effect of binding materials at grafting part on graft-take.

The lateral buds of 'Hanakisoi' were used. Polyvinyl tapes and flax strings were used for binding. Grafting was carried out at 5 September. The number of grafted nursery stocks in plots of polyvinyl tape and flax string were 44 and 50, respectively.

In both experiment 1 and 2, graft nursery stocks were buried(heeled in) in outdoor wet soil under the conditions that the soil was covered by roof not to be got wet by rain. Percentages of graft-take were investigated at first 10 days of October.

[1991]

Two-year-old herbaceous peonies after seeding were dugged at 27 August. Stocks with 2~2.5cm root diameter and 20~30g weight were used. Lateral buds were used for scion and grafted by whittle grafting. Only flax strings were used for binding grafting part(Photo. 1).

Experiment 3.

Effect of grafting time and place of heeling-in after grafting on graft-take.

Scion of 'Hanakisoi' were used. Grafting was carried out every week from 29 August to 26 September and then in 4 November. Grafted nursery stocks were

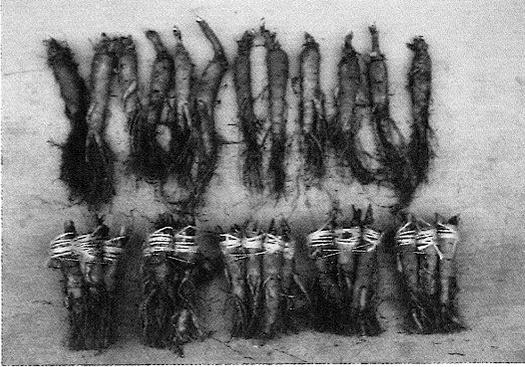


Photo. 1. Rootstocks (upper; 2-year-old herbaceous peony after seeding) and grafted nursery stocks (lower).

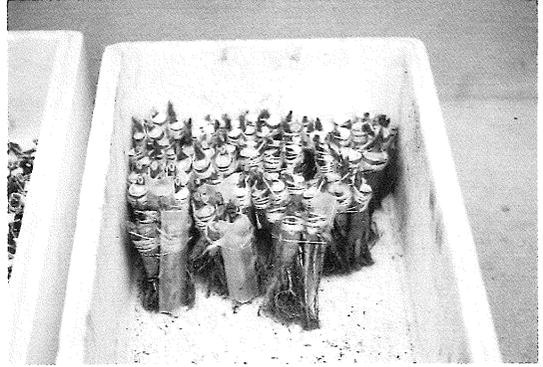


Photo. 2. Grafted nursery stocks gotten into a polystyrene box after grafting.

divided into two plots. One was thermostatic room plot and the other, outdoor plot. In thermostatic room plot, grafted nursery stocks were gotten into a polystyrene box after grafting (Photo. 2) and were sometimes sprayed by water to prevent stocks from drying. In outdoor plot, stocks were buried in wet soil (Photo. 3) under conditions that the stocks were covered by roof not to be got wet by rain, although they were sometimes watered upon observing wet conditions of soil. The numbers of grafted nursery stocks were 15~20 per a plot.

Experiment 4.

Effects of grafting time, place of healing-in and cultivars on graft-take.

Grafting was carried out at 29 August and at 19 September. Cultivars used were 'Kohkamon', 'Kaoh', 'Shimanofuji', 'Ten-i', 'Rakuyohkoh', 'Shimadaijin', 'Jitsugetsunishiki', 'Shinshichifukujin', 'Yaezakura', 'Shintosh-en' and 'Renkaku'. The places of healing-in after grafting were the same as experiment 3. The numbers of grafted nursery stocks were different in cultivars and plots, ranging 11 to 30.

In experiment 3 and 4, graft-take was investigated 20 days after grafting.

Temperatures during healing-in after grafting were measured in a polystyrene box (room temp.) and 5cm under ground (soil temp.). They were changed in a range of 22°C to 25°C (small changes in room) and 25°C to 11°C (large changes in soil) (Fig. 1).



Photo. 3. Grafted nursery stocks heeled in soil after grafting.

Results and Discussion

Tree peony stocks are usually propagated by grafting with rootstocks of herbaceous peony. Recently, whittle grafting has been used in Yatsuka-cho. Whittle grafting needs less time and give better stock shape than cleft grafting which was used for tree peony propagation about 30 years ago.

In grafting, it is necessary to clarify a relationship between bud position of scion and graft-take. No difference

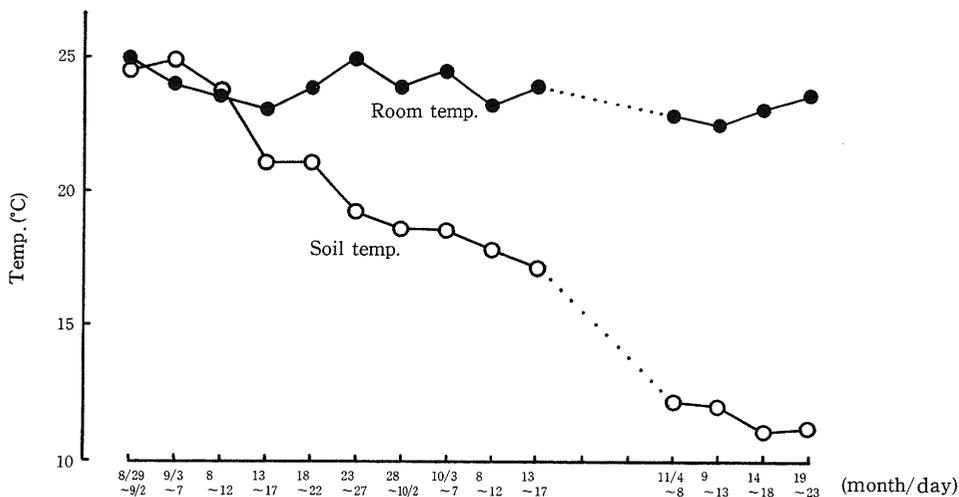


Fig. 1. Changes of temperatures in a thermostatic room and outdoor soil. They were measured in a polystylen box and at 5cm under ground.

was observed in graft-take, regardless of bud positions or cultivars. Percentages of graft-take were 100% or near 100% in all plots (Table 1). Therefore, if scion is a substantial shoot (the growth and development of lateral buds are good), it is suitable for grafting.

Usually, grafted nursery stocks of tree peony are heeled in wet soil during about 20 days after grafting, and then are transplanted in the field after recognizing graft-take. If the soil dries during heeling-in, water is sprinkled on soil. So, it is anxious that water soaks in grafting part. Some producers use polyvinyl tapes which are used for grafting of other flowering trees and shrubs or fruit trees. In the case of this method, it is necessary to remove tapes at a certain time (at digging or growing period) after graft-take. As the binding part is under ground, it spends a plenty of time to remove tapes, compared with the case of other flower trees and shrubs or fruit trees. Therefore, it is considered to use for grafting flax string, which naturally rots and is not necessary to be removed. Binding by flax string is considerably prevailing in production region, but there is no detail data, compared with polyvinyl tape. Table 2 shows the effect of binding materials on graft-take. Percentages of graft-take showed near 100% in both plots of polyvinyl tape and

Table 1. Effects of bud position of scion and cultivar on graft-take of grafted tree peony.

Cultivar	Position ² of scion	Number of grafting	Number of graft-take	Percentage of graft-take
Hanakisoi	12	28	24	86
	34	27	27	100
Shimanofuji	12	12	12	100
	37	26	26	100
Shimadaijin	12	8	8	100
	37	24	23	96

²Bud positions of scion were measured from upper of stem.

Table 2. Effects of binding materials on graft-take of grafted tree peony cv. 'Hanakisoi'.

Binding material	Number of grafting	Number of graft-take	Percentage of graft-take
Polyvinyl tape	44	42	95
Flax string	50	49	98

Table 3. Effects of grafting time and places of heeling-in after grafting on graft-take of grafted tree peony cv. 'Hanakisoi'.

Grafting date (month/day)	Thermostatic room ^z			Outdoors ^y		
	Number of grafting	Number of graft-take	Percentage of graft-take	Number of grafting	Number of graft-take	Percentage of graft-take
8/29	15	14	93	15	14	93
9/ 5	15	14	93	15	13	87
9/12	16	15	94	15	15	100
9/19	20	19	95	15	14	93
9/26	20	18	90	15	13	87
11/ 4	17	15	88	18	8	44

^z Average temperature of day changed a range of 22°C to 25°C during 20 days after grafting.

^y See Fig. 1 about soil temperatures after grafting.

flax string, and it became clear that binding materials have no effect on graft-take. Binding time necessary for grafting with flax string was very shorter than that with polyvinyl tape. Upon considering the time for binding or removing tape after graft-take, flax string is superior to polyvinyl tape for binding material in grafting of tree peony.

The autumn equinoctial week is said to be proper for grafting, and grafting has been carried out about that time in Yatsuka-cho. However, it is unfavorable from a viewpoint of the division of labor that grafting is centered on the short period. Shipping quantity of tree peony stocks tended to decrease year by year. Because recent tree peony forcing has been attempted by the guild organized in Yatsuka-cho, grafted nursery stock producers have used for themselves a plenty of stocks for forcing, and many suitable cultivars for December shipping(1, 2, 3) has been grafted. Therefore, the time of grafting overlaps with digging and shipping time of ginseng and tree peony stocks, and the period of grafting is limited in a short time from a viewpoint of labor forcing. Recently, some producers hasten the time of grafting to start from last 10 days of August. However, there is no exact data for graft-take of that time. Therefore, it is necessary to elucidate exactly the proper time for grafting. In the case of stocks grafted from 29 August to 26 September and heeled in outdoor wet soil, the percentage of graft-take were about 90%. It was less than 50% in the case of stocks grafted at 4 November. On the other hand, in the case of stocks set into a polystyren box and controlled in a thermostatic room after grafting, the percentage of graft-take were about 90%, regardless the time of grafting(Table 3). Some cultivars grafted at the first 10 days of November and then controlled in a thermostatic room, they were also about 90%(data was not shown). As Fig. 1 shows, temperatures in a thermostatic room were kept in a range of 22°C to 25°C after grafting, whereas that in outdoor soil were lowered as autumn went on, ranging from 11°C to 12°C at November. Graft-take of stocks grafted on 4 November and then controlled outdoors was very poor, owing to a decrease in soil temperatures.

Table 4 shows the results on cultivars except 'Hanakisoi'. There is a little difference between the last 10 days of August and middle 10 days of September, but the percentage of graft-take were in a range of 80% to 90% in all cultivars and grafting times. The percentages of graft-take in thermostatic room plots were equal to or slightly higher than those of outdoor soil plots. Therefore, it is preferable

Table 4. Effects of grafting time and cultivars on graft-take of grafted tree peony.

cultivar	Grafting date (month/day)	Thermostatic room ^z			Outdoors ^y		
		Number of grafting	Number of graft-take	Percentage of graft-take	Number of grafting	Number of graft-take	Percentage of graft-take
Kohkamon	8/29	16	15	94	15	12	80
Kaoh	8/29	15	15	100	15	14	93
Shimanofuji	8/29	15	14	93	15	14	93
Ten-i	8/29	30	29	97	—	—	—
Rakuyohkoh	8/29	30	27	90	—	—	—
Kohkamon	9/19	13	12	92	12	9	75
Kaoh	9/19	16	15	94	15	14	93
Shimanofuji	9/19	13	12	92	12	10	83
Ten-i	9/19	29	27	93	14	12	86
Shimadaijin	9/19	14	13	93	14	13	93
Jitsugetsu-nishiki	9/19	17	16	94	17	16	94
Shin-shichifukujin	9/19	23	21	91	15	13	87
Yaezakura	9/19	19	17	89	19	16	84
Rakuyohkoh	9/19	11	10	91	—	—	—
Shintosh-en	9/19	15	13	87	—	—	—
Renkaku	9/19	16	14	88	—	—	—

^z Average temperature of day changed a range of 22°C to 25°C during 20 days after grafting.

^y See Fig. 1 about soil temperatures after grafting.

for the control just after grafting to use polystyren boxes, which are easy and available for harvesting and control.

The proper period for grafting in tree peony is not only from middle 10 days to last 10 days of September as has been said from before, but also from last 10 days of August when soil temperature is kept a little higher.

As mentioned above, flax string is available for binding material in grafting of tree peony, and there is a certain period (about a month or more) on the proper period for grafting, regardless of cultivars. If the temperature after grafting is kept about 20°C or more (by getting in a polystyren box and controlling in a thermostatic room or electric heating under ground in a plastic film greenhouse), the proper period for grafting becomes longer and the division of labor force becomes easy.

References

- 1) AOKI, N.: J. Japan. Soc. Hort. Sci. **59** (Suppl. 1): 484–485, 1990.
- 2) AOKI, N.: J. Japan. Soc. Hort. Sci. **61**: 151–157, 1992.
- 3) HOSOKI, T., HAMADA, M., KANDO, T., SEO, M., MORIWAKI, R. and INABA, K.: Bull. Fac. Agr. Shimane Univ. **23**: 16–24, 1989.

摘 要

ボタン接ぎ木における接ぎ穂の部位、結束材料、時期、品種および接ぎ木後の仮植場所が活着に及ぼす影響について調査した。活着率は接ぎ穂の部位や品種による差がほとんど見られず、いずれの区も100%か100%に近い活着率であった。8月下旬に行った接ぎ木において、ビニルテープ、麻ひもの両区とも100%に近い活着率を示した。8月下旬から9月下旬にかけて行った接ぎ木では、仮植場所のいか

んにかかわらず、90%前後の活着率を示した。11月上旬では、恒温区の活着率が約90%であったのに対し、屋外区は50%以下であった。8月下旬と9月中旬では、品種や仮植場所に関係なく80~90%の活着率であった。しかしながら8月下旬の活着率は9月中旬に比べ、また恒温区は屋外区に比べ同じかやや高い傾向を示した。