

Effects of Feijoa Cutting Diameter on Seedling Quality

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Abstract: In order to understand the effect of feijoa cutting quality on seedling plants, different diameter cutting of cultivar Unique was used as materials for cutting propagation. The results showed that cutting diameter has a remarkable influence on the rooting rate, rooting traits (sum of adventitious roots and average length of roots), germination rate and growth quantity of shoot of *Feijoa sellowiana*; the rooting rate, traits, germination rate and growth quantity of shoot obtained from using the diameter from 2.5-3.0 mm are significantly greater than those using the diameter 2.0-2.5 and 1.5-2.0 mm; thus the cutting slips of >3.0 mm in diameter are the best choice for seedling growth.

Key words: *Feijoa sellowiana* berg, softwood cutting, cutting diameter, rooting result, seedling quality, China

INTRODUCTION

Feijoa sellowiana is a subtropical species belonging to the Myrtaceae family. It is native to South Brazil with a secondary dispersion in Uruguay (Thorp and Bielecki, 2002). The fresh fruit is enjoyed for its characteristic flavour and aroma which are similar to pineapple. For this reason, it is also called pineapple guava. Owing to its easy adaptability in subtropical regions, now-a-days it is extensively cultivated in America, France, Spain, Russia, Australia, Japan and especially in New Zealand where the fruits are popular. In China, this species was introduced at the end of the 20th century, initially as an ornamental plant. Recently, the species has assumed some economic relevance with orchards planted in the Southern regions of the country such as Jiangsu, Shanghai, Sichuan and Zhejiang. As a newly rising species for its edible fruits, ornamental and medicinal properties, feijoa shows great potential in foods, drugs and cosmetics (Hideki, 2001; Hardy and Michapl, 1970; Kolesnik *et al.*, 1991). Supported by the overseas intellectual resource introduction program of Sichuan Bureau of Foreign experts administration. Wang *et al.* (2007) in Southwest University of Science and Technology (SWUST) introduced a small number of fruit seedlings from New Zealand in 2004. She considers that feijoa have great potential for the development of ornamental trees and edible fruits because it retains its fine qualities in Sichuan climatic conditions (Wang *et al.*, 2007). It is urgent to speed up the rate of reproduction in order to meet production demand. Feijoa can be propagated either from seed or by cuttings. They are relatively easy to grow from

seed but the quality of fruit from seed-propagated trees varies considerably from one seedling tree to the next. Cutting propagation can maintain the original properties, therefore, it is widely used in propagation.

As a newly rising species for its edible fruits, ornamental and medicinal properties, its cutting propagation technique most concentrated on the research methods such as cutting matrix, hormone, cutting period, tree-age and cutting location (Zhang *et al.*, 2009a, b, c; Wang *et al.*, 2009). With the rapid development of feijoa, more and more people are aware that seedlings quality has a great effect on the resistance, growth potential and yield. In this study, the effect of feijoa cutting quality on seedling plants was studied, in order to provide a theoretical and technical basis for nursery stock production.

MATERIALS AND METHODS

The experiment was carried out in the Agriculture Laboratory of SWUST. On June 20, 2009, softwood cuttings were taken from *Feijoa sellowiana* Berg. Unique 4 years old mother plants. Cuttings were collected from each tree top, keeping two to three nodes and two pairs leaves (half-leaf pruned) and all cuttings were 8-12 cm long.

The diameter at the mid point of each cutting was measured and the cuttings were divided into three size classes: 0.15-0.20 A₁, 0.20-0.25 A₂ and 0.25-0.30 cm A₃. The experiment was a completely randomized design with three replications and 30 subsamples (cuttings) per replication.

The cuttings were rooted under fog at 70% humidity. Air temperatures ranged from 15-35°C with venting set at 24°C. The greenhouse was a glasshouse shade to 55%. Ventilation was almost constant. Within one week of planting all cuttings were sprayed with topsin at 0.45 g L⁻¹ to prevent root. No fertilisers were used. Cuttings were dipped in 1000 mg L⁻¹ IBA for 10 sec then inserted into cell trays containing a perlite medium. The experiment was observed every 10 days from the beginning of June to the end. New sprouts, roots and shoots were recorded when they could be clearly identified. All cuttings were evaluated for root length, root number and rooting rate after 60 days. A root was described as the emergence from the cutting of any rounded growth with a minimum of 1 mm in length. The data on the vegetative characteristic were subjected to analysis of variance and the significant differences between means were determined by using the Least Significant Difference (LSD) test at the 5% level. The rooting rate data were arcsine transformed and the transformed data were statistically analyzed.

RESULTS AND DISCUSSION

Rooting capacity of feijoa cuttings at different diameter:

The diameter of cuttings have significant impacts on the rooting capacity of feijoa (Table 1). Root length, root number and rooting rate increased gradually with increase in the diameter of cuttings. The thickest cuttings A₁ were best in rooting capacity and had significant differences with thin A₃ and medium thick cuttings A₂. The stouter the cuttings, the higher the nutritional contents and relatively speaking thus better the rooting capacity.

Sprouting rate of feijoa cuttings at different diameter:

Formation and growth of root system of feijoa cuttings had great effect on sprout, cytokinins are produced in roots where they promote the growth of lateral buds. Sprouting efficiency can be used as a morphological marker at rooting speed. A few branches begins sprout 10 days after cutting, sprouting rate of the thin cuttings 6% were higher than that of the thick A₁ and the medium thick cuttings A₂ which may be due to the thin cuttings from the top of the branches, the higher hormone levels (Table 2). Analyzed from 40 days after cutting, the diameter of cuttings affect deeply sprouting rate. Sprouting rate of the thick A₁ cuttings had significant differences with the thin A₃ and the medium thick cuttings A₂.

Growth of new shoots of feijoa cuttings at different diameter: The new shoots from cuttings can produced

Table 1: The rooting capacity of cuttings

Diameter (cm)	Root length (cm)	Root no.	Root rate (%)
0.25-0.30	13.6 ^a	4.8 ^a	90.2 ^a
0.20-0.25	10.5 ^b	3.0 ^b	86.8 ^b
0.15-0.20	8.3 ^c	2.8 ^b	71.1 ^c

Table 2: Sprouting rate of cuttings

Diameter (cm)	Cuttings no.	10 days		20 days	
		Sprouting no.	Sprouting rate (%)	Sprouting no.	Sprouting rate (%)
0.25-0.30	90	3	3	15	17
0.20-0.25	90	4	4	12	13
0.15-0.20	90	6	6	12	13

Diameter (cm)	Cuttings no.	30 days		40 days	
		Sprouting no.	Sprouting rate (%)	Sprouting no.	Sprouting rate (%)
0.25-0.30	90	35	39	44	49 ^a
0.20-0.25	90	30	33	35	39 ^b
0.15-0.20	90	28	31	33	37 ^b

Table 3: Growth quantity of new shoots

Diameter (cm)	Length (cm)	Diameter (mm)
0.25-0.30	15.8 ^a	3.2 ^a
0.20-0.25	8.5 ^b	2.8 ^b
0.15-0.20	4.7 ^c	1.7 ^c

hormones which affected the growth and development of the cuttings. As the center of metabolic hormones, new shoots plays an important role in regulation and control the distribution of nutrients. The growth quantity of new shoots is the main reason that cause the later growth difference between different diameter cuttings. The stouter the cutting, the better the growth. Length and diameter of new shoots in thick cuttings were better than that of the thin A₃ and the medium thick cuttings A₂ and the length and the diameter were 3.2 mm and 15.8 cm, respectively which had significant differences with the thin A₃ and the medium thick cuttings A₂ (Table 3).

CONCLUSION

The diameter of cuttings have significant impacts on the rooting capacity of feijoa. At the same age stage and under same conditions, the thick cuttings had better rooting capacity because young cell layer of cambium in thick cuttings was thicker and had a stronger vitality than that of the thin A₃ and the medium thick cuttings A₂. In practice, the cutting slips of >3.0 mm in diameter are the best choice for seedling growth.

The soft cuttings of feijoa had one very special characteristic during rooting:rooting first, sprouting later which can be used as a morphological marker at rooting speed and also provided favorable conditions for large scale seedling propagation by cutting in feijoa. From the growth of new shoots, the growth of new shoots in thick cuttings were highest and photosynthetic capability was

strong which were the basis for the development of fine feijoa seedlings. Thus, the thick cuttings should be chosen for cutting in production practice.

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