



The Influence of the Scheme of Planting Green Cuttings of the Kiwi Plant on Their Retention and the Quality of Seedlings

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Abstract: In the article, it is stated that scientific researches were carried out on various planting schemes from semi-wooden cuttings in a special facility protecting the variety of kiwi plant "Hayward" and it is possible to get 44-46 seedlings of standard size from 1 m² of area.

Keywords: kiwi, *Actinidia deliciosa*, *Actinidia chinensis*, leaf, fruit, plant, green cutting, planting scheme, root, stem, regeneration, seedling, Hayward, variety.

Introduction

Kiwi plant (Sweet actinidia) is a large liana or creeping shrub, reaching up to 9 m in height. The leaves are shed, arranged alternately in long bundles, 7.5-12.5 cm long. The shape is ovoid or almost round, the base is grooved. The young leaves are covered with reddish hair, the upper side of the large leaves is light green, the lower side is dull, the veins are visible. The flowers are fragrant, usually bisexual, rarely unisexual, placed singly or in clusters of up to three in leaf axils. The crown is white at first, then turns yellow as it matures. Pollinators are numerous in all flowers, but in female flowers they are sterile. The fruits of Chinese or sweet actinidia are oblong-ovoid to spherical, usually 5-6 cm in diameter, brown in color, thickly covered with hairs. The flesh is green, rarely yellow, white or brown. The seeds are small, black or dark purple [5].

Kiwi (sweet actinidia) - *Actinidia deliciosa* or *Actinidia chinensis* is a plant that is grown in large areas in most subtropical climate regions of the world. According to its taxonomic classification, it is also called *Actinidia chinensis* var. *Deliciosa* (A.Chev.) or *Actinidia chinensis* var. *Hispida* or *Actinidia latifolia* var. *deliciosa* A.Chev [4].

The modern name "kiwi" of the sweet actinidia was given by the famous breeder scientist A. Ellison from New Zealand in the 60s of the XX century, when this fruit was widely distributed in this region. It was named after the kiwi bird, which is the national symbol of New Zealand and is featured on many stamps and emblems of the country [6].

Actinidia fruits are also rich in B vitamins. Well-ripened fruits contain vitamins B₁, B₂, B₄, B₆, B₉, PP, macro- and microelements, fiber, flavonols, flavoring and coloring substances. Biologically active substances of all types of actinidia have a good effect on the human gastrointestinal tract, ease the digestion of food, especially the digestion of meat [1].

The kiwi plant has been studied in our republic only as an ornamental plant, not as a fruit plant, and its fruits are mainly imported from foreign countries at high prices. "In January-September 2022, Uzbekistan will receive 2.4 million dollars from 6 foreign countries. 3.7 thousand tons of kiwi products were imported, which is equivalent to US dollars. Kiwi imports increased by 1.5 thousand tons compared to the corresponding period of 2021. The countries where Uzbekistan imported the

most kiwis in 9 months of 2022: Iran - 3.1 thousand tons, Turkey - 483 tons, China - 122 tons, Kazakhstan - 33 tons, Italy - 8.4 tons. and the volume of imports is increasing year by year.

According to scientists, many factors (planting scheme, duration, state of the branch from which cuttings are taken and its part prepared for cuttings, growing substances and their concentration, etc.) affect their rooting ability when propagating fruit plants from green cuttings. Among these factors, the planting scheme of green cuttings is also important. Because excessive compaction leads to rotting of cuttings due to increased moisture and shading, on the contrary, increasing the distance reduces the number of seedlings per unit area.

The fact that the planting scheme is highly important in the reproduction of fruit plants from green cuttings has been emphasized by many foreign and domestic scientists. However, the work of these scientists is on grafts of fruit plants, vines, olives and other plants, whose biological properties are fundamentally different from those of the kiwi plant. Therefore, when growing a kiwi plant from a green cutting, choosing a planting scheme suitable for the biological characteristics of this plant is an important factor in ensuring the speed of its regeneration [2, 3].

Result and Discussion

Experiments on propagation of kiwi plant from green cuttings in different planting schemes showed that the rootability of green cuttings differed according to options. As the planting pattern expanded, the rooting capacity of cuttings increased. In accordance with the rule, the highest rooting capacity was recorded in the variant planted in the 15x25 cm scheme. In this option, the number of cuttings that took root reached 90.6% compared to the total number of planted cuttings. The least rooting was observed in the 10x5 scheme. In this experimental variant, the rate of rooting of green cuttings of kiwi plant did not exceed 79.3%.

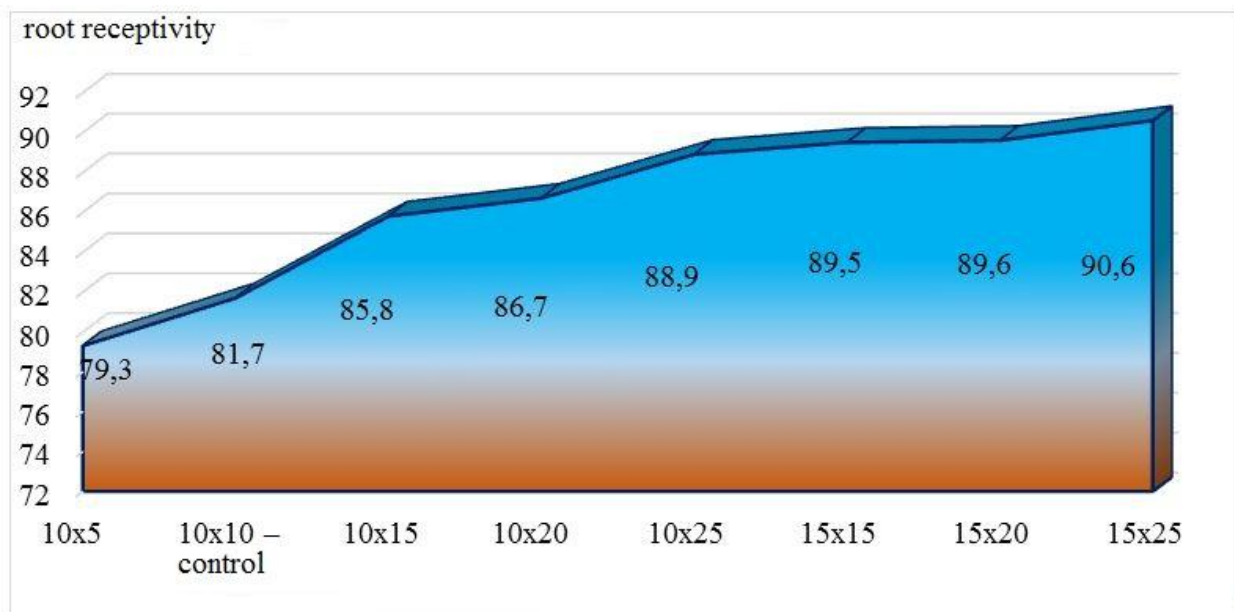


Figure 1. Rooting of green cuttings of the Hayward variety of kiwifruit in different planting schemes, 2018-2021

It should be noted that, although the difference between the rooting ability in the experimental options is not so high, the cuttings planted with thinning showed an advantage in terms of the parameters of the development of the root system. In this case, the best developed root system was noted in the cuttings of the options planted in the scheme of 10x15...25 and 15x15...25 cm (see Fig. 2).

Planting scheme also had a significant effect on the development parameters of the above-ground part of green pens. In this case, the highest value of the ability to form a branch in the planted cuttings was recorded in the variant planted in the scheme of 15x25 cm. In this option, compared to the total number of planted green cuttings, the amount of them that formed a branch reached almost

98.3%. As the planting pattern became denser, the ability to form a branch decreased proportionally. According to the rule, the least growing cuttings were recorded in the scheme of 10x5 cm. In this experimental variant, the number of sprouts did not exceed 51.6% compared to the total number of planted green cuttings.

The rest of the variants ranked between these two variants in terms of new shoot production in green cuttings and varied between 79.8 and 97.8% of the total planted cuttings according to the variants.



Figure 2. Development of the root system in green cuttings of the Hayward variety of the kiwi plant in different planting schemes (September 1 situation):

1 – 10x5; 2 – 10x10; 3 – 10x15; 4 – 10x20; 5 – 10x25; 6 – 15x15; 7 – 15x20; 8 – 15x25

The number of leaves formed in plants grown from green cuttings also differed depending on shoot formation. The superiority in terms of this biometric parameter was also noted in the variant planted in the 15x25 cm scheme. On average, 19 leaves were formed on the branches of green cuttings planted in this scheme, which means 11 leaves more than the control.

The lowest number of leaves in rooted green cuttings was recorded in the variant where the cuttings were planted in a 10x5 cm scheme. In this scheme, 2 fewer (6.3) leaves were formed compared to the control variant (8.3). In terms of the number of leaves produced in the regenerated plants, the remaining experimental variants were intermediate in the growth sequence between these two variants and ranged from 9.6 to 18.7 according to the variants. changed and produced 1.3-10.4 more leaves compared to the control. The smallest difference was 0.4.

Experimental data show that the scheme of planting green cuttings had a significant effect on the development of the conditional body of one-year seedlings. The same trend as the number of leaves was observed in the formation of this physiological indicator (see Table 1).

Therefore, the thickest and well-developed plants with a 15x25 cm scheme were recorded. The diameter of the stem of the conditional body of the plants grown from the green cuttings planted in this scheme reached an average of 15.1 mm, which means that it is 6 mm thicker than this physiological indicator of the control option, the smallest difference is 0.4 formed

In rooted green cuttings, the thinnest conditional body diameter was determined in the variant where the cuttings were planted in a scheme of 10x5 cm. The diameter of the conditional body of the plants grown in this experimental variant did not exceed 7.2 mm, and they were 1.9 mm thinner compared to this indicator (9.1) of the plants in the control variant.

The rest of the experimental variants in terms of the diameter of the conditional body of the plants developed from the green cutting took an intermediate place between these variants and varied in the range of 11.4-14.7 mm according to the variants. The diameter of the conditional body of the plants of these experimental variants was thicker by 2.3-5.6 mm compared to the control.

Table 1 Development characteristics of the Hayward variety of kiwi grown from green cuttings in different planting schemes, 2018-2021.

Experiment option, cm	The size of the root system, cm ³	The cuttings formed the stick, %	Number of leaves, pcs	Conditional body diameter, mm	The length of the plant stick, cm
10x5 cm	2,1	51,6	6,3	7,2	36,5
10x10 cm – control	4,3	79,8	8,3	9,1	41,6
10x15 cm	5,1	85,7	9,6	11,4	45,4
10x20 cm	5,9	92,3	11,7	13,5	61,0
10x25 cm	6,5	95,8	15,7	13,7	66,2
15x15 cm	6,9	95,9	16,8	14,2	68,3
15x20 cm	7,0	97,8	18,7	14,7	69,7
15x25 cm	7,1	98,3	19,1	15,1	73,6

It is known that in horticulture, the height of ready seedlings is also an important economic indicator. Measuring the height of the plant branches grown from the green cuttings planted in different schemes showed that the tallest plants were formed in the experimental variant planted in the 15x25 cm scheme. In this experiment, the average height of the shoots of plants grown in this variant reached 73 cm, which means that it is 32 cm more than the physiological indicator of plants in the control variant (41 cm).

In the experiment, the plants with the lowest branches were determined in the version where green cuttings were planted in a scheme of 10x5 cm. The height of the plant stems grown in this experimental variant did not exceed 36 cm, and they were 5 cm lower than the height of the plant stems in the control variant. The rest of the experimental variants in terms of the height of the plant shoots developed from green cuttings were intermediate between these variants and varied in the range of 45-69 cm according to the variants. The length of the shoots formed in these experimental options was 4-28 cm longer, compared to the control option. The smallest difference was 0.8.

It is worth noting that although the regeneration of plants occurs at a high rate when the planting scheme is thinned, it is important to choose an optimal option in terms of the amount of ready seedlings per unit area.

Calculations showed that the yield of standard seedlings with the length of the main stem exceeding 60 cm was the highest in the 10x20 cm and 15x15 cm planting schemes (46 and 44 pieces/m², respectively) compared to the total grown plants. In densely planted options, although the number of plants that took root and grew was large, most of them (75-80%) were left for next year's cultivation. Because their height did not even reach 50 cm. On the other hand, in the sparsely planted options, almost 95-98% of the plants sprouted and grew strongly, but due to the fact that less cuttings were planted per unit area, the number of seedlings was correspondingly less.

Conclusion

Based on the results of the experiment presented above, it can be concluded that the rootability of green cuttings of the Hayward variety of kiwi is higher as the spacing becomes smaller and reaches almost 95%. However, from the point of view of seedling yield per unit area, it is recommended to produce planting schemes of 10x20 and 15x15 cm. In these planting schemes, it is possible to get up to 44-46 seedlings of standard size from a unit of area (1 m²).

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