

The Analysis of Rooting and Growth Peculiarities of *Juniperus* Species Propagated by Cuttings

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Abstract. The ornamental trees and shrubs play an important role in shaping the human environment. Aesthetic appearance is important in developing a positive impact on the environment. The main experiment is to investigate the impact of different rooting substrates upon the rooting formation of the *Juniperus* species.

Keywords: ornamental trees, *Juniperus*, perlite, propagation, cuttings, rooting substrates

INTRODUCTION

Members of the genus *Juniperus* are ornamental trees or shrubs. There are about 60 known species living in the northern hemisphere. Their size varies from tall trees to shrubs, their shape may be strictly regular or irregular (Gencsi and Vancsura, 1992).

Members of the genus *Juniperus* has some similarities with genus *Pinus*. Plants are light-loving, most raise a slight crown and lose their shape if they are planted in shade (Heike, 1989). Most species like heat such as *Juniperus communis* and *Juniperus scopulorum*, few of them like shady places, *Juniperus chinensis* (Iliescu, 2005).

They are propagated by seeds or cuttings. The cuttings are growing: in the fall in cold greenhouses (Orloczi, 2005). In early July, can stock, so roots grow in the same year (Schmidt and Tóth, 2006). Usually the tall form with roots grows reverse proportion to the height. Types that form columnar roots are very difficult to grow (Schmidt and Tóth, 2005). At this species we cut the cuttings from young plants, otherwise the roots may take 1 (-2) years. Some ornamental species form roots very hard therefore they grafted in cold greenhouses to grow (Schmidt and Tóth, 2005).

MATERIALS AND METHODS

Place of the experiment. Tree nursery of Lokpinus company, started as a family business in 2003. Main activities include conifers, deciduous shrubs and perennials. The propagation took place on only 20 m², in one plastic tunnel.

The reproductive material for experiment was taken on March 17, 2009. On the same day I cut the plant material, 40 pieces of each variety. This represents a total of 160 pieces of broken cuttings. The process of cutting was followed by growth stimulating treatment. The cuttings were dipped in the 5 mm-deep INCIT 8 preparation.

The propagating containers were placed in unheated plastic tunnels, then was irrigated them. In the plastic tunnel was 80-90% humidity, provided by humidifier irrigation.

The cuttings were in ingrained 9-cm pots, uniform soil mixtures planted on 19 July, and transferred to another Raschel plastic tunnel.

Three weeks later, the seedlings began training, on August 9. This means that it constantly acclimated to the outdoor temperature by ventilation. From August 9 until August 30 the ventilation openings remained opened through the night.

The measurement data was analyzed with two-factor ANOVA procedure. The statistical evaluation was performed in the Past program. The statistical evaluation of the basic data was calculated in decimal logarithm, thus reducing the standard deviation.

RESULTS AND DISCUSSION

The callus tissue rate of the juniper species used in the experiment.

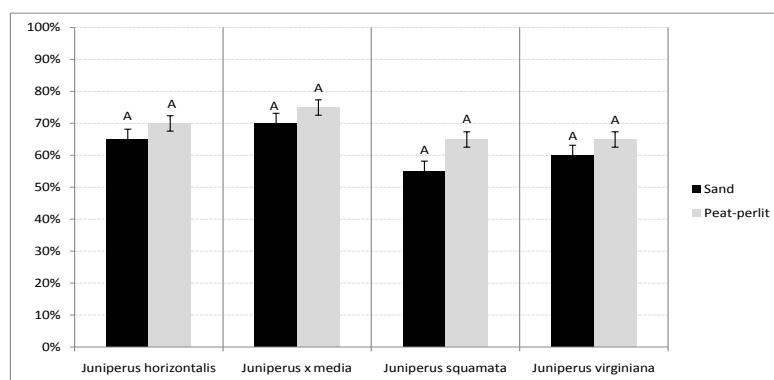


Fig. 1. The callus tissue rate of the *Juniperus* species

Taking into account the callus tissue rate of the juniper species, the peat-perlit mixture was the best callus tissue. Although there were no significant differences between callus tissue of species, however, concluded that both the medium *Juniperus horizontalis* ‘Andorra Compact’ and *Juniperus x media* ‘Pfitzeriana Aurea’ considered to have achieved better results (Fig. 1). There was not found significant differences between the values. The rooting rate of the juniper species used in the experiment

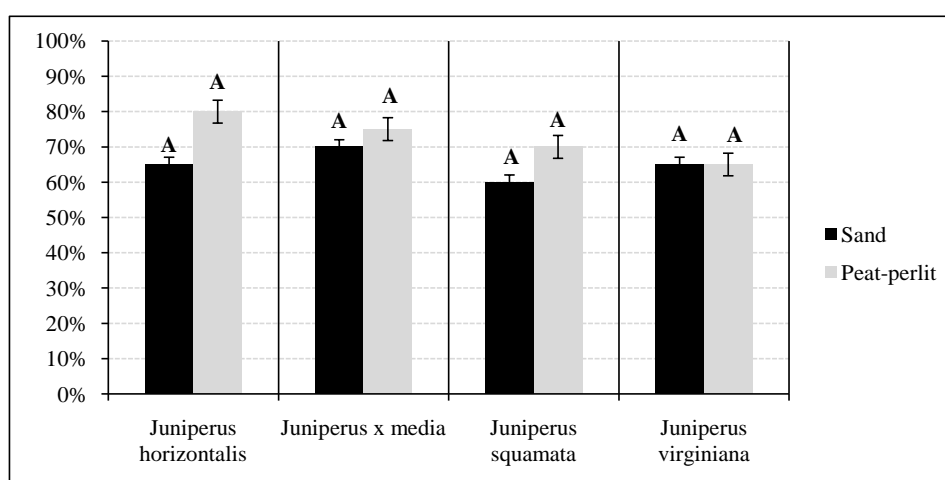


Fig. 2. The rooting rate of the *Juniperus* species

Based on the results of the rooting test taken in July 19, can state that the best results were achieved in the peat-perlit. In the case of the *Juniperus horizontalis* ‘Andorra Compact’ and *Juniperus x media* ‘Pfitzeriana Aurea’ rooting proportion is 80% and 75% respectively.

Juniperus species rooting in the sand had approximately the same rooting rate. There are no significant differences between the values.

The average number of roots of juniper species used in the experiment.

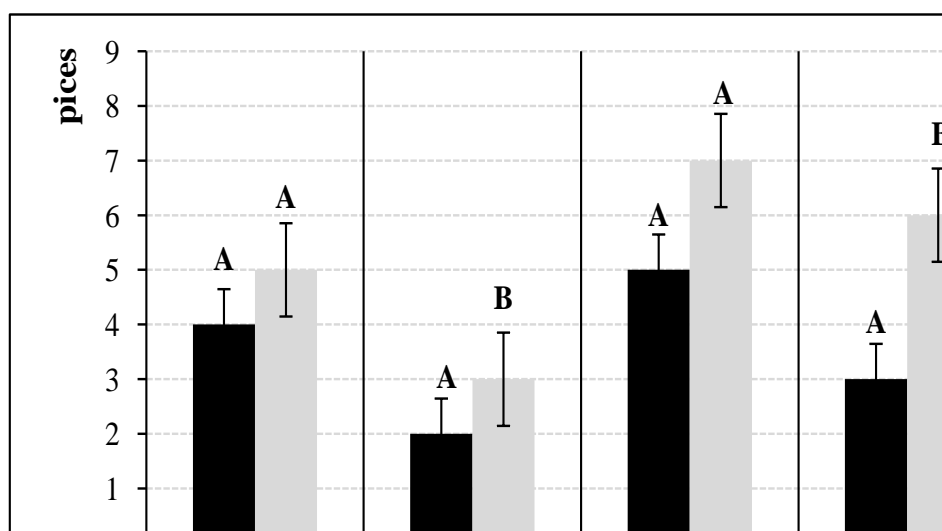


Fig. 3. The average number of roots of *Juniperus* species

Based on the result of the test taken on July 19, by the average root number. can say that I found the best results in the peat - perlite mixture. In case of the *Juniperus squamata* ‘Blue Carpet’ and *Juniperus virginiana* ‘Grey Owl’, the highest average number of roots, 7 pcs. and 6 were found. But in the sand the best results were achieved by the *Juniperus horizontalis* ‘Andorra Compact’ and *Juniperus squamata* ‘Blue Carpet’ with 4 pieces, and 5 pieces each.

In this case, very significant differences have been found between *Juniperus x media* ‘Pfitzeriana Aurea’ ($p=0.008448$), and *Juniperus virginiana* ‘Grey Owl’-AL ($p=0.001732$). These values are illustrated in Fig. 3.

The average root length of juniper species used in the experiment

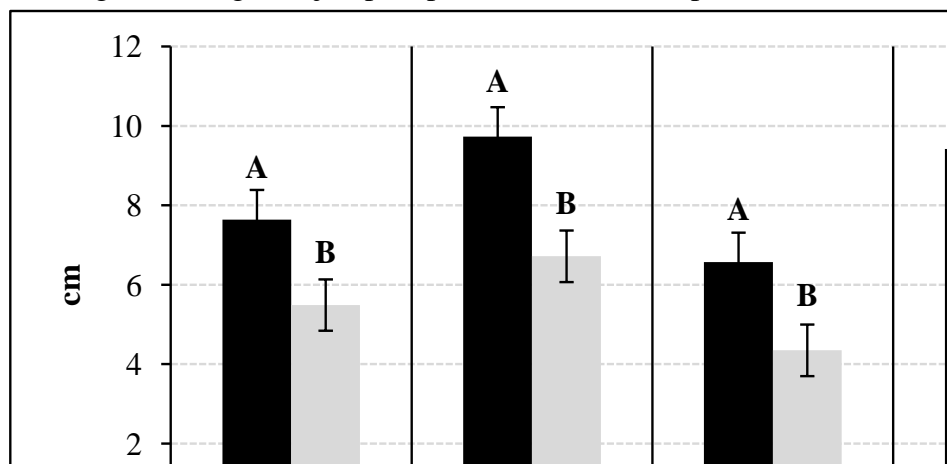


Fig. 4. The average root length of *Juniperus* species

Comparing the length of roots, the sand measured results show a significant difference in relation to those in peat-perlit mixture, the pilot plants roots are longer in sand, while the peat-perlit mixture has more and stronger root branch. Here I found significant differences between every species. The best results in the sand were reached by the *Juniperus x media* 'Pfitzeriana Aurea' (9.73 cm) and *Juniperus virginiana* 'Grey Owl' (9,42 cm). The best results for peat - perlite mixture were obtained by *Juniperus virginiana* 'Grey Owl' (7.24 cm) and *Juniperus x media* 'Pfitzeriana Aurea' (6.72 cm). This can be seen in Fig. 4.

Comparison of the growth of the studied species

On July 19, when the plants were transpositioned, were measured the length of the cuttings and these values are marked on the graph to zero. Further measurements were carried out monthly, to crops planted on a single medium. The average measurement results are summerized on 5th-8rd diagrams.

The average length of shoots on uniform soil mixtures at *Juniperus horizontalis*

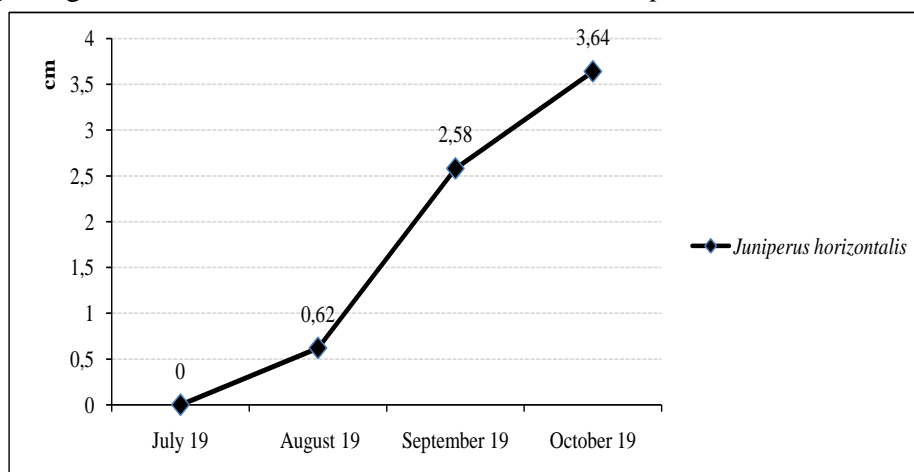


Fig. 5. The average length of shoots of *Juniperus horizontalis*

The creeping *Juniperus horizontalis* shoot, in August was very minimum (0.62 cm) because the plants have suffered from transposition, in September was the strongest growth, the shoot was (2.58 cm). In October the increase again slowed (3.64 cm), this marks the end of the vegetation, the plants prepare for colder weather (Fig. 5).

The average length shoots of a single soil mixtures at *Juniperus x media*

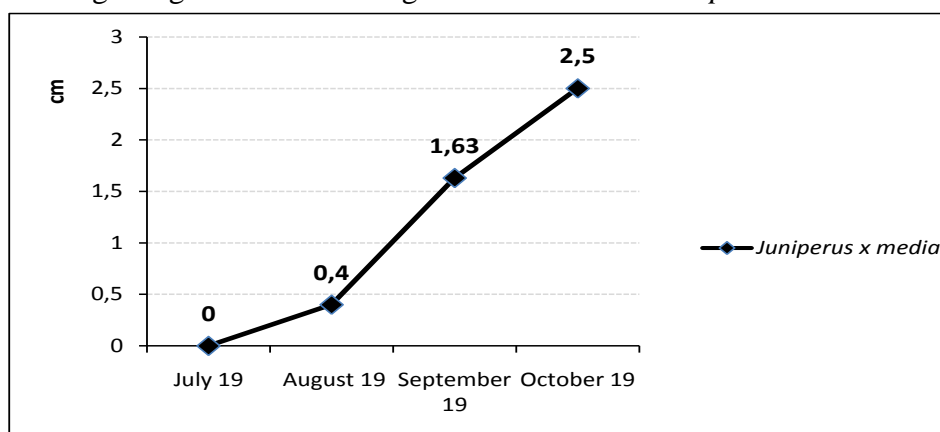


Fig. 6. The average length of shoots of *Juniperus x media*

In the case of *Juniperus x media* the shoot growth was also weaker in the first month, in the middle stronger and finally slows down again. By the end of the vegetation the shoot has reached (2.5 cm) (Fig. 6).

Average length of shoots in the unitary soil mixtures at *Juniperus squamata*

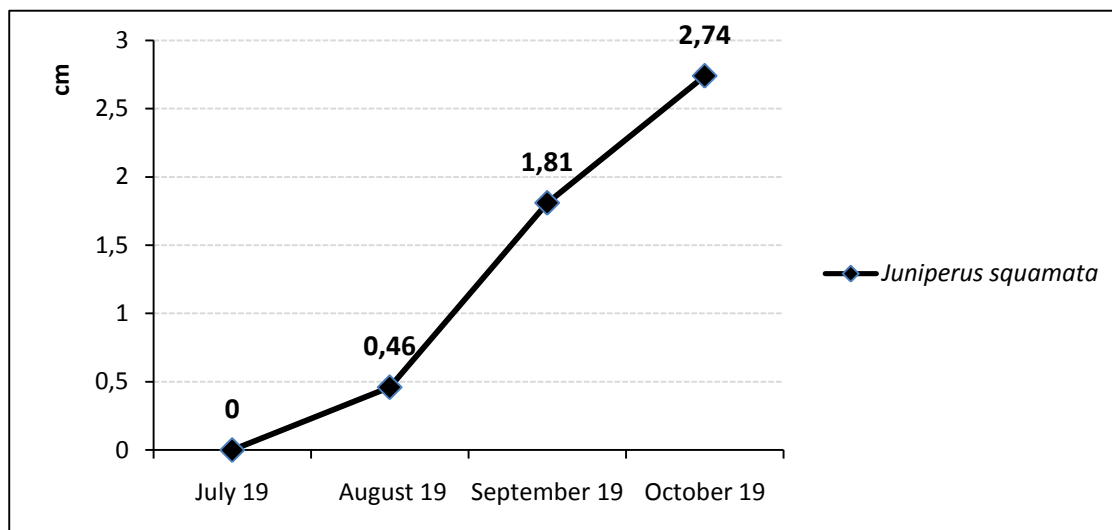


Fig. 7. The average length of shoots of *Juniperus squamata*

In case of the *Juniperus squamata* the shoot growth dynamic is similar to other breeds. Here the shoot in the third measurement reached 2.74 cm (Fig. 7).

Average length of shoots in the unitary soil mixtures at *Juniperus virginiana*

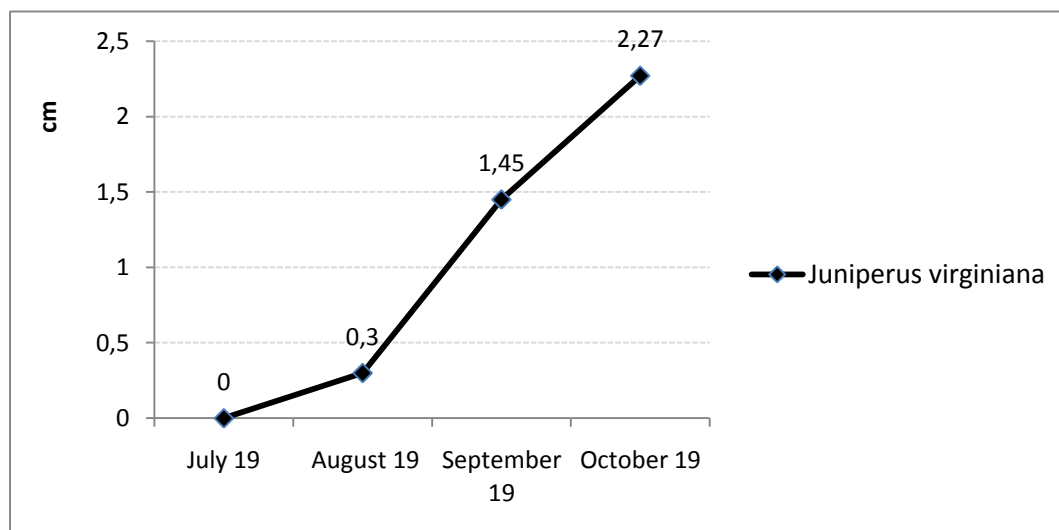


Fig. 8. The average length of shoots of *Juniperus virginiana*

The *Juniperus virginiana* had the weakest shoot growth (2.27 cm) from all types. This variety is similar the growth dynamics (Fig. 8).

CONCLUSIONS

The data of the rooting attempts at area *Juniperus* species suggests that both propagating medium had a satisfactory reproductive rate. Although there is no significant difference in rooting, the peat-perlit mixture positively affected the callus tissue development.

In case of the *Juniperus horizontalis* 'Andorra Compact' the callus tissue rate was higher in peat-perlit (70%), the rooting (80%), while the average root number was 5 pieces. I reached a higher average root length on sand (7,64 cm), due to the fact that there are less roots in the sand (4 pieces) but they are longer, while in peat-perlit roots are shorter (5,49 cm), but are numerous.

In the case of the *Juniperus x media* 'Pfitzeriana Aurea' in turf – the average root length was highest in sand (9,73 cm), in turf - perlit (6,72 cm). This is because the roots are less than in sand (2), but longer, while the peat - perlit roots are shorter and more numerous.

In the case of the *Juniperus squamata* 'Blue Carpet' in the turf perlit mixture was better the process of callus tissue (65%) and rooting (70%). The average root number was the highest in both medium sand (5 pieces), peat - perlit (7 pieces), as a consequence, the average root length was the lowest in both medium sand (6,57 cm), peat - perlit mixture (4.35 cm).

At *Juniperus virginiana* 'Grey Owl' callus tissue was better in turf –perlit, 65%), but the ratio of the two rooting medium was the same (65%). Between the values regarding the average root number is a big difference in peat - perlit (6 pieces) is twice the value of the sand (3 pieces). The average root length in sand is larger (9,42 cm) less in the root number. The turf - perlit value (7,24 cm) is less, because the root number is higher.

The *Juniperus horizontalis* 'Andorra Compact' in terms of growth exceeded the other species (3,64 cm).

The *Juniperus x media* 'Pfitzeriana Aurea' is fast-rooting species, but growth was lower (2,5 cm).

According to professional literature, the *Juniperus squamata* 'Blue Carpet' is growing relatively fast, and my experiment also demonstrated it (2,74 cm).

According to professional literature, the *Juniperus virginiana* 'Grey Owl' is growing fast, however the data obtained from my experiment refuted this.

In case of pine cutting I suggest turf – perlit as rooting medium since the results of my experiment confirmed this.

As propagation for the species I recommend *Juniperus horizontalis* 'Andorra Compact' because it rooted the best, and it had the strongest shoot growth.

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