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# EFFECTS OF DIFFERENT APPLICATIONS ON ROOTING CAPACITY OF BLACK ELDERBERRY CUTTINGS

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***Abstract***
*Elderberry species (Sambucus spp.) grows mostly in wild form in the northern hemisphere. It is often used for landscaping riverbanks, as a windbreak, but also for human nutrition and medicinal purposes. This plant is used especially in the industrial field to obtain essence. In this study, the effects of some applications on rooting success in elder wood cuttings were investigated. For this purpose, in addition to 0, 2000, 4000 ppm IBA solution, a mixture solution of different Bacillus species ($1.7X10^8$ cfu/ml) was used. After the above-mentioned applications were applied to the wood cuttings taken from the plants during the resting period, they were taken into the perlite environment in the greenhouse at 22 $^0$C. According to the results obtained, the number of roots per cutting was found to be between 11.3-22.4. Root lengths varied between 7.1-8.4 mm according to the applications. 2000 ppm IBA application was the application that increased both root length and root number the most. The study revealed that the rooting efficiency of black elderberry plant would be increased by IBA application.*

*Keywords: plant growth regulators, rooting, Sambucus.*

## 1. INTRODUCTION

Turkey has rich plant genetic resources including many wild, perennial herbaceous and woody plants due to its location between two plant gene centers (Ağaoğlu ve ark., 1997; Ercişli, 2004). In addition to the major fruit types, the demand for some minor fruits has been increasing in recent years, taking into account their health benefits. Black Elderberry (*Sambucus nigra* L.) is one of these minor berries. It is a shrub or small tree up to 4 m tall with a foul smell. Its brown branches are lenticular, with soft and spongy cores. Leaves opposite, leaflets fraternal or lanceolate, sometimes elliptical, toothed, hairy along the veins on the underside, glabrous on the other sideIt attracts attention because of its medicinal aspect and industrial product potential. Its leaves contain glycoside, sambunigrine, essential oil, malic and valeric acids, carotene, vitamin C. Its fruits contain glycosides, sambunigrine, vitamin C, sugar, acetic, malic and tartaric acids. It has blood purifying, relieving constipation, pain relief and diuretic effects. It is used as infusion, decoction, syrup, fruit juice, tincture, liquid extract, porridge, powder, ointment, distilled water and essential oil (Chiej, 1988).


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In recent years, with the prominence of some important species in the field of health, the interest in some species naturally grown in nature has started to increase and demands for these species have begun to occur in both commercial and hobby terms. In order to meet these demands, seedlings produced by appropriate methods are needed. As in other fruit species, clonal propagation is very important in black elderberry. For this purpose, in this study, the effects of different applications on rooting performance of elderberry wood cuttings were examined and the prominent application in this regard was determined.

Auxins are the most widely used plant growth regulators. Auxins increase growth by promoting cell division and rooting (Saini et al. 2012; Sönmezışık et al. 2021). In this study, besides different IBA doses for rooting performance, for the first time a mix of different Bacillus species was used. Bacteria known as Plant Growth-Promoting Rhizobacteria (PGPR) are diverse and can exibit a growth-promoting activities in through several direct and indirect mechanism. They can supply phytohormones, nitrogen through nitrogen fixation, free phosphorus by solubilization, and sequester iron by sidrophores (Akhtar et al. 2012). PGPR additionally prevent plants from pathogens by direct hostile interactions between the pathogen and the biocontrol agent, and also by stimulation of host resistance. Phosphate dissolving bacteria can advance plant growth by production of phytohormones indole-3-acetic acid (IAA), gibberellins and cytokinins and different other plant growth promoting materials (Verma et al. 2012). For example auxin and indole-3-acetic acid stimulates longer root lengths in plants. The nutrients themselves and the activity of specific molecular pathways involved in their acquisition may act to induce hormonal signals triggering increases in root density and length (Lopez Bucio et al. 2003).

## 2. MATERIALS AND METHODS

In the study, wood cuttings belonging to an elderberry genotype found in Talas district of Kayseri province were used as material. The wood cuttings were taken from one-year shoots in February and transferred to the perlite medium in the greenhouse with a temperature of 22 $^0$C. In order to determine their rooting capacity, 0, 2000 and 4000 ppm IBA applications were applied to the cuttings, as well as a mixture solution of different *Bacillus* species (*Bacillus thuringiensis, Bacillus simplex, Bacillus amyloliquefaciens,* 1.7X10$^8$ cfu/ml) application. In each application, 3 replications and 20 cuttings were included in each replication. After the applications, cuttings were taken into the perlite environment in the greenhouse. After three months, rooting ratio (%), root number and root lenght of application was measured.

## 3.RESULTS AND DISCUSSIONS

According to the results obtained, rooting ratio of all application was very high (95-100%). However, root number and root length differed according to the applications. The number of roots per cutting was found to be between 11.3-22.4 (Table 1). Root lengths ranged from 7.1 to 8.4 cm. The lowest root length value was found in the Bacterial mix application, and the lowest root number value was found in the control application. 2000 ppm IBA application increased both root length and root number the most. On the other hand, bacterial application increased root number compared to control (Figure 1).


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***Table 1. Rooting parameters obtained in elderberry cuttings as a result of different applications***

| Application | Root Lenght (cm) | Root Number |
|---|---|---|
| Control | 7.7±2.1 | 11.3±2.6 |
| 2000 ppm IBA | 8.4±1.6 | 22.4±3.2 |
| 4000 ppm IBA | 7.1±1.4 | 21.1±2.9 |
| Bacterial Mix | 7.2±1.6 | 13.6±2.4 |

Application of plant growth regulators generally increases rooting capacity of cuttings. Gerçekçioğlu et al. (2008) revealed that 250 ppm IBA application had a positive effect on rooting in elderberry. Gudeva et al. (2017) stated that 5 ppm IAA application increased elderberry rooting rate. Also longer root lengths were obtained in a previous study using IAA (Sönmezışık et al. 2021). It is predicted that the differences between the studies are due to the material, application, rooting environment and working time.

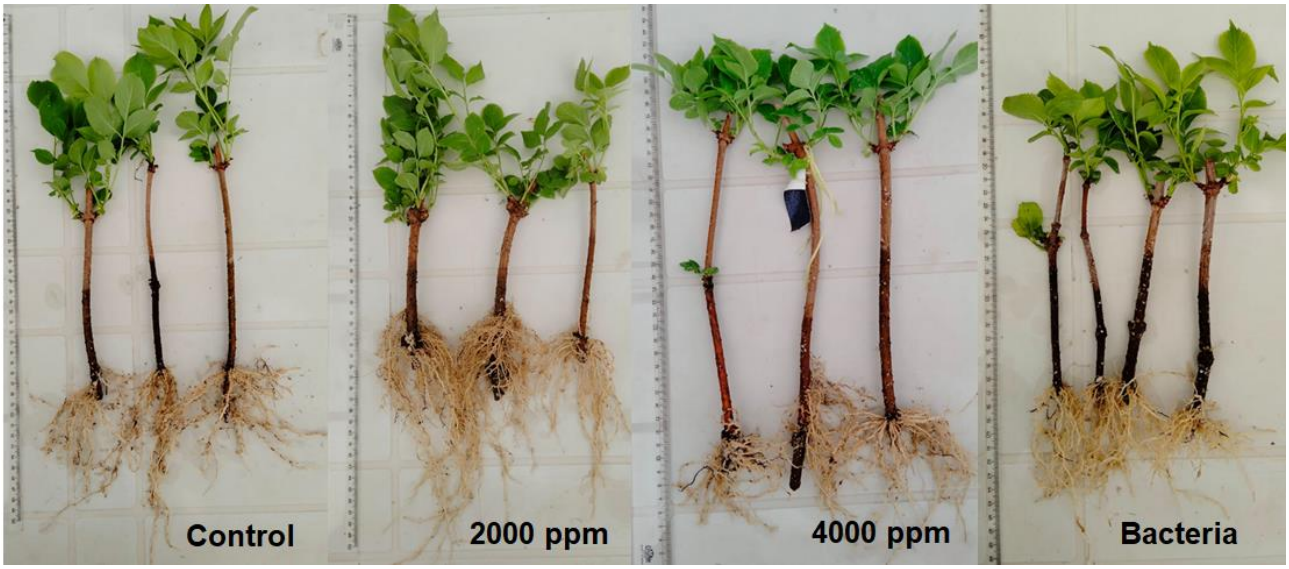


***Figure 1. Image showing the effect of different applications on rooting in elderberry***

The reason for this should be that the material is kept in the environment for a longer time and the application difference. The study revealed that the rooting efficiency of black elderberry plant would be increased by IBA application.

## 4. CONCLUSIONS

The use of growth regulators in Elderberry has a positive effect on root number and length. In addition, bacterial mix, which was used for the first time in this species in our study, increased the number of roots compared to the control. In particular, the use of different types and concentrations of bacteria for these purposes is important in order to obtain more successful results.


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