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**EFFECTS OF LIGHT AND MOISTURE ON GROWTH AND
MORPHOLOGICAL CHARACTERISTICS OF HORSECHESTNUT
(*Aesculus hippocastanum* L.) SEEDLINGS IN THE WESTERN
BLACKSEA REGION IN TURKEY**

SUMMARY

The aim of study is determined of growth performances and changes of morphological characteristics of horse chestnut seedlings at different light and moisture conditions at the nursery stage. This research carried out greenhouse conditions in the Gökçebey Forest Nursery Directorate. In this context the same growing material (1/3sand+1/3clay+1/3natural organic humic material) was created in the greenhouse field. The 4 different light (30%, 50%, 60% and 80%) and moisture (40%, 60%, 80% and 90%) conditions were attempted on seedlings of horse chestnut in the greenhouse conditions. The results obtained from the research that a rapid growth of chestnut horse with the particularly responded quickly to changing light conditions, but can be continued until the response is determined about 80% intensity. On the other hand it reacts to changing humidity conditions against a chestnut horse, but was determined to show high growth in terms of numerical values, such as in this case, the light intensity. As well as root growth that the light intensity the resulting changes despite the rapidly increased to accommodate the growth that occurred and that this increase starts pause of approximately 70% light intensity, root length despite the changes in the moisture content was determined to continue to grow to about 90% moisture content. In this context light intensity of increased approximately 70% and performed upbringing process of horse chestnut trees in the moisture content up to 80%. However, both the bud growth, required for growth and development of fruit grown in 50% light 60% moisture content and their powerful and adaptations may be useful for the production of high horse chestnut trees.

Keywords: Horse chestnut, adaptation, light, moisture, seedling, greenhouse, growth

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INTRODUCTION

Horse Chestnut (*Aesculus hippocastanum* L.) is a large deciduous, rapidly-growing tree that can reach a height of 36 meters. It is native to the countries of the Balkan Peninsula, but because of its large, showy flower clusters the tree is cultivated worldwide for its beauty. Flowers are white or pink with a small red spot. Leaves are large, consisting of either five or seven leaflets and the fruit is round with a thick, green, spiny husk containing a glossy brown seed (chestnut or conker) (Anonymous, 2009). While the common name for the tree is horse chestnut, it is also known as buckeye, and like other buckeyes, is a member of the *Hippocastanaceae* family, rather than the chestnut family (*Castanea*) (Lorenz and Marek, 2009). The name, horse chestnut, is believed to be derived from the brown conkers that look similar to chestnuts and because a horseshoe shaped mark (complete with spots resembling horseshoe nails) is left on the twig when the leaves drop off in autumn (Pittler, 1998). Historically, the seed extract was used as a treatment for many ailments, including rheumatism, rectal complaints,³ bladder and gastrointestinal disorders, fever (first written account in 1720), hemorrhoids (as early as 1886),⁴ and leg cramps.⁵ (Pearson and Vanhountte, 1993). Currently, horse chestnut seed extract (HCSE) is widely used in Europe for chronic venous insufficiency, hemorrhoids, post-operative edema, and topically for clearing skin conditions (Panigati, 1992). The aim of study is determined of growty performances and changes of morphological characteristics of horse chesnut seedlings at different light and moisture conditions at the nursery stage.

MATERIAL AND METHODS

This research carried out greenhouse conditions in the Gökçebey Forest Nursey Directorate. In this context the same growing material (1/3san+1/3clay+1/3natural organic humic material) was created in the greenhouse field. The 4 different light and moisture conditions were attempted on seedlings of horse chestnut in the grenhouse conditions. These different light and moisture conditions which were the attempted of this research were given Table1

Table 1. Different light and moisture conditions

Light Conditions (%)	Moisture Conditions (%)
30	40
50	60
60	80
80	90

The all treatments were used on 3 ages horse chestnut seedlings and measuments and observed about growth performances and morphological charecteristics after 1 growing season in the nursery. In this context height, root collar diameter, leaf area, root length and bud length state were determined

containing this research. The measured of 30 seedlings each parameter of seedlings. On the other hand total 200 seedlings were measured.

Statistical Analyses

The ANOVA and Duncan Range Test were used this research for determination differences all light and moisture conditions respect to the growth performances and morphological characteristics. In this reason SPSS package statistical programme was used for analyses.

For identification, culture morphology, growth rate and conidial morphology were observed from 7-10 day-old cultures grown on PDA (Sutton, 1980). The shape, length and width of 100 conidia were determined; and mean length and width were calculated. Fungal isolates were sent to CABI-UK for species identification by sequencing the internal transcribed spacer (ITS) of the rDNA of two representative isolates.

RESULTS AND DISCUSSION

Growth Performances of Seedlings

The obtained from different light and moisture conditions experiments were given Table 2

Table 2. Growth Performances of Seedlings

Growth Conditions Code	Light Conditions (%)	Moisture Conditions (%)	Height (cm)	Root Collar Diameter (mm)	Leaf Are (mm ²)
1	30	40	12.3a*	10.3a	680.6a
2	50	60	14.6b	12.6b	794.8a
3	60	80	22.4c	18.7b	1052.7b
4	80	90	28.6c	23.2c	1426.4c

*: Similar letters indicate the same group

The results of ANOVA and Duncan Range Test were applied on dataset of growth parameters, there are significant differences 99% level all parameters respect to the different light and moisture conditions. In this state was used Duncan Range Test and results of this test occurring 3 groups of growth variables. In this context, light and growth of the seedlings are growing rapidly due to the increase in humidity conditions. However, growth is slowing after the high humidity and light conditions and is emerging small numerical differences between the growth rate. This type of growth has slowed down in other research, especially after the 80% light intensity and It is reported that then begin to decline at 60% humidity and fruit quality (Bazzoni et al., 1991; Bombardelli et al., 1996)

Morphological Characteristics of Seedlings

Morphological characters related to growth such as stem length and bud length of horse chestnut in this study. The values obtained in the measurement results are given in Table 3.

Table 3. Morphological characteristics of seedlings at different light and moisture conditions

Growth Conditions Code	Light Conditions (%)	Moisture Conditions (%)	Root Length (cm)	Bud Length (mm)
1	30	40	28.4a*	21.4a
2	50	60	32.6b	28.6a
3	60	80	56.3c	35.7b
4	80	90	64.8d	48.9c

*: Similar letters indicate the same group.

As a results of ANOVA and Duncan test at the root length of four characters in the group consisting of different growth conditions, and the bud length was determined that three different groups occurred. In this context, to give immediate response to differences in root length 50% humidity, and light intensity, but light buds length and remains unresponsive to differences in growth medium intensity up to 60% humidity. After this issue made especially moisture content of 40% root length of the horse chestnut trees in a similar research is increasing rapidly and it is emphasized that this case can easily be determined in light textured soils (Suter et al., 2006).

This from a young age, in the light of the results obtained from the research that a rapid growth of chestnut horse with the particularly responded quickly to changing light conditions, but can be continued until the response is determined about 80% intensity. On the other hand it reacts to changing humidity conditions against a chestnut horse, but was determined to show high growth in terms of numerical values, such as in this case, the light intensity. As well as root growth that the light intensity the resulting changes despite the rapidly increased to accommodate the growth that occurred and that this increase pause of approximately 70% light intensity, Root length despite the changes in the moisture content was determined to continue to grow to about 90% moisture content. In this context light intensity of increased approximately 70% and performed upbringing process of horse chestnut trees in the moisture content up to 80%. However, both the bud growth, required for growth and development of fruit grown in 50% light 60% moisture content and their strongly seedlings and adaptations may be useful for the production of high horse chestnut trees. Detailed the generation of the afforestation work done on it and kind of physiological studies for the pharmaceutical industry, as well as horse chestnut starting to find new areas is of great importance.

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