RESEARCH ARTICLE

DETERMINATION OF ADAPTATION AND GROWTH STATE OF ARTIFICIAL REGENERATION STUDIES OF ORIENTAL BEECH (FAGUS ORIENTALISLIPSKY.) SEEDLINGS IN THE AKKUS-SALMAN DISTRICT IN TURKEY

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ABSTRACT

Background: In this research carried out in the Akkuş-Salman region, the growth status of 2 + 0 aged and naked rooted oriental beech (Fagus orientalis Lipsky.) seedlings used in the artificial regeneration field of the oriental beech has been examined. This growth of the first year, while providing important information on the future of work, does not yet have definitive results in terms of general evaluation of artificial regeneration. According to this; it was determined that the mean height growth of beech seedlings varied between 18.1-20.8 cm in the first year results. Root collar diameter development of oriental beech seedlings planted within the scope of the research has also been examined. As a result of the examinations made, it was determined that the average root collar diameter changed between 14.2-18.4 mm. The last variable examined in artificial regeneration areas of the oriental beech in Salman region is the percentage of survival of the seedlings. It was determined that the percentage of survival of the seedlings changed between 79.4-88.9% in the experimental areas taken from the research area.

INTRODUCTION

Today's modern world has become an increasingly complex world in which the ecological balance such as rising population, rapid rise in energy demand, rapid increase in environmental pollution, global warming, drought, melting ice and carbon emissions, and caused compensatory damages to come to fruition. Faced with this situation, many sources, especially fossil origin, have been consumed rapidly and have come to the end. On the other side, the forests leading to the natural renewable resources still retain the indispensable role that carbon sequestration plays in controlling carbon emissions, despite the considerable decline in the face of the damage they suffer from these negativities. As a matter of fact, the mangrove in Central and South America, considered as the lungs of the world, has been reduced by 36.32% (FAO, 2015) due to excessive use of tropical rainforest and evergreen forests. When this reduction is examined in terms of the level of development of the countries, it is seen that 34.12% of the

developing countries are consumed by the developed countries as a raw material source as a part of the exploitation concept of forest resources (Madsen and Larsen, 1997). Maintaining the sustainability of the forests, which are too much to be counted for the society in terms of the products and services they provide against all developments, is the main task of all mankind and our country's forestry. Successful silvicultural studies need to be carried out in order to achieve this goal.At the beginning of these studies, rejuvenation, maintenance and afforestation work are coming (Saatçioğlu, 1969). However, as a result of over-exploitation, fires, trenching, snowmelt winds, insects and other factors, the majority of forest resources have lost their natural features and their production power has decreased considerably in recent years. As a matter of fact, according to a comparison made by Ürgenç (1998), the annual current increase in the national forests is between 0.600-0.750 m^3 ha^{-1} $year^{-1}$ 1.113 m^3 ha^{-1} $year^{-1}$ in Romania, 1.523 m^3 ha^{-1} $year^{-1}$ was calculated as 1.254 m^3 ha^{-1} $year^{-1}$. On the other hand, our country 51% of Turkey's state forests, forest productivity, according to recent statements made regarding unproductive, while 49% are considered as efficient (GDF, 2016). In this context, it is of utmost importance that our forests are re-fertilized and genetic structures and quality of crops are brought to high standards in terms of breeding

(Tunçtaner, 2007). In this respect, the most important application made within the scope of restoration of damaged forest areas is artificial regeneration studies (Saatçioğlu, 1979). For this reason, it is necessary to keep the success rate high in artificial regeneration works carried out especially in slow growing species in the youth by planting (Saatçioğlu, 1969). Our country is home to quite rich and diverse forest establishments with the effect of different geographical conditions. One of these important tree species is the oriental beech (*Fagus orientalis* Lipsky). It is our 4th country with the largest distribution area in the natural forests in our country with 1.7 million hectares of natural distribution area with the oriental beech. For this reason, it is very important to regenerate the degraded forests. Due to the wide use of wood and its long-term preservation, large-scale forest areas, conscious and unconscious interventions, and the rehabilitation of beech forests, which have been severely damaged, are very important in terms of our country's forestry and economy (Tunçtaner and Özel, 2008).

Objective of the Study

In this study, the success of the artificial rejuvenation studies of oriental beech (*Fagus orientalis* Lipsky.) Using 2 + 0 bare root seedlings in Akkuş-Salman region was investigated. In this area, where the inspections, measurements and determinations were carried out for one year, the values of height, root collar diameter growth and survival percentage of the oriental beech seedlings were determined.

MATERIALS AND METHODS

Material: The Salman Forest Range Directorate, where the survey was conducted, is connected to the Akkush Forest Management Directorate from the administrative side. The total area of the Salman Forest Management Chamber is 8787 ha and about 88% of this area is inefficient when the remaining forest area is efficient. The most widespread business class in the Salman Forest Management is the Oriental Beech Management Class, where production areas and permanent forest management areas are separated. The area where the research is made is 28 division and the total area where the artificial regeneration work is done is 3 ha in size. The regeneration area is 870 m high and is located on the middle slope. In addition, in the forest zone, the sub-core is in the forest zone of the West Black Sea and the Fagetum zone. The study area is again north and northeast, with a land slope of 25-35%. Soil structure is in deep soil class and is clayey-sandy-slime. The soil in general has an elaborate structure and the level of aeration and organic matter is very high. The mean temperature in the study area is 21.3°C and the mean precipitation is 946 mm. In the field of research, land prepared in September of 2016, the forest cover, which is covered with human power in general, has been cut off from the area by rooting. In order to realize the field planting, the planting pits were opened at a distance of approximately 2x1.5 m and triangular planting was carried out. All the plantings were made in the form of a pit-like stump and pits opened by an anchor. On the other hand, the seedling material used in the planting is Akkus origin beech seedlings and has 2 + 0 bare rooted seedlings characterization (Anon., 2016).

Method: In the scope of the research, random blocks sample plots of 10 units and 25x40m in size were taken in the beech field where artificial regeneration was performed. The sample

sites were taken as rectangles in order to reduce the neighborhood relations to the lowest level. The total height, root collar diameter and survival percentage values of oriental beech seedlings having a 1 year old land area were determined in the sample sites. For this purpose, a millimeter-tiered length and digital diameter gauge are used. In addition, the percentage of survival was calculated by taking advantage of the existing planting-spacing distance in each of the sample plots.

RESULTS

The mean height growth values determined by the test sites as a result of the measurements made in the research area are given on the size chart in Figure 1.
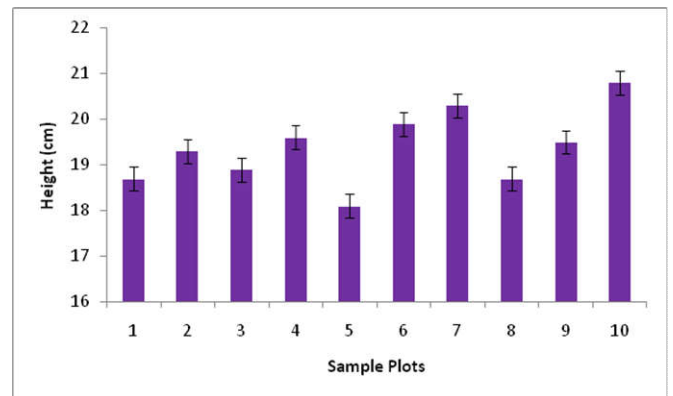

Figure 1. Mean height growth of oriental beech seedlings

When Figure 1 is examined, it is determined that mean height growth values of 2 + 0 age of oriental beech seedlings at the end of the 1st year in the experimental areas are changed between 18.1-20.8cm. The mean root collar diameters at the end of the first year of oriental beech seedlings were also determined in the study area. The mean root collar diameters determined in this respect are shown in Figure 2.
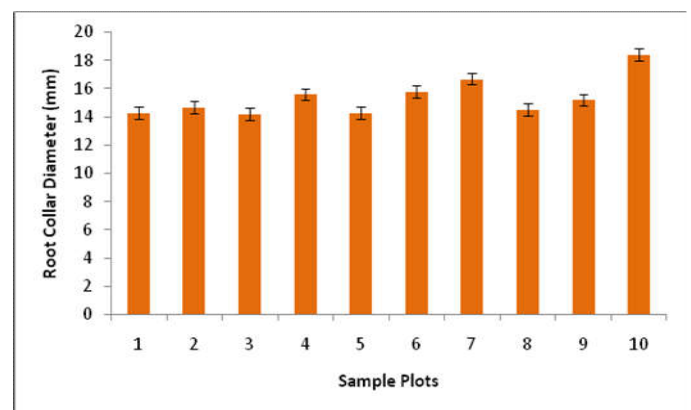

Figure 2. Mean root collar diameter growth of oriental beech seedlings

When the mean root collar diameters values in Figure 2 are examined, it was found that the mean root collar diameter growth varied between 14.2-18.4 mm. Percentage survival values were also determined by using the planting interval distance of the seedlings in the sample plots. The mean percentages of survival determined by sample plots are shown in Figure 3. When the survival percentage rate of the seedlings at the end of the first year belonging to oriental beech were examined, it was determined that the mean survival percentage values changed between 85.3% and 93.7%.
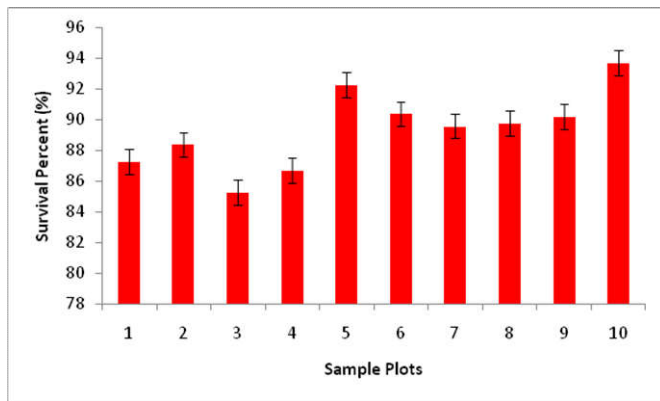
Figure 3. Mean survival percentage of oriental beech seedlings

DISCUSSIONS

It was determined that the mean height growth in the data obtained from sample plots in the field of artificial regeneration changed between 18.1-20.8 cm at the end of the first year in the study of artificial rejuvenation studies of beech in the Salman Forest Management Department affiliated to Ordu-Akkus Forest Management Directorate (Figure 1). In this study, it was determined that the average height growth of bloomed 2 + 0 beech seedlings changed from 15.3 to 17.2 cm at the end of the first year in a survey conducted in the Bolu region, which has similar growth conditions to the research area (Tosun and Gülcan, 1985). In another survey carried out in the Bolu region, the mean height growth was found to be 16.8 cm (Tosun, 1992). In another survey conducted in the Zonguldak-Ereğli region, it was determined that the mean height growth values of the oriental beech seedlings at the end of the first year changed between 14.3-19.6cm (Tunçtaner et al., 2006). It can be said that the mean height growth values detected in the beard artificial regeneration scene in Salman region in these data lights are satisfactory and their growth performance is progressing well. In the scope of the research, also the findings about the diameter of the root collar which is the most important information about the seedling growth which is the most important information in the first years are also realized. According to this, it was determined that the diameter of the mean root collar diameter determined in the sample plots taken from the artificial regeneration area of the oriental beech in Salman region changed between 14.2-18.4 mm (Figure 2). In the study conducted by Tosun and Gülcan (1985), it was determined that the mean root collar diameter growth of the oriental beech seedlings at the end of the first year changed between 11.2-15.6 mm. In another study carried out by Tosun (1992), it was determined that at the end of the second year, the mean root collar diameter was 13.8 mm in bare rooted oriental beech seedlings 2 + 0 years old. It can be said that the root collar diameter growth at the end of the first year of 2 + 0-year-old bare rooted seedlings planted in the area in Salman region where the research is carried out in this value light is in a very good condition. This can be said to be due to the fact that the seedlings planted in the area do not comply with the conditions of the current growing environment and that they have no problems due to their origins and that they particularly benefit the capillary roots which are an important part of the root systems of the seedlings. One of the important variables used in determination of success in artificial regeneration and afforestation activities is the percentage of survival. The percentage of survival is not a very important variable due to the high rates of variability in the first years,

but it gives important ideas in terms of the level of success of the study in the following years, especially after the first five years of artificial regeneration. In this context, the values of percentage of survival of the oriental beech seedlings at the end of the first year were determined in 10 sample plots taken from artificial regeneration field of oriental beech in Salman region. At the time of this detection, the 2x1.5m range-distance used as the planting interval-distance was used in the sample plots of 25x40m size. As a result of these calculations, it was found that the mean survival percentage rate in artificial regeneration area changed between 85.3% and 93.7% (Figure 3). In this research, it was determined that the percentage of survival in the area of artificial regeneration of the oriental beech changed between 79.4-88.9% (Tosun, 1992). In another research carried out in the Akkuş region, which is very close to the research area, the success rate of the natural regeneration areas was determined and in these artificial regeneration areas and stand areas, in order to support natural regeneration activities, up to 87% of the survivals in bare rooted beech seedlings of 1 + 0 age (Suner, 1978). In another research carried out in Zonguldak-Devrek and Pürenkaya regions, it was determined that the hold success rate of the sample plots at the end of the first year in the 3 + 0-year old beech seedlings was between 63-78% (Tosun et al., 2002). It can be said that the mean survival percentage of the oriental beech seedlings in the study area is very high in the direction of this data used for comparison.

Conclusion

In the light of these findings, it is possible to say that the general condition of the field and the initial development performance are quite good. However, in order to obtain detailed and more precise results on the artificial regeneration field of oriental beech, it is necessary to repeat the researches for many years. In this sense, it is necessary to repeat similar measurements after completion of the process of 5 years. For this reason, the field must be protected as much as possible, especially in accordance with the timing and technique of cultural care measures.

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