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Research article/Araştırma makalesi

Comparison of differently originated oriental beech (*Fagus orientalis* Lipsky) seedling growth in field

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Abstract

It is not possible to make artificial regeneration and afforestation areas optimum totally because of the fact that site area conditions have very different characteristics regionally. Based on these ecological conditions where seed origins and application area should be considered. Within the study, it is aimed to examine the land performances of seedlings grown from different origins. For this purpose, 11 natural populations were chosen from natural distribution oriental beech. The seedlings were sowed appropriate to the randomized blocks design with 3 replications.

After grown along two vegetation period in nursery, Trabzon-Maçka, Trabzon-Çaykara, Düzce-Çiçekli, Giresun-Kulakkaya, Ordu-Akkuş and Kahramanmaraş-Andırın populations were planted in the 1230 meters altitude experimental forest in Tonya-Kalınçam. Sinop-Merkez, Sinop-Ayancık, Samsun-Kunduz, Samsun-Karapınar and Karabük-Yenice populations were grown in Of forest nursery for along three vegetation period and then they were planted on the same area. After a vegetation period in the area conditions, morphological measurements such as seedling height, root collar diameter and branch number were made on population and tree basis.

By making variation analysis with the SPSS 20 statistic program, it was determined that these measurements variations within and among populations. It was found that variations in populations are more than variations among populations in terms of morphological characters. On the other hand, populations were grouped with hierarchical cluster analysis.

Key words: Oriental beech, field performance, variation, origin, seedling

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Farklı orijinli doğu kayını (*Fagus orientalis* Lipsky) fidanlarının arazideki büyümelerinin karşılaştırılması

Özet

Yetişme ortamı koşullarının yöresel olarak çok farklı özelliklere sahip olması nedeniyle yapay gençleştirme ve ağaçlandırma sahalarının bütünüyle optimum hale getirilmesi mümkün olmamaktadır. Buna bağlı olarak tohumun toplandığı alanlar ile fidanın üretildiği ve dikildiği alanlarının ekolojik koşulları dikkate alınmalıdır. Bu çalışma kapsamında Doğu Kayınının (*Fagus orientalis* Lipsky.) farklı orijinlerinden toplanan tohumlardan yetiştirilen fidanların arazi performanslarını incelemek amaçlanmıştır. Bunun için ülkemizdeki doğal yayılış alanları temsilen seçilen 11 doğal populasyon kullanılmıştır. Tohumlar Of Orman Fidanlığında raslantı blokları deneme desenine uygun olarak 3 tekrarlı ekilmiştir.

Trabzon-Maçka, Trabzon-Çaykara, Düzce-Çiçekli, Giresun-Kulakkaya, Ordu-Akkuş ve Kahramanmaraş-Andırın populasyonları iki vejetasyon dönemi boyunca fidanlıkta yetiştirildikten sonra Tonya-Kalınçam mevkiindeki 1230 metre yükseltideki deneme alanına populasyon bazında dikilmişlerdir. Sinop-Merkez, Sinop-Ayancık, Samsun-Kunduz, Samsun-Karapınar ve Karabük-Yenice populasyonları üç vejetasyon dönemi Of Orman fidanlığında yetiştirildikten sonra ağaç bazında aynı araziye dikilmişlerdir. Arazi koşullarında bir vejetasyon dönemi geçtikten sonra fidanlarda populasyon ve ağaç bazında; fidan boyu, kök boğazı çapı ve yan dal sayısı gibi morfolojik ölçümler yapılarak populasyon içi ve arası varyasyonlar belirlenmeye çalışılmıştır.

Elde edilen verilerle, SPSS istatistik programı ile varyans analizi yapılarak ölçülen karakterler bakımından populasyonlar içinde ve arasında genetik varyasyonların olduğu belirlenmiştir. Çalışma sonucunda ölçülen karakterlerin

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birçoğu bakımından populasyonlar içerisindeki varyasyonun, populasyonlar arasındaki varyasyondan daha fazla olduğu tespit edilmiştir. Bunun yanında ölçülen değişkenlere ilişkin olarak oluşan grupları ortaya koymak için hiyerarşik cluster analizi yapılmıştır.

Anahtar kelimeler: Doğu Kayını, arazi performansı, varyasyon, orijin, fidan

1. Introduction

A large part of Turkey's forests is unable to provide the benefits expected from them in terms of both quantity and quality, because of the fact that they have been exposed to various forms of degradation until today.

Oriental beech (*Fagus orientalis* Lipsky) is an important tree species for forestry in our country. Thus, the ecological characteristics of planting areas and seedlings to be used in afforestation efforts should be well known (Ertekin et. al., 2015).

The need for forest products is increasing in our country, but it is becoming harder for our existing forests to meet this need. Economy of our country is adversely affected ensuring these needs through imports from other countries. It will be needed more afforestation to overcome deficit of wood raw material, to prevent water and wind erosion that substantially threatening agricultural areas, to ensure the continuity of these areas, to make efficient unproductive forest areas in our country, also to eliminate soil and water pollution occurred as a result of industrialization. Afforestation efforts have intensified in order to eliminate these disadvantages especially since the last 25 years in our country (Sakıcı and Ayan, 2016).

The most effective way to increase the effectiveness of forestry in the national income is to make productive many efficient forest areas that are still no producing and degraded. According to some calculations, it is possible to increase the current efficiency several times more in this way.

Afforestation investments are expensive and long-term investments. It should be used seeds and seedlings that have superior genotypic characteristics in order to guarantee the future of these investments. Besides, regarding selection of the area to use this material needs care in determining seeding and planting methods. Afforestation investments that require great financial devotion must be given great importance in terms of ecologically and technically healthy, socially acceptable and economically reliable. Quality nursery works are of great importance in order to conduct the most economic afforestation efforts and to obtain the highest success especially in unproductive areas.

Within this study it is aimed to examine the land performances of seedlings grown by seeds collected from different origins of *Fagus orientalis*. For this purpose, 11 natural populations were chosen from natural distribution areas of oriental beech in Turkey.

2. Materials and methods

In this study, 11 natural oriental beech populations, represented the natural range of oriental beech in Turkey, were selected as the study material. Seedlings grown by seeds collected from a total of 225 trees including average of 20 trees from each of these populations were used.

2.1. Determination of sample populations

In accordance with to the research objectives, 11 oriental beech populations, which are able to represent Turkey, were selected. Accordingly, it was made measurements on seedlings grown by seeds collected from Sinop-Merkez, Sinop-Ayancık, Samsun-Kunduz, Samsun-Karapınar, Karabük-Yenice, Düzce-Çiçekli, Trabzon-Maçka, Trabzon-Çaykara, Giresun-Kulakkaya, Ordu-Akkuş and Kahramanmaraş-Andırın populations. Some informations related to sites of populations collected seed material were given in Table 1, and the geographical location of the populations were given in Figure 1.

2.2. Measurements related to seedlings

After grown along two vegetation period in nursery, Trabzon-Maçka, Trabzon-Çaykara, Düzce-Çiçekli, Giresun-Kulakkaya, Ordu-Akkuş and Kahramanmaraş-Andırın populations were planted in the 1230 meters altitude sample plot in Tonya-Kalınçam. Sinop-Merkez, Sinop-Ayancık, Samsun-Kunduz, Samsun-Karapınar and Karabük-Yenice populations were grown in Of forest nursery for along three vegetation period and then they were planted on the same area. After a vegetation period in the area conditions, variations within and among populations were tried to determine as made morphological measurements such as seedling height, root collar diameter and number of side branch have been done on population and tree basis..

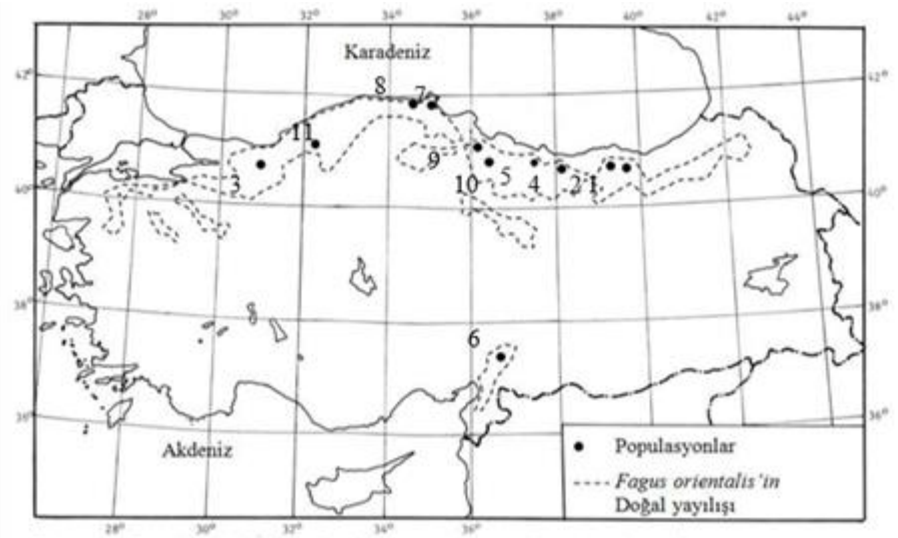


Figure 1. The geographical location of the populations collected seed material

Table 1. Information on the populations

Pop No	Name of Population	Tree Number (N)	* East Longitude	* North Latitude	Altitude	Aspect Groups
1	Trabzon Maçka	19	536104-537264	4502315-4502863	1510-1650	N, NE, NW, E, SW, W
2	Trabzon Çaykara	18	602433-603016	4504412-4506099	920-1485	NE, E, S, SW, SE, W
3	Düzce Çiçekli	20	853080-855918	4507317-4508900	1310-1405	N, NE, NW
4	Giresun Kulakkaya	18	442625-452537	4503642-4504163	455-1460	N, NE, W, S
5	Ordu Akkuş	23	331483-331845	4519805-4520234	1200-1315	N,NE,NW,E S, SE, SW
6	K.Maraş Andırın	20	269188-272115	4175208-4185518	1395-1740	N, NE, NW, E, SE,W
7	Sinop Merkez	21	646426-645002	4530786-4531627	90-140	N, NW, E, S, SW
8	Sinop Ayancık	26	644126-647212	4633190-4635389	605-745	N, NE, NW, E, S, SW
9	Samsun Kunduz	20	666533-665881	4559311-4559075	1300-1390	N, NE, NW
10	Samsun Karapınar	20	685470-685433	4549004-4549406	1250-1360	N, NE
11	Karabük Yenice	20	452653-457710	4566618-4576555	610-1100	N, NE, NW, E, S, SW

* The coordinates of populations were taken by the UTM coordinates system.

3. Results

After grown along two vegetation periods in nursery, Trabzon-Maçka, Trabzon-Çaykara, Düzce-Çiçekli, Giresun-Kulakkaya, Ordu-Akkuş and Kahramanmaraş-Andırın populations were planted for field experiments as tree based in sample plot. The average seedlings height (SH), root collar diameter (RCD) and number of side branch (NSB) values in the 2 + 1 years-old seedlings grown on the land during a vegetation were given together with the standard deviation in Table 2. It was tested by analysis of variance whether difference with regard to measured morphological characteristics in among populations of 2 + 1 years-old seedlings. And then, grouping was performed by Duncan test (Table 2). According to analysis of variance, it was determined that statistically (with % 99 confidence level) differences related to seedling height, root collar diameter and number of side branch in among populations. After these differences were determined, groupings formed by populations were exhibited by Duncan test. As a result, 5 different groups occurred in terms of seedling height. Ordu-Akkuş population was had the highest value with 38.7 cm, and Düzce-Çiçekli population was had the lowest value with 19.4 cm in terms of the average seedling height, and so they occurred two different groups. At the same time, Trabzon-Maçka and Trabzon-Çaykara populations were located in the same group in terms of seedling height. K.Maraş-Andırın and Giresun-Kulakkaya populations were taken place in the other groups.

Table 2. The results of the analysis of variance and Duncan test related to characteristics of 2 + 1 years-old seedlings in among populations

Pop. No	Avg. SH (mm)	Groups	Avg. RCD (mm)	Groups	Avg. NSB (pieces)	Groups
Trabzon-Maçka	33,6±11,0	b	7,1±2,3	b	4,2±2,4	bc
Trabzon-Çaykara	34,3±13,3	b	6,8±2,1	bc	4,4±2,9	b
Düzce-Çiçekli	19,4±6,2	e	4,9±1,6	e	3,1±2,3	e
Giresun-Kulakkaya	28,1±11,1	c	6,5±2,3	c	3,9±2,7	cd
Ordu-Akkuş	38,7±11,8	a	7,8±2,0	a	6,4±2,8	a
K.Maraş-Andırın	22,6±9,7	d	6,1±2,2	d	3,7±2,1	d
Avg.	30,4±12,8		6,6±2,3		4,4±2,8	
Anova results	F : 114.59 *(P): 0.000***		F : 53.453 *(P): 0.000***		F : 51.241 *(P): 0.000***	

** There is difference as statistically. Significance level *P <0.01*

Six different groups occurred in terms of root collar diameter. Ordu-Akkuş population was had the highest value with 7.8 cm, and Düzce-Çiçekli population was had the lowest value with 4.9 cm, and so they occurred two groups just as seedling height. Additionally, same situation arose in terms of the number of side branches having 6 different groups. Ordu-Akkuş population was had the highest average number of side branch with 6.4 and Düzce-Çiçekli population was had the lowest average number of side branch with 3.1.

After grown during three vegetation periods in nursery, Samsun-Kunduz, Samsun-Karapınar, Karabük-Yenice, Trabzon-Maçka and Giresun-Kulakkaya populations were planted as population based in the sample plot. The average seedlings height, the average root collar diameter and the average number of side branch values and Duncan test results with analysis of variance in the 3 + 1 years-old seedlings were given in Table 3.

Table 3. The results of the analysis of variance and Duncan test related to characteristics of 3 + 1 years-old seedlings in among populations

Pop. No	Avg. SH (mm)	Groups	Avg. RCD (mm)	Groups	Avg. NSB (pieces)	Groups
Sinop-Merkez	74.4±15,4	a	11.4±3.3	b	9,2±4.0	a
Sinop-Ayancık	82,5±25.6	a	13.6±3.4	a	9.5±4.4	a
Samsun-Kunduz	42.9±13.6	c	8.1±3.2	c	6.0±3.0	b
Samsun-Karapınar	53.4±18.0	b	10.7±2,8	b	9.7±3.9	a
Karabük-Yenice	56.2±16.3	b	10.2±3.4	b	8.6±4.4	a
Avg.	61.9±23.1		10.8±3.7		8.6±4.1	
Anova results	F : 23.55 *(P): 0.000***		F : 11.32 *(P): 0.000***		F : 4.40 *(P): 0.002***	

** There is difference as statistically. Significance level *P <0.01*

According to analysis of variance, it was determined statistically differences related to seedling height, root collar diameter and number of side branch in 3 + 1 years-old seedlings. Groupings occurred by populations were revealed by the Duncan test. As a result, 3 different groups occurred in terms of seedling height. Sinop-Ayancık and Sinop-Merkez populations were taken place with regard to seedlings height with values of 82.5 cm and 74.4 cm, respectively, in the same group. Samsun-Kunduz population was had the lowest average value with 42.9 cm. Samsun-Karapınar and Karabük-Yenice populations were taken place in the same group, and they constituted the third group.
Three different groups occurred in terms of root collar diameter. Sinop-Ayancık population was had the highest value with 13.6 cm and Samsun- Kunduz population was had the lowest value with 8.1 cm, and so they occurred two different groups with these root collar diameter values. And then, Sinop-Merkez, Samsun-Karapınar and Karabük-Yenice populations were taken place in the same group.

Two groups occurred in terms of number of side branches. Sinop-Merkez, Sinop-Ayancık, Samsun-Karapınar and Karabük-Yenice were taken place in the same group by taking values close to each other. Samsun-Kunduz population with the lowest average in terms of number of side branches occurred second group.
Within Trabzon-Maçka, Trabzon-Çaykara, Düzce-Çiçekli, Giresun-Kulakkaya, Ordu-Akkuş and K.Maraş-Andırın populations transferred as tree based to area, the averages related to characteristics of 2 + 1 years-old seedlings were given in Table 4. It was tried to determine variations within population depending on the results of analysis of variance related each population evaluated in itself (Table 4).

Significance level as shown in Table 4, in the results of analysis of variance was determined to be smaller than 0.01 for each population. Accordingly, it can be said that each population shown statistically differ in terms of seedling characteristics in 2 + 1 years-old seedlings within populations as well as among populations.

Table 4. The results of analysis of variance belong to 2 + 1 years-old seedlings characters within populations

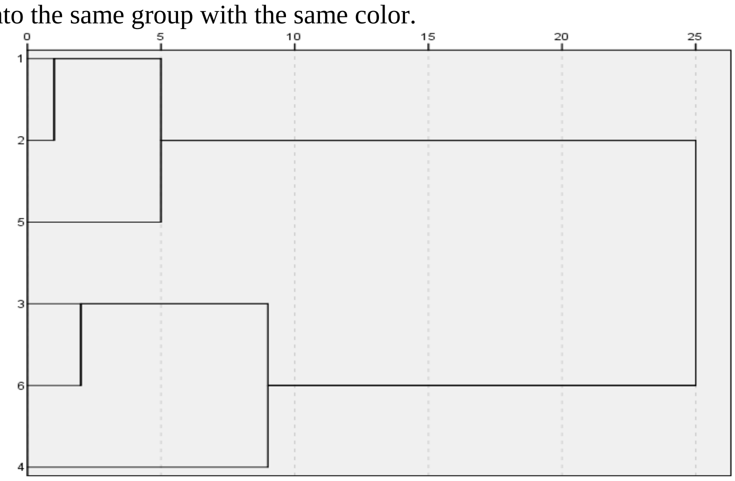
Pop	Trabzon-Maçka			Trabzon-Çaykara			Düzce-Çiçekli			Giresun-Kulakkaya			Ordu-Akkuş			Kahramanmaraş Andırın		
Tree	sh	rcd	nsb	sh	rcd	nsb	sh	rcd	nsb	sh	rcd	nsb	sh	rcd	nsb	sh	rcd	nsb
1	39,	8,6	5,8	21,	5,9	3,2	19,	5,5	2,4	28,	6,1	3,1	42,	7,2	5,1	21,	5,8	3,6
2	39,	8,5	5,7	31,	6,0	2,2	18,	4,6	1,5	24,	5,6	3,4	47,	9,3	8,0	25,	6,7	4,2
3	27,	5,9	2,8	32,	6,8	5,0	17,	4,9	3,3	29,	6,9	3,7	38,	8,5	4,7	14,	3,5	2,3
4	29,	6,4	3,7	41,	7,6	7,0	20,	4,6	4,2	18,	4,6	2,5	33,	7,2	6,6	16,	5,8	3,2
5	33,	9,3	4,2	47,	8,1	5,4	18,	5,3	2,7	29,	7,7	4,4	43,	6,8	6,7	18,	5,7	2,3
6	35,	6,3	3,6	35,	7,4	4,8	19,	5,8	3,7	45,	9,0	7,5	42,	7,7	6,8	17,	4,2	2,6
7	39,	7,3	5,0	28,	6,7	4,4	18,	4,2	1,9	27,	7,4	4,3	37,	7,8	7,3	41,	9,5	5,9
8	31,	5,8	4,2	32,	6,3	4,4	15,	3,7	1,9	23,	5,8	3,1	41,	8,5	7,5	19,	5,2	2,3
9	40,	6,9	4,5	31,	6,6	2,9	16,	3,5	2,2				29,	7,1	5,5	27,	7,6	5,1
10	27,	6,3	2,7	39,	7,1	5,5	26,	6,7	5,3				32.	7,7	5,4	25,	6,2	3,9
11				30,	6,1	2,9	19,	4,5	3,4									
Avg. F P Gro	34, 6 9.0 7	7,2 10. 6 0.0	4,2 6.7 9 0.0	34, 3 9.4 1	6,8 3.3 4 0.0	4,4 8.4 7 0.0	19, 4 5.5 0	4,9 10. 8 0.0	3,1 6.6 9 0.0	28, 1 23. 7	6,5 14. 3 0.0	3,9 11. 3 0.0	38. 7 7.5 3	7.8 4.8 6 0.0	6.4 5.0 7 0.0	22. 5 26. 9	6.1 21. 8 0.0	3.6 9.1 4 0.0

** There is difference as statistically. Significance level *P <0.01;* Group: The number of groups formed as a result of Duncan test

After determining differences within populations, with Duncan test, it was determined how many different groups exist according to seedling height, root collar diameter and number of side branch. According to this, Trabzon-Maçka population occurred 6 different groups in terms of seedling height, 4 different groups related to root collar diameter and 5 different groups concerning number of side branch. Trabzon-Çaykara population formed 7 different groups in terms of seedling height, 5 different groups related to root collar diameter and 7 different groups concerning number of side branch. Düzce-Çiçekli population created 2 different groups in terms of seedling height, 8 different groups related to root collar diameter and 11 different groups concerning number of side branch. Giresun-Kulakkaya population formed 5 different groups in terms of seedling height, 7 different groups related to root collar diameter and 4 different groups concerning number of side branch. Ordu-Akkuş population occurred 5 different groups in terms of seedling height, 4 different groups related to root collar diameter and 6 different groups concerning number of side branch. Kahramanmaraş-Andırın population created 6 different groups in terms of seedling height, 7 different groups related to root collar diameter and 5 different groups concerning number of side branch.

A statistical analysis was made by hierarchical cluster analysis as using averages of seedling height, root collar diameter and number of side branch in order to determine how populations involved in a grouping. It was given groupings of 2 + 1 years-old seedlings, with cluster analysis, in Figure 2.

While Trabzon-Maçka, Trabzon-Çaykara and Ordu-Akkuş populations were taken place in the same group, Düzce-Çiçekli and K.Maraş-Andırın populations occurred another group. Giresun-Kulakkaya population alone created third group. Distribution on the natural distribution areas of oriental beech for these groups was given in Figure 3. It was shown populations into the same group with the same color.



1: Trabzon-Maçka, 2: Trabzon-Çaykara, 3: Düzce-Çiçekli, 4: Giresun-Kulakkaya, 5: Ordu-Akkuş 6: K.Maraş-Andırın

Figure 2. Groups occurred by cluster analysis in terms of seedling height, root collar diameter and number of side branch in 2 + 1 years-old seedlings.

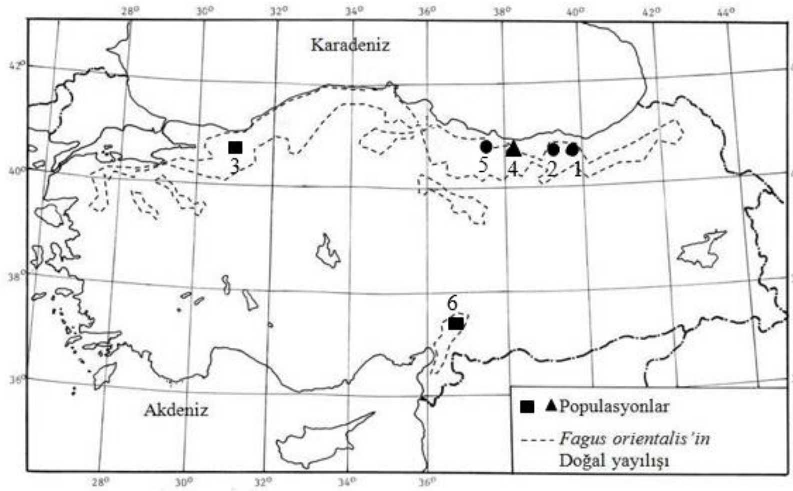
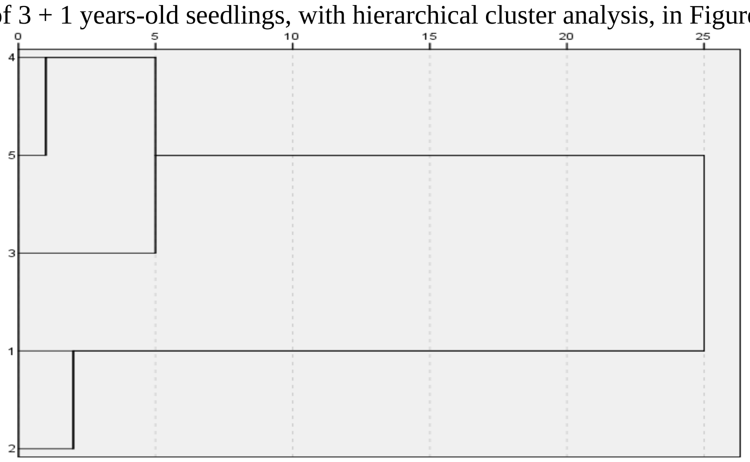


Figure 3. Distribution on the map of groups occurred by cluster analysis in terms of seedling height, root collar diameter and number of side branch in 2 + 1 years-old seedlings

It was shown groupings of 3 + 1 years-old seedlings, with hierarchical cluster analysis, in Figure 4.



1: Sinop-Merkez, 2: Sinop-Ayancık, 3: Samsun-Kunduz, 4: Samsun-Karapınar, 5: Karabük-Yenice

Figure 4. Groups occurred by cluster analysis in terms of seedling height, root collar diameter and number of side branch in 3 + 1 years-old seedlings

As it can be seen from Figure 4, whereas Samsun-Kunduz, Samsun-Karapınar and Karabük-Yenice populations were taken place in the same group, Sinop-Merkez and Sinop-Ayancık populations occurred second group. Distribution on the map of these groups was given in Figure 5.

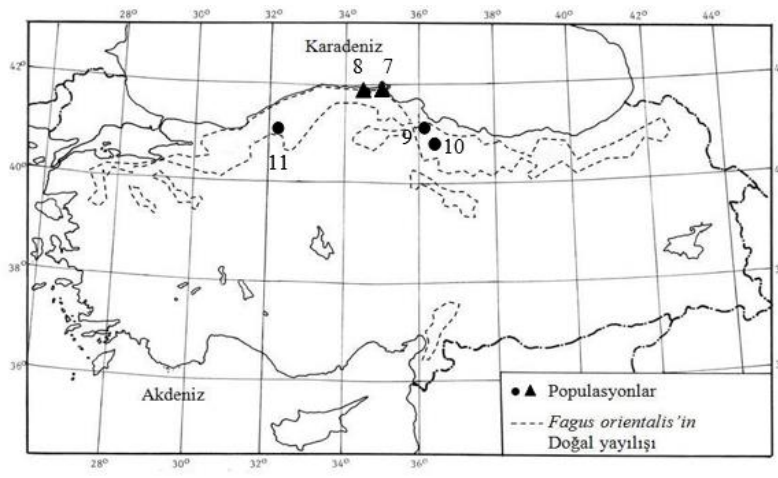


Figure 5. Distribution on the map of groups occurred by cluster analysis in terms of seedling height, root collar diameter and number of side branch in 3 + 1 years-old seedlings

4. Conclusions and discussion

It was determined genetic variations in terms of characters measured by making analysis of variance with the SPSS 20 statistic program within and among populations. On the other hand, populations were grouped with hierarchical cluster analysis in order to reveal groups in relation to measured variables.

As a result of Cluster analysis made for 2 + 1 years-old seedlings, Trabzon-Maçka, Trabzon-Çaykara and Ordu-Akkuş populations were occurred first group, Düzce-Çiçekli and K.Maraş-Andırın populations were generated second group and Giresun-Kulakkaya population was created third group. Then, as a result of Cluster analysis made for 3 + 1 years-old seedlings, Samsun-Kunduz, Samsun-Karapınar and Karabük-Yenice populations were occurred first group, Sinop-Merkez and Sinop-Ayancık populations were generated second group.

There are many studies revealed variation within and among populations related to seedling properties. It was investigated that variations among origins depend on soil moisture content in *Fagus sylvatica* L. seedlings which are represented, grown in greenhouse, 14 different origins. As a result of this study, it was determined that morphological characters such as seedling height and root collar diameter and physiological properties such as starting time and length of the growing period were had differences among origins (Nielsen and Jorgensen, 2003).

Cause of genetic variations in this study can be explained with the fact that oriental beech spread very wide geographic areas in our country and ecological factors in these geographic areas within and among populations (topography, climate, environmental factors, etc.). In other respects, in many studies made in *Fagus sylvatica* L., natural selection and genetic isolation together with differences in environmental factors depending on wide geographical distribution of this species were explained as a cause of genetic variation in beech stands (Belletti, 1996; Thiebaut et al., 1982; Barrière et al., 1985; Cuguen et al., 1985). This situation supports our results.

Studies indicate that wind-pollinated species, such as beech, have high genetic variation. For this species, variation within population is generally higher. But variation among populations does not generally exceed 5% (Larsen, 1996; Leonardi and Menozzi, 1995; Paule et al., 1995). In another study, made by sampling 20 populations with isoenzyme analysis in *Fagus sylvatica* L., it was determined that total genetic variation originated from diversity within population by % 98 and originated from diversity among population by % 2 (Konnert, 1995). In a similar study made by 16 populations in *Fagus japonica*, it was stated that variation among populations was low, but variation within population was high (Hiraoka and Tomaru, 2009b).

Each population was generated by subpopulations generated itself because forest trees can carry a large amount of their seeds to confined area (Işık, 1988). Because of the fact that subpopulation was occurred by different individuals unique to specific environmental conditions of microhabitat and local environmental differences, genetic diversity within population is high here. So, different races and sub-races can occur even in a very short distance. In our country, there are studies revealed existence of different local races in a short distance (Boydak, 1977; Işık, 1979; Aslan and Uğurlu, 1986; Ayan et. al., 2016). This situation is similar with oriental beech investigated in this study. Beech seeds are big, and they can germinate under its own shelter. So, beech can create a micro-environment in a very small area.

It is stated that genetic structure of beech stands is attached to natural selection besides gene flow and genetic drift. Furthermore, it was reported in several studies that these factors cause differences within and among populations (Kim, 1979; Müller-Starck, 1985, 1989; Cuguen, 1988; Gregorius, 1986).

The existence of the genetic diversity in a population is considered as an important factor related to adaptation to place where existed the species in the population (Stern, 1974; Hamrick, 1985).

In any time period, interventions made to living populations have genetic effects that continue for tens of thousands of years in further generations. Therefore, rehabilitation efforts and genetic planning are required as a precaution against especially in terms of ensuring the continuity of local races and genetic contamination (Güney, 2009). To effective protection and use of gene resources in sustainable forestry studies, structure and dimension of genetic diversity in natural stands should be well known (Kaya 1990; Millar and Marshall, 1991).

Suggestions

Determination of variations within and among populations for oriental beech was made by measurements of the morphological characteristics of the seedlings grown under field conditions. In result of the study for oriental beech, it was revealed that, in optimal distribution areas and outside these areas for natural populations, there are variations within and among populations.

Both altitudinal zones and protection of variation value should be taken care in afforestation efforts made for oriental beech. Using the material that has uncertain origin in afforestation efforts will cause genetic contamination and corruption of high genetic base identified in oriental beech.

Sinop-Ayancık population and especially Sinop-Merkez population showed clearly variations, and remained outside optimal natural distribution areas in terms of elevation of oriental beech. For this reason, conservation of genetic resources in its own place is important for continuity of the variation and consequently preservation of biodiversity. With protection of existing population should be provided continuation of genetic variation.

In the result of this study, Sinop-Ayancık population and especially Sinop-Merkez population have the highest values concerning both root collar diameter and seedling height. These populations were separated itself from other populations by creating a different group in the groupings. Determination of superior properties in terms of seedling characters in Sinop-Merkez population, which is outside natural distribution areas of oriental beech and grown at elevations close to see level in terms of especially elevation, shows that genetic variation is more here. Accordingly, particularly in these populations, the use of materials unknown origin and therefore genetic base will lead to deterioration of existing genetic wealth in afforestation efforts to do in this region.

The results belonging to applications carried out in particularly forestry activities reveal in the long-term, so using the material having uncertain origin and uncontrolled activities will cause genetic contamination in populations having a rich genetic structure without rehabilitation activities. Individuals, planted in afforestation area by bringing from populations in another region, show various adjustment disorders and even die.

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