

## Identification of Poplar clones, using morphological markers

F. Assadi<sup>1</sup>, H. Mirzai - Nodushan<sup>1</sup>, A. R. Modirrahmati<sup>1</sup>  
and M. A. Naderi - Shahab<sup>1</sup>

### Abstract

Identification of Poplar clones is necessary, Particularly at early stage of growth, to demonstrate their similarity and diversity in selection process. Identification and selection of poplar clones was carried out using morphological attributes after a process period of 10-15 years. Although this approach, renders some information about the clones growth characteristics, but requires relatively high costs for time and site. In this study 12 clones belonged to four species were planted under randomized complete blocks statistical design with three replicates and their data were recorded during the years 1999-2001.

Twenty distinctive morphological attributes of the poplar clones leaves, branches and roots which according to the new methods can be applied to identify clones and species at early growth stages, were measured at different times. The data were analyzed using various univariate and multivariate statistical methods including analysis of variance, cluster analysis and principal component analysis.

The results shows that the morphological markers in conjunction with appropriate statistical methods are able to differentiate poplar clones. There were significant differences between the species and clones, regarding their morphological characteristics.

Although univariate analysis was not suitable for systematical classification, but multivariate analyses such as cluster and component analyses were the best for the clones and species classification. Overall, the clones of the species *P. alba*, *P. nigra*, *P. euphratica* and *P. deltoides* were classified at separate groups.

**Key words:** Populus, nursery, morphological markers, cluster analysis, Principal Component Analysis.

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1- Members of Scientific board, Research Institute of Forests Rangelands. P.O. Box 13185-116 E-mail: Fassadi@rifr-ac.ir

## Regeneration gaps and quantitative characteristics of seedlings in different development stages of undisturbed beech stands (Kelardasht, Northern Iran)

B. Delfan Abazari<sup>1</sup>, Kh. Sagheb - Talebi<sup>2</sup> and M. Namiranian<sup>3</sup>

### Abstract

A continuous forest cover depends on the continuity and establishment of natural regeneration, which is a slow process in undisturbed and virgin forests.

The following investigation is carried out in a protected natural undisturbed beech forest in Kelardasht region, Mazandaran province.

All the main three development stages (initial, optimal and decay) are recognized in the studied stand. Establishment of regeneration begins with falling of dead trees and with creation of gaps.

Results showed that the highest frequency of gaps belongs to areas in mean size of 550 m<sup>2</sup> with falling of two dead trees; whereas, the lowest frequency belongs to an area of 1200-1700 m<sup>2</sup> created with falling of more than four trees. The highest number of seedling is observed in the decay stage (17600-ha). Number of seedlings obviously decreases in other development stages.

**Key words:** Caspian forests, Kelardasht, beech, regeneration, development stages.

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1- Senior Forest Expert Forest, Range and Watercatchment Organization, Chalus, Iran.

2- Member of Scientific board, Research Institute of Forests and Rangelands, E-mail: saghebtalebi@rifr-ac.ir

3- Member of scientific board, University of Tehran.

## Investigation on wood production of different poplar clones (wide crown clones) in Karaj area

R. Ghasemi<sup>1</sup> and A.R. Modirrahmati<sup>1</sup>

### Abstract

In this investigation 15 superior poplar clones with wide crown were selected from the first stage of the Selection Nurseries Trial. One year old seedlings of the clones were planted under the statistical design of Randomized Complete Blocks at Karaj Natural Resources Centre in 1999 (75 seedlings at each plot). At the end of each growing season diameter at breast height (dbh) and height were measured.

After calculating mean height and diameter of the clones, their mean, current and total growth volumes were determined. The mean growth volume data was analyzed using the MSTATC computer software.

The results of 10 year old trial shows that among the investigated poplar clones, *Populus euramericana vernirubensis* with diameter of 24.6 cm and *Populus euramericana* 154 with height of 18.57 m achieved the greatest diameter and height growth rate, respectively.

There was significant difference between *P. euramericana vernirubensis* and *P. alba nivea* in average volume growth rate (27.45 and 9.02 m<sup>3</sup> /ha/y, respectively).

During the 10 year growth period, the highest current volume growth of the poplar clones belonged to years 1996-1998, because 52.18 to 64.2 percent of the total growth developed during these three years. *P. deltoides* Particularly *P. deltoides* 73/51 was the most tolerant species whereas *P. alba* (*P. alba nivea*) and *P. nigra* (*P. nigra* 42/51) were the low tolerant species to pest infection.

**Key words:** Poplar, Wood, diameter, height, volume, *P.alba*, *P. nigra*, *P. deltoides*, *P. euramericana*

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1- Members of Scientific board, Research Institute of Forests and Rangelands. Tehran. P.O. Box 13185-116 E-mail: Ghassemi@rifr-ac.ir

## Investigation on natural regeneration of *Quercus castaneifolia* C. A. M. at Loveh forest management project

N. Mohajer<sup>1</sup> and Z. Mirkazemi<sup>1</sup>

### Abstract

In order to study the natural regeneration of *Q. Castaneifolia*, the regeneration unit of District No.2 of the Loveh forest Management project was selected. The regeneration unit has been under management from 1981 at 350 ha area, using the uniform compartment system to produce an even - aged high forest. The required cuttings under the silvicultural system are being made irregularly.

In 1992, 102 nested plots of 100 to 1000 m<sup>2</sup> area were allocated under the Systematic Randomized Sampling Method and the required cuttings were made. Regeneration of oak and other species and the seedling establishment and their relationships with the silvicultural method and environmental factors were studied.

The results show that 78.5% of the regeneration unit area has a moderate to excellent level of regeneration, whereas 59% of its area is lack of oak regeneration. The minimum percentage of regeneration in different environmental conditions is as follows:

- Slope gradient of 10-20%: 51.7%
- Slope aspect of north 0.5-0.9: 61.7%
- Crown Cover of 0.5-0.9: 61.7%
- Humus thickness of 3.0-5.0 cm: 30.2%

Overall, the forest management project has not been applied in accordance to the preliminary regulations objectives. The factors that decreased natural regeneration were: inharmonic cuttings, marking the seeding trees for cutting at early stage of applying the silvicultural system, low number of seeding trees, construction of secondary roads with less technical basics, damage caused by local people, seed feed by wild animals and seed damage by different pests.

**Key words:** *Quercus castaneifolia*, regeneration, silviculture

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1- Members of Scientific board, Golestan Agricultural and Natural Resources Research Center, P.O. Box 49165-731, Gorgan, I. R. Iran.  
E-mail: Nasser-mohajer@yahoo.com

## Seed extraction from ripe and unripe fruits of Caper tree and effects of different seed treatments and pot mix on their germination and seedling survival

Gh. R. Damizadeh<sup>1</sup>

### Abstract

Ripe and unripe fruits of Capertree (*Capparis decidua*) (Forsk.) Edgew) were collected separately from its natural habitat at Sirik Harbour in Hormozgan province in 2001 (June) and rubbed and washed in laboratory to remove their fleshy part. Two separate trials were carried out in nursery to examine the seeds germination and their subsequent seedlings survival. The trials were the same in statistical design - (Factorial under completely randomized plots at three replicates).

There were two factors as follows:

1- Seed germination at four levels (control or soaking seeds in water for 12 hours, soaking in sulfuric acid for 30 minutes, soaking seeds in sulfuric acid for 45 minutes and sowing the whole fruit.

2- Pot mix (sand, clay, livestock manure and garden soil) at 11 levels, including control (natural habitat soil) and 10 levels of pot mix rate. There were four pots at each plot.

Except at control level of seed germination, the effects of the other treatments on seed germination and seedling survival were significant ( $p < 0.01$ ). Seed and seedling performance in ripe fruits was greater than in unripe fruits. In control treatment, seed germination and seedling performance was greater than the other treatments, but there were not significant between the two types of the fruits. Overall, the seed and seedling performance of the ripe fruits was significantly ( $p < 0.01$ ) greater than the unripe fruits at all levels of pot mix.

**Key words:** *Capparis decidua*, seed, germination, seedling, survival, fruit, soil

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1- Research Expert, Hormozgan Natural Resources and Livestock Research Center, Bandar - Abbas, Hormozgan, I. R. Iran

## A study on morphological, qualitative and quantitative characteristics of oriental beech stands from gene conservation point of view

P. Salehi Shanjani<sup>1</sup> and Kh. Sagheb - Talebi<sup>1</sup>

### Abstract

Beech is one of the most abundant economically important species in northern Iran. Stand structure identification, combined with silvicultural characteristics, including of ad-mixture, age classes, vertical and horizontal structure, crown cover, absence or presence of gaps and regeneration or under storey could help in optimal management.

Morphological qualitative and quantitative characteristics as well as genetic variation of beech were investigated in 14 sample plots, each covering 0.5 ha; originating from the major part of distribution range of this species in Hyrcanian zone. In this research also the role of human manipulation and selected management methods for management of beech forests on these characteristics were studied.

Considerable genetic diversity of beech forests (expected heterozygosity = 0.191) represents large adaptive potential of this species. Due to positive correlation between genetic diversity and rate of undesirable trees, selection and conservation of desirable trees in shelterwood system must be considered with precaution. Because the selection for conservation of some genotypes is one of the most important processes in forest management practices, it changes the genetic variation of trees. During this process frequency of some genes and following that genetic variability and future adaptability, would be strongly reduced. An appropriate silvicultural system should reflect a sense of conservation, or a determined effort to provide future yields of goods and other values, even while harvesting or using those available at the moment. Therefore, the rate and circumstances of utilizing resources at present would be guaranteed adequate and continuous applies for future. Recent studies revealed that among silvicultural methods, the selection system and group selections are the best options for management of beech forests in a sustainable way. In this research high adaptive potential of some population (Neka at elevation 900 m.a.s.l. and Kheyroud at elevation 600 m.a.s.l. with 14 rare and specific area alleles) in comparison with limited adaptivity of others (such as Kheirud at elevation 1200 m.a.s.l. and Gorgan at elevation 2000 m.a.s.l. with 2 rare and specific area alleles) also emphasized on genetic resource conservation of beech forests and selection of suitable silviculture methods based on potential in every region.

**Key words:** Beech, *Fagus orientalis* Lipsky, Iran, Silviculture, genetic diversity, gene conservation.

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1- Members of Scientific board, Research Institute of Forests and Rangelands, P.O.Box 13185-116, Tehran, Iran.

E-mail: [Psalehi@rifr-ac.ir](mailto:Psalehi@rifr-ac.ir) and [saghebalebi@rifr-ac.ir](mailto:saghebalebi@rifr-ac.ir)