

Effects of soil compaction and water stress on growth and root development of *Olea europaea* L. at glasshouse

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Abstract

The aim of the trial was to investigate the effects of soil compaction and water stresses on olive seedling growth and root development. The trial was carried out under pot and glasshouse condition in 2001 at the National Botanical Garden, Tehran. The experimental design was Factorial under completely randomized plots with two factors (compaction and irrigation treatments), two levels and three replicates. There were three pots in each plot. The pots were filled with compacted soil (sandy clay loam) up to 50 cm height at one of the levels (bulk densities of 1.3 [low] and 1.6 [high] g/cm³). Seed propagated seedlings were transplanted into the pots and irrigated under one of the period intervals (three [wet] and six [dry] days). The seedlings were harvested in summer 2002 and their survival and canopy and root parameters, including height, shoot dry weight, root length and root dry weight were measured. The data were analyzed using SPSS Microsoft program and ANOVA and T-test methods.

Only compaction had significant effects on root parameters. The high level of compaction not only had negative effects on root development, but it increased root length and dry weight significantly. It could be concluded that although both the compaction and drought stresses did not significantly influence survival, but they significantly affected root development

Key words: compaction, growth, *Olea europaea*, root, shoot, soil, survival, water stress.

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Biology and physiology of sexual reproduction in *Pistacia atlantica* subsp. *mutica*

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Abstract

Pistacia atlantica subsp. *mutica* is a predominant and endemic species throughout the western sparse forests of Iran. In this study, some of the biological and physiological aspects such as flower and fruit development, embryo sac and endosperm initiation, embryo development and resting periods, up to 16 weeks after anthesis as well as pollen tube growth and development along a week of fertilization, were studied.

The collected samples were fixed in Carnoy's solution for pollen tube growth. Tissues for embryo sac, embryo and endosperm studies were fixed in FAA and stored in 75% ethanol in the fridge (at 4° C) up to the processing time. Pollen tube was stained using aniline blue dye and samples were studied with a light microscope facilitated with an epi-fluorescence adaptor with 3 barrier filters, under UV light reflection. All samples for assessing the tissues were dissected 3-7 micrometers and then stained with toluidine blue O (TBO), Schiff's reagent and periodic acid. Preparations were observed under a light Zise microscope. Data were analyzed by SAS analytical program, using a nested design and excel software for comparison means analysis.

Key words: *Pistacia atlantica* subsp. *mutica* (Baneh), Pollination, Pollen tub growth, Polygonum style, Embryo, Embryo sac, Endosperm, Seed and fruit development.

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Study on compatibility of tree and shrub species with the aim of rehabilitation and extension of riparian lands in the margin of Dez River in khouzeestan province

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Abstract

Dez River is one of the five most important permanent rivers of khouzeestan province of Iran where there are about 15873 ha riparian groves, growing in continuous or discontinuous forms at different densities. Ten tree and shrub species were used in this experiment to increase diversity at the riparian groves of Dez River and use them for rehabilitation and expansion program of the groves. The trail was conducted under experimental design of Randomized Completel Blocks with three replicates in 1993 at rainfed condition and in 2001. Ninety seedlings of each species were planted at each plot (3×3 m.) Survival and average of height and diameter of the species were recorded. Effects of drought and water logging period on the species performance were investigated. Six of the species (*Eucalyptus camaldulensis* 9616, *E. microtheca*, *Acacia farnesiana*, *A. salicina*, *A. stenophylla* and *Dalbergia sisso*) were the most resistant to ecological condition due to their high percentage of survival (> 75%). *Acacia victoriae* was eliminated from the trail at the second year, because of its low resistant to soil and climate fragile conditions. The species *E. camaldulensis* 9616, *Dalbergia sisso* and *A. salicina* achieved the greatest average of height and diameter growth rate.

Key words: river bank stabilization, riparian, rehabilitation, expansion.

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Effects of thinning on plantation of Maple (*Acer velutinum* Boiss) at Emamzadeh-Abdullah experimental site after eight years

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Abstract

The trial was conducted in 1995, under statistical method of split plots and Fully Randomized Design, with three replicates. The main treatments consisted of three levels of thinning (control, medium and heavy) and the secondary treatments consisted of two thinning intervals (three and five years). Three plots (0.3- 0.4 ha) were allocated at each replicate of a Maple plantation stand in Emamzadeh-Abdullah experimental site (Caspian Forests of Iran). Each plot was divided to two subplots. Before beginning thinning in the ten-year old stand in 1995, height was measured in the plots which average mean and dominant height were 10.86 and 12.14m., respectively. The qualitative characteristics of the future trees were measured annually, where the whole trees at each subplot were measured in accordance to their thinning intervals. Overall, 307 individual trees were selected in the nine plots as future trees.

The results show that the effects of thinning treatments, particularly the heavy level on growth parameters were significant. The effects of heavy thinning on future trees diameter growth rate (1.3 cm/y at D.B.H), crown diameter and slenderness factor was significantly more than the control thinning in 2002. Thinning increased the mean stem diameter from 12.7 cm in 1995 to 18.5 cm in 2001. As a result the wood quality potential increased for different products. The heavy thinning doubled mean basal area after three years (1995-1998) from 12.73 to 24.54 m²/ha (3.0 m²/ha/y). At the same period, mean volume growth for the remained and the whole trees (removed+remained) were 15.43 and 29.07 m³/ha/y, respectively.

Key words: Thinning, Future tree, *Acer velutinum* Boiss, Slenderness factor

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Optimum plantation spacing with Maple and Alder at a lowland site of the Caspian forests of Iran

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Abstract

Forest plantation at the degraded parts of the Caspian Forests is important for forest rehabilitation. Most of the plantations at the low and midlands of the Caspian Forests are made with the native broad - leaved species such as Maple, Alder, Ash and Oak. Availability of information in relation to forest plantation techniques is important for expenses reduction and plantation maintenance and density.

The trail was Conducted in 1987 under experimental design of Randomized Complete Blocks, using five spacing treatments (1×1, 1×2, 2×2, 2×3, and 3×3 m.), two species (*Acer velutinum* Boiss. and *Alnus subcordata* C. A. M.) and four replicates. The measured tree characteristics were: survival%, collar diameter, d.b.h. and height. The methods of ANOVA and T - Test (Duncan) were used for statistical analysis. The trees parameters were measured in 2001. The results show that the treatments have not influenced the height in the both species, significantly. In Maple, the greatest survival% and diameter growth were achieved at spacing densities of 2×2, 2×3, and 2×3, 3×3 m., respectively, whereas in Alder were at 2×2, 2×3, 3×3 and 2×3, 3×3 m., respectively.

Key words: Maple, Alder, spacing, survival, diameter, height

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Development stages and dynamic of undisturbed oriental beech (*Fagus orientalis* Lipsky) stands in Kelardasht region (Iran)

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Abstract

The temperate deciduous stands in northern Iran are considered as relict forests from Tertiary, which have not been influenced by glacials. The high biodiversity makes these forests more valuable, hence we can consider them as a unique gene reserve in the world. Existence of several trees such as beech, maple, alder, wild service tree, ash, wild cherry, oak and ironwood make the value of Caspian forests more clearly.

Among these broad-leaved trees, beech has an important role in development and succession of the forests. The proportion of beech is 23.6% of total stem number and 29.9% of total volume of Caspian forests. Studying the development stages and the quantitative as well as qualitative characteristics of each stage in undisturbed stands can show us a sustainable management method of forest.

For this purpose, two reserve unmanaged beech stands in Kelardasht region are studied. Eight sample plots, each one ha (100 x 100m) laid out and parameters such as tree species, stem number per diameter, height classes, volume, basal area and regeneration were studied in each development stage.

Results showed that all the three main development stages (initial, optimal and decay) would be recognized in the studied beech forests. The maximum stem number per ha was 468 in the initial stage, whereas the minimum was 279 in the decay stage. The highest volume was computed for 588 m³/ha in the optimal stage, while the lowest was 357 m³/ha in the decay stage. The highest number of regeneration was observed in the optimal stage (17600 N/ha), whereas the lowest amount was observed in the optimal stage (1090 N/ha).

Keywords: Caspian region, natural forest, undisturbed forest, beech, development stage, stem number, volume.

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