

## Phenology of *Quercus brantii* (Lindl.) at Kurdistan Forests of Iran

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### Abstract

Phenological characteristics of *Q. brantii* were investigated at two different sites of Kurdistan Forests (Baneh and Marivan), each at three levels of altitude (1200-1400, 1400-1600, 1600-1800 m. absl) and two aspects (North and South), during 1995-2002. Overall, 10 Plots (1.0 ha), each containing 10 healthy trees were used for recording the phenological parameters. The data were analyzed statistically, using the Minitab computer program. The species phenological characteristics were as follows: Leaf and flower buds opening period: 2<sup>nd</sup>-4<sup>th</sup> week of April, the fruits start growing at 3<sup>rd</sup>-4<sup>th</sup> week of August and Mature at 1<sup>st</sup>-2<sup>nd</sup> week of November, leaves fall at 2<sup>nd</sup>-4<sup>th</sup> week of Nov., fruits fall at 3<sup>rd</sup>-4<sup>th</sup> week of Nov. The statistical analysis showed that there were significant differences between the phenological characteristics in respect to the different site physiographical characteristics. Furthermore, there were significant negative correlations between average rainfall and average air temperature and three of the phenological characteristics (leaf and flower appearance date and flowering amount). The correlation between average air temperature and leaf mature and fall date and flower or fruit amount was significantly negative.

**Keywords:** altitude, aspect, flower, fruit, leaf, temperature, rainfall, Phenology, *Quercus barantii*

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## Plant species diversity in relation to physiographical factors at Dehsorkh Woodland

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### Abstract

Species diversity is an important characteristic of bio-communities. Organisms diversity, diversity measurement and hypothesis test in relation to diversity causes are issues which the ecologists are interested in for long period. The aim of the trial was to study plant species diversity in Dehsorkh woodland at Javanroud, Kermanshah province, Iran. For this reason 300 sampling plots were used from which 60 at 256 m<sup>2</sup> and 240 at 2.25 m<sup>2</sup> area. At each plot six diversity indices (Shannon's (H), Simpson's reciprocal, Hill's N1, Pielou's (J), Alatalo's F and Molinari's G) with respect to physiographical factors (slope, aspect and altitude) were investigated. The results showed that species diversity was the greatest at north aspects and slopes less than 30% and there was not significant difference between altitude and species diversity. The correlation between species number and indices analysis at each plot and the tendency and the role of each index at different analysis processes showed that the Simpson's reciprocal index is a best index for such research trials.

**Keywords:** Diversity, Physiography, Species, aspect, slope, altitude.

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## Direct and indirect effects of Poplar different attributes on its yield in early growth stage

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### Abstract

Direct selection of poplar clones for expanding their plantation is based on yield (wood production) evaluation. Because of limitations in site ecological characteristics which prevent desirable production, this method is not applicable. Therefore, indirect selection by studying other phenotypical characteristics which have well correlation with yield could be useful. The Path test for some of the morphological and growth factors was tested on one to two year old poplar clones seedlings in 2000 and 2001. At each experimental unit, five seedlings were selected to measure their following characteristics. Leaf number, leaf area, total leaf area, length of blade, maximum leaf width, width/length ratio, petiole length, depth of leaf rib, vein number, branch number, branch length, branch diameter, stem diameter, stem diameter/branch diameter, branch angle, height, root number, root length, new leaf number and survival. After a confident result of differences between the species and their clones, for the characters, Path analysis was performed on the data.

The results showed that branch number and branch angle had great direct effects on height as an independent variable. Branch number affected the height directly and negatively at high level, but its indirect effect on height through the dependent variables, was positive. As a result, the total effect on height was negative (-0.554).

Leaf number left high positive effect on height. The branch diameter/stem diameter ratio had the greatest total negative effect on height. As a result, stem diameter had the greatest positive effect on height. Survival had also a great indirect positive effect on height through independent variables, counterbalancing negative direct effects to a positive effect of 0.667. Branch length showed a high negative direct effect, but a high positive indirect effect, resulting a high positive total effect on dependent variable, height. However, total leaf area with positive direct and indirect effects on height, which is in turn the most influential character on height, would be the best indicator of height in the poplar species under study. This would be of high value, particularly when a great number of clones are under investigation at early stages of a cultivation programme.

**Key words:** Poplar, Path analysis, Morphological attributes, direct and indirect effects.

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## Estimating forest canopy cover using Landsat7 ETM+ data

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### Abstract

The remotely sensed data is one of the most rapid methods for providing thematic maps in natural resources, especially forest. By combining ETM+ data and ground observation data, we can have access to thematic maps of forest such as canopy cover map, that it can be used in forest ecological studies and forest management and improvement.

The research was conducted to evaluate and investigate the possibility of using Landsat7 ETM+ data for developing forest canopy cover density map at four classes in four sites of Caspian Forests of Iran.

Based on OIF index and statistical analysis of the ETM+ data, Color composite 3, 4, 5 were selected for unsupervised and supervised classifications. Ground observation information was collected from 282 plots (150\*150m), using unsupervised map as a primary map.

Finally, combining the ETM+ data and the ground information, using supervised classification method, canopy cover map was achieved at four classes (5-30%, 31-50%, 51-80%, 81-100%).

Evaluation of the canopy cover density percentage showed that the overall accuracy of the canopy cover percentage map developed by the Landsat7 ETM+ data and average accuracy, producer's and user's accuracy were: 85.43, 84.7 and 82.68 percent, respectively.

**Keywords:** Canopy cover, Classification, Satellite data, Training sample, Accuracy assessment, Caspian Forests.

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## Effects of spacing on yield of various clones of *Populus nigra* L.

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In order to determine the optimal spacing in respect to maximum wood production in unit area, an experiment was conducted in 1993 at West Paper Industries Co. site (West Iran), using a number of high yield exotic poplars under statistical design of factorial with three replicates. The factors consisted of spacing at four levels (1×2, 2×2, 2×3 and 2×4 m.) and *Populus nigra* with four clones (exotics: 62/172, 62/154 and 63/135 and native (control): 42/78). Every plot contained 25 seedlings of one year old root and stem. The growth parameters consisted of height, breast height diameter and volume which were measured and recorded annually, up to eight years. The best poplar clones in respect to maximum wood volume production at each spacing treatment were as follows:

1×2 m. spacing: *P. nigra* 63/135 with 54 m<sup>3</sup>/ha/y and 11.3 cm DBH

2×2 m. spacing: *P. nigra* 63/135 with 34.3 m<sup>3</sup>/ha/y and 13 cm DBH.

2×3 m. spacing: *P. nigra* 62/154 with 29 m<sup>3</sup>/ha/y 13.9 cm DBH.

2×4 m. spacing: *P. nigra* 63/135 with 25 m<sup>3</sup>/ha/y and 15.2 cm DBH.

**Keywords:** Poplar, clone, spacing, diameter, height, volume.

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## Determination of seeding cycle by stem analysis of three beech stands

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### Abstract

Three natural stands of beech (*Fagus orientalis* Lipsky) at different parts of Caspian Forests of Iran (Kelardasht, Sangdeh and Gorgan) were chosen to determine their seeding cycle by stem analysis. For this reason, 85 dominant trees were selected randomly from the stands. After measuring the tree's quantitative and qualitative properties and sampling soil and vegetation from the stands, the dominant trees were fallen down. A disc (20 cm thick) was removed from base of each fallen tree (cross cut), in order to study the annual rings at two directions, particularly annual diameter increment. After analysing the data, the results were as follows:

- 1- Two types of seeding were determined for *F. orientalis* at the three sites: heavy and light seeding.
- 2- Seeding started at age of 30 to 35 year when seed production is often light.
- 3- Based on the sites characteristics, the heavy seeding started at age of 60 and extended to ago of 75 year.
- 4- The trees had different seeding characteristics due to their different site characteristics and their different performance.
- 5- The light and heavy seeding cycles repeats every 1-3 and 3-9 years, respectively. The difference between the sites was not significant.
- 6- Natural regeneration of beech is more correlated to light seedling cycle will be due to its more frequency than the heavy seeding cycle.
- 7- There were three kinds of relationship between annual diameter increment and seeding cycles as follows:
  - a- If the annual diameter increment is less than 0.74 mm, no seeding cycle will be expected.
  - b- If the annual diameter increment is between 0.74-1.5 mm, light seeding will be expected, but if its diameter increment is more than 1.5 mm, heavy seeding will be expected.

**Key words:** Beech, Caspian, Seeding, cycle, Regeneration, Diameter growth, Disc.

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