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Contents

- | | | |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| 1 | Technical Analysis of Created Scars on the Edge Trees of Skid-trail due to Skidding Operation | Farshad Keivan Behjou; Baris Majnounian; Manochehr Namiranian |
| 2 | Potential of Tolerance in Germplasm of Wild Pear under Flooding Stress | Ali Sattarian; Ghasemali Parad; Mehrdad Zarafshar; Moslem Akbarinia; Seyed Farid Ghaffari Dehkordi |
| 3 | Influences of Prolonged Soil Flooding on Leaf Gas Exchanges and Growth of <i>Populusdeltoides</i> and <i>Taxodiumdistichum</i> Seedlings | EhsanGhanbary; MasoudTabari |
| 4 | Determinate ASTER Satellite Data Capability and Classification and Regression Tree and Random Forest Algorithm for Forest Type Mapping | Asghar Fallah; Siavash Kalbi; Shaban Shataee; Omid Karami |
| 5 | Rainfall Interception in a Natural Stand of a <i>Fagus orientalis</i> and a <i>Picea abies</i> Plantation within the Growing Season in Kelardasht Region, North of Iran | Parisa Abbasian; Pedram Attarod; Seyed Mohammad Hojjati |
| 6 | Growth Models using to Simulate and Investigate Different Forest Management Methods (Case Study: Gorazbon District in Kheyroud Forest, North of Iran) | Mahmoud Bayat; Manouchehr Namiranian; Mahmoud Zobeiri; Timo Pukkala |
| 7 | Decolorization of CMP Pulp Effluent by Biological-Chemical Treatments | Samaneh Karimi; Ali Abdulkhani; J co k' tgl c" Tqf k'=Clinaghi Karimi= Yahya Hamzej |
| 8 | Harvested Log Damage Associated with Motor-Manual Tree Felling and Bucking (Case Study: Beech and Hornbeam trees in Kheyroud Forest) | Zahra Ghorbani; Meghad Jourgholami |
| 9 | A Comparison of Liquid Limit Value Determined Using the Casagrande and Cone Penetrometer | Fatemeh Mousavi; Ehsan Abdi |
| 10 | Investigation of Climate Impact on Afghan Pine (<i>Pinuseldarica</i>) Using DendrochronologicalMethods | Shamsaddin Balapour; Tofiq Sadiq Mammadov; Shirzad Gerayeli |
| 11 | Using Unbleached Bagasse Fibers for Fabricating Magnetic Paper | Mohammad Azadfallah; Kajar Moradian Gilan; Hasan Mousavipazhouh; Mohammad Mahdi Hadilam; Elahe Amini |
| 12 | Evaluation of Contact Angle and Leach Resistance of Beech Wood Treated with Nano-Zinc Oxide | Samaneh Yousefian; Mojtaba Soltani |
| 13 | Visual Grading of Small Diameter Poplar for Use in Sawmill Timber | Ali Bayatkashkoli; Mohammadreza Sharefpour |
| 14 | Morphology and Mechanical Properties Silane Treatment Rice Straw Flour/Polypropylene Composites | Mehdi Kalagar; Habibollah Khademieslam; Sahab Hejazi |

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Technical Analysis of Created Scars on the Edge Trees of Skid-trail due to Skidding Operation

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ABSTRACT

Logging operations is an engineering system with the aim of maximizing efficiency and minimizing negative effects. This study was carried out in two compartments including 220 and 225 in Namkhaneh district of Kheiroudkenar watershed. In this study, damages resulted from skidding operation by Timber jack 450C were evaluated. The results of this study showed that in two compartments 220 and 225, 80.6% and 72.7% of scars resulted from skidding operations was happened in low parts of the tree (root and stump area) and more than 40% of scars are with the area of lower than 200cm², but 57% of scars are accompanied with cambium damage. The results of study showed that with regarding to lower logging intensity in compartment 225 compared to compartment 220, the average size of scars in compartment 225 (10.43cm) is more than compartment 220 (9.06cm) that this important note is referred to more skid-trail turns in compartment 225 compared to compartment 220 (around 2 times more). Also, the results of analysis of variance showed that the wound-stem ratio is significant difference between two compartments in 1% level ($F=9.01$, $P=0.003$, $df=1$). Generally, concluded that increasing number of turns in skid-trails have more degradation effects in comparison with harvesting intensity on edge trees.

Keywords: scar width, skid-trail, turn, wound-stem ratio.

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Potential of Tolerance in Germplasm of Wild Pear under Flooding Stress

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ABSTRACT

Wild plant germplasm possesses useful adaptive strategies. Wild plant species, for example, are resistant to biotic and abiotic stress and can be used for reforestation, agriculture, and horticulture. We surveyed the potential of wild pear to resist flooding. We looked at survival, growth, biomass, and several physiological variables. The rootstocks of wild pear are candidates for planting in orchards that experience periodic flooding. For this purpose, we conducted a completely randomized design with two flooding treatments: 1. 15 days flooding plus 15 days recovery and 2. control, for a 30 day experimental period. The results showed no discernible effects of flooding on survival, height, and diameter. Nevertheless, seven days of flooding had negative and extensive effects on photosynthesis, transpiration, and stomatal conductance. This trend continued until the fifteenth day. Photosynthesis, however, recovered 15 days after the flooding. In addition, plant biomass was negatively affected by flooding. Cessation of photosynthesis after 15 days of flooding proves that the wild pear can be used as rootstock in areas prone to flooding for up to 15 days. If the flooding continues, however, the plant will eventually die.

Keywords: biomass, height growth, photosynthesis, stomatal conductance, vitality.

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Influences of Prolonged Soil Flooding on Leaf Gas Exchanges and Growth of *Populus deltoides* and *Taxodium distichum* Seedlings

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ABSTRACT

The effects of 450-days of flooding on morphological and gas exchanges responses were investigated under controlled conditions for *Populus deltoides* (clone 77.51) and *Taxodium distichum* seedlings. Seedlings were subjected to three outdoor treatments: not flooded (control), flooded to 3 cm above the soil surface (shallow flooded), and flooded to 15 cm above the soil surface (deep flooded). Flooding had no significant effect on the height growth and survival of *T. distichum* seedlings during 450-day period, but survival and height growth of deep flooded seedlings in *P. deltoides* were decreased. Under flooding conditions diameter growth increased in *T. distichum* and decreased in *P. deltoides*. Leaf area and biomass accumulations reduced by flooding in both species. Flooding reduced net photosynthesis, stomata conductance and transpiration in both species. Overall, even though at flooding status in both species some morpho-physiological variables reduced but due to satisfactory of some other variables like survival, height growth and shoot biomass in 450 days of experiment, possibility of growth and survival of seedlings will be expected.

Keywords: leaf area, photosynthetic, stomata conductance, survival, transpiration.

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Determinate ASTER Satellite Data Capability and Classification and Regression Tree and Random Forest Algorithm for Forest Type Mapping

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ABSTRACT

Recognition equal units and segregation them and upshot planning per units most basic method for management forest units. Aim this study presentation and comparison classification and regression tree (CART) and random forest (RF) algorithm for forest type mapping using ASTER satellite data in district one didactic and research forest's darabkola. In start using inventory network 500* 350 m, take number 150 sample plat in over district. After accomplish Geometric correction and reduce atmospheric effect on image processing bands rationing, create general vegetation indices, principal component analysis and tesslatcap index. After extraction spectrum values relevant by sample plats fabric and processing bands, classification values other pixel accomplish using investigating algorithms. Evaluation accuracy results classification accomplish by some sample plat that not participate in process classification. The result showed preparation map using RF with overall accuracy 66% and kappa coefficient 0.57 than classification and regression tree with overall accuracy 58% and kappa coefficient 0.49 has superior accuracy. Totality result showed using above algorithm may increased accuracy forest type map.

Keywords: ASTER Satellite, classification and regression tree and Random forest, forest type.

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Rainfall Interception in a Natural Stand of a *Fagus orientalis* and a *Picea abies* Plantation within the Growing Season in Kelardasht Region, North of Iran

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ABSTRACT

The aim of this study was to compare rainfall interception (I) in a natural forest of *Fagus orientalis* L. with a neighboring *Picea abies* plantation in Kelardasht area, the Caspian forests, North of Iran. To measure gross rainfall (GR), four manual collectors were installed in an open area adjacent to the forest sites and throughfall (TF) was measured using 20 collectors randomly located underneath of stands. I was calculated as the difference between GR and TF . Measurements were made from July to November, 2012. During the measurement, 13 rainfall events were recorded with a cumulative depth of 319.8 mm. Cumulative depth of I for *F. orientalis* and *P. abies* were 84.4 mm and 155.5 mm, respectively. On the event-based measurements, average $(I:GR)\%$ in *F. orientalis* and *P. abies* stands were found to be 26.5% and 48.6%, respectively. Positive power correlations were observed between I and GR in both stands ($r^2_{F. orientalis}$: 0.9; $r^2_{P. abies}$: 0.8). Results showed logarithmic correlations between I and $(I:GR)\%$ in *F. orientalis* and *P. abies* forests ($r^2_{F. orientalis} = 0.66$, $(I:GR)\% = -9.15\ln(GR) + 58.8$; $r^2_{P. abies} = 0.51$, $(I:GR)\% = -12.28\ln(GR) + 91.49$). The greater amount of water reaches the forest floor in *F. orientalis* suggests that the planting of *P. abies* relative to *F. orientalis* will have a significant impact on the hydrological cycle of the watershed. Estimating I , along with the transpiration of species, is necessary to consider while selecting the adapted species for reforestation in the derelict areas of the Caspian forests.

Keywords: *Fagus orientalis* Lipsky, Kelardasht, *Picea abies*, rainfall interception, throughfall.

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Growth Models using to Simulate and Investigate Different Forest Management Methods (Case Study: Gorazbon District in Kheyroud Forest, North of Iran)

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ABSTRACT

Hyrcanian forests are the most valuable forests in the north of Iran and industrial harvesting occurs only in this area. It is a productive region near the southern coast of Caspian Sea. In these forests mixed beech stands mostly shown uneven-aged structure that is managed under selection system. In order to determine the priority of uneven aged method not only from an ecological view, but also from other views, especially in economical view compared to other methods should be prove this important by tools or methods. The growth models enable the simulation of stand development in alternative management schedules and select finally the best method. Nowadays sivicultural tendency has been applied here. 768.4 ha unmanaged forest of Gorazbon district in Kheyroud educational-experimental forest was studied using 258 permanent sample plots. The models were used to optimize the stand structure and the alternatives in which various initial stands should be converted to the optimal uneven-aged structure. The model set consists of individual-tree diameter increment model, individual tree height model, survival model, and a model for ingrowth. The models indicate that the annual volume increment of the forests ranges from 2.5 to 7 m³ha⁻¹a⁻¹ in uneven-aged management, depending on species composition. The models and analysis of this study indicate that the uneven aged forest is more practical and superior than other methods (young even-aged stand, mature even-aged stand, and two-storied stand) in forest conversation and economically wood production.

Keywords: different methods, Gorazbon district, individual-tree model.

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Decolorization of CMP Pulp Effluent by Biological-Chemical Treatments

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ABSTRACT

The efficiency of Oxidation Processes, Enzymatic treatment, and combined enzymatic/chemical sequences on color remediation of CMP pulp mill effluent was investigated. Two kinds of fungal enzymes; Laccase (EC: 1.10.3.2) from *Terametes versicolor* and Versatile Peroxidase (EC: 1.11.1.7) from *Bjerkandera adusta* were chosen and applied. Also, the effect of external mediator on the enzyme based degradations was studied. It was found that both VP from *Bjerkandera adusta* and Laccase from *Terametes versicolor* decolorized the deep brown effluent to a clear light yellow solution. It has been found that, concomitant use of enzymes and photo-Fenton process produces a considerable effect on color remediation. The data analysis of sequence treatment indicated that, chemical treatment after the enzymatic stage (photo-Fenton as a post treatment unit) yield a better performance for the CMP effluent.

Keywords: color remediation, effluent, Fenton, Laccase, peroxidase, photo-fenton.

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Harvested Log Damage Associated with Motor-Manual Tree Felling and Bucking (Case Study: Beech and Hornbeam trees in Kheyroud Forest)

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ABSTRACT

The log damage and value loss were examined by felling and bucking function, species, and damage type, in Kheyroud Forest in Namkhaneh district in the Hyrcanian Forest of Iran. In order to calculate the wood value following tree felling and bucking, 250 trees and 167 logs consisting of beech and hornbeam species were measured. There were five types of damage recorded following the tree felling operations: split damage, stump height, slab damage, splintering or breakage damage and no damage. Results showed that the total volume of damaged logs was 42.5 cubic meters (9%) for all trees. The majority of woody tissue damage is caused by splits, slab and splintering or breakage damage. Stump height consists of a small amount of volume loss. Also There were four types of damage recorded the effects of bucking operations: slab damage, log length split, measurement error and without damage. The total volume of damaged logs was 16.1 cubic meters (10.3%) for all logs. The majority of woody tissue damage consists of the measurement error. Slab and Log length split caused a small amount of volume loss. Value loss associated with splits was 46.52%, and value loss associated with high stump was 1.66%. Slabs and Splintering or breakage damage caused a small amount of average volume loss per damaged log which were 30.5 and 21.33%, respectively.

Keywords: bucking, forest harvesting, log damage, tree felling, wood loss.

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A Comparison of Liquid Limit Value Determined Using the Casagrande and Cone Penetrometer

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ABSTRACT

Depending on the moisture contents, the soil behavior is revealed as solid, semisolid, plastic and liquid states. Liquid limit is an important property of fine-grained soils and Casagrande and cone penetrometer are two different methods employed for the determination of liquid limit of the soil. In forest environment, the Casagrande method is the classic method for liquid limit determination, but cone penetrometer method was not tested yet. The result of Casagrande method is related to user experience, for this end, this study was carried out to verify the differences between the two techniques for liquid limit determination. Casagrande and cone penetrometer liquid limit tests (each test repeated 4 times) were conducted using on 2 soil samples obtain from Patum and Namkhaneh district of educational and experimental forest of the University of Tehran in northern Iran. The results show liquid limit for Patum sample was near 50 and soil classes could change by a little differences in the assessment of liquid limit and the difference between the two methods is significant, but liquid limit for Namkhaneh was not near the edge and little differences in the result could not lead to change the soil classes. Comparison of coefficient variation values between two method showed that the cone penetrometer method have higher precision than Casagrande method. Finally, it is suggested that in casagrande method, before main test, some per experiment should be performed.

Keywords: Casagrande, coefficient of variation, Cone penetrometer, liquid limit, precision.

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Investigation of Climate Impact on Afghan Pine (*Pinuseldarica*) Using Dendrochronological Methods

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ABSTRACT

Afghan pine one of the native tree species in Eldar region of Azerbaijan Republic. Fast growing, suited for dry climate condition, increasing wood in unit volume, reason of using Eldar pine in reforestation and plantations. At this case study of Absheron peninsular of Baku, Azerbaijan, were taken 14 trees samples of two sites. BBG, Baku Botanical Garden and BMD, Baku MerdakanDendrary, are two case study sites in this research. The tree ring chronology of BBG and BMD, are 1961-2010 (49 years) and 1932-2010 (78 years) time span, respectively. The chronology statistic shows that there is similarity between two sites (GLK=65, T-value= 4, GSL= 95%). The result showsthat there is positive correlation between monthly total precipitations of November before growing season with tree ring of *Pinuseldarica* at BMD site. Mean temperature of November has negative correlation with growth of Pine at BMD site. The monthly total precipitation of august has negative impact on growth of Eldar pine in BBG site. Decreasing temperature in November month is parallel to increasing of rain. That has the positive impact on tree ring growth next growing season. In summer, increasing of temperature case of decreasing rainfall and increasing water stress and so lead to narrow tree ring width. The results of this research can useful for choice of Afghan pine to various reforestation and plantations.

Keywords: dendrochronology, *PinusEldarica*, tree ring, temperature and precipitation.

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Using Unbleached Bagasse Fibers for Fabricating Magnetic Paper

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ABSTRACT

Magnetic lignocellulosic fibers have good potential in applications such as information storage, security papers, electromagnetic shielding and etc. In this study unbleached bagasse fibers were used to fabricate magnetic paper by chemical co-precipitation method. Lumen loading and precipitation of magnetic nanoparticles on the surface of fibers were carried out by in situ synthesis. Then the formation of magnetite and hematite nanoparticles during synthesis process was demonstrated by patterns of X-ray diffraction (XRD). Micrographs of scanning electron microscopy (SEM) indicated well the nanoparticles deposition on the fiber surfaces. Degree of loading increased with increasing temperature up to 60 °C and iron content of suspension up to 6mmol. The magnetic particles deposited on the fiber surfaces had detrimental effects on the tensile strength of the magnetic papers. Measuring the magnetic properties with vibrating sample magnetometer (VSM) demonstrated the superparamagnetic behavior of fabricated papers. Magnetization at saturation (M_s) of the papers was increased by increase in loading degree.

Keywords: bagasse fiber, co-precipitation, loading, magnetic paper, magnetite.

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Evaluation of Contact Angle and Leach Resistance of Beech Wood Treated with Nano-Zinc Oxide

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ABSTRACT

The objective of this research is characterizing the effect of Nano-Zinc oxide (nano-ZnO) dispersions on leach resistance and contact angle of beech wood (*Fagus orientalis* Lipsky). The Beech wood was cut into standard dimension, and oven dried after treating with nano-Zno solution, based on immersion method. Three treating nano-Zno solution levels: (0, 20000 and 40000 ppm), and two thermal treating levels: (60 and 120°C) were selected. After conditioning, leaching tests were performed and contact angle of samples after 1 and 10 seconds were measured. The results showed that by increasing of the nano material concentration and the temperature, the contact angle increased. In tenth second, the minimum and maximum angles were 53.30° and 90.07° which observed for untreated sample and for 40000 ppm concentration and 120°C temperatures, respectively. Improving on contact angle represents the significant reduction in wettability property of surface in treated wood. Results of leaching test implied that effect of increment of nano-zno concentration was negligible, while the temperature increasing resulted in nano-ZnO stabilization.

Keywords: Beech wood, contact angle, leaching, nano-zinc oxide, treating.

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Visual Grading of Small Diameter Poplar for Use in Sawmill Timber

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ABSTRACT

Small diameter timbers have many used in wood and paper industries such as veneer and plywood, furniture industry, wood working and their particle for papermaking and particleboard. Diameter of small diameter poplar is between 15 to 35 cm and poplar trees are planted in excess of 23 provinces of Iran. Small diameter poplar are visual graded to lumber of sawmill. Since, small diameter poplars are graded on the basis of traditional rules of grading and then outputs of timber production are investigated by standard rules of lumber. Experimental results are showed that small diameter poplar and their timber production have more firsts and selects of grades than others grades on the basis of national grading of Iran (1275 and 8073), United State Forest Service and National Hardwood Lumber Association. Defects such as frost cracks in small diameter poplar and core in poplar timber are influence onto application usage and ranges of grades scales and effective defects are determined by average measured of defects, national standard rules and field research. Also, their application usages are very sensitive to the effective defects, in the practical condition.

Keywords: defect, small diameter timber, visual grading, poplar.

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Morphology and Mechanical Properties Silane Treatment Rice Straw Flour/Polypropylene Composites

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ABSTRACT

In this research, effects of concentration and time of silane treatment of rice straw flour on the morphology and mechanical strengths of rice straw flour/polypropylene composites were investigated. Tri ethoxy vinyl silane ($C_8H_{18}O_3Si$) with 98% purity in two concentrations of 5 and 10%, that each concentration had two immersion times including, 45 and 90 min for using treatment rice straw flour. Also the polypropylene, as a matrix with 65% wt% and MAPP as a coupling agent with 5 wt% were used for making all testing samples. For blending the internal raw materials, mixer Haake HBI system 90 machines and for making standard testing samples the injection molding were used. The results showed that composites including rice straw flour were treated with silane in the concentrations and times were recited to cause a significant increase in the bending and tensile properties (strength and modulus) in comparison with untreated composites. Also increasing the concentration and time of silane treatment among treated samples causes an increase in the bending and tensile properties. With attention to the results from morphological composites detected silane treatment cause to improve in adhesive interfacial surface of filler/ matrix, better dispersion filler in matrix and finally cause to be improved in the mechanical properties.

Keywords: composites, mechanical properties, morphological, silane treatment concentration and times, rice straw flour.

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