PROOFREADING SAMPLES

Anatomical, ultrastructural, physical, and mechanical properties of two-year-old *Eucalyptus grandis* x *Eucalyptus urophylla* clones

Zanuncio.21.08.15

Abstract

Eucalyptus wood is used for various purposes; however, the wood of younger trees has limited use. This study aims to characterize and propose the various uses of two-year-old *Eucalyptus* wood. Six two-year-old *Eucalyptus grandis* x *Eucalyptus urophylla* clones have been selected and their anatomical, ultrastructural, physical, and mechanical characteristics evaluated. Clone A shows more robust fibers with better microfibril arrangement, resulting in better mechanical properties, and therefore, a better performance for structural use. Clone F shows a low variation of basic density in the radial direction, facilitating its machinability, and Clone B shows a lower coefficient of anisotropy, and therefore, is recommended for locations with high variations of humidity. The heterogeneity of the characteristics of the evaluated clones confirms the need for further studies, to choose those most adequate to each use.

Introduction

The forest sector is very important for the Brazilian economy. *Eucalyptus* plantations aim to produce wood for various purposes, such as panels, cellulose, energy, and sawmills.

Wood is a heterogeneous material, making its use difficult. The anatomical and ultrastructural characteristics reflect the physical and mechanical behavior of wood, and therefore, its use depends on a complete survey of these features.

Silvicultural practices such as thinning and natural phenomena such as wind damage, can induce wood harvest when the trees are young. The lack of alternatives for

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this material leads to its use for energy. However, its use in the production of small objects and in the furniture industry is unexplored and can add value to this wood type.

Using two-year-old wood depends on a complete study of their anatomy, ultrastructure, physics, and mechanics. Therefore, the aim of this study is to characterize two-year-old *Eucalyptus* clones and suggest the uses for this material.

Methodology

Biological Material

Three two-year-old trees were selected from each of the six *Eucalyptus* clones. Three 5 cm thickness disks were removed, 1.3 m above the ground level, to determine the density, anatomy, and ultrastructure of its wood. A three-meter log was removed from just above this position, and from this log, a central plank was removed as a specimen, with a saw blade, for the mechanical characterization and evaluation of the dimensional and volumetric variation of the wood.

Anatomical characterization

A sample was obtained from an intermediate position in the pith to the bark, in one of the 5 cm disks that was removed from 1.3 m above the ground level. Histological slides and macerated materials were prepared. The length and width of the fiber, lumen diameter, diameter and frequency of the vessels, and height and width of the rays were measured. The wall thickness of the fiber was obtained by the difference between the width of the fiber and the lumen diameter, divided by two. The cell wall fraction was calculated using the equation: $Cwf = (2 \times Cwt)/Fw) \times 100$, where, Cwf = Cell wall fraction (%); Fw = fiber width (μm); Cwt = cell wall thickness (μm).

Microfibril angle measurement

The microfibril angle of the S2 layer was measured in the specimens used in the anatomical characterization. After saturation, the wood blocks were cut with a microtome in the tangential plane in 10 μm thick sections and macerated with hydrogen peroxide solution and glacial acetic acid in the ratio 2:1 at 55°C for 24 hours to prepare temporary slides.

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The measurement of the microfibril angle was performed by polarized light microscopy with an Olympus BX51 microscope adapted with a rotary stage, graduated from 0° to 360°, connected to the image analysis program Image Pro-plus.

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Asset Pricing based on preferences Function of Marshall

Azam Mohammadzadeh[1]*, Mohammad Nabi Shahiki Tash[2], Reza Roshan[3]

Abstract

This articlearticle investigates the implications of a novel class of preferences for the behavior of asset prices. This class of preferences was suggested by Marshall (1920), these preferences mean that people derive utility not only from consumption, but also from the very act of saving. These ‘‘saving-based’’ preferences are related to models of habit formation and the spirit of capitalism, but incorporate the feature that people have anticipatory habits, because they care about the future accumulation of wealth. In this articlearticle after modeling the save behavior, is drove the Euler equations for these preferences and estimated them with generalized method of moments (GMM). We are going to have estimates of the parameters of the subjective discount factor (β), the curvature of the utility function (η), and the tendency to save (θ), respectively.

After testing various alternative instrumental variables, five alternatives were rejected by the J-test. In the remaining alternatives and in one alternative, we obtained estimations for parameters θ, η, and β equal to 101.20, 0.99, and 0.86, respectively, and estimations for parameters in the other alternative equal to 58.10, 0.96, and 0.84, respectively. Our estimates suggested that the preference for saving is not economically significant or the other word parameter θ is not significant in the model.

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Keywords: Asset pricing, preferences, saving, Saving-based asset-pricing

1- Introduction

Asset pricing for special stocks for the process of investing in these bonds is the most important issue facing investors and participants in the capital market. Therefore, researchers are interested in the accurate pricing of stocks to predict their expected returns too. Basically investments for volatility in their returns are risky.

Financial economists have proposed different models for measuring risk. One of the methods that helps the investors to gauge the risk and return on investment is using the "Capital Asset Pricing Model" (CAPM[4]). This model was introduced in 1960 by William Sharpe. In this model, the expected return per share is equal to the risk-free rate plus the beta of the share-multiplied market risk premium, In other words, the expected equity risk premium, according to the market beta. Although this model is highly regarded by investors and financial analysts, subsequent studies have been criticized. However, many researchers began to develop it. The respective changes and adjustments were made according to the Standard Model of capital assets pricing, models such as the capital asset pricing model reducing[5], intertemporal[6], adjusted[7], conditional, consumption[8], and revised[9] models are presented.

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Another model of capital asset pricing is CCAPM[10] that was presented by Breeden (1979). An investor should decide on the consumption, value of his/her savings, and portfolio of assets that will hold. In this model, the expected return on a share changes with the beta of consumption (not the market beta). In other words, there is a direct relationship between the uncertainty about stock returns and uncertainty about the consumption. Thus, this model describes how changes in stock market returns are related to the growth in consumption. The CCAPM model has been used less in practical models, while in this model, since it measures the return on investment and consumption, its performance is better than the CAPM. In the standard model of CCAPM, there is a linear relationship between the consumption's beta and excess return on assets, but unfortunately, the linear CAPM made the Equity Premium a puzzle. In this case, to explain the large equity, the premium needs to spend a very high risk aversion. This is known as the "equity premium puzzle". The puzzle was presented for the first time by Mehra and Prescott (1985). After presenting puzzles such as the equity premium puzzle, adjustments were made in the CCAPM. These adjustments can be made in the function of preference such as in the research of Batch and Muller (2011), Epstein and Zin (1989 and 1991), and Chao et al. (2012).

Based on the above criticism, which may be the greatest criticism for CCAPM, in this articlearticle, to review the standard model CCAPM, adjustments have been made in the preferences. These adjustments are fully explained in the theoretical part.

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Also included are importing the saving tothe utility function and use of GMM for estimating the model.

This article is organized as follows, the second part of the article contains previous studies, the third part contains the theoretical model, the fourth part describes the data and variables of the model, the fifth part is devoted to the results of the estimation, and finally, the last section, presents a summary and the conclusion.

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A Parametric Study of the Seismic Behavior of Micropiles

Abstract

This article shows a general study of the behavior of micropiles under the effect of dynamic load. An analysis has been made using modeling of limited components. Soil behavior has been modeled as elastoplastic along with damping riley and micropiles as elastic beam elements. The first section shows a literary examination of the behavior of micropiles; the second section illustrates the numeric model used in this study, and the last part shows the analysis related to the effect of changing micropile param and the intensity of different loads on the performance of micropiles. The results show that the effect of the micropile diameter parameter on its seismic performance precedes the micropile length parameter; also, the change of distance between the micropiles has no perceivable effect on the system's lateral displacement. The values of lateral displacement and the micropile bending moment increase with peak horizontal ground acceleration and the Arias intensity.

Introduction

Soil, as the most important among building materials and in the primary foundation of a building, has always been utilized by man, and without doubt, one of the basic and primary principles for implementing civil programs is having land with adequate loading capacity. In recent years, the area of proper land for building and construction is decreasing because of the increase in population and demand. Therefore, researchers are always trying to increase the loading capacity and resistance of land, and improving its characteristics, and in such situations, there is keen competition between the civil engineers of developed countries for the need to acquire new and proper methods for improving and adjusting improper land. One of the effective methods for improving the loading capacity of soil and reducing its displacement is the implementation of micropiles under it.

A micropile is a renewable stanchion through digging and grouting, which is usually armed and has a smaller diameter (usually less than 300 millimeters (mm)) and is usually used for strengthening and arming foundations. For example, a diameter in the range of 150 to 300 mm (usually 50 to 300 mm steel pipes are used as micropiles), with a standard length of 5 to 30 meters (m) and a minimum compressive resistance of 1000 kilonewtons (kN) is proper for micropiles [1].

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Healthy or Unhealthy lifestyle: A Thematic Analysis of the Male Adolescents' Perspectives

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ABSTRACT

Identifying what adolescents perceive as their lifestyle and exploring the factors persuading their decisions to engage in or avoid healthy or unhealthy lifestyle behaviors, could

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improve the ability of healthcare professionals to develop innovative preventive strategies and modify the negative health behaviors in adolescents. This study was conducted to explore the perspectives of an adolescent lifestyle in a qualitative manner. We interviewed a number of adolescents and the results of the interviews were summarized by using the thematic analysis method. After data immersion, the interview texts were transcribed and about 800 initial codes were extracted. The initial codes were re-evaluated to yield 48 main themes. After reviewing these themes, a final thematic map was devised that had five overarching themes and twelve sub-themes, which illustrated that the interviewees mostly emphasized on the unhealthy lifestyle. The components of an unhealthy lifestyle seemed significant to them, because they thought that elimination of those negative behaviors could help them lead a healthy life.

Keywords: Adolescent, healthy lifestyle, unhealthy lifestyle, thematic analysis

Introduction

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Adolescence is a period when many healthy and unhealthy habits are imbibed, which may last throughout a person's life. The increasing number of adolescents who engage in risky behaviors has become a matter of great concern. Many studies have highlighted the prevalence of risky behaviors, such as, smoking, drug abuse, alcohol consumption, physical inactivity, and so on, among adolescents in Iran and other countries (Mohammadpoorasl *et al.*, 2014; Kelly *et al.*, 2011).

Although previous studies from other countries can provide some useful data, the extent of political, sociocultural, and religious differences, together with the availability of various relevant resources, suggests that each country needs its own research data to better understand how the health-related lifestyle perspectives of participants can best be met (Baheiraei *et al.*, 2014).

Current researchers in the field, argue that our descriptive knowledge base is not conceptually robust and is inadequate to sufficiently describe and provide a comprehensive assessment of the lifestyle of adolescents (Rodham *et al.*, 2006; Woodgate & Skarlato, 2015). An increasing number of researchers and community activists argue that instead of focusing on youth problems, attention must be paid to the reasons for such behaviors (Currie *et al.*, 2008). Identifying the points of view of adolescents, based on their lifestyle choices, can improve the ability of healthcare professionals to develop innovative preventive strategies, support the inherent strengths, and ultimately modify the unhealthy behaviors (Lee-Lan *et al.*, 2006). There are significant cultural differences regarding "lifestyle choices", and further research is needed to determine the related perspective

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Chapter 1

Life history and life table of *Stenoma impressella* (Lepidoptera: Elachistidae) on the oil palm, at different temperatures

Abstract

Stenoma impressella Busck (Lepidoptera: Elachistidae) is an important oil palm pest and its life history and life table parameters were studied at different temperatures, from 16 to 40ºC. Females and males developed successfully into adults between 20 and 36ºC. However, no eggs were found at 10ºC and all the adults died after exposure to 40ºC. The developmental time from egg to adult was higher (170.5 days) at 15ºC and lower (76.6 days) at 35ºC. Therefore, temperature has a strong effect on the survival of *S. impressella* from 15ºC to 35ºC. The reproduction period varied between 15-35ºC with 6.82 to 3.24 days for pre-oviposition, 17.5 to 4.89 days for oviposition, and 5.29 to 0.82 days for the post-oviposition period. Female longevity was longer than that of the male, at all temperatures. The population growth parameters of *S. impressella* net reproductive rate (R_0), intrinsic rate increase (r_m), finite increase rate (λ), mean generation time (T) and doubling time (D) were significantly affected by temperature. Temperature affects *S. impressella* populations by reducing or increasing their possible occurrence in the palm trees. The effect of temperature on the development, survival and reproduction of *S. impressella* can be useful for predicting its long-term population fluctuation as an invasive pest of oil palm plantations.

KEY WORDS: Demographic parameters, insect pest, reproduction, survival, *Stenoma impressella*

1. Introduction

Stenoma impressella Busck (Lepidoptera: Elachistidae) is a pest of oil palm (*Elaeis guineensis* Jacquin; Arecales: Arecaceae) with the larvae defoliating the oil

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palm plantations in Colombia, Costa Rica, Ecuador, Honduras, Panamá, Peru and Venezuela (Genty et al., 1978; Howard et al., 2001; Martínez et al., 2009). *S. impressella*, a highly polyphagous caterpillar, is a known pest of *Citrus sinensis* (Osbeck), *Coffea arabica* (L.), *Psidium guajava* (L.), and *Theobroma cacao* (L.) between 0 and 1600 m altitudes and 22-32ºC (Genty et al., 1978; Zener de Polania and Posada, 1992).

The environmental conditions play a vital role in the adaptation of the insect pests and cause variations in the rate of development, colonization and distribution in the tropical crops (Gilbert and Raworth, 1996; López-Arroyo et al., 1999; Nechols et al., 1999; Bybee et al., 2004). Temperature has a strong effect on the reproduction and development rates of the insects (Burke et al., 2005; Noriyuki et al., 2011; Da Silva et al., 2012).

In investigating insect pest problems, the life history theory can be used to analyze population structure and stability, estimate the extinction likelihood, predict pest outbreaks, and examine the colonization and invasion probabilities (Jervis and Copland, 1996; Vargas et al., 2000). Studies on the insect life histories allow for the construction of models to analyze the reproduction, longevity and population dynamics of the pests in the agroecosystems. Studies on the biology and ecology of the oil palm pest defoliators *Elymnias agondas glaucopis* Staudinger (Lepidoptera: Nymphalidae), *Metisa plana* Walker, *Pteroma pendula* Joannis (Lepidoptera: Psychidae) and *Segestes decoratus* Redtenbacher (Orthoptera: Tettigoniidae) have been used as a starting point for the adoption of control methods and strategies (Young, 1985; Merrett, 1993; Ibrahim et al., 2013).

Population parameters are important in the measurement of the population growth capacity of a species under specified conditions. These parameters are also used

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as indices of population growth rates responding to the selected conditions and as bioclimatic indices in assessing the potential of a pest population growth in a new area (Southwood and Henderson, 2000). The research has been directed towards determining the basic biology of the insect pests on selected host plants and selected constant temperatures to develop models of the population dynamics (Kim et al., 2001; Bonato et al., 2007; Park et al., 2010). To develop a process-based mathematical model, descriptions of processes such as adult survival rate, oviposition, longevity and stage-specific development rates and mortalities are necessary (Taylor, 1982; Southwood and Henderson, 2000; Medeiros et al., 2003a; 2003b).

There is little information on the ecology of *S. impressella*, although populations are probably increasing greatly as the oil palm plantations expand to cover larger areas (Howard et al., 2001; Martínez et al., 2009). The biology and life history of *S. impressella* has been partially studied, primarily on the oil palm under variable conditions; however, these studies were carried out in the 1970s under inconsistent experimental conditions and the details of the life-cycle are not conclusive (Genty, 1978; Genty et al., 1978).

In this study, we describe the development rate, survival and fecundity of *S. impressella* on the oil palm, *E. guineensis*, under different temperatures, in order to contribute to the comprehension of the biology and ecology of *S. impressella* as a basis for the development of Integrated Management Programs in the oil palm plantations.

2. Materials and methods

Insects

In the field, 1835 adults of *S. impressella* (♂ = 941, ♀ = 894) were handy captured in 7-year-old commercial plantations of the oil palm, in the municipality of Puerto Wilches, Santander, Colombia (07°20' N 73°54' W), with 28.46°C average

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temperature, 75-92% RH, 145-225 sunshine h/year and 2168 mm annual rainfall. The insects were placed in metallic boxes (70cm long x 70cm wide x 80cm high) covered with a nylon mesh and transferred to the Entomology Laboratory of the Universidad de La Paz, Barrancabermeja, Santander, Colombia and reared at 28 ± 1°C and 75 ± 5% RH under a 12:12 light:dark photoperiod. These insects were used to establish a colony under laboratory conditions. Healthy insects without malformations were used in the bioassays.

Development

Males and females of *S. impressella* were caged in glass containers (30 cm x 30 cm x 30 cm) covered with a nylon mesh along with *E. guineensis* leaflets. Eggs were collected daily from the leaflet surfaces and transferred to Petri dishes (90mm x 15mm high) with a moistened filter paper at the bottom. The eggs were maintained at 16, 20, 24, 28, 32, 36 or 40 ± 1ºC, 75 ± 5% RH and 12: 12 L:D photoperiod.

In the course of the larval and pupal development, the first instar larvae were individualized in glass vials (5 cm x 25 cm high) plugged with cotton and fed daily on 25 cm^2 *E. guineensis* leaflets. The larvae and pupae were maintained at the same temperatures for the eggs until adult emergence.

The adults were placed in glass containers (30cm x 30cm x 30cm) covered with a nylon mesh and fed daily on a liquid diet (10 mL of sugarcane juice + honey + water, 3:1:1 proportion). The adults were maintained at test temperatures. The life history was determined from the newly laid eggs at seven different constant temperatures. Longevity and survival data from the different developmental stages of *S. impressella* were recorded daily.

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Pulp manufacturing with wood of *Eucalyptus* trees broken by wind

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Abstract

Forest plantations may be damaged by winds, especially 24 months after planting. The reduced quality of the wood fibers hinders cellulosic pulp production. The objective is to evaluate the use of these materials for pulp manufacturing when mixed with seven-year-old wood. The pulp of two *Eucalyptus grandis* x *Eucalyptus urophylla* clones were produced, bleached, and refined with 100, 95, 85, 75, and 0% of seven-year-wood, related to cutting age. Wood from two-year-old trees — the age at which most trees are damaged by wind — was used to complete each treatment. A 5 cm thick disk was taken from a 1.3-m height for each tree, for anatomical and ultrastructural characterization. The seven-year-old wood showed a lower frequency of vessels and fibers with a higher length, cell wall fraction, modulus of elasticity and hardness, and a lower microfibril angle. The refining of pulps decreased the opacity and specific volume, increased air resistance, and improved the mechanical properties. The addition of two-year-old wood in pulp production reduced the mechanical properties and opacity, and increased the air resistance of the paper. The proportion of the two-year-old wood that can be used in pulp production, varied with the clone, parameter, and refining level. However, the pulp produced with 5% of two-year-old wood and 95% of seven-year-old wood was similar to that produced with 100% of seven-year-old wood. Therefore, 5% of two-year-old wood can be used for pulp production without loss in quality.

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Keywords: Fiber, opacity, tear index, tensile index, wood

Introduction

In Brazil, the planted forests of *Eucalyptus* produce an average of 39 m^3/ha.year in a cutting cycle of seven years. These results are because of climate conditions and investment in research. The wood from these crops are used for multiple purposes, such as, production of panels, energy, and lumber and cellulose pulp. This generates jobs and taxes for the Brazilian economy, but the damage by winds may limit the performance of this segment.

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Wind damage results from air displacement from a low to a high pressure area. In Brazil, these damages are common in *Eucalyptus* plantations, mainly 24 and 36 months after planting, reaching up to 20% of the planted area.

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The losses by the winds reach the entire production chain. The wood harvest with a smaller diameter increases the cost of this operation and a new cultivation must be started early. Trees broken by the wind have poorer quality fibers because of early wood age, hindering its industrial use for pulp and paper manufacturing. Thus, this wood is considered for lower value use, such as power generation.

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The use of wood broken by wind in pulp and paper production can reduce the loss caused by the wind damage. The objective of this study is to characterize the anatomy and ultrastructure of the wood and assess the pulp quality from two *Eucalyptus grandis* x *Eucalyptus urophylla* clones made with mixtures of two- and seven-year-old woods.

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Methodology

Biological Material

Two *Eucalyptus grandis* × *Eucalyptus urophylla* clones with seven- and two-year-old wood were selected. The first age refers to the cutting time and the second to the highest wind damage. Three trees per clone and age were harvested. A disk of 5 cm was removed from a height of 1.3 m, for anatomical and ultrastructural characterization. Finally, one meter logs were taken at 0, 25, 50, 75 and 100% of the commercial height, for pulp production.

Anatomical characterization

A wood sample (1.5 x 1.5 x 1.5 cm) was removed from an intermediate position on the pith to the bark in the disk, at a height of 1.3 m. The slides (Johansen 1940) and the macerated material (Franklin 1945) were prepared. The microscopic description of the wood was done according to the International Association of Wood Anatomists (IAWA 1989). The cell-wall thickness of the fibers was calculated with the equation: Cwt = (Fw □ Lw)/2, and the cell wall fraction using the equation: Cwf = (2 × Cwt)/Fw) × 100, where, Cwt = cell wall thickness (μm); Fw = fiber width (μm); Lw = lumen width; Cwf = Cell wall fraction (%).

Microfibril angle measurement

The microfibril angle of the S2 layer was determined using the same sample used for anatomical characterization. After saturation, the sample was cut with a microtome in the tangential plane, in 10 μm thick sections. These were macerated with hydrogen peroxide solution and glacial acetic acid in the ratio 2:1 at 55°C for 24 hours. Next, the fibers were washed in distilled water and temporary slides were prepared to measure the microfibril angle.

The measurement of the microfibril angle was performed by polarized light microscopy, using an Olympus BX 51 microscope, adapted with a rotary stage, graduated from 0° to 360°, and connected to the image analysis program, Image Pro-plus. The size was increased 200 times and 20 fibers were analyzed per wood sample.

Nanoindentation

A sample (1.5 × 1.5 × 1.5 cm) was removed from the opposite position to that used for anatomical characterization. From this sample, a 3 × 3 × 3 mm specimen was made and embedded in epoxy resin solution to determine the modulus of elasticity and hardness of the S2 layer of the fiber and the middle lamella. The nanoindentation was performed in a TriboIndenter Hysitron TI-900®. The maximum applied load was 100 μN for 60 seconds, with discharge performed in 20 μN/s. The modulus of elasticity was determined according to the equation:

Where: MOE = modulus of elasticity (GPa); according to device manufacturer instructions, vi = 0.07; vm = 0.35, and Ei = 1140 GPA. The reduced modulus (Er) was obtained from the load-displacement curve, from the initial slope of unloading, wherein, the elastic response was generated (Muñoz et al., 2012).

The hardness was determined by the maximum load supported by the specimen divided by the contact area, according to the equation:

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