ISSN: 2230-9926

Available online at http://www.journalijdr.com

IJDR

International Journal of Development Research
Vol. 10, Issue, 03, pp. 34636-34638, March, 2020

https://doi.org/10.37118/ijdr.18355.03.2020

RESEARCH ARTICLE OPEN ACCESS

VARIATIONS OF LOG DIAMETER IN CLEAR LUMBER YIELD

***[1]Deus, P.R., [2]Dias, R.R., [1]Bilesky, L.R. and [3]De Deus, C.F.**

[1]Faculty of Technology, Department of Forestry, Capão Bonito, SP, Brazil; [2]UniversityJulio de Mesquita Filho - UNESP, Guaratinguetá, SP, Brazil; [3]Cultural and educational Society of Itapeva - FAIT, Itapeva, SP, Brazil

ARTICLE INFO

Article History:
Received 14th December, 2019
Received in revised form
28th January, 2020
Accepted 03rd February, 2020
Published online 31st March, 2020

Key Words:

Wood, Pine, Sawmills,
Standard S2.

****Corresponding author:*** **Deus, P.R.,**

ABSTRACT

The low yield and the high level of waste generated are a reality for many timber industries, the variation of the data can provide the increase of the conversion factor caused by the use of diameters with values below the desirable standard. The objective of this work was to evaluate the diameter Taeda pine wood with S2 and if there are interferences between the variations in diameter and the yield of the sawn wood. The diameter of the base and the top was checked over a period of one month, evaluating 02 loads per day, taking a sample of 32 logs per load. After, the stereo was related to the number of cubic meters of wood and the rate of conversion of logs into sawn wood was determined. Through the analysis of the input diameters, a large variation in the values with logs below the S2 standard was identified, which interfered directly in the wood conversion factor, requiring the use of a greater number of logs to form 1m3 of sawn wood. The control of the entry of logs into the company is important, as it allows to adjust the quality of the products.

Citation: ***Deus, P.R., Dias, R.R., Bilesky, L.R. and De Deus, C.F.*** **2020.** "Variations of log diameter in clear lumber yield", *International Journal of Development Research*, 10, (03), 34636-34638.

INTRODUCTION

Brazil has in its territory a vast amount of a material that has been widely used throughout history, Madeira. Being among the largest producers in the world and owning a significant area of forests, the country ends up having to deal with situations such as the exploitation and the unconscious use of this resource. Being also a major consumer, it registered 7.83 million hectares of planted areas and 5.80 million hectares of native areas in 2018, within this panorama it has 6.3 million hectares of certified areas including productive and conservation area. This study is based on planted forests for industrial segments, which includes products of approximately 5 thousand varieties including sawn wood, paper, cellulose, wood and charcoal floors and panels [1]. As it is a region of great commercial importance due to the export of tropical wood to many places in the world, the Amazon moves the socioeconomic sector, increasingly encouraging the use and exploitation of species that have a destiny and already established qualifications. Many species also resident in the same territory as the most common woods, certainly have potentials and qualities that can be used commercially and intended for different purposes. Such discoveries can arise through the deepening of knowledge through studies and research regarding anatomy and its technological use [2]. The discovery of new techniques of use and specific qualifications allows the expansion to new species able to supply the demand of consumption according to the purposes and designs sought, meeting the merchant needs, being that the biggest investments are destined to the genera that have fast growth with strategies aimed at the quantity of production [2]. The low yield and high rate of waste generated are a reality today for many small timber companies and even industries. The tactics used for the unfolding procedure are associated with the machines used, the characteristics and qualification of the raw material and also the applied methods that directly interfere in the results related to the utilization and the quantity of production [3]. In the forestry area, however, we have the possibility to quantify the yield of the raw material, with certainty and readiness, making the decisions about the industry's behavior to be precise, allowing the reduction of expenses and losses in the production process. It also establishes parameters for the formation of systems models for the exploration of future productions considering the results of the final product volume [4]. The index of variation of conversion of raw material into final product is 25% to 70% of the log volume, the main losses being caused by the steps of removing the angles, sawdust and

shavings for uniform width, length and thickness of the pieces. Factors such as wood properties, production systems exercised by the company and also the finalization of the product result in a decrease in productivity if poorly planned [3].

Hardly the sawn wood yield of a log had an excellent profit category, since the operator will rarely have a wide view of all the existing cutting options, making it difficult to define the best alternative [5]. With the national and international market more demanding in relation to quality and cost, competitiveness makes companies become more and more technical to reach the quality parameters. For this, the operational process must be organized and well established. The quality system parameters can indicate the direction and what should be considered, however the companies are not organized in a fiscal way [6]. In the forestry area, however, we have the possibility to quantify the yield of the raw material, with certainty and readiness, making the decisions about the industry's behavior to be precise, allowing the reduction of expenses and losses in the production process. It also establishes parameters for the formation of models of systems for the exploration of future productions considering results of volume of final product [4]. Also known as Transformation Coefficient, the yield factor is the association between the volume produced of sawn wood and the volume of log, given in percentage, where several factors affect the volume reached of sawn wood that induce the volumetric yield [7]. It is of great convenience that the selection of diameter classes and the determination of cut patterns occur, as they are elements of primary importance that aim to achieve high levels of utilization for specific diametric classes [5].

The Wood Assortment Standards are defined according to the final product that the forest is intended for, being quantified and classified for its different purposes based on the minimum diameter values of use (top diameter), for sawmill we have the Standard S2 with Fine tip diameter with a minimum bark of 23 cm and log length of up to 3.1 m. [8]. It is of great importance that strict control of the log diameters is carried out in the companies so that it is possible to quantify the yield achieved. The variation in the data can provide an increase in the Conversion Factor caused by the use of diameters with values below the considerable ones for a better performance, making it necessary to have a greater number of stereos (1 meter long wooden logs, 1 meter long). wide and 1 high with empty spaces between the pieces, that is, they do not fit precisely) for the formation of 1 m^3 of clear sawn wood (sawn, pretended and joined top pieces of wood, which do not present any knots and any defect or visual imperfection). The objective of this work was to evaluate the diameter input values of the logs that arrive at the sawmill of a timber industry with the production of Clear wood and if there are interferences between the variations in diameter and the yield of sawn wood.

MATERIALS AND METHODS

Pinus taeda wood was used with a pattern adopted by the sawmill called S2, harvested from a farm in the city of Sengés-PR. The woods are destined for a door construction industry - A, in which the diameter of the logs was evaluated in relation to the productivity of clear woods (boards ready for production). Log readings were taken in one month and then 02 loads per day were inspected taking a sample of 32 logs per load and finally the feet and the top of the samples are measured with a starret tape measure. After the readings, the average diameter is determined by relating the average of the foot to the average of the top, the volumes of the logs were obtained through two measures of diameter with bark at each end. Through the arithmetic mean of the diameters, the average diameter (Dm) was obtained, the diameters are classified according to the standards. This relationship also allows to determine the taper of the woods. After the tabulation of these data, the stereo is related to the amount of cubic meters of wood. Finally, the log conversion index for sawn wood is determined. These data were calculated using the Minitab statistical program.

RESULTS AND DISCUSSIONS

In Figure 1 it is possible to identify logs well below 23 cm in diameter, with logs up to 17 cm in diameter (outside the S2 standard). In Figure 2, it is observed that the yield was lower in week 01, 03 and 04. Due to the low diameter and high taper in the logs, because the higher the number in St / m^3, the lower the yield. Standard S2 (with thin point diameters over 23 cm) was the one adopted by the company, but when looking at Figure 1 we notice that there is a wide variation in diameters that directly interferes with the wood conversion factor, causing it to rise as the decrease in the measures found, going from 2.2 to 2.6 conversion rates, thus lowering the expected sawn wood yield.

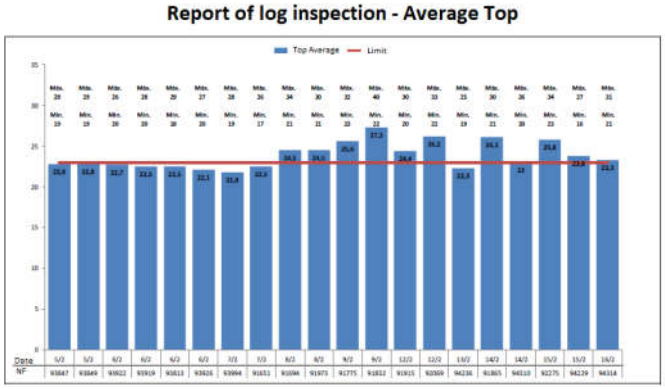

Figure 1. Average of the top readings

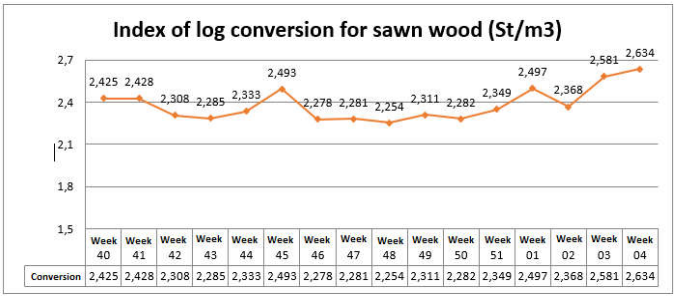

Figure 2. Log conversion index for sawn wood

In Figure 3, it can be seen that the ratio of stereo per cubic meter and the diameter of the log also shows a result similar to the yield of the conversion index, showing that a greater quantity of logs is necessary for the classes with the lowest average diameter. We can see in Figure 4 that there was a great variation in the amount of logs needed to form 1m^3 of sawn wood, this is due to the oscillation of values found in the analyzes carried out on the wood loads. The same fact occurs with the production of Clear sawn wood which, according to the increase in the Log Conversion factor, due to the decrease

in diameter, causing the need to use a greater number of stereos. The same situation of smaller log volume caused an increase in loss of end (removal of defects in the extremities such as cracks and breaks) and also in the lower yield value to obtain a m^3 of Clear sawn wood, since small diameter logs tend to have more knots and more bone marrow, making it necessary to use more logs to make $1m^3$ of sawn wood and consequently increasing the amount of waste generated, further reducing the final utilization results.

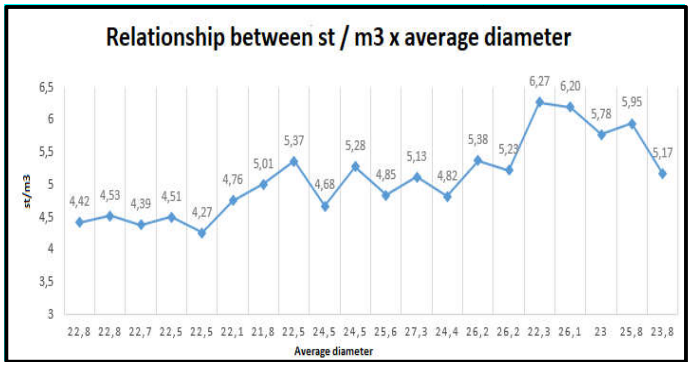

Figure 3. Relationship between the amount of stereos / m3 required according to the average diameter of the logs to form $1m^3$ of sawn wood

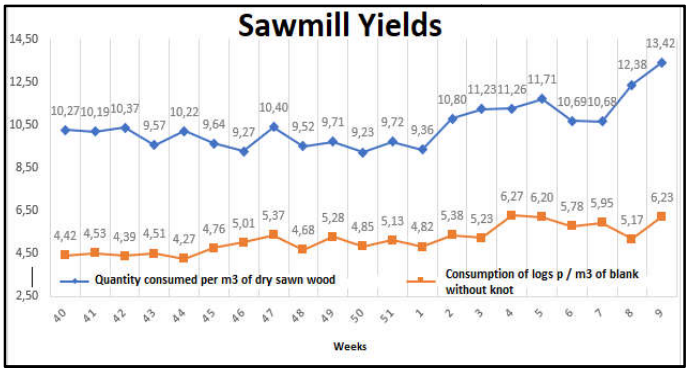

Figure 4. Number of Logs needed to obtain $1m^3$ of sawn wood and number of Stereos used to produce $1m^3$ of Clear sawn wood, respectively

Observing the junction between the variables: Average Diameter and stereos/m^3 we found the information that there was a significant increase from 4.0 to 4.5 st/m^3 to more than 6 st/m^3 for the formation of $1m^3$ of Clear wood, a fact occurred due to the decrease in yield and elevation in the Conversion Factor in the sawmill, where a larger amount of logs was used because the volume of wood was reduced due to the lower values of diameters found in the analysis of log entry control.

Conclusion

The small diameter and the high taper rate in the logs resulted in the use of a greater amount of stereos for the formation of $1m^3$ of sawn wood, showing that the higher the number in st/m^3, the lower the yield. The yield, normally between 68 and 70%, fell to an average of 66%, lost due to the need to use more logs, generating more waste, reducing the rate of use of the raw material. The control of log entry in the company is extremely important, because through this it was possible to identify the diameter variation that occurred between the wood loads in which values below the S2 Standard were found causing the Conversion Factor increase of 2.3 to 2.6 st/m^3.

REFERENCES

IBÁ - Indústria Brasileira de produtores de Árvores. Relatório IBÁ 2017 ano base 2016. Brasília: 2017. 100 p. Disponível em:< http://iba.org/pt/biblioteca-iba/publicacoes>. Acesso em: 30 jan. 2020

GARCIA, D. P.; CARASCHI, J. C.; VENTORIM, G. Caracterização energética de pellets de madeira. Revista da Madeira, v. 24, n. 135, p. 14-16, 2012. DOI : 10.15628/holos.2016.3886

DEUS, P.R. LIMA, J.H.S., BILESKY, L.R., DE DEUS, C.F. Elasticity of Eucalyptus Cloeziana Wood within a Sawmill Industry chanics, Materials Science & Engineering, Vol. 16, 2018. DOI 10.2412/mmse.60.91.911

VALÉRIO, A.F. *et al*. Determinação da densidade básica da madeira de cedro (CedrelafissilisVell.) ao longo do fuste. Pesquisa aplicada e agrotecnologia, v.1, n.1. p.23-28, 2008. DOI 10.1590/S0103-84782014000500009

CAMPOS, B.P.F; BINOTI, D.H.B; SILVA, M.L; LEITE, H.G. E BINOTI, M.L.M.S. Conversão de árvores em multiprodutos da madeira utilizando programação inteira. Revista Árvore, Viçosa-MG, v.37, n.5, p.881-887, 2013. DOI 10.1590/S0100-67622013000500010

LONGE JUNIOR, D.COLODETTE. L. J.Importância e versatilidade da madeira de eucalipto para a indústria de base florestal.Pesquisa Florestal Brasileira, Colombo, v. 33, n. 76, p. 429-438, out./dez. 2013. DOI 10.4336/2013.pfb.33.76.528

OLIVEIRA, A.D. de *et al*. Viabilidade econômica de serrarias que processam madeiras florestais nativas. O caso do municipio de Jru, Estado de Rondônio. Cerne, v.9, n.1, p 001-015, 2003.

KOHLER, S.V. Evolution of tree stem taper in Pinus taeda stands. Cienc. Rural, Santa Maria, v. 46, n. 7, p. 1185-1191, July 2016.

****