

Physical and acoustical properties of wavy maple wood used for musical instruments

Current title

Physical and acoustical properties of wavy grain sycamore maple (*Acer pseudoplatanus* L.) used for musical instruments

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Authors' Amendments

First we would like to thank the reviewers for carefully going through the manuscript and providing helpful suggestions for its improvement. Thanks to their constructive comments, we are able to present clearly and better version than the original manuscript. All the comments of the reviewers have been considered. In particular, the following changes have been made according to the reviewers' suggestions, highlighted by yellow color in the manuscript.

Response to Reviewer 2:

Thank you very much for your time and suggestions to improve our work.

Comments/Recommendations

While I appreciate the concept of the study, the paper needs a lot of work. The purpose of the study is not clear (see notes below). The methodology is flawed in that type of figure, angel variations, etc., is not noted or discussed (see notes below), and the results are questionable. English language clean up may help a lot of this but significant discussion in the introduction is needed about types of figure in maples, as is better sample methodology.

- The abstract is confusing. What was the purpose of the study? Is it trying to correlate the desire for figured maple with favorable acoustic properties? Clarity is needed here
- the purpose statement in the introduction is also confusing. It appears as though the authors are trying to figure out what additional properties figured maple gives to musical instruments. However figure is broad and each degree of fiber angle change could have an impact. The introduction does not do a review of the different types of figure, such as the curly, quilted, fiddleback, and flame figure in maple, among many others.

Answer: We thank the reviewer for this relevant and thoughtful remark in the current context. The objective of the study refers to European sycamore maple wood used for musical instruments. We reformulated the purpose of the research highlighting the novelty of the results in the context of the state of the arts.

In the introduction, reference was made to the types of figure wood known for sycamore maple, exemplifying with pictures made by the authors themselves (See Figure 1). Also, information was introduced regarding the wavelength measurement methodology, the approaches from the literature on the angle of curly grain being discussed.

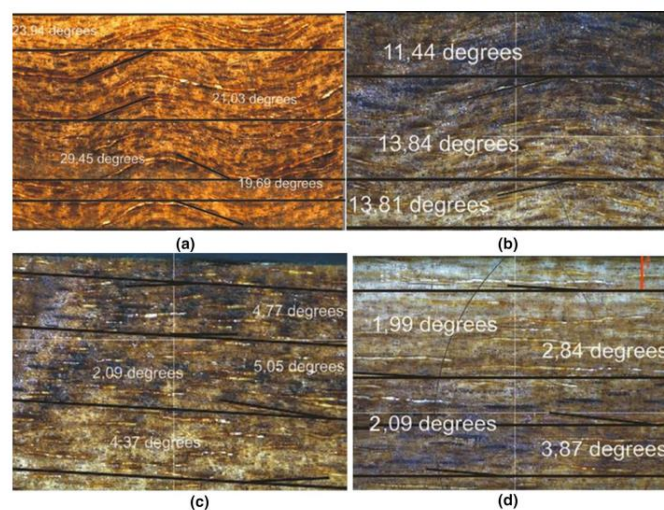
The verification of the English language was done with the help of the am MDPI editing service.

- It is unclear whether the citation about sycamore in the intro is about European sycamore (a maple) or North American sycamore (not a maple). North American sycamore has genetically controlled interlocked grain, which is NOT the same as having curly or wavy figure. They come from two separate mechanisms. This point needs to be clarified.

Answer: We thank to reviewer for useful recommendation. We clarified in the paper this aspect related to the analyzed species - it is European sycamore maple (*Acer Pseudoplatanul L*), and to avoid confusion, the name sycamore maple was used throughout the article.

Previous studies by the authors as well as from the references, highlighted the fact that the shorter the wavelength, the higher the degree of curly grain, thus existing an inversely proportional relationship between the two characteristics. In the article [Stanciu, M.D., Coşereanu, C., Dinulică, F. et al. *Effect of wood species on vibration modes of violins plates*. *Eur. J. Wood Prod.* 78, 785–799 (2020). <https://doi.org/10.1007/s00107-020-01538-5>] the angle of the fiber was measured according to the method proposed by Alkadri et al, 2018 [ref. 9] and an inverse proportionality relationship was found between the wavelength and the angle of the curly grain. Starting from this conclusion, in the present paper we consider that the wavelength is sufficient to express the degree of undulation (see below figure extracted from ref. Stanciu et all. 2020).

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The Spearman rank-order correlation coefficient between the wavelength and the width of the rings is -0.367 ($p=0.13$) and the correlation between the wavelength and the regularity of the rings is -0.075 ($p=0.79$). From here it follows that there is no connection between the geometry of the rings and the curly grain. Therefore, the degree of curly can only be justified with the wavelength (if the wavelength is small, it means a pronounced undulation, if the wavelength is large, it means a low degree of curly).

- methods: how did the authors decide what constituted wavy grain, or enough wave? Figure is not uniform in wood. Some areas may have more figure than others. What was the cut off? What if the wave had more of an angle in a piece? How was the selection of wood controlled?

Answer: We thank the reviewer for this relevant and thoughtful remark in the current context. The selection of samples in the four classes was based on the method of selecting sycamore maple wood by luthiers, knowing that there is a rigorous selection because the price of the wood and implicitly of the musical instrument increases the more the wood has a special figure. Such a method was chosen because the study regarding the correlations between the physical characteristics and the elastic and acoustic ones of sycamore maple wood, has an applicative character and technological transfer to the producers of musical instruments.

- I do not understand the purpose of measuring color of the point of the research was sound quality from figured wood

- it is unclear how the width of the annual rings plays into figure in this study and should be explained
- as the color data was not statistically significant and color does not affect sound, I suggest deleting this part. It does not help the narrative

Answer: We thank to reviewer for useful recommendation. The study started from the hypothesis of the existence of correlations between the physical appearance of sycamore maple wood, including figure of wood and its acoustic/elastic properties, as we mention also in the paper. Thus, we tested the hypothesis of the connection between color, macroscopic structure and acoustic properties that was highlighted, in previous studies in spruce (see ref. 20. Dinulică, F.; Stanciu, M.D.; Savin, A. *Correlation between Anatomical Grading and Acoustic–Elastic Properties of Resonant Spruce Wood Used for Musical Instruments*. *Forests*, 2021, 12,1122. <https://doi.org/10.3390/f12081122>). Even if the color data was not statistically significant, this is precisely a conclusion of the study regarding the existence of any link between color and acoustic characteristics. Thus, with all due respect, we consider that the data highlighted in the article are necessary.

- the conclusions make it sound like the authors were comparing spruce wood results to maple. Is this correct? In three different places we have three different purposes for the study

The subject of the study is interesting. However, I am confused about the choice of species that are studied. The objective is on maple wood however, the authors studied sycamore and spruce wood.

Answer: We thank the reviewer for this relevant and thoughtful remark in the current context. The objective of the study refers to the correlation between physical features of sycamore maple wood and its acoustic and elastic properties. To avoid the confusion, throughout the article, comments related to spruce wood have been removed.

We thank the reviewer for the attention paid to the evaluation of the paper and for the all and all recommendations made to improve the article.