Gambang: The Gamelan Wooden Xylophone

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This work investigated the ironwood used to construct a gambang, which is a traditional musical instrument. A gambang is constructed from a wooden bar with a similar thickness and width but a different length. The sound and established frequencies were compared with the equal tempered scale. The peak differed from the intended pitch and the partials were not always harmonic. This gambang only classified 4 octaves. The audio classification of the gambang was based on signal processing using a Picoscope oscilloscope. This article explains how wood is transformed into musical instruments. The findings revealed that the sound aspect and sound value of the wood keyboard instruments differed from the desired pitch. The third octave notes created C5, E5, E5, G5, and A5 instead of C5, D5, E5, G5, and A5, while the fourth octave pitch produced C6, D6, E6, G6, and A6# instead of C6, D6, E6, G6, and A6. Only the third and fourth octaves exhibited nearly flawless tuning for the gambang.

DOI: 10.15376/biores.17.2.2020-2030

Keywords: Harmonic; Gambang; Octave; Note and pitch

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INTRODUCTION

A gambang consists of wooden bars that sit on a wooden resonator. There are two arrangements of tone, *i.e.*, slendro and pelog. Slendro is comprised of five tones, 1, 2, 3, 5, and 6, whereas the pelog tone is arranged as 1, 2, 3, 4, 5, 6, and 7 (Radèn 1984). All complete double sets of gamelan instruments contain two gambang, one for slendro and one for pelog (Gitosaprodjo 1984). In addition, the gambang has a 3 to 4 octave register pitch (Vetter 1989). The octave based on note C, starts from octave 1 (C3 to C4), goes to octave 2 (C4 to C5), and then goes to octave 3 (C5 to C6). However, in some circumstances the octave is based on note E, starting from octave 1 (E2 to E3), going to octave 2 (E3 to E4), octave 3 (E4 to E5), and octave 4 (E5 to E6). One Javanese gamelan ensemble consists of 3 sets of gambang. One set is a slendro scale, and two sets are a pelog scale. A gambang is a wooden musical instrument like a xylophone (similar to the metallic ones of a typical metallophones). It has many bars of varying lengths that correspond to different pitches and produce a diverse frequency spectrum. The bars are often constructed of teak wood, though ironwood is sometimes used because it is a dense hardwood that is difficult to rot. Teak (*Tectona grandis*) is a tropical hardwood tree species in the family Lamiaceae. It is a large, deciduous tree that occurs in mixed hardwood forests. *Tectona grandis* has small, fragrant white flowers arranged in dense clusters (panicles) at the end of the branches. Ironwood is extremely strong and heavy, and it has been classified as a heavy hardwood with an air-dry density of 835 kg/m^3 to 1185 kg/m^3 (Wegst 2008). This timber is one of the