Production of String Instruments Made of Japanese Cedar (*Cryptomeria japonica* D. Don) from Nara

Nara Forest Research Institute

1. Project Outline

Japanese cedar trees in Nara have been grown under laborious forestry management and maintenance with close planting, repeated thinning and long rotation. This allows for the production of strong and beautiful wood with uniform and dense annual rings. In this project, focusing on the refined characteristics of Nara cedar, we measured the wood's acoustic properties to evaluate its potential as a material for string instruments, and then tried to product a violin, viola, and cello using local, high-quality Nara cedar wood.

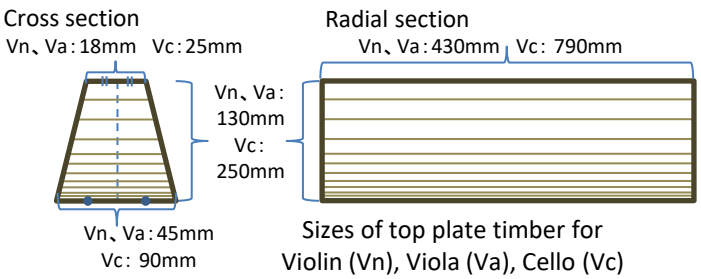
2. Production of string instruments

■ **Production period**: ① Violin 1: October 2017 - March 2018
② Violin 2, Viola, Cello: April 2018 - March 2019

■ **Parts made with Nara cedar**: Top plate, bass bar, sound post (For other parts, wood species commonly used for each item were used since their characteristics are different from those of Japanese cedar.)

- **Top plate**: Also known as the soundboard. It acts as a vibrating body that transmits sound. Spruce with a straight wood grain is commonly used.
- **Bass bar**: A piece of wood on the underside of the top plate. It reinforces the top plate and efficiently distributes vibrations throughout the top. Particularly useful for low-pitched tones.
- **Sound post**: A post sandwiched between the top and the back. It supports the pressure of the string tension and transfers the vibration of the sound received from the bridge from the top to the back for better acoustic effects.

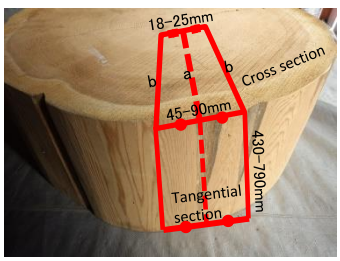
Main parts of string instruments	Material
Top plate, bass bar, sound post	Spruce --> **Japanese cedar from Nara**
Back plate, ribs, neck, etc.	Maple
Fingerboard, nut, pegs, etc.	Ebony



Sizes of top plate timber for Violin (Vn), Viola (Va), Cello (Vc)

■ **Details of Nara cedar used for production**

- **Place of origin**: Kawakami Village, Yoshino District, Nara
- **Age of trees**: ① 270 years old ② 250 years old
- **Drying method**: ① Naturally dried for more than 20 years
② Naturally dried for less than 5 years, and low-temperature artificial drying
- **Original use**: Construction materials (e.g. ceiling panels)



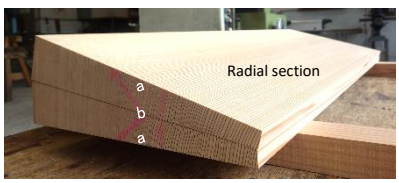
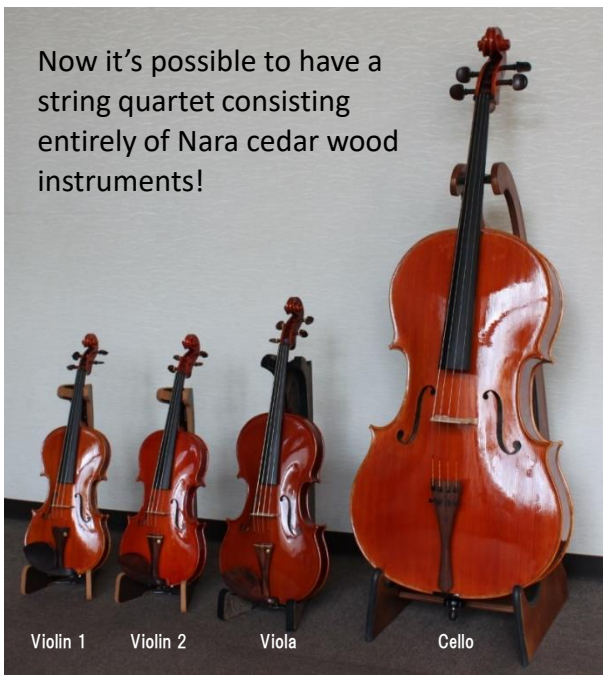


Image of sawing into top plate (left).
Timber cut for cello top plate (right)

Production process of violin top plate



3. Results of acoustic test

We measured the radiation characteristics of the sound and confirmed that the instruments made with Nara cedar have similar characteristics to those made with ordinary spruce (*Picea abies*).