TREE-RING BULLETIN, *Vol. 56, 2000*

RESEARCH REPORT
TWISTED INCREMENT CORES: GETTING IT STRAIGHT

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ABSTRACT

Increment cores that dry with a spiral twist are a problem in any study where a clear view of transverse wood anatomy is required. This problem may become acute when working with wood that is partially decomposed. After soaking cores in a urea solution, we can remove spiral twists by applying steam to the cores and gently twisting cores until they straighten. Treatment does not result in a serious distortion of ring widths.

INTRODUCTION

Sampling trees by taking increment cores is a method of increasing importance in climatological (Cleaveland et al. 1992; Meko et al. 1993; Stahle et al. 1988), archaeological (Bannister 1962; Robinson 1976), and ecological (Baisan and Swetnam 1990; Cook 1987; Fritts and Swetnam 1989) research. Dendrochronologists commonly encounter the spiral twisting of the core. Although this problem sometimes indicates a dull or dirty borer, twisting can be the result of structural characteristics of the wood. Slight twists <90 degrees in the length of the core are not unusual and can often be remedied simply by twisting gently while using a jet of steam to soften the wood. More extreme twisting can become a significant problem, especially when the wood being sampled is partially decayed. Decomposing wood may swell inside the increment borer, causing the core to turn with the borer, or differential drying rates within the wood may create a spiral twist in the sample after collection. Regardless of the cause, spiral twisting can result in the loss of valuable samples. In addition, efforts to straighten samples often cause breaks that serve as additional sources of error in dating and measurement even if the twist is successfully removed. This paper presents a method that can be used to easily and inexpensively straighten severely twisted cores.

METHODS

Samples of American chestnut (*Castanea dentata*) were collected from remnant logs using an increment borer. Many cores became twisted because of swelling that occurred after the wood was in the borer. Other cores twisted during drying. A 1:1 ratio by weight solution of urea and water was prepared using reagent grade urea (U.S.D.A. Forest Products Laboratory 1943). Cores were placed in plastic soda straws that had been slit on the sides to facilitate movement of the solution as well as

subsequent drying of the cores. Straws were placed in a shallow, flat pan, and a block of wood was placed on the straws to hold them in the solution. The samples were left in the urea solution for 24 hours, removed, and allowed to dry for several days. Once dry, cores were held over a steam jet until the wood became pliable (a matter of seconds), then the cores were gently manipulated until they untwisted.

To determine if the treatment altered the dimensions of the cores, four cores were mounted, lightly sanded and measured prior to being soaked in the urea solution. The cores were then soaked off the mounts, saturated with the urea solution, dried, steamed, remounted, sanded, and remeasured. A paired t-test was used to determine if there were significant differences between the before and after measurements.

RESULTS AND CONCLUSION

There were no significant differences between before-treatment and after-treatment measurements for two of the cores ($p<0.05$). Significant differences did exist for the remaining two cores. These differences, however, were generally small, never exceeding one standard deviation from the mean of the initial series ($n=240$). Significant differences were the result of measurements being more negative or positive for a particular core. We believe that any slight distortion in measurements was offset by the recovery of data that might otherwise have been lost.

In conclusion, this process provides an inexpensive and easy method for manipulating samples that are distorted due to twisting that occurred during the coring or drying process. It does not appear to appreciably alter the dimensions of rings if they have not been distorted by twisting.

ACKNOWLEDGMENTS

We gratefully acknowledge suggestions for manuscript improvement by David Stahle, John Dixon, and Bob Keeland.

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