Björner and Wachs defined a major index for labeled plane forests and showed that it has the same distribution as the number of inversions. We will define and study the distributions of a few other natural statistics on labeled forests. Specifically, we introduce the notions of bottom-to-top maxima, cyclic bottom-to-top maxima, sorting index and cycle minima. Then we show that the pairs $(\text{inv, Btmax})$, $(\text{sor, Cyc})$, and $(\text{maj, Cbtmax})$ are equidistributed. Our results extend the result of Björner and Wachs and generalize results for permutations. (Received September 22, 2017)