In 1976, Gyárfás and Lehel conjectured that any finite list $T_2, T_3, \ldots, T_n$ of trees with 2 through $n$ vertices can be packed into $K_n$, the complete graph on $n$ vertices. This means that the edges of $K_n$ can be partitioned into disjoint sets $E_2, \ldots, E_n$ in such a way that $E_i$ is the set of edges of a tree isomorphic to $T_i$ for $2 \leq i \leq n$. This conjecture is still unresolved.

We examine an analogous conjecture for packing trees into complete bipartite graphs: that is, if $T_{a,a}$ denotes a tree whose partite sets both have size $a$, which we call a balanced tree, we conjecture that any finite list $T_{1,1}, T_{2,2}, \ldots, T_{k,k}$ can be packed into $K_{n,n}$, the complete bipartite graph on $2n$ vertices.

We first show that so long as $k < \lfloor \sqrt{7/18n} \rfloor$, any list of balanced trees $T_{1,1}, T_{2,2}, \ldots, T_{k,k}$ can be packed into $K_{n,n}$.

We go on to find restrictions on the degree sequences which guarantee that, if we specify the degree sequences for one of the partite sets, we can find a list of balanced trees $T_{1,1}, T_{2,2}, \ldots, T_{n,n}$ having the specified degree sequences so that these trees can be packed into $K_{n,n}$. (Received September 22, 2011)