**Charcoal and Forest Management**

Charcoal is vital to the *tatara* ironmaking process. It acts as both a fuel and a reducing agent: the burning of charcoal releases carbon dioxide that reacts with and removes oxygen atoms from the iron sand, leaving behind elemental iron.

Oak, pine, and beech wood was used to make charcoal for *tatara* furnaces. Wood was taken primarily from trees that were at least 30 years old; by that age, they had already produced new generations of saplings, and their growth had begun to slow.

Charcoal is made by heating wood past the kindling point in an oxygen-deprived environment to prevent it from catching fire. By heating the wood at different temperatures and changing the duration for which it is “cooked,” it is possible to change the characteristics of the charcoal. The charcoal for *tatara* furnaces still contains a certain amount of organic matter, which burns faster and at a higher temperature, creating the temperatures necessary to smelt iron and steel.

At the height of ironmaking in the region, the average *tatara* furnace operated 60 times per year, annually consuming roughly 810 metric tons of charcoal. This meant that each furnace needed nearly 60 hectares of forest to supply it with charcoal. The ironworks owner was responsible for managing the forest so that fuel did not run out.