

Tomita Jinpei and the Underdrainage Revolution

The story of rice farming in Kikuchi is one of steady technological progress, achieved through the efforts of local visionaries driven by a desire to improve life in their communities. Among the most influential of these innovators was Tomita Jinpei (1848–1927), a self-taught agricultural engineer who invented a simple but effective method for regulating the water level in paddy fields. His solution came to be widely adopted and paved the way for a significant increase in rice production throughout Japan.

Tomita Jinpei was born a farmer's son in the riverside village of Utena, west of what is now central Kikuchi. Since most of the village was marshland, its paddies were notoriously unproductive and susceptible to flooding, and there was no practical way to drain away the water when necessary. Toiling on the family farm, the young Tomita had first-hand knowledge of these difficulties. In 1875, while taking part in a government survey of farmland conducted nationwide in order to implement a new system of land taxation, he realized the difference proper drainage could make for crop yields.

Tomita decided to start an experiment. He purchased a portion of particularly waterlogged fields and laid underground drainage pipes made of bamboo, routing water downstream from his paddies. He then connected these pipes to a cylinder in which the water level could be adjusted by opening or closing an exit hole. Tomita continued to improve his system, and in 1903 he perfected a sophisticated underdrainage technique that came to be known as the Tomita System.

Efficient wet rice cultivation requires that the paddies can be freely drained or filled. In the Tomita System, ceramic drains are installed under the paddy soil, allowing water to flow downhill into a simple control structure consisting of two connected horizontal drainage pipes, one higher than the other. Gravity causes water from the paddy to drain from the upper pipe into the lower. Between these two pipes is a vertical cylinder that allows a plug to be lowered into place to block the flow of water. With the plug open, water drains easily out of the paddy, but closing the plug keeps the water in the paddy at a stable level.

Tomita's invention was revolutionary for both its efficacy and its simplicity, which made implementation easy and inexpensive. The Tomita System was adopted throughout Japan and in Korea, which was under Japanese rule at the time, and

contributed to notable increases in productivity and total arable land. Tomita Jinpei spent the rest of his life educating farmers and administrators on the importance of agricultural engineering. He also directed land reclamation projects on the Korean Peninsula from 1914 until his death at the age of 78 in 1927.