Fiona Heaney

Professor Clark

HI 3335

November 25, 2013

The Implications of Chinese Agriculture in Challenging Preconceptions

The development of China in the study of history of science, technology, and medicine is often over looked or minimized by Western historians as they explore the ways of the past. Such an error is costly in that the Chinese realm helped develop some of the very basic technologies that eventually became the building blocks for all of humanity. Although the European scientific revolution is one of the most commonly known among western cultures, the Chinese made numerous agricultural advancements that prove they had their own unique form of scientific development.

Since the beginning of Chinese civilization, finding arable land has been a difficult part of sustaining a growing population. Last reported in 2011, China currently has 12% arable land[[1]](#footnote-1) for planting crops such as cotton, wheat, millet, and rice. Because a sign of a thriving country was a growing populous, providing enough food to sustain an increasing population was a serious issue for China during ancient times dating back to 722 BCE. As a result, the Chinese people were the first to create a variety of planting methods and technologies that increased the efficiency of crop output long before Western civilizations reached the same efficiency.

One way of meeting large food demands was double cropping.[[2]](#footnote-2) This process of alternating crops by row allowed farmers to produce two kinds of harvest and overlap growing seasons of different kinds of vegetables and grain. The Chinese were the first to plant in rows which decreased the amount of animal interference with new seeds, because they were planted underground and put them ahead of their Western neighbors by allowing them to create trap crops. Trap crops are “a crop planted to attract insect pests from another crop, especially one in which the pests fail to survive or reproduce”[[3]](#footnote-3) Both of these techniques attributed to high crop success and these techniques were eventually passed on to Europe, thus allowing them to have a high crop success rate as well.

Another problem faced by having such a small amount of land was the difficulty in trying to lose as few plants as possible to pests. Some methods for avoiding pests were deep ploughing, finding insect resilient crops, releasing predators of pests, and maintaining weeds[[4]](#footnote-4). Each of these methods required a large amount of manual labor but because crop management was such a high priority, the emperors would hire officers to ensure pest prevention. Due to limited space, the highest number of crops possible needed to survive, which caused the Chinese to innovate and contribute to their own scientific revolution.

As an adaptation to elevated or uneven land, terrace irrigation was introduced.[[5]](#footnote-5) Although this technique was not adopted in Europe as much as some of the other irrigation and pest control methods of farming, this adaptation to a challenging landscape is evidence of the high level of adaptability the Chinese people had to less than ideal terrains. In order to deal with the flat surfaces built at higher elevations, irrigation systems had to be developed to deliver water to these crops.

Technologies such as the square-pallet chain pump and paternoster pump[[6]](#footnote-6) allowed farmers to feed water from large sources, such as the Yangtze River, into irrigation canals and channels by utilizing an circular chain containing square pallets that carried water as far as fifteen feet high. This primitive system made it possible for people to work away from large bodies of water but such ability was not seen in the Western world until the Industrial Revolution. The two events, however, occurred in vastly different time periods; the pallet pump originated to about 1 AD[[7]](#footnote-7) whereas the mills and water systems of the industrial revolution were not seen until the 18th century. By 20 AD, China had also developed the trip hammer,[[8]](#footnote-8) originally used for polishing grain. Such technology was not seen in Europe until the 12th century AD.

The later introduction to technological advancements made by the Chinese was not a rare occurrence. Things such as silk, paper, tea, and porcelain were not widely used by the West until at least 1000 years later.[[9]](#footnote-9) Nathan Sivin[[10]](#footnote-10) asked why the scientific revolution did not (supposedly) take place in China, but it can be seen through the advancement of agriculture that the non-western world did indeed have a revolution, but at their own pace and time, unlike their neighbors. The Chinese people developed new technologies, as they needed to, whether it was to sustain their growing population, or make their lives easier. The common misconception that Chinese agriculture, among other technologies and sciences, was “by Western standards…both backwards and stagnant,”[[11]](#footnote-11) is not valid in respect to their advancements made throughout the Neolithic era and when spoken of in respect to modern technologies, the Chinese are not backwards in any way, rather they have developed a system that has not yet failed them and therefore has gone without revision. This speaks to the strength of the Chinese nation and its ability to withstand numerous political and social movements without ever needing to divide itself.

Western historians should learn from this and broaden the scope of knowledge they use when stating that Europe was a highly enlightened group of countries that were superior and far more advanced than their counterparts. The most common misperception is that the major changes in thinking and eventual introduction to capitalism made the Europeans smarter than the Chinese. The separation of church and science whilst making discoveries about the workings of the Universe in Europe appeared to be a great advancement, whereas in China, such boundaries never existed. The Chinese people accepted the integration of beliefs with scientific discovery and never identified it as its own field, thus allowing it to grow freely and without the societal implications produced by things such as the Royal Scientific Society. The implications of Chinese history can be seen throughout the world whenever the Western world was introduced to a “new” technology that they had never seen before. Their advancements made them a valuable trading partner and allowed growth of ideas among a variety of cultures.

The usage of Chinese agriculture is just one of many ways in which the non-western world developed a variety of technologies and methods long before their Western neighbors. The preconceived notion held by most Western inhabitants is one of false superiority that can be easily challenged by the rich history of Chinese advancement. In addition, the study of China and its background not only challenge preconceptions, but also allow for new insights as to how other cultures and regions may have worked outside of the typical European understandings.

# Works Cited

Wei-Ming Wang, Jin-Long Ding , Jun-Wu Shu, Wei Chen. *Exploration of Early Rice Farming in China.* Vol. 227. Nanjing: Elsevier, 2010.

Chengxiang, Pan. "The Development of Integrated Pest Control in China." *Agricultural History* (Agricultural History Society) 62 No. 1 (Winter 1988): 1-12.

Encyclopedia of Modern Asia. *Terrace Irrigation.* Vol. 5. The Gale Group Inc, 2002.

Kuo-Chün, Chao. *Organized Leadership and Agricultural Technology in Modern China.* Vol. 32. 1 vols. Agricultural History Society, 1958.

"Trap Crop" *Merriam-Webster.* Britannica Digital Learning , Web 25 November 2013

2011.

Morton, W. Scott. "Timeline of Chinese INventions." *Columbia Univeristy.* 1983. http://afe.easia.columbia.edu/song/readings/inventions\_timeline.htm (accessed November 20, 2013).

Sivin, Nathan. "Why the Scientific Revolution did not Take Place in China -- or did it?" *The Environmentalist* 5, no. 1 (1985): 39-50.

Shelach, Gideon. *The Earliest Neolithic Cultures of Northeast China: Recent Discoveries and New Perspectives on the Beginning of Agriculture.* Vol. 14. 4 vols. Journal of World Prehistory, 2000.

The World Bank. *Arable Land by Country.* 2012. http://data.worldbank.org/ (accessed November 20, 2013).

1. The World Bank. *Arable Land by Country.* 2012. http://data.worldbank.org/ (accessed November 20, 2013). [↑](#footnote-ref-1)
2. The Press Syndicate of the University of Cambridge *The Cambridge History of Ancient China: From the Origins of Civilization to 221 B.C.* Cambridge, UK: Cambridge University Press, 1999 [↑](#footnote-ref-2)
3. "Trap Crop" *Merriam-Webster.* Britannica Digital Learning , Web 25 November 2013

2011. [↑](#footnote-ref-3)
4. Chengxiang, Pan. "The Development of Integrated Pest Control in China." *Agricultural History* (Agricultural History Society) 62 No. 1 (Winter 1988): 1-12. [↑](#footnote-ref-4)
5. Encyclopedia of Modern Asia. *Terrace Irrigation.* Vol. 5. The Gale Group Inc, 2002. [↑](#footnote-ref-5)
6. Needham, Joseph *Science and Civilisation in China: Volume 4, Physics and Physical Technology, Part 2, Mechanical Engineering* Cambridge University Press, Jan 2, 1965

These pumps utilized human or animal power to pull the endless chain at an ideal inclination of 24º. See fig. 579 on pg. 340 of Needham’s book. [↑](#footnote-ref-6)
7. Needham 578 [↑](#footnote-ref-7)
8. Needham 82. The trip hammer is one of the simplest methods for utilizing rotary motion that was eventually adapted for various uses beyond its original purpose of decorticating rice [↑](#footnote-ref-8)
9. Morton, W. Scott. "Timeline of Chinese Inventions." *Columbia University.* 1983. http://afe.easia.columbia.edu/song/readings/inventions\_timeline.htm [↑](#footnote-ref-9)
10. Sivin, Nathan. "Why the Scientific Revolution did not Take Place in China -- or did it?" *The Environmentalist* Vol. 5, No. 1 (1985): 39-50. Dr. N. Sivin is Professor of both Chinese Culture and the History of Science at the Univeristy of Pennsylvania [↑](#footnote-ref-10)
11. Kuo-Chün, Chao. *Organized Leadership and Agricultural Technology in Modern China.* Vol 32. Issue 1 Agricultural History Society, 1958. [↑](#footnote-ref-11)