

Analysis on the Historical Data of Cultivation Chapter in *Zhen Wang Nongshu*

Feng Huang¹ & Jiahu Hu¹

¹ College of History and Philosophy, Tarim University, 1487, Alaer 843300, China

Correspondence: Jiahu Hu, College of History and Philosophy, Tarim University, 1487, Alaer 843300, China.

doi:10.56397/JRSSH.2022.11.01

Abstract

“Reclamation means eliminating wasteland, and plough means plowing fields.” In the cultivation chapter of *Zhen Wang Nongshu—Farming and Sericulture*, eliminating wasteland and plowing fields are considered to be the priorities of agricultural planting, which are closely connected with specific technology and favorable timing and place in practice. Other agricultural books are also cited to explain this statement. The ancient agricultural reclamation technology and methods are explored by systematically sorting out the historical data in cultivation chapter, and we have learned that the ancient people knew nature, respected nature and used nature from agricultural cultivation, as well as the agronomic thoughts reflected by them, so that we can further discuss the value of the historical data contained in cultivation chapter.

Keywords: *Zhen Wang Nongshu*, cultivation, the value of the historical data, agronomic thoughts

1. Introduction

Xuan Zheng of the Eastern Han Dynasty said, “Field is meant to be fertile and cultivable, and it is mostly meant to be given to the people by the grain.” No matter farming time, farming equipment, agricultural technology, etc., all take the cultivation of land as the first step. Without cultivation of land, there is no farming, and there is no agricultural civilization without farming. *Zhen Wang Nongshu* name agricultural book, because of the song dynasty Fu Chen, Ming dynasty Shen is the agricultural book, so the acla by the agricultural book is also known as *Zhen*

Wang Nongshu. It is composed of three parts: Nong Sang Tong Jue, Nong Qi Atlas, and Grain Spectrum (The four library versions are also known as the Grain Spectrum). The academic circles generally believe that the Nong Qi Atlas, with its combination of texts, diagrams and poems, is of the highest value, but the importance of the theoretical Nong Sang Tong Jue is also disputed.

So far, there are a lot of studies on *Zhen Wang* and his *Nongshu* in academic circles. Mr. Shusen Qiu thought *Zhen Wang* was from Tai'an, not Dongping, through textual research. Mr (Shusen Qiu & Ying Zhou, 1991) (P90-92). Ying Zhou is

also believed to be Tai'an (Ying Zhou, 2019) (P207-210). However, at present, the scholars generally believe that they were Dongping people, and no scholars have made textual research on them. Mr. Shiyuan Hao believes that *Zhen Wang Nongshu* was written in the second year of Dade in Chengzong (1298) and published in the second year of Huang Qing in Renzong (1313) (Shiyuan Hao, 1985) (P95-98). However, Mr. Shijiang Peng believes that the *Zhen Wang Nongshu* was written around 1303, the seventh year of Cheng Zong Dynasty (Shijiang Peng, 1986) (P131-133). In addition, some scholars differentiated the version of *Zhen Wang Nong Shu* (Kexhi Xiao & Jianqiang Cao, 1999) (P289-290) (Kexhi Xiao & Zhaokun Li, 1992) (P56-57+63), and the agronomic ideas contained in the *Nongshu* (Xiangcai Zhong, 2017; Yun Pan, 2007; Wentao Guo, 1997) (P1-7) (Tianjun Wu, 2013) (P14152-14155) (Tianjun Wu & Shuangting Zhang, 2014) (P32-33), Zhen Wang's own life story (Shusen Qiu & Ying Zhou, 1991) (P90-92) (The ancient agricultural figure—Zhen Wang, 2016) (P68) (Qiyu Miao, 1990) (P326-335). And "making movable type to print calligraphy", etc (Huiming Cheng, 2004) (P300-301) (Zhizhong Li, 2002) (P53-57). Some scholars also reviewed and analyzed specific chapters of *Zhen Wang Nongshu* (Jinli Wang, Shuhua Yu, 2020) (P160-163) (Shenmao Jia, 2020) (P68-72) (Xin Zhou, 2013) (P122-123). However, there is little research on reclamation and tillage. The reclaiming and plowing describes the specific techniques of wasteland removal and arable land. It also contains the agronomic ideas of time and place; the analysis of its historical data is of significance to understand the ancient tillage and to compare the present reference.

2. Zhen Wang

Zhen Wang (1271-1368), courtesy name Boshan, was born in Dongping. Some scholars also believe that he was born in Tai'an Prefecture. There are few historical records about Zhen Wang's life, and the earliest record should be Boshan Wang *Nongshu* written by Biaoyuan Dai, a contemporary of Zhen Wang:

"When Bingshen was a young man, he visited Xuancheng County. He was a good man, a scholar, and a ruler of Jingde.....For three years, Boshan did not go to Jingde, but the people of Jingde sang songs instead. Cover boshan not only teach that

the farmers of the square and device, but also can not disturb and safety, so that the people tame and the daily chemical also. Six years later, I recommended him to the official Xinzhou, and then Boshan transferred him to kill Yongfeng.....The government of Boshan was rapid in Yongfeng, and it was almost as fast as when he lived in Jingde.....So Bo Shan from Yongfeng write book, said *Nong Qi Atlas*, *Nong Sang Tong Jue* show me." (Zhen Wang wrote it. Xianwu Sun, Xingchao You proofreading, 2014) (P928)

In this preface, Zhen Wang first served as an official in Jingde and then was transferred to Yongfeng, and both of them made good use of methods to advise and teach Nongsang skills, and recorded Zhen Wang's writing of *Nongshu*. Biaoyuan Dai's preface to *Zhen Wang Nongshu* is more credible because it is a contemporary product. The textual research on Zhen Wang himself and the time when *Nongshu* was written comes from this. At present, a more comprehensive description of Zhen Wang's works should be the Great Dictionary of Chinese Local Records:

"Zhen Wang, courtesy name Boshan, was born in Dongping County, Shandong Province in Yuan Dynasty. Yuan early famous agronomist, movable type printing improvement and the chorography scholars. From the Zhenyuan period to the fourth year of Dade (1295-1300), County Yin of Jingde and Yongfeng counties paid attention to farming and sang. He wrote the thirty-seventh volume of *Nongshu* and the *Calligraphy of Making Movable Type and Printing*, and compiled the *Annals of Jingde County*. The book has about 60,000 words and is printed with homemade wooden movable type. Can be called a good book, cherish the death." (Editorial Committee of Chinese Local Chronicles Dictionary, 1988) (P372)

In the Dictionary, Zhen Wang is classified as a native of Dongping County, and there is a brief account of Zhen Wang's improvement of movable type printing and his compilation of *Jingde Annals*. Like the Dictionary, Zhen Wang is described as a Dongping native in many local chronicles, works and periodicals. In addition, there are four inscriptions related to Zhen Wang (Shusen Qiu & Ying Zhou, 1991) (P90-92) (Ying Zhou, 2019) (P207-210), Mr. Xianwu Sun and Mr. Xingchao You gave an overview of the four

inscriptions:

"The first pass for Zhen Wang wrote, "Ji'nan Renjie Du recorded" Dongping Fu Lu to commend Zhang Gong on Mount Tai, in the second year of the Zhiyuan Dynasty (1265); The second passage is "Wang buried a monument to his relatives", established in the fourth year of the Zhiyuan Dynasty (1267); The third link is written by Qian Li of Dongping government school, "Rebuilding the Xuansheng Fu in Tai'an", established in the twelfth year of Zhiyuan (1275) April; The fourth passage is Zhen Wang's compilation of "Tai'an rebuilding spirit school hou temple Tablet" in the thirteenth year of Zhiyuan (1276) October." (Zhen Wang wrote it. Xianwu Sun, Xingchao You proofreading, 2014) (P1)

Different from the academic community widely described, Mr. Shusen Qiu and Mr. Ying Zhou through textual research that Zhen Wang was Tai'an. Mr. Shusen Qiu, by comparing the historical materials of two Zhen Wang in Yuan Dynasty and analyzing the four inscriptions, believes that it is Zhen Wang, an agronomist, who was born in Tai'an. "It is more accurate to know that Zhen Wang was originally from Tai'an, Shandong Province. Zhen Wang was formerly called a Dongping man. In the ninth year of the Zhiyuan Dynasty (1272), Dongping put down the road, which has a wide jurisdiction and many changes. Now according to the first monument began to know Zhen Wang for Tai'an state. And Tai'an state to the yuan five years (1268) has been analyzed province, not Dongping." (Shusen Qiu & Ying Zhou, 1991) (P91) There are two reasons why Shusen Qiu thinks so. First, ZhenWang was born in the 8th year of the Reign of the Emperor (1271), and Dongping Road was separated from Tai'an Prefecture in the 5th year of the reign of the Emperor (1268). "Tai'an state...to the yuan two years, province Xintai County into Laiwu County, five years, analysis of the province, thirty-one years..." (Lian Song & et al., 1976) (P1369) Tai'an Prefecture was originally under the jurisdiction of Zhong Shu Province and in the first tombstone inscription, Zhen Wang claimed that "Fenggao was born late". Fenggao was located in the middle of Fengfu and Laiwu, and belonged to Tai'an Prefecture (Qixiang Tan chief editor, 1996) (P9-10); Second, if the argument is only based on one inscription, it is a lonely proof, so Mr. Shusen Qiu

verified that Zhen Wang was named as Professor of the state in the three and four stone inscriptions. "Zhou professor Yinzhen Wang sent his protege Chen Liu to write a book in Dongping, please remember the story", Zhou Professor Zhen Wang wrote, so it is believed that Zhen Wang belonged to Tai'an people. Mr. Ying Zhou also in Mr. Shusen Qiu's textual research on the basis of certain arguments.

But the author doubts that Mr. Shusen Qiu, Mr. Ying Zhou, Mr. Xianwu Sun and Mr. Xingchao. You all believe that the first tablet mentioned to the second year of the Zhiyuan Dynasty is 1265, but Zhen Wang was born in 1271, the inscription earlier than Zhen Wang, and how to explain the first tablet is the agronomist Zhen Wang. Historically, the year name Zhi Yuan was used by two emperors of the Yuan Dynasty, one by Kublai Khan, Emperor Shizu of the Yuan Dynasty, for 31 years from 1264 to 1294, the second year of the Zhiyuan Dynasty in 1265, and the other by Tuoze, Emperor Shun of the Yuan Dynasty, for 6 years from 1335 to 1340, the second year of the Zhiyuan Dynasty in 1336. In combination with the first tablet of Dongping Fu Lu proclaimed Dehui Zhang (1195-1274), the first tablet should be established in the second year of Zhiyuan Shizu to Yuan Dynasty (1265). Zhen Wang was not born in this year, so Fenggao late born Zhen Wang is not an agronomist Zhen Wang. Similarly, Zhou Professor Zhen Wang in the three and four stone inscriptions is not an agronomist Zhen Wang. Therefore, there are insufficient historical materials in the argument that Zhen Wang was from Tai'an Prefecture.

3. Analysis of the Structure and Content of Reclamation and Cultivation

3.1 Reclamation and Cultivation Structure

The whole content can be divided into four parts: general theory, waste removal, arable land, and arable land, showing a total score structure.

From "Yi Da Zhuan Yue" to "The sound of a well, premeditatively ploughing", a total of 163 words, describing the origin and evolution of farming, and explaining the two words reclamation and cultivation, it is necessary to introduce the content of the two subjects. The content of the eradication of wasteland ranges from "Guo Zhao was the chief of the search millet" to "This is the success of

the eradication of wasteland and reclamation”, with a total of 725 words. The specific content is a total score structure, involving different seasons, different terrain, different tree weeding methods, and arable land can also be weeded, which can also improve grain output after weeding. The contents of cultivated land range from “the matter of plough and plow” to “the difference between the North and the South Topography”, with a total of 1259 words. The specific contents are divided into the total score structure, involving the change of cultivated land at the beginning and end, the adaptation of cultivated land to the time and place, the method of cultivated land in different places of the North and the South, etc. As the two main parts, the writing combines the specific techniques and methods, and the idea of natural time and geographical agronomy runs through the whole. The contents range from “every family works in the field” to “the work of the grain wall can be done next”, with a total of 320 words, and can also be a total score structure, emphasizing the importance of human factors and the development of people and thoughts.

3.2 Content Analysis of Waste Removal

Reclamation refers to the burning or removal of vegetation on wasteland so as to make land available for cultivation. In ancient times, there are different terms for the reclamation of land in different seasons. The reclamation of land in spring is called liao huang, which means to burn the weeds on the land with fire and burn the grass that is about to sprout. The cultivation of land in summer is called green, which means that the lush grass is buried in the soil by ox tillage and used as soil fertilizer. The land reclaimed in autumn is called the wild grass, which is cut down with tools and burned to death. As for when and how to carry out land reclamation and other contents of land reclamation, Zhen Wang combined the agronomic research achievements of his predecessors and his own experience in Reclamation, quoting the *Si Min Yue Ling*, *Rites of Zhou* and *Poems* respectively to explain.

3.2.1 When and How to Eliminate Waste

Zhen Wang has a brief description of the time, the land and the purpose of the desolation removal. For example, quoting Shi Cui’s *Si Min Yue Ling*, “In the first month, the earth rises, and the earth

grows”, is also called “old roots can be pulled out” in *Qi Min Yao Shu*, so that the desolation removal will be “the land of the Black ruins of strong earth”. In February, the earth returns to spring and the weather warms up, which can remove the wasteland, slow the soil and improve the land along the river. Apricot blossom in March can be removed from the waste white light soil field; May, June can eliminate the wheat. The aim of eradication is to rid the soil of roots, roots, trees, etc, to make it viable for cultivation, a mower that can be mowed down in different ways for different fields. Zhen Wang believed that in the field of reeds in water park, the li dao (weeding tool) should be used first to cut off the upper reeds, and then the iron plow should be used to remove the roots of reeds, which is relatively labor-saving. Larger trees, in the mountains or old wasteland to cut dig dug away with its branch parts, for the tree roots buried in soil, should use common tools to remove, or to trees with broad area rather than digging roots, branches can be burned from the top of the roots after being dried, and then in office after the rain cow drag the stone wheel or roller rolling with mud. It can be planted in a year or two. If the forest is too fecal, it can be killed by peeling, and three years later, the root, plant and stem will be decayed by fire, so that it is ripe field and can be cultivated.

3.2.2 Specially Set up Waste Removal Personnel

In the early days, there were officials dedicated to land reclamation. Zhen Wang described Zhi, who took charge of “killing grass”, and Zuo, who took charge of “attacking the foothill of vegetation and forest”, in quoting the *Rites of Zhou*, both of which were subordinate officials of the Autumn official “Si Kou”. Zhi uses the way of “spring born and cute, summer has come and gone, autumn rope and mower, Winter kill is invented.” (Tianyu Yang, 2004) (P556) Spring, summer, autumn and winter seasons are given according to the different characteristics of grass eradication, and there is “if you want to change it, it will be changed by fire and water” to improve the soil strong soil thought. Zuo method of removing plants and trees was to burn them in summer and freeze them with water in winter. In winter, make the stripping of Yin wood and water. If you want to change it, the spring and autumn will change its fire and water. (Tianyu Yang, 2004) (P555) It also contains the idea

of strengthening the soil to improve the soil.

Although the *Rites of Zhou* describes the number of special officials, it reflects the urgent need and attention of the ancient rulers to weeding and land reclamation, and also reflects the ancient people's idea of understanding nature, using nature, and making good use of the right time and place.

3.2.3 Waste Removal Can also Strengthen Soil

In addition to the thought of strengthening soil that "water and fire change" mentioned in the *Rites of Zhou*, Zhen Wang believed that the elimination of wasteland can also strengthen soil, that is, the combination of the elimination of wasteland with reclamation, natural time, methods, soil cultivation, weeding and so on. First of all, all the land reclamation will be in the rain, the reason should be soft soil after the rain, and turned into the bottom after sufficient moisture. The tool in addition to waste is to take "mediation plow shallow deep thickness, shallow is grass-roots, deep is not to plug, coarse is greedy for hard work, detailed rules greedy less work, only in can" (Zhen Wang wrote it. Xianwu Sun, Xingchao You proofreading, 2014) (P67-68) reclamation way, Wentao Guo called it "Shang Zhong" thought (Wentao Guo, 1997) (P1-7). After the reclamation, crops such as millet, sesamum and mung bean are planted in the soil to enrich the soil and improve the soil quality. In another year, it can become a grain field. If it is planted for many years and many grass species are selected, it can have a good harvest, that is, it can achieve the effect of twice as much as the ripe field.

3.3 Analysis of Cultivated Land Content

3.3.1 The Revolution of Plow Tools and Methods

As an important tool of land farming, plow plays an important role in agricultural production. The continuous improvement of plow tools and cultivated land mode in history has promoted the development of agricultural society. The early mature plow tool is "Lei Si", "the ancient people, all eat animal meat, as for Shennong, many people, the lack of animals, so Shennong because of the day, the force of the land, Lei Si people farming." (Gu Ban & et al., 1985) (P21) However, the farming method is combined with the plow of Xia, Shang and Zhou generations. That is, two people plow with the two plows, resulting in low production efficiency. After the Spring and Autumn Period,

the Jun Shu of Ji Hou began to promote ox farming. At the same time, iron farm implements were also widely used. "The materials for making farm implements changed from non-metal to metal, and it was an era when copper farm implements alternated with iron farm implements." (Yanjing Chen, 2011) (P5) In the Han Dynasty, Guo Zhao summarized the method of replacing farmland and carried out the system of three plows and one ox, which made the farmland more labor-saving and improved the farming efficiency. Moreover, Zhen Wang believed that the farmland tools and methods in the Yuan dynasty were "the cultivator who cultivates today has a large share of the ancestors". According to Qiyu Miao and Guilong Miao, the three ploughs and one ox here should be three feet columbine. (Zhen Wang wrote it, Qiyu Miao, Guilong Miao translated notes, 2008) (P33) The planter, it's not a plowing tool. However, the coupling plough created by Zhen Wang, that is, two cows, three people and one plough, did improve the efficiency of farming.

Plow as a plow tool is widely used and continuous improvement greatly promotes the agricultural production efficiency. Zhen Wang believes that "today's easy Lei Si is a plow, not to mention the strong and weak land." (Zhen Wang wrote it. Xianwu Sun, Xingchao You proofreading, 2014) (P69) Thus we can see the role played by the improved plough in agricultural production. In addition, the cultivated land can also be based on the depth of the cultivated land and the need to take the initiative to adjust, and that plow as a tool, should be a simpler structure and a high use efficiency, "but the plow for the device, not simple and use." (Zhen Wang wrote it. Xianwu Sun, Xingchao You proofreading, 2014) (P69) Thus facilitating agricultural arable land.

3.3.2 The Close Connection Between Arable Land and Nature

Arable land is a necessary prerequisite for crop planting, which is not only closely related to plow tools and methods, but also closely related to weather. The mastery of arable land and weather is conducive to crop planting and harvest. The ancients of the uncultivated land said health, has cultivated land said ripe, early cultivated land said collapse, and then cultivated land said turn, coexist with the "living to deep and fierce, ripe to

shallow and cheap,” (Zhen Wang wrote it. Xianwu Sun, Xingchao You proofreading, 2014) (P69) the method of arable land. Ancient people also had certain requirements on the time of tillage of land. They believed that “fields differ from Yin, Yang, cold and Australia, and Australia’s topography differs from Australia’s superior to Australia’s dryness and humidity”, and therefore “the heaven is Australia’s.” Is the book this article quotes *Yue Ling, Qi Min Yao Shu, Fan Sheng Zhi Shu, Han Shi Zhi Shuo* to explain farming and the specific requirements and links.

Yue Ling believes that farmers planting should be in the spring plow first, “Meng Chunyue, the emperor with the Yuan pray grain in heaven, is the choose yuan Chen, the emperor operation Lei Si... The first alignment, agriculture is not confused, the month of the middle of spring, the cultivator less shed, this farmer to spring plowing as the first service also.” (Zhen Wang wrote it. Xianwu Sun, Xingchao You proofreading, 2014) (P70) and recorded that when the Emperor of Heaven and the three lords and Nine ministers cultivated the land, they taught the people what kind of crops to plant according to the characteristics of the land and what was appropriate for the land, and set the specific time requirements for farming, so that the people had the concept of the time of heaven for farming.

Qi Min Yao Shu that “all plowed high fields, do not ask the spring and autumn, must be dry wet for the best.” (Sixie Jia, Compilation compiled by Yun Yang, Zhu Cui & et al., 1995) (P7) There is no specific time limit for planting the fields, but there is a requirement for weather. For example, when there is no adjustment between drought and water, it is better to farm in hot and dry conditions than in wet conditions, because dry tillage, although not good, will improve the soil quality when it rains, and wet tillage will reduce the yield. *Qi Min Yao Shu* also thinks that “where the autumn ploughing to deep, spring and summer to shallow, plow to cheap, labor to again, autumn ploughing to cover the green. The first plow is deep, but the land is shallow.” (Sixie Jia, Compilation compiled by Yun Yang, Zhu Cui & et al., 1995) (P8) Different requirements for different times and different land conditions for cultivation, and Zhen Wang also agreed with Sixie Jia’s idea, that is, “we should practice cattle and sheep, and die in July.” (Zhen

Wang wrote it. Xianwu Sun, Xingchao You proofreading, 2014) (P70)

Fan Sheng Zhi Shu pays attention to the close relationship between farmland and the time of heaven. “The foundation of all plowing lies in the time of convergence... Ninety days after the summer solstice, day and night, heaven and earth and gas, to this time of farming, one and when five, called gypsum, all got time.” (Guoding Gao compilation, 1957) (P21) The 90 days after the summer solstice is also the autumn equinox, so that the autumn equinox is the best time to plow.

Han Shi Zhi Shuo believes that “all the land in addition to wheat, and appropriate autumn ploughing.” (Zhen Wang wrote it. Xianwu Sun, Xingchao You proofreading, 2014) (P71) Because the land cultivated in autumn has less wastage, it is more labor-saving. At the same time, *Han Shi Zhi Shuo* also believes that if there is no ox cannot fall tillage, in addition to the chestnuts of the land, the rest of the planting millet, beans of the land can also be spring tillage. Thus, it can be thought the spring and autumn ploughing the most appropriate, but it is worth noting that the asaps straightforward mentioned autumn ploughing should be early, late spring should be, namely the autumn ploughing should be taken advantage of the sun be the spirit is not cold, early farming or autumn frost in the middle of the cultivation, and spring to be postponed until the weather is warm, the sun rises, the both is to avoid the chill in the grave, that affect the harvest.

3.3.3 The Description of the Differences Between North and South Arable Land

Zhen Wang was an early agronomist who systematically recorded the differences between farming in the North and South, Biaoyuan Dai account in “Boshan Wang Nongshu preface”, Zhen Wang’s description of the differences between North and South agriculture is highly appraised. In Reclaiming tillage, Zhen Wang described the two different tillage modes in the North and south because of the difference in topography.

Zhen Wang thinks the northern farmland, “the land is flat, dry land”, spring is suitable for morning and evening tillage, summer is suitable for night tillage, autumn is suitable for high day tillage, and when ploughing, two or more cattle

are needed, but only one person holds the plow, according to the number of cattle and the force produced to determine the amount of arable land, that is, measure the strength of cattle, how much arable land. There are also certain requirements regarding the specific tillage method. To cultivate the land, it is necessary to combine the two plows to make the soil into a pile, then turn the plows to the outside, and finally make the three plows to form a domain. In the south, paddy fields are high and low, wide and narrow, and they are cultivated in water with a cow. Because of the difference of terrain in the south, the early maturity in the high field and the late maturity in the low field, but the people and animals in the south are resistant to summer, and the four seasons can be cultivated.

4. Historical Data Value of Reclamation and Cultivation

Since ancient times, all growers in the scale of land, all take reclamation as the first, now is no exception. Land is one of the important sources of food. The farming people harvest food and reproduce through farming. Through practice and exploration, they improve farming methods, innovate planting techniques, improve living standards, and make good use of the favorable conditions, so that agricultural civilization can be created and inherited. Nowadays, there are many differences between farming methods and ancient times, but the ancient farming experience is still useful for reference.

4.1 The Right Place at the Right Time

Zhen Wang thinks that agricultural production all has its time, "four hours each has its business, December each has its appropriate. The first time, is lost too early and not born; Later, it is too late to fail." (Zhen Wang wrote it. Xianwu Sun, Xingchao You proofreading, 2014) (P48) In the part of "Nong Sang Tong Jue Collection One", the author describes farming, ox farming and silkworm farming, as well as timing, geographical location and filial piety, the thought of heaven and time contained in it runs through the whole part of Nong Sang Tong Jue." The part of Zhen Wang's "Nongshu Nong Sang Tong Jue" can be said to be a general theory of agriculture, which is an overview of the content and scope of agriculture in a broad sense. The important agronomy thought revealed in it is the harmony and unity of

the characters of heaven and earth." (Wentao Guo, 1997) (P1) This agronomy thought is reflected in Reclamation and Cultivation by Zhen Wang in combination with many agricultural books. For example, in the content of land reclamation, land reclamation should be done in different months and in different ways in different seasons. For example, in the content of cultivated land, different seasons should be cultivated in different ways, and when converging, the appropriate time should be chosen, and the strong soil and weak soil should be distinguished, and the interests of the land should be paid attention to.

The utilization of cultivation and tillage in the nature, time and location is only partially reflected in the whole book, but it can also give a glimpse of the agronomy thought Zhen Wang wanted to express. Farmers book transit time can also be seen as farming, geographical can also be seen as human, people to recognize the nature of heaven and earth, in what way to know when and where the arable tillage can achieve the best effect, even include stars, stars and astronomical phenomena, such as is the ancient people under the small-scale peasant economy fully observation of nature and repeatedly try to grow, is also the pursuit of natural harmony and unity.

4.2 The Application of the Idea of Strong Soil

From early slash-and-burn agriculture to the cultivation agriculture, with the Lei Si and iron plows oxen-led to large mechanical production of modern agriculture, farmers had placed great emphasis on soil fertility, settled in intensive cultivation, the concept of strong soil forming gradually, reclamation and cultivation concept about strong soil in the the right place is also reflected in two aspects of wild and cultivated land.

Zhen Wang's idea of eliminating wasteland and strengthening soil is mainly manifested in removing all kinds of grass roots and seeds in the soil with the above method of eliminating wasteland, so that there is no wasteland to grow. So, the crop can lose growth, make more harvest, that is, "edge of the new ground, grass roots are dead, no drought can be born, if the color seeds pick every year, don't show, between a few years, can be no drought, often times the harvest of ripe field." (Zhen Wang wrote it. Xianwu Sun,

Xingchao You proofreading, 2014) (P68)

Zhen Wang's idea of strengthening soil in cultivated land is to improve soil quality, which is divided into "seedling dung, grass dung, fire dung, mud dung" and so on. (Zhen Wang wrote it. Xianwu Sun, Xingchao You proofreading, 2014) (P92-95) It is believed that the soil quality should be improved by the way of dung soil. "The field is good and thin, the soil is fat and Qiao, and the dung soil is urgent. Waste soil, so thin fields into fertile land, qiaosoil into fat soil." (Zhen Wang wrote it. Xianwu Sun, Xingchao You proofreading, 2014) (P91) In the "reclamation and article" involves the content of seedling dung, Zhen Wang's idea is "diffuse millet or fat hemp, mung beans, rake work again, next year is planted for the grain field." (Zhen Wang wrote it. Xianwu Sun, Xingchao You proofreading, 2014) (P68) And quote the book of Chen Nongshu to supplement it. "After the early fields were cut, then ploughing, sunburn, add dung accumulation, and planting rice, wheat, vegetables, thus ripe the soil and fertile, which is enough to help the harvest." (Zhen Wang wrote it. Xianwu Sun, Xingchao You proofreading, 2014) (P72) This method is also described in the *Qi Min Yao Shu* to plow the first, "where the method of the beautiful field, mung bean, small beans, flax second, are planted in May, June, July, August plow cover, for the spring valley field, mu of ten stones." (Sixie Jia, Compilation compiled by Yun Yang, Zhu Cui & et al., 1995) (P8) In addition to planting rice to improve the soil quality of the seedling dung, but also by growing weeds and burying, by the grass dung way to improve the soil quality, strong soil, Zhen Wang quoted *Qi Min Yao Shu* to account, "spring qi, can plow hard strong black Lou soil, often flat grinding its block to produce grass, grass sheng si si, light rain and it, the order has a block, waiting for time." (Zhen Wang wrote it. Xianwu Sun, Xingchao You proofreading, 2014) (P71) As for fire dung, it is "accumulated soil, with vegetation stacked burning." (Zhen Wang wrote it. Xianwu Sun, Xingchao You proofreading, 2014) (P94) In addition to the "dung soil" account, "reclamation and tillage" also has some accounts, such as "to fire, then through the ripe fields also." (Zhen Wang wrote it. Xianwu Sun, Xingchao You proofreading, 2014) (P67) Therefore, the land grass can be removed for easy cultivation, or buried in

the soil as grass manure, and can also be burned into fire manure to improve the soil fertility.

The concept of strong soil can be applied in various ways, mainly because of the intensive farming method of farmers in ancient times, so that a small amount of land can produce more food with greater fertility. It is the same principle as agricultural fertilization, but the method more reflects the concept of harmony and unity between man and nature, and also brings the idea of geographical location into play in multiple aspects of agricultural production.

4.3 Do What You Can to Plow

Sixie Jia of the Northern Wei Dynasty was the first to propose that "every family should be measured, and would rather be less good than more evil." (Sixie Jia, Compilation compiled by Yun Yang, Zhu Cui & et al., 1995) (P5) This view is quoted in Chen of the Song Dynasty and Zhen Wang of the Yuan Dynasty, intended to warn farmers to cultivate according to their ability, must not be greedy and become simple disadvantages. That is, "ploughing and reckless, in fact, also reckless and report, non-success and destroyed, in fact, also destroyed and report." (Zhen Wang wrote it. Xianwu Sun, Xingchao You proofreading, 2014) (P73) The land is not under intensive cultivation and the harvest is reduced. Zhen Wang combined with the predecessors' method of changing farmland, proposed to plow the land according to his ability, that is, the human resources. "If the dung is treated, and the manpower is present, the geographical place will spare himself. Despite the disaster, it should not be lost." (Zhen Wang wrote it. Xianwu Sun, Xingchao You proofreading, 2014) (P179)

Zhen Wang cited the *Fu Chen Nongshu* to describe the division of land and easy fields, "In the ancient times, the system of land division, one husband and one woman, awarded 100 mu of land, the land is fertile, so there is not easy, one easy, again easy difference." (Zhen Wang wrote it. Xianwu Sun, Xingchao You proofreading, 2014) (P73) It shows that the law of Yitian has a long history, and the earliest account of Yitian should be the *Rites of Zhou*, "a not easy land, home 100 mu, an easy land, home 200 mu, and then an easy land, home 300 mu." (Tianyu Yang, 2004) (P152) easy field method to change the land to plow, but

Zhen Wang believes that this method is not to maintain the soil fertility, that is, not to think that the soil is not growth, gas biological failure, but to restrain financial resources, tillage, harvest after intensive cultivation," suppress its financial resources, deep ploughing easy beans, and age can often be born." (Zhen Wang wrote it. Xianwu Sun, Xingchao You proofreading, 2014) (P74) Zhen Wang also believed that "today's farmer is not as good as the ancient", so he should be more farming according to the amount of money, to avoid "reckless destruction".

We also pay attention to intensive cultivation, pay attention to land fertility, advocate intensive management and the pursuit of harmony and unity with nature. *Fan Sheng Zhi Shu*, *Qi Min Yao Shu* till few about the account of tillage, *Fu Chen Nongshu*, "financial article" has power and till clear formulation, and analyze the pros and cons of content, Zhen wang summarizes the predecessors Yitian, on the basis of power to farming with its financial resources, and further analyze the pros and cons. In Guangqi Xu's *Complete Book of Agricultural Administration, The Rules of Cultivation*, it directly discusses the relationship between the number of mu and the required number, which is consistent with the concept of ploughing according to the ability proposed by Zhen Wang, Fu Chen and others.

5. Conclusion

Zhen Wang recorded the land reclamation and cultivation respectively in his "Chapter on Reclamation and tillage", in which he often cited historical materials for supplement and demonstration. The narration is clear and the content is detailed, which highlights the importance of reclamation and tillage. The widespread quotation of historical materials also has shortcomings. For example, in the Reclamation and Cultivation, the historical materials spring gas pass, plow hard and strong black soil, often plow the block with grass, grass plow, day has the light rain plow and it, the business order has a piece to be filled, the so-called strong soil but weak. It should have been in the *Fan Sheng Zhi Shu* ploughing. Sixie Jia also quoted it in the *Qi Min Yao Shu* ploughing. First, while Zhen Wang described it as "*Qi Min Yao Shu* speak", which seems to have something wrong. Moreover, a large number of references of

historical materials make the description of Reclamation and Cultivation lack of practicality. Although some references are marked in the book, there are still some quotes that are not explained. The content is quoted from some *Nongshu* before the Yuan Dynasty, but it is written in Zhen Wang's voice, so it is impossible to tell whether Zhen Wang has practiced this content. Although there are flaws in Zhen Wang's *Nongshu*, it does not hinder its status and value in the history of agriculture, as well as its role in the subsequent agricultural production. The description of "reclaiming arable land" provides some experience for us to reclaiming wasteland and arable land, and it still has its value in the current agricultural production.

References

- Shusen Qiu, Ying Zhou, (1991). An important discovery of the life story of the agronomist Zhen Wang. *Journal of Northwest Second Nationalities (Philosophy and Social Sciences edition)*, (01).
- Ying Zhou, (2019). Zhen Wang and the historical evidence of *Nongshu*. *Agricultural Archaeology*, (04).
- Shiyuan Hao, (1985). Yuan Zhen Wang *Nongshu* into the book time examination. *Agricultural History of China*, (01).
- Shijiang Peng, (1986). Also talk about Zhen Wang *Nongshu* into the book time—and Shiyuan Hao comrade discussion. *Agricultural History of China*, (02).
- Kezhi Xiao, Jianqiang Cao, (1999). A comparison of the Ming and Qing editions of the Zhen Wang *Nongshu*. *Agricultural Archaeology*, (03).
- Kezhi Xiao, Zhaokun Li, (1992). Zhen Wang *Nongshu* version quiz. *Ancient and Modern Agriculture*, (01).
- Xiangcai Zhong, (2017). *The History of Chinese Agricultural Thought*. Shanghai: Shanghai Jiao Tong University Press.
- Yun Pan, (2007). Study on the agro-ecological thought of Zhen Wang's *Nongshu*. Nanjing Agricultural University.
- Wentao Guo, (1997). Zhen Wang agricultural ology. *Ancient and Modern Agriculture*, (03).
- Tianjun Wu, (2013). Agronomic thought and

- contemporary value of Zhen Wang's Nongshu. *Anhui Agricultural Sciences*, 41(36).
- Tianjun Wu, Shuangting Zhang, (2014). Zhen Wang's Nongshu: an exploration of agronomic thought. *Journal of Ezhou University*, 21(04).
- Zhen Wang, (2016). The ancient agricultural figure. *Grain Economy in China*, (07).
- Qiyu Miao, (1990). Zhen Wang's character, political achievements and Zhen Wang Nongshu. *Agricultural Archaeology*, (02).
- Huiming Cheng, (2004). Zhen Wang and Nongshu makes movable type printing calligraphy. *Journal of Central-South University for Nationalities (Humanities and Social Sciences edition)*, (S1).
- Zhizhong Li, (2002). An interpretation of Sheng Bi's mud movable type calligraphy recorded in Meng Tan Pen Talk. *China Printing*, (08).
- Jinli Wang, Shuhua Yu, (2020). Brief analysis of the content and value of fungus in Zhen Wang Nongshu. *Chinese Edible Fungi*, 39(11).
- Shenmao Jia, (2020). Comment on the historical data value of fungus in Zhen Wang Nongshu. *Food and Medicinal Bacteria*, 28(01).
- Xin Zhou, (2013). Scatter perspective in Zhen Wang Nongshu Agricultural Atlas. *Agricultural Archaeology*, (01).
- Zhen Wang wrote it. Xianwu Sun, Xingchao You proofreading, (2014). *Zhen Wang Nongshu*. Changsha: Hunan Science and Technology Publishing House.
- Editorial Committee of Chinese Local Chronicles Dictionary, (1988). *Chinese Local Chronicles Dictionary*. Hangzhou: Zhejiang People's Publishing House.
- Lian Song et al., (1976). *History of the Yuan Dynasty*. Beijing: Zhonghua Book Company.
- Qixiang Tan chief editor, (1996). *The Historical Atlas of China*, 7. Beijing: China Map Press.
- Tianyu Yang, (2004). *Thirteen Classics translated notes*, Rites of Zhou translated notes. Shanghai: Shanghai Ancient Books Publishing House.
- Gu Ban et al., (1985). *Bai Hutong*. Zhonghua Book Company.
- Yanjing Chen, (2011). Research on ancient farm tools in Zhen Wang Nongshu Atlas. Qinghai Normal University.
- Zhen Wang wrote it, Qiyu Miao, Guilong Miao translated notes, (2008). *Translation of Donglu Wang's Nongshu*, Shanghai: Shanghai Ancient Books Publishing House.
- Sixie Jia, Compilation compiled by Yun Yang, Zhu Cui, et al., (1995). *To the art of the vernacular full translation*. Shenyang: Shenyang Publishing House.
- Guoding Gao compilation, (1957). The creation of the victory., *Fan Sheng Zhi Shu compilation*. Beijing: Zhonghua Book Company Shanghai Printing Factory printing.