

Dryland farming dispersal and population migration in 8000 to 5000 BP Northeast China: archaeobotanical and molecular biological evidence

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Short Abstract

The West Liao River valley has been well known as a centre for origin of dryland (millet) farming in Northeast Asia, with a history of millet farming for at least 8000 years. How millet farming was dispersed beyond the West Liao River valley and in particular how it was moved towards the Jilin and Heilongjiang provinces, remain little explored. Archaeobotanical remains and molecular biological evidence (from both humans and animals) shed light on this question in two aspects: (1) revealing the timing when human subsistence strategies shifted and suggesting changing role of millet farming over time and across space; (2) human DNA signatures are direct evidence for population contact and migration; while animal husbandry, especial domesticated animals, indicates the development of millet farming and its introduction to a new region (Heilongjiang province) also suggests population migration. The joint paper highlights the findings, especially those recently made yet unpublished, about plant and animal use, which can be combined to test the inland route for millet dispersal to the Russian Far East. It also sheds light on the connection between the West Liao River valley and the Liaodong/Shandong and Korean peninsulas.

Full Abstract

The West Liao River valley, characterized by the loess hilly-gully region, loess terraces and slope land, is ideal for early agriculture to be developed there. It is also an zone of ecogocial transition where the influence of environmental changes is clearly demonstrated. Since the cultural and chronological frameworks are being more fully developed in the West Liao River valley, many studies have been carried out to understand the economic production and subsistence strategies in different archaeological cultures and at different phases. In particular, the flotation method widely adopted in archaeobotanical studies have greatly advanced our understanding of the origin and development of dryland farming in the West Liao River valley.

During the Xinglongwa period, dated to as early as 8000 BP, two species of millets—broomcorn and foxtail, both of which are in relatively small sizes, with

long-grain shapes, and retained biological characteristics of their wild ancestors—were cultivated in the West Liao River valley. The changes in biological characteristics of wild plants suggest shifting human behaviors. From Zhaobaogou to Hongshan (ca. 7000—5000 BP), human subsistence strategies included agriculture as part of food production and agriculture focused on the cultivation of broomcorn and foxtail millets, even though both millets were relatively few, in terms of their absolute counts and ubiquity, in the archaeobotanical remains. Starting from about 4000 BP, great changes took place in the dryland farming system in the Lower Xiajiadian period, characterized by well-established agricultural facilities and diverse domesticated plants.

Molecular biology and physical anthropological studies have suggested that, from Hongshan to Xiaoheyuan, there was a genetic and physical continuity among the majority of human populations in the West Liao River valley. In terms of physical features, The individuals from this period of time and in this region were mostly characterized by an ‘ancient Northeast type’. Their Mitochondrial DNA (mtDNA) dominant haplogroups are D, A, B, while their Y-chromosome DNA haplogroup is dominated by N.

However, by the Lower Xiajiadian period, there is evidence that human genes in the West Liao River valley underwent shift and genetic admixture is strongly suggested, between the ‘ancient Northeast type’ and the so-called ‘ancient North China type’ populations, the latter of which lived in present-day northern Hebei and central-southern Inner Mongolia. Only by this period of time did the Y-chromosome DNA haplogroup O₃, which characterized the typical agriculturalists, start to become evident. The populations of the ‘ancient Northeast type’ and the ‘ancient North China type’ interacted with each other more often than ever before, which further promoted the development of dryland farming.

In addition, zooarchaeological studies have shown that, in the Middle Neolithic (ca. 8000—5000 BP), Northeast Chinese populations relied mainly on fishing and hunting for food, although they occasionally raised pigs for meat. Not until around 5000 BP did domesticated cows were raised in the Nenjiang River valley of Northeast China. After 5000 BP, suggesting that animal husbandry was developed by then. Therefore, zooarchaeological evidence not only suggests that the Nenjiang River valley received influence, possibly along with immigrants from other parts of Northeast China, by 5000 BP; it also suggests that dryland farming was much developed by 5000 BP.