Chapter 3
The Onset of Agriculture and Northeast Asian Neolithic Farm Culture

Abstract In the history of humanity, the beginning of agriculture is estimated to have occurred in the Near East, East Asia, and Central and South America at around the same time, about 12,000 years before present (YBP). Regions with a historically independent civilization are making efforts to discover the origins of their food culture. Europe, which developed archeological digs and analyses relatively early, asserts that wheat and barley were first grown in Mesopotamia, and that goats, sheep, and cattle were also first domesticated in that region. Russian plant breeder Vavilov (1887–1943) argued that rice originated in India, but archeological studies in China, which began in the early 1900s, about a century later than Europe, show that China preceded India in cultivating rice for the first time. On the Korean Peninsula, where archeological studies were initiated half a century later than Japan or China, the discovery of rice seeds at Soro-ri that are estimated to have been cultivated around 12,500 BCE, have challenged theories of the origin of rice cultivation once again. In this chapter, the history of agriculture, especially rice and soybean cultivation in East Asia was reviewed.

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C.-H. Lee, *Korean Food and Foodways*,
https://doi.org/10.1007/978-981-19-0023-5_3

3.1 The Beginning of Agriculture

Archeological studies indicate that by about 20,000 YBP the flow of human history brought people to most of the world's continents, including the Americas, and that by 12,000 YBP agriculture had begun in some of these regions, replacing the hunter-gatherer way of life with a more settled lifestyle. As humanity spread across the globe from its origins in Africa, people gradually began sowing seeds, taking root themselves when they found suitable locales for farming. According to Jared Diamond in *Guns, Germs, and Steel*, suitable places for growing crops included Southwest Asia's Fertile Crescent, China, Central America, the Andes Mountains, the Amazon River Basin, and the eastern region of the United States (Diamond 1997). Agriculture began with the cultivation of wild grains such as rice, wheat, barley, broomcorn millet, and corn, and as people began to grasp how to raise pigs, cows, dogs, horses, and other wild animals, they also discovered new ways of using them for food. The Near East and East Asia have the oldest artifacts yet discovered that were made for the purpose of preparing domesticated animals for food. In about 8000 BCE in Iraq's Jarmo region, traces of tools used to raise cows and cultivate wheat and barley have been unearthed, and in Thailand artifacts used with domesticated pigs have been found. Tools used for agriculture or animal husbandry that date to 7000 BCE have been excavated in Thessaly, Greece (pigs and sheep); in Jarmo, Iraq (donkeys); in the Near East (barley); and in Mexico (corn and pulses). From 6000 BCE archeological remains point to cow husbandry in northern Iran and the cultivation of pulses in Thessaly and Macedonia. There is a record of horse breeding from 4350 BCE in Ukraine and Central Asia. Broomcorn millet and rice grew wild in East Asia, but these began to be cultivated around 3000 BCE in the Yunnan area of China and Assam, India (Fig. 3.1).

Shin (2014) delineates seven independent civilizations around the world at the onset of farming culture, as follows:

1. Mesopotamia (Tigris and Euphrates River Civilizations): Grew wheat and supplied the Middle East and Europe with winter cereals (barley, rye, oats); the beginning of bread-based cultures, such as those around the Aegean Sea and Rome.
2. Egypt (Nile River Civilization): Cultivated Einkorn wheat (*Tritucum monococcum*) introduced from Mesopotamia; bread-based culture.
3. India (Indus and Ganges River Civilization): Cultivated Indica rice (long-grain); Indica rice-based culture.
4. Gojoseon (Han, Daedong, and Liao River Civilizations): Cultivated Japonica rice (short-grain) and soybeans (*Glycine max*); rice and soybean-based culture.
5. Ancient China (Yellow River Civilization): Grew short-grain rice, long-grain rice, and wheat; rice and noodle-based culture.
6. Central America (Maya Civilization): Cultivated maize; maize-based culture.
7. Andes (Inca Civilization): Cultivated potatoes (*Solanum tuberosum*); potato-based culture.

Fig. 3.1 Origins of plant cultivation and animal domestication

Shin, Yong-Ha inserts Gojoseon into a generally accepted list of global civilizations, maintaining that evidence supports the independent civilization of the Korean Peninsula, which included parts of northeastern China and southeastern Russia at the time.

Humans eventually migrated from their place of origin in Africa east through the Eurasian continent, and on to the Far East, including the Korean Peninsula. About 53,000 YBP, during the final glacial period of the Pleistocene epoch (the fourth Würm glaciation), people could not survive north of the 40th parallel (which passes through current-day Sinuiju and Beijing), and Paleolithic peoples living in Korea congregated in limestone caves (Shin 2018). About 13,000 YBP, when the last glacial period ended, amid rising temperatures Paleolithic families moved out of caves and began living along river banks and coastal areas to fish and farm. The Korean Peninsula was the most populous area of Northeast Asia at the time, especially in the fertile regions of the South Han River (*Namhangang*) and upper Geum River (*Geumgang*), which are thought to be the areas in which rice and broomcorn millet were first cultivated (Shin 2014). When charred rice seeds from about 12,500 YBP were excavated at Soro-ri archeological site along the South Han River, the previously held origin date of initial rice farming was tentatively adjusted back by almost 5000 years. A number of Korean academics, including this author, hold that the dissemination of short-grain rice cultivation may have spread from its origin near the South Han River to the Daedong River region, and then north to the Liaodong Peninsula (Dazuizi site) and to Shandong Peninsula (where rice seeds dating to about 2040 BCE had been discovered). Thousands of years after its

inception, rice cultivation was broadcast throughout the Liaodong Peninsula by the nomadic Eastern Archer tribes, the Dongyi.

3.2 The Origin of Rice Cultivation

3.2.1 Origin of Rice Cultivation in East Asia

The origin of rice cultivation was once thought to have been located in the Assam region of India's Ganges River, from whence it was said to have spread to Myanmar, Thailand, Laos, and Yunnan China. This generally accepted view was updated when evidence of older rice grains was found in China. According to findings at the Gaho archeological site in Henan, and sites such as Pengtoushan, Bashidang, and Yuchanyan in Hunan, rice cultivation is now believed by many to have begun in the Yangtze River Valley about 11,500 YBP (Huang 2000). Signs of the conversion from wild to cultivated rice species are judged by changes in the morphology of seeds, phytoliths, and panicle rachis. Some scientists argue that it would have taken about 5000 years to transition from wild to fully cultivated rice (Liu and Chen 2012). Therefore, in gathering cultures where wild rice was collected and eaten, the time difference between the first deliberately sown rice plants and the generalized practice of rice cultivation was vast. Regular cultivation of rice occurs around the same period as wheat and barley cultivation in the Near East, around 10,000 YBP.

India's oldest ancient rice dates to 1700 BCE (although carbonized rice has been reported from the 3000s BCE, both wild and cultivated). India's oldest Sanskrit book, the *Rig Veda*, which was written in 1000 BCE, mentions wheat and barley, but there is no record of rice. On the other hand, in China, several records of rice and rice wine are found in the literature of the Shang dynasty (1600–1046 BCE) and Zhou dynasty (1050–256 BCE). Archeologically, cultivated rice (*Oryza sativa*) from around 4000 BCE was excavated at the Ching-lien-kang site in the Yangtze River basin, but Indica (long-grain) rice and Japonica (short-grain) rice are mixed here. Most rice produced in China until 1000 CE, however, was short-grained, although some long-grained rice was produced in southern China (Ho 1975).

However, as mentioned above, 12,500-year-old rice seeds have since been excavated in Korea's North Chungcheong Province at the Soro-ri archeological site in Cheongwon-gun (Lee 2014). North of Soro-ri stands the Charyeong mountain range, while about 900 meters south of the site the Miho stream, a tributary of the Geum River, flows through a flat area of land that has been researched extensively. At the request of the Korea Land Development Corporation, the Chungbuk University Museum implemented an investigation of the earth's strata for cultural artifacts here in 1994. Through this investigation, a wide array of Paleolithic tools was discovered, including choppers, scrapers, notches, cores, and flakes. In total, 127 grains of ancient rice were excavated at this site. Of the 18 grains of rice recovered, 17 were Japonica and 1 was Indica. 109 grains of "quasi-rice," types 1 and 2, were also discovered, making quasi-rice the dominant species at the site.

Fig. 3.2 The World's Oldest Cultivated Rice Seeds, Discovered at the Soro-ri Site, Cheongwon-gun, North Chungcheong Province, Korea

The rice seeds were mostly excavated from the upper part of the middle peat deposit layer; in the middle part, one grain each of ancient rice and quasi-rice were detected; and the lower part revealed only 1 grain of quasi-rice. The form of the rachilla (the spikelet that bears the seeds atop the plant's stem) on these ancient rice grains is truncated, different from that of wild varieties, which are elongated and pointy, but not due to natural variation; rather, SEM (Scanning Electron Microscope) images indicate that the rachilla shows traits of having been cut by an outside force, which is characteristic of cultivated rice (Fig. 3.2). Cambridge University's worldwide public survey program has dated Soro-ri rice seeds as far back as 15,118 BCE, or about 17,000 YBP. These seeds have been given the scientific name *Oryza sativa coreaca*.

In Korea "weedy rice" is the extant species closest to ancestral wild rice; the actual wild ancestor of today's rice no longer exists. In light of the fact that the Soro-sri rice seeds are the oldest generation of rice found to date, the current lack of ancestral wild rice stems from the natural selection that would have occurred over time during the continual process of people planting and harvesting rice. The results of a DNA analysis of the Soro-ri rice seeds show a 39.6% genetic similarity between quasi-rice and cultivated rice, thus indicating an evolutionary process at work. Soro-ri rice seeds have been shown to have about a 57% rate of similarity to wild rice. Soro-ri rice fits into the evolutionary process of gradual refinement between the semi-agricultural stage and the early farming stage. In other words, it may be surmised that Soro-ri rice is a grain in the early stages of refinement, an ancestor to Korean cultivated rice (Lee 2014).

The regions with the largest concentration of common wild rice in China comprise Hainan Island, Guangdong Province, and part of Guangxi, while north of the 24th parallel wild rice is rare. However, Beijing University Professor Yan (2000) uses Harlan's theory (Harlan 1997) to argue that the cultivation of rice did not begin in the fertile South China region where wild rice grew in abundance, but rather in the northern reaches of the Yangtze River, where winters are cold and food must be stored. By looking at an aggregate of archeological sources, including pictographs found on bones and tortoise shells, Dr. Huang, Hsing-Tsung, research biochemist (Huang 2000), concludes that during the Shang (1520–1030 BCE) and Western Zhou (1030–722 BCE) dynasties the main types of grain consumed consisted of foxtail millet (*Setaria italica* (L.) Beauv), sorghum (broomcorn millet, *Panicum*

Table 3.1 Staple grains and major livestock of ancient China (Huang 2000)

Province	Location	Staple grains	Livestock
Yang-chou	Lower Yangtze & South	Rice	Bird, beast
Ching-chou	Middle Yangtze & South	Rice	Bird, beast
Yü-chou	Honan & Huai valley	Five grains[a]	Six beasts[b]
Ching-chou	East Shantung	Rice, wheat/barley	Chicken, dog
Yen-chou	N. Honan, W. Shantung, S. Hopei	Four grains[c]	Six beasts[b]
Yung-chou	Shensi, E. Kansu	*Panicum* & *Setaria* millets	Ox, horse
Yu-chou	S. Liaoning, N. Shantung, N. Hopei	Three grains[d]	Four beasts[e]
Chi-chou	S. Shansi	*Panicum* & *Setaria* millets	Ox, sheep
Ping-chou	N. Shansi, N, Hopei	Five grains[a]	Six beasts[f]

[a]Five grains: *Panicum* & *Setaria* millets, soybean, wheat/barley, and rice
[b]Six beasts: Horse, ox, sheep, pig, dog, and chicken
[c]Four grains: *Panicum* & *Setaria* millets, rice, and wheat/barley
[d]Three grains: *Panicum* & *Setaria* millets, and rice
[e]Four beasts: Horse, ox, sheep, and pig
[f]Five beasts: Horse, cattle, sheep, dog, and pig

miliacium (L) Beauv), rice (*Oryza sativa* L), barley (or wheat), and hemp (*Cannabis sativa* L.). Table 3.1 shows that rice cultivation is predominant in the Yangtze River basin and the south, while millet and rice are the staple grains in the northeastern region.

3.2.2 Origin of Rice Culture on the Korean Peninsula

Theories on the origin of rice culture in Korea have until now rested on the supposition that the practice was introduced from China or Southeast Asia, but with the discovery of the Soro-ri rice seeds, Korea is now posited as one of the original locations of rice cultivation. Rice farming began in Korea towards the end of the Neolithic era and became universal during the Bronze Age (Cho 2000). Rice paddies from Bronze Age farm sites have been confirmed at Majeon-ri in Nonsan, South Chungcheong Province (Sohn 2000) and at Okhyeon in Ulsan (Lee 1999b).

Based on findings at the Hemudu site (about 5000 BCE) at the mouth of the Yangtze River (near present-day Shanghai), Chinese scholars assert a Yangtze River origin theory for rice farming. Meanwhile, the 50:50 ratio of long-grain to short-grain rice excavated at a nearby Liangzhu culture archeological site (2760 BCE) indicates that by the twenty-eighth century BCE ancient Chinese civilizations had been influenced by Korean short-grain rice cultivation. The types of grain domesticated and cultivated in both the Taedong and Han River civilizations (now in North and South Korea, respectively) included short-grain rice, soybeans, foxtail millet, broomcorn millet, sorghum, wheat, barley, and perilla seeds. Ancient grains have been found at archeological sites dotting the land between the upper Geum River, as

at Soro-ri, North Chungcheong Province, and the South Han River in South Central Korea, such as at the Jodong-ri site in Chungju. The latter site reveals food remains from 6200 YBP (4250 BCE) and 6140 YBP, including short-grain rice hulls, charcoal rice, wheat, barley, sorghum, unknown fruit, acorn, gourd seeds, and peach seeds. At the Daecheon-ri site in Okcheon, near the upper reaches of the South Han River, excavated food remains carbon-dated to about 5500 YBP (around 3500 BCE) include rice, wheat, barley, broomcorn millet, foxtail millet, legume seeds (of an unknown species), and hemp seed. Japan also benefitted from Gojoseon civilization's short-grain rice cultivation, which spread to the Japanese Archipelago between the seventh and fifth centuries BCE, when Japan entered the short-grain rice cultural sphere (Shin 2014).

Working from within the historical framework of rice cultivation originating during China's Han dynasty, Lee (1965) asserts that barnyard grass, broomcorn millet, foxtail millet, and other grains were cultivated early in Korea, while rice and winter cereals were transmitted later from northern China. However, as mentioned above, due to recent discoveries of various ancient grains at archeological sites, including the world's oldest rice grains at Soro-ri, a re-evaluation of the early history of farming on the Korean Peninsula is needed. In terms of plant taxonomy, barnyard grass, broomcorn millet, and foxtail millet all pertain to the rice family, and, as mentioned in Chap. 1, pollen from the rice family has been found at Paleolithic sites in Korea. Thus, wild varieties of rice are believed to have existed on the Korean Peninsula before the advent of Neolithic farm culture.

Rice appears to have been highly valued compared to other early grains because Silla and Baekje fostered the production of rice on a national level during the Three Kingdoms period (57 BCE-668 CE). By the Unified Silla period (668–935 CE), rice had surpassed all others to become the queen of staple grains. As rice gradually became the main target of taxes, the term *jo* (of *jose*, meaning "tax") came to stand in for the word "rice." Further, a scene in a mural dating to the Goguryeo (37 BCE-668 CE) dynasty at Anak Tombs, Hwanghae Province, depicts rice steaming in an earthenware pot, which indicates that rice had long been a staple part of the diet of wealthy families (Lee and Kwon 2003).

Joseon rice—rice that came from the Korean Peninsula—was famous for its delicious flavor; there is a story that Japanese warriors kept watch for an opportunity to invade the peninsula with the goal of obtaining this rice. Following the Japanese annexation of Korea in 1910, one of the important missions of the Japanese government was to research Korean varieties of rice. According to a report from 1911–1912, a total of 1451 varieties of rice were found, 876 of which were non-glutinous types, 383 glutinous, and 192 dry-field varieties. Japan brought some of these rice varieties home to cultivate there, and they were so well-liked that they comprise most of the rice consumed in Japan today (Lee and Kwon 2003).

3.3 Northeast Asia's Neolithic Farm Culture

The Hongshan culture archeological site in Chifeng, the oldest Neolithic farm site connected to comb-pattern pottery culture on the Bohai coast, Inner Mongolian Autonomous District, provides a picture of the beginning of Neolithic farming in Northeast Asia. Scholars have demonstrated that Hongshan culture (4500–3000 BCE) comprised part of the Dongyi tribal civilization. In 1979 and 1983 newly discovered Neolithic sites, at Dongshanzui, Harqin Zuoyi Mongol Autonomous County, and nearby Niuheliang, received global attention for the discovery of artifacts representing a hitherto unknown ancient culture. Relics of ancestral rites were discovered at Dongshanzui, and burial cairns, shrines, and altars were excavated at Niuheliang. Burial cairns are the representative tomb style used by the Dongyi tribes, and the particular style seen at Niuheliang appears continually until the Three Kingdoms (Korea) period. No such cairns have been discovered further south or inland in China.

In Korean archeological studies, the Neolithic era is situated between 5000–1000 BCE (Kim 1973; Choi 1986). Lee (1965) posits that farming began in Korea around 3000 BCE. If one allows that the Korea-centered Primitive Pottery culture constituted the main lifestyle in this area from before 8000 BCE to 5000 BCE, then 5000–3000 BCE demarcates the parallel development of the littoral forager and early Neolithic farming eras. The full expression of the Neolithic agricultural period, including the early years, is defined as flourishing between 5000–1000 BCE.

Table 3.2 shows the AMS (Accelerator Mass Spectrometry) dates of Neolithic relics identified on the Korean Peninsula (Lee 2011). The oldest (3450 BCE) grains (millet) have been identified at the Neunggok site in the central region of the Korean Peninsula, and grain discoveries from ensuing years have been excavated mainly in South Gyeongsang Province. In particular, the earliest carbonized soybean was identified at Pyeonggye-dong (2720 BCE). From these results, it has been concluded that the beginning of agriculture on the Korean Peninsula occurred, at the latest, circa 3500–3000 BCE (Lee 2011). This supports the chronology of Neolithic peoples of the Korean Peninsula living as littoral foragers during the period of Primitive Pottery culture (8000–5000 BCE). It is believed that in the early days of the Jeulmun pottery period (5000–3000 BCE), people lived a sedentary life in which hunting and gathering were combined with early experiments in plant cultivation.

Neolithic farming on the Korean Peninsula largely consisted of slash-and-burn and hoeing techniques. Stone tools found at sites from this period include grinding stones, stone blades, stone plows, stone sickles, and stone spades. Acorns, hoes, and grinding stones dating from around 5000 BCE were excavated from the floor of a dwelling at the Osan-ri 1 site in Yangyang-gun, Gangwon Province, and similar artifacts dating from 4000 BCE were unearthed at the Misa-ri site in Amsadong, suggesting primitive farming. Farm implements dating from around 3000 BCE were discovered at Jitap-ri in Bongsan-gun, North Hwanghae Province, and at the Namgyeong site in Pyongyang. Farm sites dating from 2000–1000 BCE include

Table 3.2 AMS Dates of Plant Seeds at Neolithic Sites on the Korean Peninsula (Lee 2011)

Site	Material	Lab ID	Provenience	Cal. age (BP)
Neunggok, Gyeonggi Province	Foxtail millet	Beta 252,973	Floor fill, house 41	5470 ± 100
South Gyeongsang Province:				
Dongsamdong	Foxtail millet	TO8783	Floor fill, house 1	5260 ± 170
Pyeonggeodong	Adzuki bean	KCCAMS60748	Grid 20, pit 3C	4910 ± 40
	Soybean	SNU252972	Grid 20, pit 3-A	4740 ± 40
	Broomcorn millet		Grid 21, pit 50	4920 ± 50
Sangchon B	Acorn shell	SNU01377	Elongated 6–1	4710 ± 80
	Foxtail millet	TO8608	Outdoor hearth 1	4560 ± 200
Bonggaeri	Walnut	NUTA1034	III phase, house 9	4600 ± 160
Oun 1	Foxtail millet	TO860	Outdoor hearth 6	4560 ± 170
	Rice	TO8605	Floor fill, house 104	3970 ± 370
Okbang	Soybean	TO8611	Pit in house 658	2900 ± 70
Daundong	Adzuki bean	TO8965	Floor fill, house 7	2580 ± 120
	Soybean	KCCAMS60750	Floor fill, house 7	2590 ± 80

Beomuiguseok in Musan-gun, Cheongjin; Odong in Hoeryeong-gun, North Hamgyeong Province; Gaheung-ri in Muan-gun, South Jeolla Province; and Heunam-ri in Yeoju-gun, Gyeonggi Province (Table 3.3). In terms of crop types, charred remains of barnyard grass and foxtail millet have been found at Jitap-ri, foxtail millet, and adzuki beans at Seoktan-ri in Hwanghae Province; soybeans at Odong; and broomcorn millet and sorghum at Beomuiguseok. Rice, foxtail millet, broomcorn millet, sorghum, and soybeans were excavated at Namgyeong, and rice, barley, foxtail millet, and sorghum were discovered at Heunam-ri. Rice, adzuki beans, sorghum, foxtail millet, and various other grains were cultivated evenly across the entirety of the Korean Peninsula during this period, pointing to an active farming lifestyle (Choi 1986).

The first and second layers of the Seopohang site in Unggi, North Hamgyong Province, yielded hoes made of severed deer horn and shaped like a shoe sole. Their existence locates the onset of hoe farming between 5000–4000 BCE (Choi 1986). At the dawn of 3000 BCE, farm implements began to increase greatly in number and type, and included such tools as T-shaped stone hoes, stone shovels, plowshares, semilunar knives made from clamshells, and sickles, mortars, and pestles made of boar tusk (Fig. 3.3).

There are few archeological finds having to do with animal domestication during the Neolithic, but it is known that dogs, pigs, cows, hens, and more began to be raised by humans toward the end of the era. At Neolithic sites in the Tumen River region of North Hamgyong Province, such as Odong, Chodo (in Najin), and

Table 3.3 Ancient grains found in Neolithic/Bronze Age dwellings on the Korean Peninsula

Sites and dwellings	Time period	Types of grain	Book source
Dwelling #2, Jitap-ri site, Bongsan-gun, North Hwanghae Province	Neolithic, early 3000s BCE	Barnyard grass Foxtail millet	*Jitap-ri wonsiyujeok balgul bogo* (Report on excavations at Jitap-ri primitive archeological site), Institute of Science Press, 1961
Dwelling #15, Beomuiguseok site, Musan-gun, Cheongjin City	Bronze age, later 2000s BCE	Broomcorn millet sorghum	*Gogominsognonmunjip 6* (Collected theories of ancient folklore 6), Social Science Press, 1975 (165–205)
Lot #31, Beomuiguseok site	Late 2000s-early 1000s BCE	Broomcorn millet	Ibid
Odong site, Hoeryeong-gun, North Hamgyong Province	Bronze age, later 2000s BCE	Soybeans, adzuki beans, broomcorn millet	*Heoryeong Odong wonsiyujeok balgul bogo* (Report of excavations at Hoeryeong Odong primitive site), Institute of Science Press, 1960
Lot #39, Seoktan-ri site, Songnim City, North Hwanghae Province	Bronze age, eighth–seventh centuries BCE	Foxtail millet Adzuki beans	*Seoktan-ri yujeok balgul bogo* (Report of excavations at Seoktan-ri site), Science and Encyclopedia Press, 1980
Lot #31, Namgyong site, Samsok-guyok, Pyongyang City	Neolithic, later 3000s BCE	Foxtail millet	Choi (1986).
Lot #36, Namgyong site	Bronze age, late 2000s-early 1000s BCE	Rice, foxtail millet, broomcorn millet, sorghum, soybeans	Ibid
Giheung-ri Yeongsan'gang site, Dasi-myeon, Muan-gun, south Jeolla Province	Around 1050 BCE	Pine tree pollen Rice	
Dwelling #12, Heunam-ri site, Jeomdong-myeon, Yeoju-gun, Gyeonggi Province	1260, 1030, 970, 670 BCE		

Beomuiguseok, bones of cows, dogs, and deer have been excavated, along with bones of rabbit and weasel, which suggests that in addition to keeping domesticated animals, people continued to rely on hunting as a source of protein.

Fig. 3.3 Neolithic farming tools unearthed on the Korean Peninsula

3.4 Soybeans: Place of Origin and Dissemination

3.4.1 The Origin of Soybeans as Food

Soybeans may have originated in the area of Northeast Asia comprising southern Manchuria and the Korean Peninsula, the area inhabited by the Dongyi tribes. In botany, a major factor on which the determination of a crop's place of origin hinges is the distribution matrix of the native species, and in southern Manchuria and the Korean Peninsula, one finds a high concentration of native soybeans (Lee and Park 2006). On this basis, Fukuda (1933) pinpointed the greater Korean Peninsula as the origin of soybeans. On the other hand, Hymowitz (1970) of the United States targets China as the land of soybean origin on the basis of the existence of the character for *shu*, meaning soybean, in the *Book of Songs* (*Shijing*, eleventh to sixth century BCE), which contains poems from the Zhou Dynasty.

According to Kwon (1985), the ancestral strain of soybean cultivated in Korea has the same characteristics as soybeans planted around the world today in terms of plant height, time to maturity, leaf shape, seed coat color, seed size, and fat and protein content. Numerous mutations accumulated in the ancestral strain cultivated in Korea, while retaining the key qualities mentioned above. Many useful genes, such as those related to protein content and disease resistance, may have been lost

during the process of human selection following domestication. As native Korean strains gradually became more widely dispersed, they gave rise to an intermediate strain of soybeans between wild (*Glycine soja* Sieb. & Zucc.) and cultivated (that is, the semi-wild *Glycine gracilis*), which retained the desirable gene traits mentioned above. This intermediate strain has been discovered in Manchuria and on the Korean Peninsula. The dominant genes for desirable traits in the soybean plant have remained intact from ancient Korean strains, through semi-wild soybean plants, and on to present-day domesticated soybeans (*Glycine max*).

Dr. Lee Suk-Ha, a professor at the Plant Genomics and Breeding Institute, Seoul National University, Korea, has suggested that the soybean was domesticated from the *G. soja/G. max* complex that diverged from a common ancestor of these two species of *Glycine* (Kim et al. 2012). The single-origin hypothesis, that all domesticated soybeans derived from a single cluster of *G. soja* wild soybeans, is challenged by the multiple-origin hypothesis. In this context, Sedivy et al. (2017) assert that the Huanghe region around the Yellow River is another candidate for the origin of soybean domestication.

No convincing evidence of soybean cultivation or use has been found at pre-Neolithic sites in China (Liu and Chen 2012). Traces of wild soybeans were collected at the Jiahu (7000–5500 BCE) and Bancun (ca. 5500 BCE) sites in Henan, North China, as well as at the Yuezhuang (ca. 6000 BCE) site in Shangdong, but there is no basis for claiming edible use. Soybeans have also been found at the late Yangshao (3000 BCE) Dahecun site, Henan Province, and in the Yiluo River basin in China, through the period of Lungshan culture (3000–2000 BCE) and the Shang Dynasty (1600–1046 BCE). In Japan, the soybean specimens at Shimoyakebe site from the middle Jomon period (around 3000 BCE) are reported to be the oldest in the country, but no soybeans appear until the late Jomon period (Lee et al. 2011). Professor Lee Gyoung-Ah measured and compared the sizes of 949 carbonized beans dating to the Neolithic period in the three countries Korea, China, and Japan. The length (L) and width (W) of Korean soybeans from the Mumun pottery era (1600–600 BCE) were found to be significantly larger than those from other regions (Fig. 3.4). As a result, it was concluded that most of the carbonized beans excavated from the Yangshao and Lungshan cultural sites in China were wild beans, whereas beans from the Korean Peninsula during the same time period were cultivated. This finding bolsters the theory that cultivated soybeans originated on the Korean Peninsula around 2000 BCE (Lee et al. 2011).

Yi Zhou shu, a Chinese text from the sixth century BCE, contains two passages that mention soybeans: "The *Sanyung* [Chi. *shanrong*] are a Dongyi tribe. *Yungsuk* are the large soybeans they grow." And, "Western Zhou (ca. 1046 BCE) conquered Shang and received soybeans from the Sanyung as tribute." Based on this, Ho (1975) of the University of Hong Kong argues that cultivated soybeans originated from Proto-Tungusic peoples, geographically and racially.

Sima Qian's *Shiji* (*Records of the Grand Historian*) refers to soybeans in this way: "In 623 BCE the Shanrong struck the state of Yan. When the state of Qi heard of Yan's distress, Duke Huan of Qi saved Yan by conquering the Shanrong. Qi pushed them as far north as Guzhu, where his army was able to obtain yungsuk

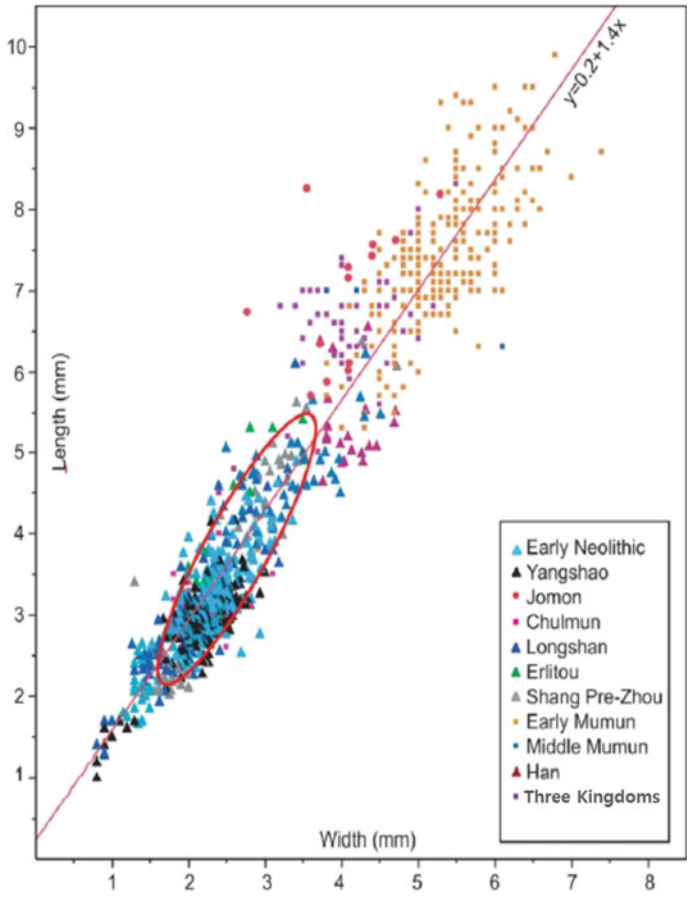


Fig. 3.4 Comparison of the Size of Carbonized Soybeans Excavated from Archeological Sites in Korea, China, and Japan (Lee et al. 2011). *Note*: The red circle designates the limit of 90% reliability of the sample size of modern wild beans

(Sanyung beans, or 'yung' beans), and then returned. Duke Huan presented these beans to the neighboring state of Lu." *Guanzi* (Writings of Master Guan), a text written by Guan Zhong (Prime Minister to Duke Huan of Qi) in the seventh century BCE, likewise affirms, "During Qi's attack on the Shanrong in the north, long green onions and yungsuk were carried back and soon spread across the land." According to these records, the soybeans cultivated at the time by the Dongyi tribes in southern Manchuria were so superior to the beans grown in Qi that *yungsuk*, as they called them, were brought back and introduced for cultivation across the entire state.

It seems, then, archeologically and historically valid that southern Manchurian-cultivated soybeans were transferred to China in the seventh century BCE (Committee for the Establishment of a Korean Soybean Museum 2017). In conclusion, wild soybeans were known and collected in Northeast Asia since the early Neolithic

period, but the use of soybeans for food is believed to have begun around 2000 BCE, when large beans in southern Manchuria and the Korean Peninsula were evidently cultivated for human consumption.

During the Primitive Pottery era, native peoples of the Korean Peninsula who became littoral foragers gradually developed a grain-and-vegetable culture based on various plants that grew wild in their region, such as rice, barnyard grass, broomcorn millet, and foxtail millet. The nomadic, horseback-riding Dongyi tribes that came to the Korean Peninsula from the north settled down to farm, but being unable to raise much livestock, they needed a stable supply of substitute protein. To this end, the people collected soybeans growing wild in the area, and, after soaking them, placed them in an earthenware pot to boil, which resulted in eliminating the impediments to nutritional health found in raw soybeans, such as trypsin inhibitors (Lee 1999a). It is thought that the people of the Yemaek tribe (a subset of Dongyi) were the first in human history to use soybeans as food (Lee 1984). Early nation formation in Northeast Asia is believed to stem from that period (4000–1000 BCE), and northern nomads who settled in the Baekdu Mountains region of southern Manchuria and northern Korea were the first in Northeast Asia to begin farming during the Neolithic era. Their crops included domesticated soybeans. By the early Bronze Age (1500 BCE), cultivating soybeans for food had become a universal practice across Northeast Asia (Lee and Kwon 2005).

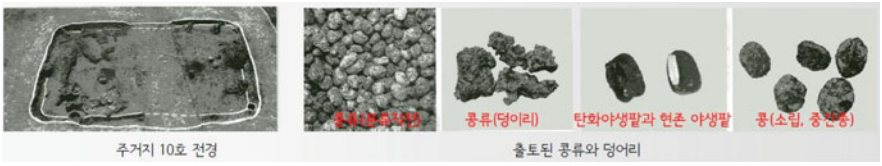
In archeology, the origin of soybean cultivation is thought to have begun about 4000 years ago during the Neolithic era, and on the Korean Peninsula, there are two Neolithic sites and several Early Bronze Age sites at which charred soybeans have been excavated. Table 3.4 lists the sites on the Korean Peninsula where early soybeans have been found (Lee 2017).

Among the sites on the Korean Peninsula connected with soybeans, the Sangchon-ri site in Jinju, South Gyeongsang Province, held what was thought to be the oldest soybean remains of the Neolithic era. Recently, however, over 20 specimens of charred grains, including rice and pulses, were unearthed at the Daecheon-ri Neolithic site in Okcheon, North Chungcheong Province. The results of radiocarbon dating reveal that these grains date from the Upper Neolithic era, between 3000–3500 BCE, and are currently the oldest examples of excavated soybeans on the Korean Peninsula (Cho 2005). Older still are pottery sherds bearing impressions of the bean family (such as soybeans and adzuki beans) discovered at the Osan-ri site that date to about 5300–5070 BCE, thus potentially pushing soybean cultivation to an earlier start date than previously supposed (Cho et al. 2014; Shin 2018).

Bronze Age sites provide firmer evidence of soybean cultivation. Irrigated rice farms had already become universal by the Bronze Age, and traditional items of Korean food culture such as *ogok*, the five staple grains, were already established. The twelve Bronze Age sites in Korea that contained remnants of beans are Odong in Heoryeong, North Hamgyong Province; Namgyong in Pyongyang; Seoktan-ri in Hwanghae Province; Yangeun-ri in Yangpyeong, Gyeonggi Province; Gungpyeong-ri in Cheongwon, North Chungcheong Province; Pyeongna-ri in Boryeong, South Chungcheong Province; Baekseokdong in Cheonan, South Chungcheong Province; Bonggyeri in Hapcheon, South Gyeongsang Province;

Table 3.4 Korean Peninsula sites where Soybeans have been unearthed

Site location	Types of grain	Other findings	Era/pottery
Daecheon-ri site, Okcheon-gun, north Chungcheong Province	Rice hulls, charred rice, barley, wheat, foxtail millet, one seed of a legume	Pit dwellings, mortar and pestle, stone ax	Neolithic era (discovered in 2000 during the construction of Gyeongbu highway)
Sangchon-ri site, Jinju City, south Gyeongsang Province	Charred legume, wheat, barley, foxtail millet, broomcorn millet, acorn, wild grapes	Dwellings, mortar, stone plowshares, polishing stones	Neolithic era/comb-pattern pottery (1996–1998 Nam River dam submerged areas)
Dwelling #10, Wondong site, Pohang City, north Gyeongsang Province	Wild soybeans, semi-wild soybeans, cultivated soybeans, wild adzuki beans	1800 charred beans; by far the highest volume found at a single site in Korea	Bronze Age (2000–2001, excavated during land readjustment work)
Honamri Namgyeong site, Samseok-guyeok, Pyeongyang	Foxtail millet (char), broomcorn millet (char), sorghum (char), and soybeans (char)	36 dwellings, Neolithic mortar and pestle	Bronze age/pointy-bottom pottery
Yanggeun-ri site, Yangpyeong, Gyeonggi Province	Soybeans, adzuki beans	Soybeans embedded at the bottom of an earthenware vessel	Bronze age (Paldang submerged area)
Gungpyeong-ri site, Cheongwon-gun, north Chungcheong Province	Charred adzuki beans, soybeans, rice, and barnyard grass	Dwellings, pottery kiln	Bronze age/patternless pottery (1993–1994, Gyeongbuk highway construction)
Daepyeong sites I and II, Jinyang-gun, south Gyeongsang Province	Rice, charred rice, foxtail millet, broomcorn millet, soybeans, adzuki beans, mung beans	Residential area, rice paddy outlines (1600 *pyeong*), stone tombs, stone tools	Bronze age/patternless pottery (1997–1998, Nam River dam construction)



Dwelling Site No. 10 **Excavated Soybeans and Masses**

Fig. 3.5 Carbonized Soybeans at Bronze Age Dwelling Site No. 10, Wondong, Pohang (Committee for the Establishment of a Korean Soybean Museum 2017)

Daepyeong in Jinyang, South Gyeongsang Province; and Daundong in Ulsan (Hyeon-Jong 2005). Another site, Wondong in Pohang City, is notable for having unearthed the highest number of intact charred beans, with over 1800 specimens (Fig. 3.5). Here, a strain of soybeans between *sorip*, a variety of wild soybeans

(*Glycine soja*), and cultivated soybeans can be found: the semi-wild *Glycine gracilis*. Cultivated soybeans (*Glycine max*) have also been found at this site.

While it is possible that soybean remains excavated from dwellings, areas of scattered artifacts, or pottery kilns could consist of plants gathered or cultivated elsewhere and relocated after harvest, materials unearthed in places like Daepyeong in Jinyang indicate that the site supported a large farm, in which case it is more likely that soybeans would have been cultivated on the premises (Committee for the Establishment of a Korean Soybean Museum 2017).

Figure 3.6 lists sites on the Korean Peninsula where legumes (including soybeans) have been excavated. It appears that by the beginning of the Bronze Age, soybeans were being cultivated in every region of the peninsula (Yeongju City, North Gyeongsang Province 2015)

Soybeans were not originally a product of China, but arrived with the Dongyi tribes when they overran the Great Wall in an attack; since the Han Chinese called these people Sanyung, their soybeans came to be known as *yungsuk* (Yung beans). The beans were disseminated into southern China, Southeast Asia, and Japan between the third and fourth century BCE. It is interesting to note that the timeframe of the initial use of soybeans as food by the ancestors of the Korean people aligns with the anecdotal 5000-year-old history of Korea.

3.4.2 Routes of Soybean Dissemination

Busan University Professor Choi (2004) writes, "By referencing China's historical records, it is clear that soybeans began to be cultivated in the northeast region of China during the early Zhou dynasty (1046-256 BCE) and were disseminated throughout northern China by the mid Spring and Autumn period (722-481 BCE). After the Jin and Han periods, the area in which soybeans were cultivated expanded to every region of China, and the name 'suk' gradually changed to '*daedu'* (large beans)."

Soybeans are generally thought to have spread throughout southeastern China and Southeast Asia by 700 CE. The reach of soybean plants into Southeast Asia occurred in tandem with Chinese immigration to that region. Although by the fourth century CE poor people from China had migrated south and created a presence in Southeast Asia, the 9th–13th centuries saw large-scale immigration from China to the south, spurring soybean cultivation and use across the Indochinese Peninsula and all of Southeast Asia.

Soybeans were brought to Europe for the first time on record when German scholar Engelbert Kaempfer returned to his country from a visit to Japan in 1712, bringing with him soybeans for personal use. A formal introduction followed in 1739, when a missionary brought soybean seeds from China and planted them in a botanical garden in Paris. In 1790, soybeans were cultivated in a British botanical garden, after which Britain also experimented with soybean cultivation in her colonies in East and West Africa (Yeongju City, North Gyeongsang Province 2015).

Neolithic Sites	Type of Beans Excavated
1. Daecheon-ri site, Okcheon	Legumes
2. Sangchon-ri site, Jinju	Legumes
Bronze Age Sites	
3. Wongdong site, Pohang	Wild adzuki beans, transitional soybeans (semi-wild), perhaps cultivated beans
4. Odong site, Heoryeong	Soybeans, adzuki beans
5. Namgyong site, Pyongyang	Soybeans
6. Seoktan-ri site, Hwanghae Province	Adzuki beans
7. Yanggeun-ri site, Yangpyeong	Soybeans, clay impressions of adzuki beans
8. Gungpyeong-ri site, Cheongwon	Soybeans, adzuki beans
9. Baekseokdong site, Cheonan	Soybeans, adzuki beans, cowpeas
10. Pyeongna-ri site, Boryeong	Pulse family
11. Bonggye-ri site, Hapcheon	Clay impressions of soybeans
12. Daepyeong I site, Jinyang	Pulse family
13. Daepyong II site, Jinyang	Adzuki beans, mung beans
14. Daundong site, Ulsan	Soybeans, mung beans, adzuki beans
Early Iron Age	
15. Gawaji site, Goyang	Pulse family
16. Samyangdong site, Jeju	Soybeans
Proto-Three Kingdoms	
17. Juwol-ri site, Paju	Pulses
18. Dunnae site, Hwangseong	Soybeans, adzuki beans
19. Garyeong-ri site, Yangyang	Soybeans, adzuki beans
20. Anin-ri site, Myeongju	Soybeans
21. Suyanggae site, Danyang	Soybeans, adzuki beans, mung beans
22. Gwanwon-ri site, Gunsan	Adzuki beans
Three Kingdoms	
23. Bangok-ri site, Buan	Clay impressions of soybeans
24. Tosan-ri site, Buan	Clay impressions of pulses
25. Simpo-ri site, Kimje	Adzuki beans
26. Buwondong site, Kimhae	Soybean hulls, adzuki beans
27. Sonam-ri site, Sancheong	Soybeans, adzuki beans, cowpeas
28. Jeopo C zone site, Hapcheon	Adzuki beans, mung beans
29. Wonbuk-ri site, Nonsan	Wild adzuki beans
30. Wanggung-ri site, Aksan	Pulses

Fig. 3.6 Sites on the Korean Peninsula with Excavated Legumes

The spread of soybeans to the Americas is twofold. First, Samuel Bowen, a sailor with the East India Trading Company who lived in Guangdong, China for a time, brought soybean seeds back to his farm in Savannah, Georgia in 1764. Second, Benjamin Franklin, as ambassador to France, is said to have obtained soybean seeds in England in 1770 and mailed them to his home in Philadelphia. Although Eastern soybeans were becoming known in the Western world in the latter half of the eighteenth century, they would not draw interest as a cash crop until more than a century later. After the first Opium War (1839–1842), American agronomists saw how the Chinese used soybeans for food and dubbed the crop "the dairy cow of the fields." They proceeded to research soybean production techniques in earnest. In the twentieth century, the two World Wars and the Great Depression brought such destruction that soybeans, which until then had been cultivated as a green manure crop or for fodder, now emerged as an important source of protein for destitute Westerners. Soybeans were so successful in times of strife they were dubbed a "Cinderella crop," or a "miracle crop." Today soybeans have become a staple food across the globe (Lee and Kwon 2005).

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