eISSN: 2229-3213 pISSN: 2229-3205
The Journal of Applied Science and Social Science
Volume 16,Issue 02 February, 2026

THE FORMATION OF AGRICULTURAL AND ECONOMIC SYSTEMS IN THE KHOREZM STATE DURING THE EARLY MIDDLE AGES (BASED ON ARCHAEOLOGICAL RESEARCH).

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Abstract. This article analyzes the formation of agricultural and economic systems in the Khorezm State during the Early Middle Ages based on archaeological evidence. The study examines the natural and geographical conditions of the Khorezm oasis, irrigation systems associated with the ancient channels of the Amu Darya, and the main directions of economic activity. Archaeological findings such as crop seeds, field remains, storage facilities, and irrigation structures make it possible to reconstruct the economic life, agricultural practices, and food supply of the population. Given the fragmentary nature of written sources, particular emphasis is placed on the scientific value of archaeological materials in studying the early medieval economy of Khorezm.

Keywords. Khorezm, Early Middle Ages, agriculture, irrigation systems, economic activity, archaeological sources, Amu Darya, horticulture, melon cultivation.

Introduction. The early Middle Ages represent one of the most complex and poorly documented periods in the history of Central Asia. During this era, political structures, social relations, and especially economic life are insufficiently reflected in written sources. In particular, systematic and detailed information on the economy of Khorezm state is almost entirely absent from medieval authors' works. Consequently, the study of the economic conditions in Khorezm oasis during the early Middle Ages relies primarily on archaeological evidence as the main scientific source.

Khorezm oasis, situated in the lower reaches of the Amu Darya River, has long been renowned as a region with developed irrigated agriculture and sophisticated economic systems. In the early medieval period, large parts of the oasis reverted to desert conditions, which contributed to the relatively good preservation of traces of settlements, fortresses, irrigation structures, fields, and other economic facilities from that time. This circumstance enables the reconstruction of economic activities – particularly agriculture, horticulture, melon cultivation, and irrigation networks – through archaeological data.

Literature Review. Scholarly research on the economic life of early medieval Khorezm has primarily been associated with archaeological investigations. Of particular importance are the studies conducted from the second half of the 20th century onward by Khorezm Archaeological-Ethnographic Expedition. The expedition's materials document irrigation facilities, field layouts, crop types, and numerous other indicators related to agricultural practices.

Written sources provide only fragmentary information on Khorezm's economy. For instance, certain Arab and Persian authors occasionally mention grain crops, melons, and beverages produced in Khorezm indirectly. However, these references do not allow for a comprehensive reconstruction of the economic system. Therefore, written accounts are generally treated as supplementary sources that corroborate or reinforce archaeological evidence and broader conclusions.

Methodological Foundations. The investigation of the economic life of Khorezm oasis in the early Middle Ages employs a comprehensive set of general scientific and specialized historical methods. Through archaeological analysis, patterns of economic activity and agricultural systems were reconstructed. The historical-comparative method facilitated comparisons between Khorezm's economic structures and those of other Central Asian regions.

A natural-geographical approach examined the influence of the Amu Darya basin, river valleys, and microrelief conditions on irrigation and farming practices. This integrated methodological framework has enabled a scientifically grounded illumination of the economic life of Khorezm state in the early Middle Ages, viewed in close connection with broader historical processes.

Analysis. The economic conditions of Khorezm state in the early Middle Ages find virtually no reflection in written sources. Insights into the state's economy can only be gained through the analysis of archaeological research findings. Due to the fact that much of the cultivated land in Khorezm oasis during this period reverted to desert, traces of monuments, canals, and fields from that era have been preserved to a significant degree. At the same time, excavations at various sites have yielded seeds of crops such as millet, sorghum, wheat, rice, barley, melons, watermelons, grapes, cotton, plums, cherries, apples, apricots, and peaches.

Researchers have examined these recovered seeds and established that some varieties remain in cultivation today. In particular, apricot types such as “kursadik,” “mirsanjali,” “kandak,” and “boboi,” as well as certain peach varieties closely resembling the “anjir shaftoli” type, have been identified [6,p.92]. These archaeobotanical findings highlight the continuity and sophistication of Khorezm's irrigated agriculture, which formed the backbone of its economy despite the challenges of the period.

Archaeological excavations have uncovered substantial quantities of millet in the storage facilities of fortresses from the early medieval period in Khorezm. These grains were not only stored but also scattered between drying platforms for desiccation. Storage areas frequently yielded large amounts of sorghum and melons, indicating that these products served as primary food sources for the population during this era.

Millet holds a prominent place among the oldest cultivated grains in Central Asia, where it was widely used for sustenance. Ibn Fadlan, the 10th-century Arab traveler, noted that the people of Khorezm carried millet with them on journeys. Millet flour was often mixed with sorghum flour to bake bread, while its groats were employed in preparing various porridges. The grains were hulled to produce a processed product known as sok (a form of parched or hulled millet). The preparation of sok involved boiling millet in large cauldrons, spreading it to dry, roasting it further, and then husking it in a mortar. The resulting sok could be soaked in milk for consumption, ground into a flour-like meal, or used to make sok oshi (a millet-based dish). This food preparation tradition persists among modern Khorezmians, and the abundance of millet finds supports the likelihood that such dishes were commonly prepared in the early Middle Ages.

Millet was also likely used to produce boza, a mildly fermented, invigorating beverage made from grains such as millet, sorghum, barley, oats, and wheat. Given the long-standing tradition of boza production in Central Asia, it is reasonable to infer its presence during the early medieval period. A reference in al-Tabari's work, describing the inhabitants' reaction to Kutayba's campaign into Sogd – "they began to drink and enjoy life" – provides indirect evidence of the consumption of intoxicating beverages in the region during that time [3,p.98]. The preparation of boza from millet typically involved soaking the grains, placing them in a bag in a warm location to germinate, grinding them, and fermenting the mash in a vessel before straining it. Boza served as a nutritious, thirst-quenching drink with invigorating properties.

The prevalence of millet in archaeological contexts can be explained by its multifaceted utility in food production, as well as its agronomic advantages: drought and salinity tolerance, and rapid maturation. These traits made it a reliable crop in the challenging environmental conditions of the Khorezm oasis.

Melons have long been – and remain – one of the most cherished foods among the Khorezmian people, from antiquity to the present day. Populations along the Aral Sea shores and the lower Amu Darya regarded melons and gourds as staple foods. Travelers on long journeys made every effort to carry ample supplies of melons, valuing them not only for their nutritional content but also for their ability to quench thirst.

The fertile riverine floodplains provided ideal conditions for high melon yields. Khorezmian farmers possessed deep knowledge of the unique properties of these alluvial soils and adapted their agriculture accordingly. Crops were generally avoided on the immediate riverbanks due to the high risk of flooding during seasonal inundations, which could destroy fields. Instead, riverbanks developed into dense tugai forests. Settlements and cultivated fields were established farther from the river to protect against floods.

The floodplains themselves featured soft, silty soils unsuitable for constructing durable embankments or growing grain crops that required consistent irrigation during the intense summer heat (from mid-May onward). Without water during this period, wheat, barley, and other cereals would fail. Consequently, these areas were dedicated to melon and gourd cultivation – crops that demanded less intensive labor and irrigation. After planting, fields required minimal attention until harvest time, yielding substantial returns with relatively low effort.

Khorezmian melons were renowned for their exceptional sweetness, aroma, and nutritional value, maintaining their worldwide fame from ancient times to the modern era. In the medieval period, they were specially wrapped in paper and exported to Baghdad during the Arab Caliphate [2,p.67]. The 14th-century traveler Ibn Battuta devoted a separate section in his travelogue to the praises of Khorezmian melons, noting their superiority and the practice of slicing and sun-drying them for export to distant regions like India and China.

Melons were extensively grown along the Amu Darya basin and its branches, from the Chorjou oasis to the Aral Sea. Because these floodplain fields were often distant from permanent settlements, urban and rural dwellers would venture out during the ripening season for outings known as river outings. Participants brought bread, oil, and tea, staying for several days in the farmers' field huts, enjoying fresh melons and grilled fish. As noted by Ya. G. Gulomov, “Going to the river, feasting on floodplain melons and roasted fish was the dream of every city dweller.”

These archaeological and historical insights underscore the central role of millet and melons in sustaining the early medieval Khorezmian economy, reflecting adaptive strategies to the oasis's environmental constraints and the continuity of cultural practices into the present.

In contrast to riverbank cultivation along the Amu Darya and its branches, Khorezmian farmers primarily conducted agriculture in the interfluve zones between the Karakum and Kyzylkum deserts. Cereal crops were planted in ancient riverbeds, dried lake basins, and other low-lying areas where groundwater levels remained relatively high, thereby facilitating irrigation without excessive reliance on surface canals. Wheat cultivation, which demanded substantial water resources, was limited even into the 19th century and was largely confined to wealthier elites or landowners capable of sustaining the required inputs. Archaeological evidence corroborates this pattern: in early medieval sites, wheat remains are notably scarce compared to millet and sorghum. rice has been recovered only from the donjon area of Teshikkala fortress, leading researchers to leave open the question of its overall economic significance during this period [5,p.93].

Fine-fiber cotton was cultivated in the Burgutkala oasis, where it supported the production of high-quality textiles and clothing. Horticulture flourished across the Khorezm oasis in the early Middle Ages, with extensive fruit tree cultivation and particularly developed viticulture. Archaeological surveys have identified traces of vineyards, specialized structures for producing musallas (a grape-based product), large storage vessels, and artistic depictions of grapes on material culture. Notable among these are images on water vessels portraying women and men harvesting fruits and grapes amid vineyard settings. Such representations vividly illustrate daily life, labor processes, and the prominence of horticulture in the period's socioeconomic fabric.

The reliable supply of water from the Amu Darya and its former channels was paramount, so initial canal construction carefully accounted for the river's elevation gradients. Farmers prioritized placing fields in low-lying areas to enable gravity-fed irrigation and modified peripheral zones to facilitate easier water diversion from the river. Consequently, meticulous

attention to microrelief features – topography, soil conditions, and natural drainage – was essential for effective agriculture.

Khorezmian farmers developed sophisticated techniques for harnessing seasonal floods productively, representing one of their greatest achievements. From the early Iron Age onward, primary canals were constructed wide and shallow to accommodate peak flood volumes, preventing overflow while minimizing rapid evaporation losses. Excess floodwater beyond immediate needs was directed into depressions. This adaptive approach shaped the artificial irrigation network from the early Iron Age, with regional variations: western Khorezm featured large trunk canals merging two branches, while eastern Khorezm employed dendritic canal systems [1,p.158].

Significant expansion occurred on the right bank of the Amu Darya in the early Middle Ages, including the establishment of the capital city Kat, served by the dedicated Kat canal that irrigated the city and surrounding areas. Traces of fields surround associated fortresses. Field shapes were adapted to crop types: rectangular or square plots divided into regular furrows typically supported melon crops or vineyards, while larger, irregularly shaped rectangular fields with flat surfaces were predominantly used for cereals.

Investigations by Ye. E. Nerazik in the Burgutkala oasis, focusing on fortresses Nos. 13, 60, and 66, revealed fields of varying sizes dedicated to melons, grapes, and cereals [4,p.95]. Central elevations within fields often featured small, single-room structures of pise and mud-brick construction, preserved up to 1–1.5 meters in height, with external finds including small vessels and two water-carrying jars. Interiors lacked permanent fixtures, suggesting these served as temporary shelters for field guards or overseers. Comparable small huts persist in modern large fields for use during labor and harvest protection.

Field architecture and layout closely resemble contemporary practices, enabling inferences about ancient irrigation methods through structural analysis. These features underscore the continuity of adaptive, knowledge-based farming strategies in Khorezm, where environmental constraints – flood regimes, groundwater access, and desert proximity – drove innovative land and water management that sustained oasis agriculture across millennia.

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